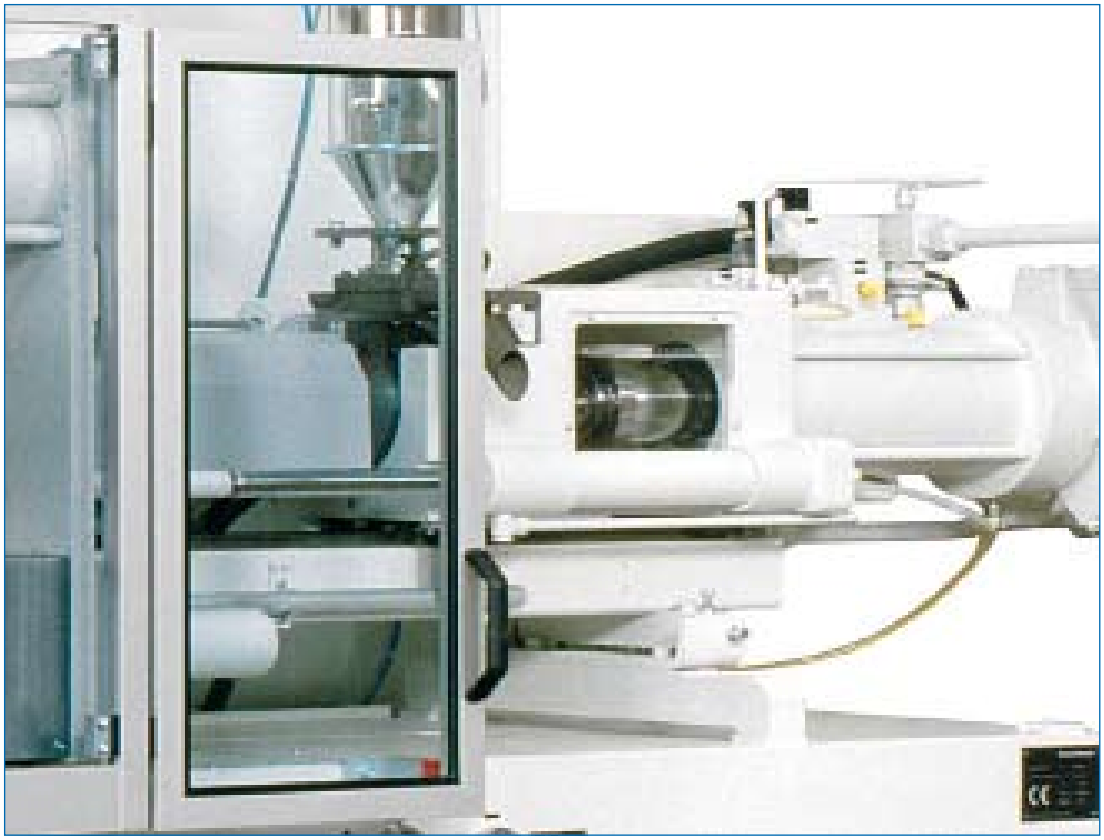
Merkel Sealing Technology for Injection-Molding Applications

Merkel
Heavy Industry

Seals and Sealing Systems for Injection-Molding Applications

Installation recommendations for sealing systems plus descriptions with dimension tables of products used predominantly in injection molding applications



Merkel Heavy Industry

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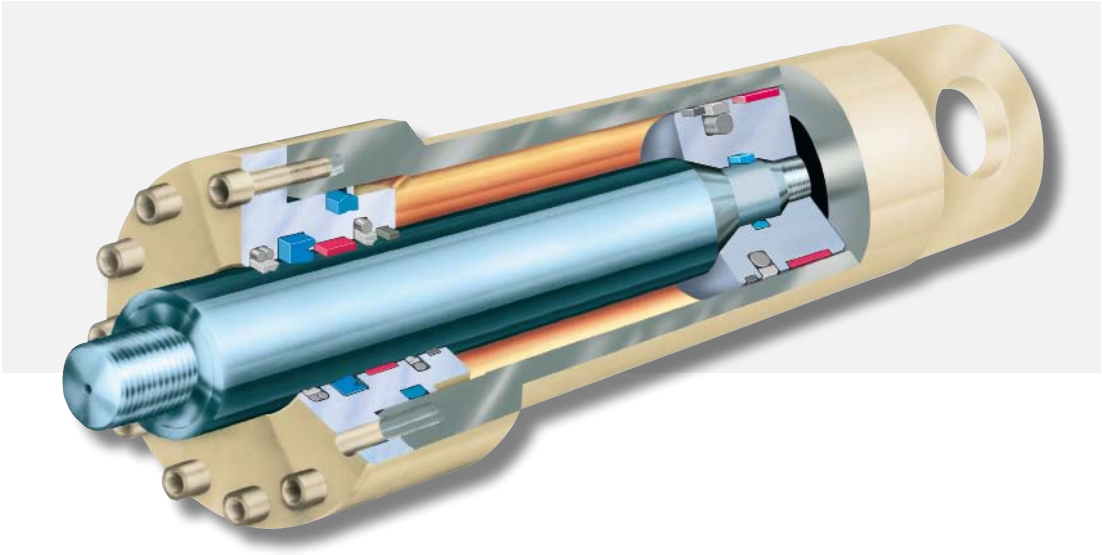
Merkel Seals and Sealing Systems for Injection-Molding Applications

Merkel Heavy Industry: world-renowned sealing expertise

Merkel Heavy Industry is the market leader in the field of seals for heavy industry. With innovative solutions and definitive products for all sectors, we rank among the world's best-thought-of experts on sealing technology. The quality of Merkel seals is recognized worldwide.

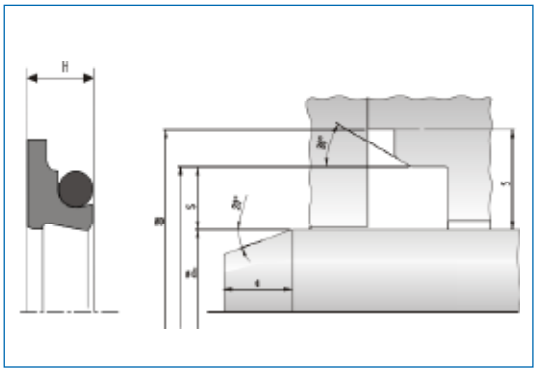
Their high functional reliability, coupled with excellent static and dynamic sealing effects, is regularly confirmed in comparative tests by all our customers at home and abroad, not least on a cross-sectoral basis.

For customized solutions to challenging problems, take advantage of our expertise in applications engineering, our profound expertise in material selection in conjunction with Freudenberg Research Services, and our sophisticated production technology.



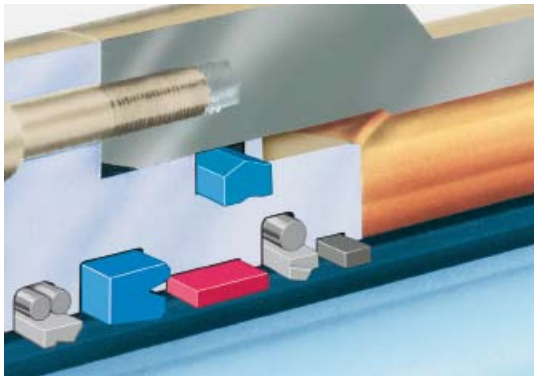
Top-class sealing technology for absolutely clean production

Merkel supplies compact-size sealing systems that ensure reliable sealing even under the extreme conditions encountered in the wide field of injection-molding machinery. The individual elements involved are optimally matched in terms of both materials and functionality, since all individual seals are developed as a system solution, and supplied from a single source.



A long service life reduces costs

Two-piece rod seal set with a very good sealing effect for linear and rotational movements. High wear-resistance and stable long term behavior make sure your maintenance and repair costs are minimized.



Merkel seals in injection-molding machines

Merkel Heavy Industry supplies you with high-performance seals for your entire production process.

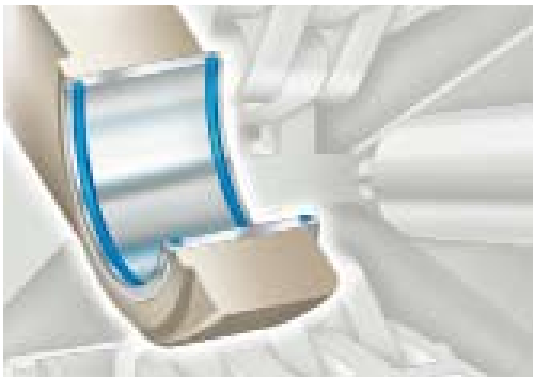
Customized, field-proven, cost-efficient: the best sealing system for every requirement

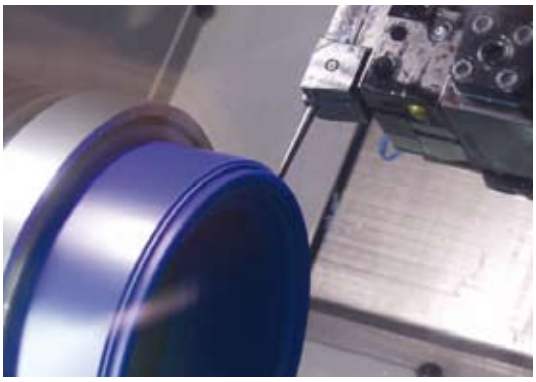
We provide sophisticated, top-quality sealing systems for sealing linear movements and radial sealing systems for applications such as:

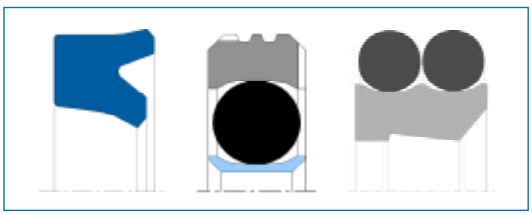
- fast-stroke cylinders
- pressure pads
- closing cylinders
- moving cylinders
- injection cylinders
- sealing systems for stroke movement and combined redating-stroke movement.

Development work is a crucial element in our globally successful product policy.

For example, you will now find at Merkel a new product for toggle-joint machines: with the double-acting compact Merkel Pinmatic seal, you are guaranteed to secure yourself a loss-free, low-maintenance lubricant supply, thus significantly extending the service intervals involved.







Merkel offers you firstly a high level of stock availability from conventional production methods, and secondly a fast-response capability for rush repair jobs, based on state-of-the-art lathe technology.

Merkel seals:
Your competitive advantage

Due to their high extrusion resistance and their superior material quality, Merkel seals have no trouble standing up to high speeds and a wide range of temperatures. This means your machines can produce not only faster, but at significantly higher efficiencies into the bargain.

The superior sealing effect can be relied upon to prevent leaks and resultant machine failures, thus saving you costly downtimes. At the same time, both service and repair outlays are reduced.

Merkel Heavy Industry

Merkel Heavy Industry is part of Merkel Freudenberg Fluidtechnic GmbH in Hamburg, Germany. Around 900 employees develop, produce and sell seals and sealing systems for industrial applications.

Merkel Freudenberg Fluidtechnic GmbH belongs to the Freudenberg Seals and Vibration Control Technology business unit, forms part of the globally operating Freudenberg Group, and is thus integrated into one of the world's biggest global partnership and sales networks for sealing technology.

Typical applications

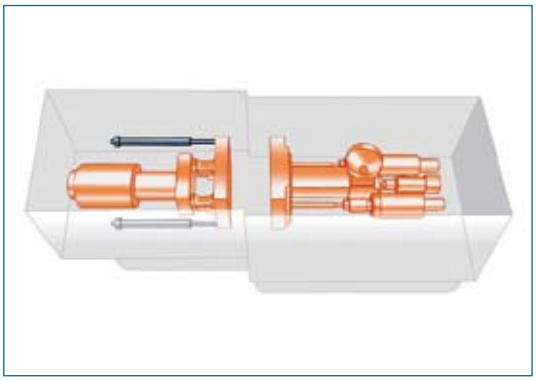
Sealing Systems in injection-molding machines

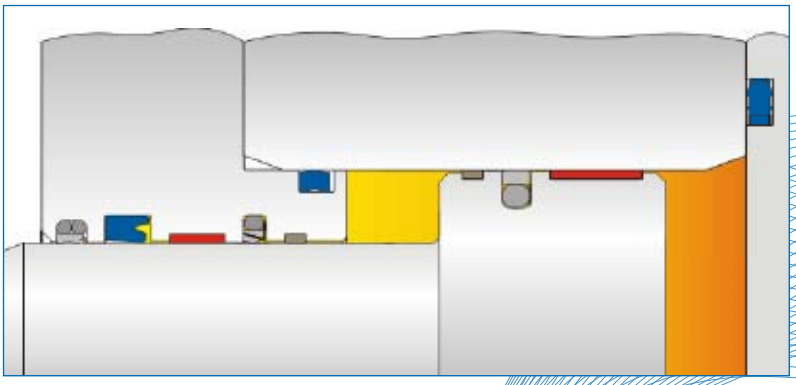
Merkel supplies compact sealing systems that ensure reliable sealing even under the extreme conditions encountered in the wide field of injection-molding machinery. The individual elements involved are optimally matched in terms of both materials and functionality, since all individual seals are developed as a system solution, and supplied from a single source. By selecting materials specifically matched to these requirements, a very high pressure resistance capability is achieved, assuring long, functional life.

Closing unit fast-stroke cylinder

Due to the high running speed involved, a comparatively thick coating of hydraulic oil remains on the counter surface. At the same time, because of the stroke length, a relevant quantity of hydraulic medium is transported at every stroke.
By using the OMS-MR PR, a continuous pressure build-up in the space between the primary and secondary seals is prevented.

Typical operating parameters	
Movement	linear
Pressure	20 MPa
Stroke	1000 mm
Running speed	1 m/s
Rod diameter	80 mm
Piston diameter	120 mm

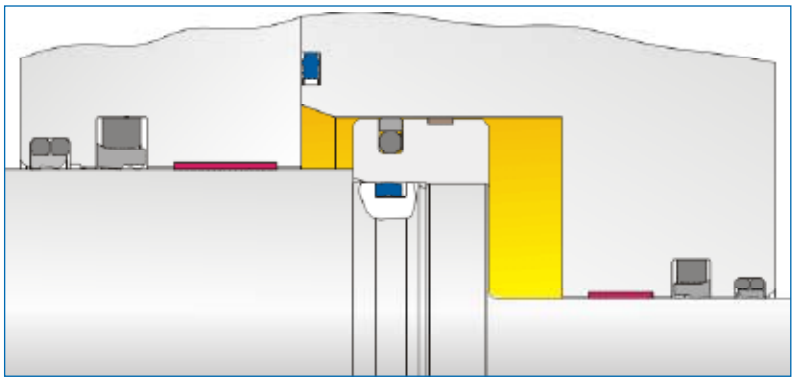


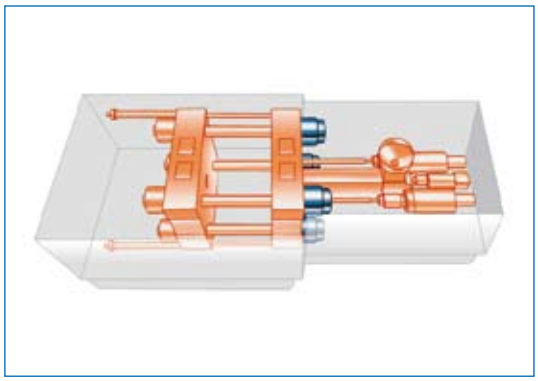


Closing unit pressure pad

Because of the short stroke involved, only a small amount of lubricant gets as far as the sealing edge and the guide elements. A lubricating film is not created.
Sealing is effected in quasi-static mode, which means that here a secondary seal can be omitted without any restriction on functionality. Operating reliability is assured by the additional sealing edge of the PT 1 double wiper.
The PTFE GM 201 (PTFE-glass-MoS2 compound) seal material used here possesses favorable sliding characteristics and behaves neutrally in relation to the counter surface. The patented Guivex geometry of the guide strips improves the intake of lubricant. Only a small support length can be provided between the guide strips, due to the compact construction of most cylinders. This means a relatively large angular offset may be encountered.

Large sealing gaps can be implemented by using the OMS-S SR primary seal. The stress increase possible in the edge area of the guide strip with a severe angular offset is avoided by virtue of the patented Guivex geometry.
The operating pressure is held for several minutes. The solid support edge in the PTFE Profile ring of the OMS-S SR increases the torsional stability and thus achieves favorable extrusion and wear behavior. The seal exhibits stable long term characteristics.



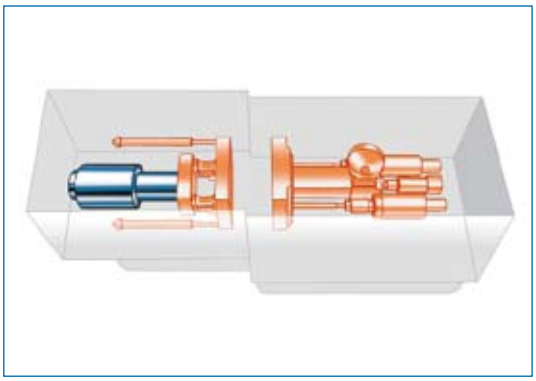


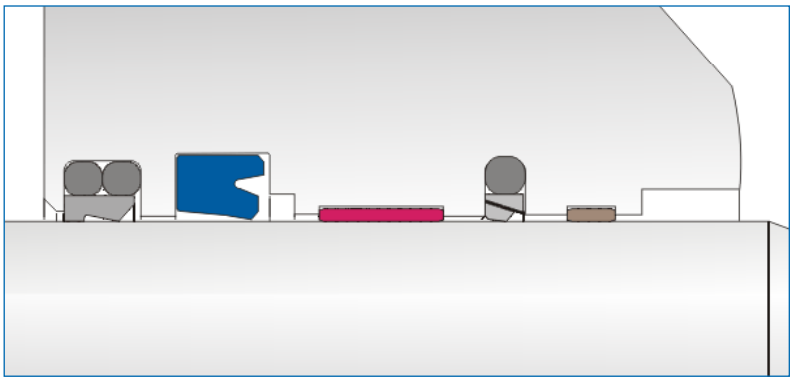
Typical operating parameters	
Movement	linear
Pressure	20 MPa
Stroke	5 mm
Running speed	-
Rod diameter	440/760 mm
Piston diameter	800 mm

Closing unit closing cylinder

The maximum operating pressure is encountered only in the end position with a short stroke and a simultaneously minimal running speed. In this operating state, there is an inadequate film of oil under the sealing edge.
The PTFE GM 201 (PTFE-glass-MoS2 compound) seal material unites the low friction properties of PTFE (especially regarding limited lubrication) with neutral behavior in relation to the counterface. Due to the high running speed, a comparatively thick coating of hydraulic oil film remains on the counter surface, particularly in low or zero pressure operation. At the same time, because of the stroke length involved, an adequate quantity of hydraulic medium is transported at every stroke.

When the OMS-MR PR is used, a continuous pressure build-up in the space between the primary and secondary seals is prevented.



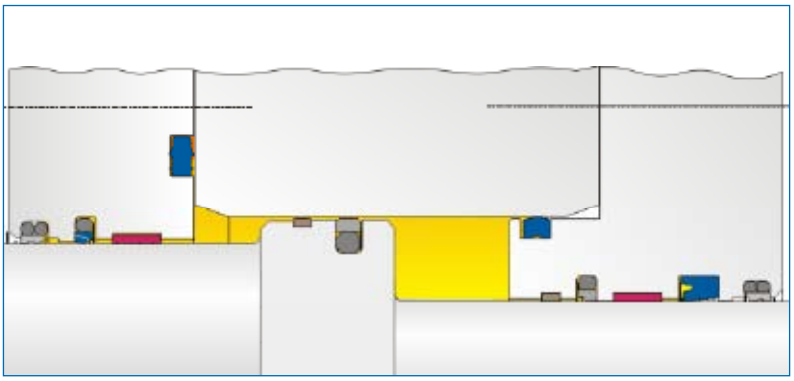


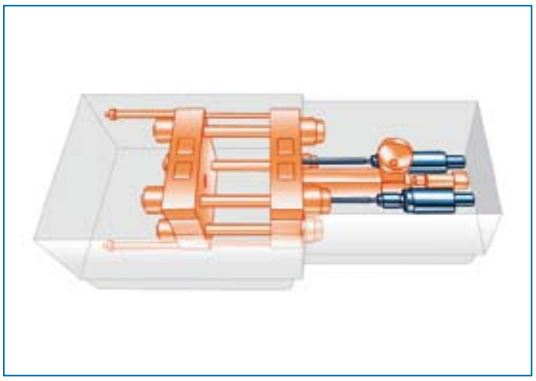
Typical operating parameters	
Movement	linear
Pressure	20 MPa
Stroke	1000 mm
Running speed	1 m/s
Rod diameter	80 mm
Piston diameter	120 mm

Typical operating parameters for closing cylinder	
Movement	linear
Pressure	20 MPa in the end position over 20 mm stroke
Stroke	800 mm
Running speed	1 m/s pressureless or at low pressure
Rod diameter	400 mm

Injection unit injection cylinder

Because of the comparatively low pressure on the low-pressure side, no typical primary seal is required.
The sealing system's operating reliability is enhanced by the additional sealing edge of the PT 1 double wiper.
The running speed during injection differs significantly from that during melting (pull-back). Since the thickness of the lubricant film is influenced by the running speed and the pressure, the oil balance is especially affected by low pressures.
The optimized OMSU-MR PR assures the requisite minimization of oil film retention while simultaneously improving the reflow back capability at low pressures.

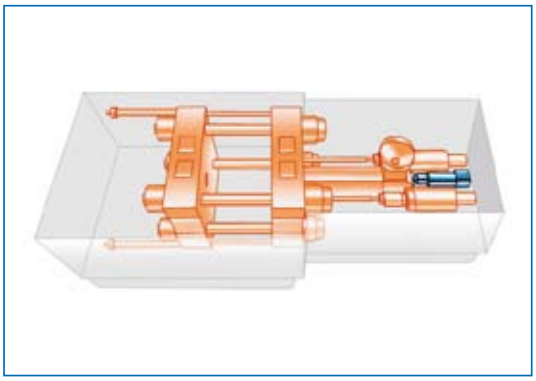


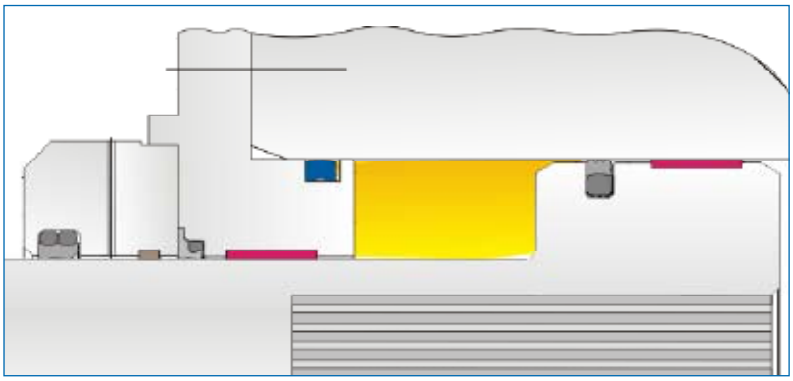


Typical operating parameters	
Movement	linear
Pressure (injection) Pressure (pull-back)	20 MPa/0,2 MPa 3 MPa/0-3 MPa
Stroke	120 mm
Running speed (injection) Running speed (pull-back)	0,4 m/s 0,04 m/s
Rod diameter	70/105 mm
Piston diameter	120 mm

Injection unit injection cylinder (redating-stroke)

The seals are stressed both in a stroke movement and in a combined redating-stroke movement. The operating pressure during stroke movements is specified at 25 MPa. In the case of rotational and rotary linear movements, the pressure of 2 MPa is exerted for a maximum of 5 s. The carefully matched geometry of the primary seal meets both the requirements entailed by the stroke movement in terms of sealing effect and pressure withstand capability, and those of the redational movement in regard to unwanted relative movement between the PTFE Profile ring and the prestressing element. In the case of a combined redating-stroke movement, as opposed to a purely linear movement, additional friction energy is imported into the system in the form of heat.

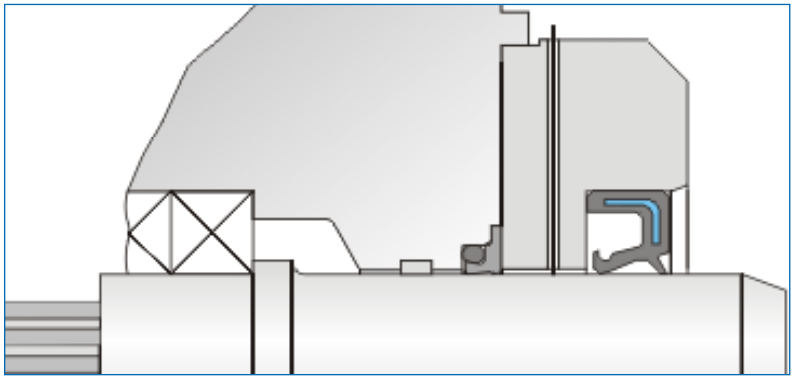


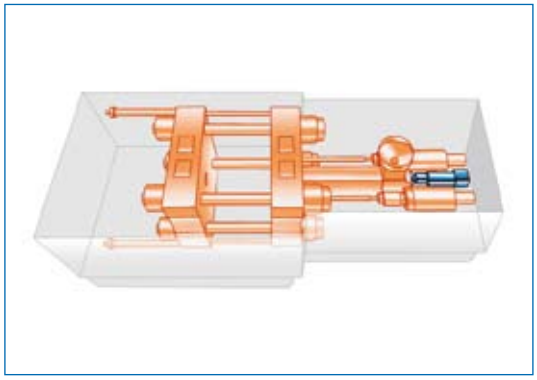


Typical operating parameters	
Movement	redating-stroke
Pressure (ring space)	2 MPa
Pressure (piston base)	2 MPa/ 25 MPa (stroke only)
Stroke	300 mm
Running speed Redation	0,5 m/s 3 m/s
Rod diameter	250 mm
Piston diameter	300 mm

Injection unit drive end (redating-stroke)

Rotary movements sealed up to 2 MPa over short periods of operating pressure in addition to a purely static sealing function up to a pressure of 25 MPa.
The Omegat OMS-DR HB makes sure that relative motion will arise exclusively between the slip ring and the sliding surface, even in the event of rotary movements. An appropriate extrusion and wear behavior is also ensured both by the geometrical configuration of the PTFE profile ring and the PTFE compound PTFE C104 (i.e. TFM-PTFE carbon-fiber compound) used here.
The BAUMSL X7 Simmerring conceived for pure rotary movements provides, in such an application, both a wiping edge and an additional sealing edge aimed at retaining the residual oil film. No pressure is applied to the Simmerring.



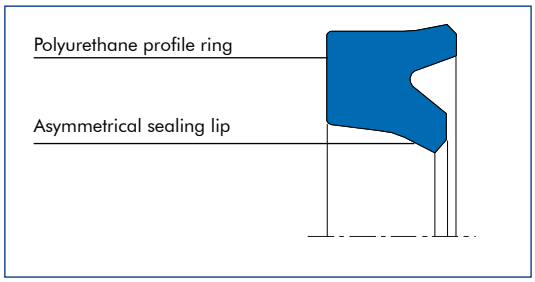


Typical operating parameters	
Movement	redation
Pressure (redation)	2 MPa
Pressure (static)	25 MPa
Velocity (redation)	3 m/s tmax 5 s

Further applications

Pressure cylinders, ejector cylinders, moving cylinders, locking cylinders.
In the case of these cylinders, the same sealing systems are used as for fast-stroking cylinders, since the boundary conditions involved are largely similar.

Merkel Rod Seal U-Ring T 20



Product description

U-ring with asymmetrical profile for sealing piston rods.

Product advantages

- extended service life in the sealing system, due to volume compensation
- functional reliability in the event of radial deflection due to profile size overlap
- operating reliability, due to sturdiness of the polyurethane profile ring
- high sealing effect, due to prominent sealing edge (high line force)
- secured against metallic contact by high extrusion resistance (large seal gap)
- favorable friction values at low pressures due to short contact length (secondary seal)
- simple and secure installation (single-piece element)

Material

Material	Designation	Color
Polyurethane	95 AU V142	dark blue
Polyurethane	94 AU 925	light blue

The material is determined by the nominal diameter and the production process involved.

Applications

- Secondary seal in a sealing system
- Single seal in the pressure range up to 26 MPa
- Single seal for subordinate applications in the pressure range up to 40 MPa
- Nominal diameter up to 2,000 mm

Field of application

Material	95 AU V142/94 AU 925
Hydraulic oils, HL, HLP	–30 ... +110 °C
HFA fluids	+5 ... +50 °C
HFB fluids	+5 ... +50 °C
HFC fluids	–30 ... +40 °C
HFD fluids	–
Water	+5 ... +40 °C
HETG (rape-seed oil)	–30 ... +60 °C
HEES (synth. ester)	–30 ... +60 °C
HEPG (glycol)	–30 ... +40 °C
Mineral greases	–30 ... +110 °C
Pressure	40 MPa
Running speed	0,5 m/s*

* When the T 20 is used as a secondary seal, running speed of up to 1.5 m/s can be permitted.

The figures given are maximum values and must not be applied simultaneously.

Surface finish

Peak-to-valley heights	R_a	R_{max}
Sliding surface	0,05 … 0,3 µm	<2,5 µm
Groove base	<1,6 µm	<6,3 µm
Groove sides	<3,0 µm	<15,0 µm

Material content Mr > 50 % to max. 90 %, with cut depth c = Rz/2 and reference line Cref = 0 %

The long term behavior of a sealing element and its dependability against early failures are crucially influenced by the quality of the counterface. Therefore a precise description and assessment of the surface is critical.
Based on recent findings, we recommend supplementing the above definition of surface finish for the sliding surface by the characteristics detailed in the table below. With these new characteristics derived from the material content, the hitherto merely general description of the material content is significantly improved, not least in regard to the abrasiveness of the surface. *See also Merkel Technical Manual.*

Surface finish of the sliding surfaces

Characteristic value	Limit	
Ra	> 0,05µm	< 0,30µm
Rmax	< 2,5µm	
Rpkx	< 0,5µm	
Rpk	< 0,5µm	
Rk	>0,25µm	<0,7µm
Rvk	>0,2µm	<0,65µm
Rvkx	>0,2µm	<2,0µm

The limit values listed in the table do not currently apply for ceramic or semi-ceramic counterfaces. *See also Merkel Technical Manual.*

Gap dimension

The dimension D2 is determined by factoring in the maximum permissible extrusion gap, the tolerances, the guide clearance, the deflection of the guide under load, and the pipe expansion *See also Merkel Technical Manual.*
The maximum permissible extrusion gap with a one-sided position of the piston rod is significantly determined by the maximum operating pressure and the temperature-dependent dimensional stability of the seal material. *See also Merkel Technical Manual.*

Profile dimension	Max. permissible gap dimension			
Profile	16 MPa	26 MPa	32 MPa	40 MPa
≤ 5,0	0,45	0,4	0,35	-
> 5,0 ... 7,5	0,5	0,45	0,4	0,35
> 7,5 ... 12,5	0,55	0,5	0,45	0,4
> 12,5 ... 15,0	0,6	0,55	0,45	0,4
> 15,0 ... 20,0	0,65	0,6	0,5	0,45
> 20,0 ... 25,0	0,65	0,6	0,5	0,45

If the T 20 U-ring is used as a secondary seal in a sealing system, a larger gap dimension can be set. The general rule applying here is D2 = d + 1 mm with a tolerance of H11 for D2 ≤ 400 or +0.4 for D2 > 400.

Tolerances

Diameter D	Tolerance
≤ 400	H11
> 400	+0,4

The tolerance for the diameters d and D2 is specified in connection with the gap dimension calculation. In typical hydraulic applications up to a nominal dimension of 1,000 mm, the tolerance fields f7 and f8 or H7 and H8 are usually chosen.

Design notes

For U-rings with a nominal dimension of d < 25 mm, an axially accessible housing is required. U-rings with a nominal dimension of d > 25 can generally be installed in a recessed groove using a fitting tool or by hand. Depending on the ratio of the nominal diameter to the Profile dimension, in individual cases an axially accessible housing will be required here as well (note in the article list).

Housing recommendation for larger diameters (individual seal)

d	D	L	C
> 320 ... 600	d + 30	25	11
> 320 ... 720	d + 40	32	12
> 720 ... 2000	d + 50	40	16

Housing recommendation for larger diameters (secondary seal in a sealing system)

d	D	L	C
> 320 ... 600	d + 20	16	8
> 600 ... 950	d + 25	20	10
> 950 ... 2000	d + 30	25	11

Please note our general design remarks in the *Merkel Technical Manual*.

Installation & assembly

Reliable seal function is dependent on correct installation
See also Merkel Technical Manual.

Additional product description for U-ring T 20

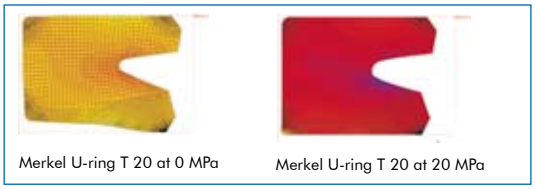
Seal configuration

The choice of a sealing element is crucially influenced by the material-dependent resistance to extrusion and the likewise material-dependent friction and wear behaviors.
The values of the principal characteristics (sealing effect, dimensional stability and friction or wear) are mutually contradictory in this context.
Depending on the operating and boundary conditions involved, U-rings made of Polyurethane are used as individual seals, but more frequently in an appropriate combination of individual sealing and guide elements as a secondary seal in a sealing system.

The characteristics of the individual elements in a sealing system are optimized in line with the principal requirement involved. An individual seal, or the primary seal in the system concerned, is exposed to the operating pressure. The principal requirement being high resistance to extrusion coupled with favorable frictional values under high pressure. The secondary seal in a sealing system is exposed to the low intermediate space pressure. The principal requirements in this case are the effective reduction of the residual-oil film released via the primary seal, coupled with favorable frictional values at low pressures.

Mold-release volume

In a sealing system, the space between the primary and secondary seals is filled with hydraulic medium after a few cycles. The further entry of media leads to an increase of the pressure in the intermediate space. If a U-ring is used as the secondary seal, then it will act as a volume compensator under pressure by reason of the mold-release volume (Fig. 01). The pressure level in the intermediate space, and thus the thermal and mechanical loads as well, are effectively reduced.



Merkel U-ring T 20 at 0 MPa Merkel U-ring T 20 at 20 MPa

Fig. 01

Sealing effect

An element's sealing effect is described in terms of the ratio between the wiping effect and the return capability.

The initial sealing effect of compact, two-piece sealing elements is achieved by pressing the pre-stressing element. There is thus, of course, a close interdependence between the deformation of the loading element and the force being applied. A small change in the compression (due to tolerances and radial movement) results in a relevant change in the force being applied and thus ultimately in the sealing effect. In the case of the T 20 U-ring, the initial sealing effect is entailed by the deformation of the sealing lips. Small changes in the radial contact pressure do not produce any relevant change in the pressure exerted by the sealing edge. The U-ring's geometry is thus, at a consistently high level of functionality, tolerant to radial deflections.

In the high-pressure range, many sealing elements exhibit a satisfactory sealing effect, attributable solely to the high contact pressure on the counterface. In the pressure range up to 5 MPa (intermediate space pressure in the sealing system), by contrast, the sealing effect is crucially influenced by the edge geometry and the contact stress. The compression characteristic under the sealing edge is generally optimized so as to ensure effective wiping ability in the pressure chamber (rapid pressure rise) and a good return capability from the back (slow pressure rise). (See Fig. 02)

In comparison to compact sealing elements, the U-ring geometry of the T 20 exhibits a short contact length at low pressure, with a definite pressing maximum value. The oil film is effectively downsized here, all that remains is the wetting on the counterface, desirable in terms of the sliding characteristics.

Friction

With sealing elements made of polyurethane, the material properties mean that a high sealing effect is achieved. Depending on the force being applied and the size of the contact area, the seal material is intermeshed to a greater or lesser extent with the counterface. The closer the contact, the higher the friction force will be. Due to the small contact length of a PU U-ring in the low-pressure range, significantly lower friction values are achieved in comparison to compact sealing elements made of polyurethane.
As the secondary seal in a sealing system, the T 20 U-ring is subjected to significantly less than the mold-release pressure. If, however, the U-ring is being used as an individual seal, the operating pressure may rise to a level above the U-ring's mold-release pressure. Because of the increased intermeshing between the seal material and the counter surfacedue to the enlarged contact area, the amount of friction rises. If the working pressure is between 5 MPa and 10 MPa, the friction-optimized version LF 300 (LF = "low friction") with a grooved contact surface is the preferable option.

Extrusion

The resistance to extrusion is essentially determined by the properties of the seal materials. In addition, not only the size of the deformation, but the deformation volume available also plays a crucial role. Due to the generally larger volume provided by a U-ring, larger gaps can be permitted here under otherwise identical boundary conditions in comparison to a compact seal with a slip ring made of Polyurethane. This significantly reduces the possibility of unwanted metallic contacts.

The sealing system's service life is extended by using the T 20 U-ring in the sealing system concerned, since as a volume compensator it substantially reduces the thermal and mechanical stresses involved, thus assuring stable long term behavior.

Due to a U-ring's larger deformation volume, larger gaps can be permitted, thus significantly reducing the possibility of metallic contacts.

The T 20 U-ring exhibits an edge geometry designed for optimum sealing effect. Individual seals and sealing systems with a T 20 U-ring as the secondary seal score highly in terms of a very good sealing effect.

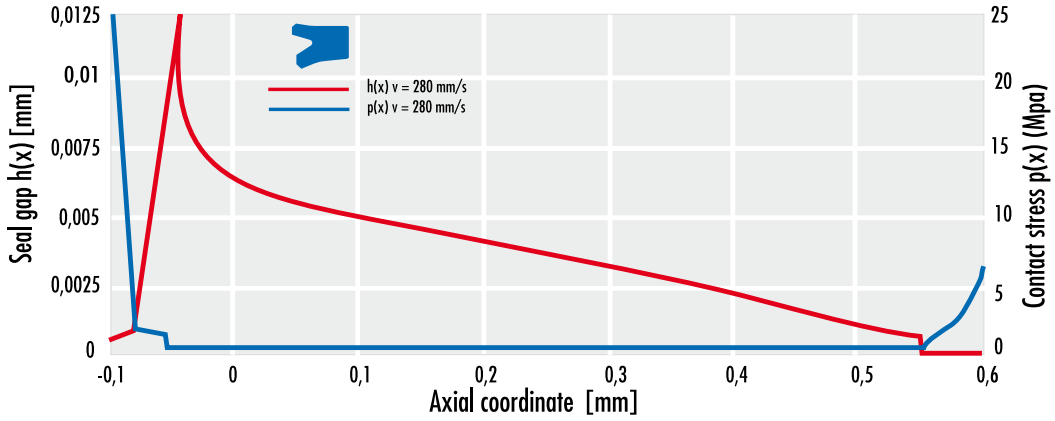
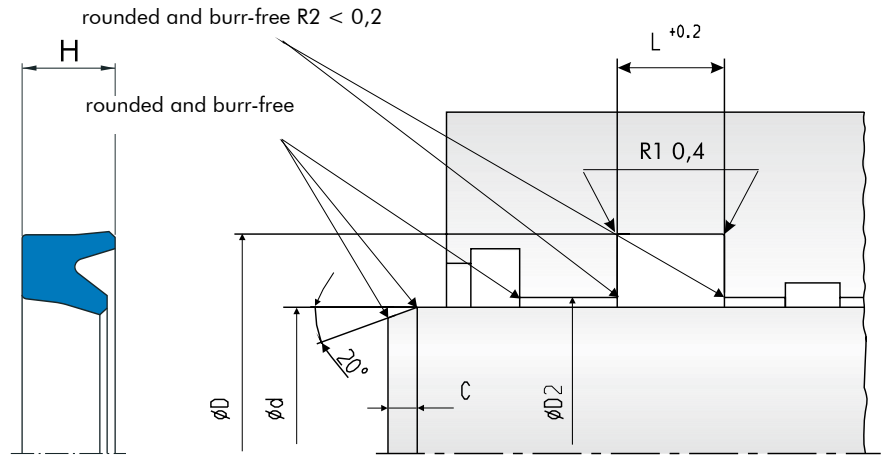


Fig. 02: Contact stress p and contact height h for the T 20 U-ring, extending rod at 0.5 MPa operating pressure, 0.28 m/s velocity



Housing	d	D	H	L	Profile	C	Installation*	Material	Article No.
	50	58	8	9	4	4,5	h	95 AU V142	24290848
	50	58	8,2	9	4	4,0	h	95 AU V142	24223250
ISO	50	60	7,3	8	5	4,5	h	95 AU V142	24223251
	50	60	10	11	5	4,5	h	95 AU V142	24187205
	50	62	10	11	6	5,0	w	95 AU V142	24223289
	50	65	10	11	7,5	5,5	w	95 AU V142	24187206
ISO	50	65	11,4	12,5	7,5	5,5	w	95 AU V142	24223290
	50	70	11,4	13	10	6,0	a	95 AU V142	24223291
	55	63	7,3	8	4	4,5	h	95 AU V142	24236859
	55	63	8	9	4	4,5	h	95 AU V142	24290846
	55	63	8,2	9	4	4,5	h	95 AU V142	24223292
	55	65	7,3	8	5	4,5	h	95 AU V142	24239429
	55	65	10	11	5	4,5	h	95 AU V142	24187207
	55	65	11,8	13	5	4,5	h	95 AU V142	24187208
	55	67	8,7	9,6	6	5,0	w	95 AU V142	24374139
	55	67	10	11	6	5,0	w	95 AU V142	24261225
	55	70	10	11	7,5	5,5	w	95 AU V142	24238292
	55	70	11,4	13	7,5	5,5	w	95 AU V142	24187209
ISO	56	71	11,4	12,5	7,5	5,5	w	95 AU V142	24223294
	60	68	8	9	4	4,5	h	95 AU V142	24219456
	60	70	7,3	8	5	4,5	h	95 AU V142	24236858
	60	70	10	11	5	4,5	h	95 AU V142	24223296
	60	70	11,8	13	5	4,5	w	95 AU V142	24187211

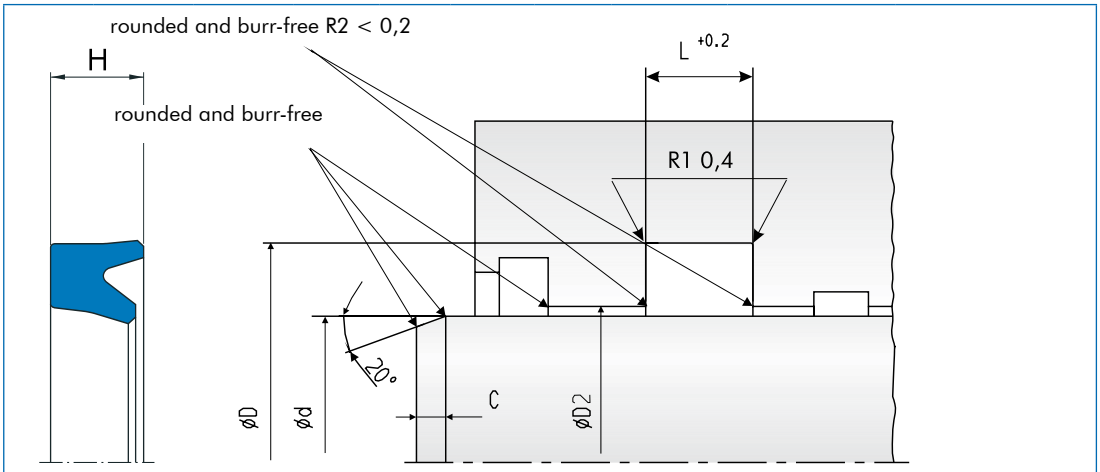
Further dimensions on request

* a = axially accessible housing; h = by hand; w = with fitting tool

Housing	d	D	H	L	Profile	C	Installation*	Material	Article No.
	60	72	10	11	6	5,0	h	95 AU V142	24261224
	60	75	10,4	11	7,5	5,5	w	95 AU V142	24337823
	60	75	11,4	12,5	7,5	5,5	w	95 AU V142	24223297
	60	75	11,4	13	7,5	5,5	w	95 AU V142	24187212
	60	80	16,6	18,2	10	6,0	a	95 AU V142	24373695
ISO	63	78	11,4	12,5	7,5	5,5	w	95 AU V142	24223299
ISO	63	83	14,6	16	10	6,0	a	95 AU V142	24289375
	65	73	8,2	9	4	4,5	h	95 AU V142	49000807
	65	75	7,3	8	5	4,5	h	95 AU V142	24370874
	65	75	11,8	13	5	4,5	h	95 AU V142	24187213
	65	77	8,7	9,6	6	5,0	h	95 AU V142	24251887
	65	80	10	11	7,5	5,5	w	95 AU V142	24373620
	65	80	11,4	13	7,5	5,5	w	95 AU V142	24223300
	65	85	11,4	13	10	6,0	a	95 AU V142	24223301
	70	78	8,2	9	4	4,5	h	95 AU V142	24314731
	70	80	11,8	13	5	4,5	h	95 AU V142	24187214
	70	82	8,7	9,6	6	5,0	h	95 AU V142	24236857
	70	85	10	11	7,5	5,5	w	95 AU V142	24233880
ISO	70	85	11,4	12,5	7,5	5,5	w	95 AU V142	24212669
	70	85	11,4	13	7,5	5,5	w	95 AU V142	24223302
	70	86	14	15,5	8	5,5	w	95 AU V142	24363001
	70	90	11,4	13	10	6,0	w	95 AU V142	24223304
ISO	70	90	14,6	16	10	6,0	w	95 AU V142	24223303
	75	85	12	12,5	5	4,5	h	95 AU V142	24227939
	75	87	8,7	9,6	6	5,0	h	95 AU V142	24266875
	75	88	10	11	6,5	5,0	h	95 AU V142	24374792
	75	90	9	9,9	7,5	5,5	h	95 AU V142	24374761
	75	90	10	11	7,5	5,5	w	95 AU V142	24223305
	75	95	14,6	16	10	6,0	w	95 AU V142	24370708
	80	90	7,3	8	5	4,5	h	95 AU V142	24363199
	80	90	10	11	5	4,5	h	95 AU V142	24187219
	80	90	11,8	13	5	4,5	h	95 AU V142	24223306
	80	92	8,7	9,6	6	5,0	h	95 AU V142	24241622

Further dimensions on request

* a = axially accessible housing; h = by hand; w = with fitting tool



Housing	d	D	H	L	Profile	C	Installation*	Material	Article No.
	80	95	9	9,9	7,5	5,5	h	95 AU V142	24374809
	80	95	10	11	7,5	5,5	h	95 AU V142	24373621
ISO	80	95	11,4	12,5	7,5	5,5	h	95 AU V142	24223307
	80	95	11,4	13	7,5	5,5	h	95 AU V142	24187220
	80	100	11,4	13	10	6,0	w	95 AU V142	24223308
ISO	80	100	14,6	16	10	6,0	w	95 AU V142	24223309
	85	95	11,8	12,5	5	4,5	h	95 AU V142	24213882
	85	97	8,7	9,6	6	5,0	h	95 AU V142	24266876
	85	100	9	9,9	7,5	5,5	h	95 AU V142	24374873
	85	100	10	11	7,5	5,5	h	95 AU V142	24374762
	85	100	11,4	12,5	7,5	5,5	h	95 AU V142	24223310
	85	100	11,4	13	7,5	5,5	h	95 AU V142	24194923
	90	98	5,7	6,3	4	4,5	h	95 AU V142	24293541
	90	98	8,2	9	4	4,5	h	95 AU V142	24359373
ISO	90	100	6,8	7,5	5	4,5	h	95 AU V142	24368410
	90	100	10	11	5	4,5	h	95 AU V142	24209770
	90	102	8,7	9,6	6	5,0	h	95 AU V142	24251888
	90	105	10	11	7,5	5,5	h	95 AU V142	24235803
ISO	90	105	11,4	12,5	7,5	5,5	h	95 AU V142	24223311
	90	105	11,4	13	7,5	5,5	h	95 AU V142	24223312
	90	110	11,4	13	10	6,0	w	95 AU V142	24223313
ISO	90	110	14,6	16	10	6,0	w	95 AU V142	24289376
	95	110	9	9,9	7,5	5,5	h	95 AU V142	24374785
	95	110	10	11	7,5	5,5	h	95 AU V142	24374810

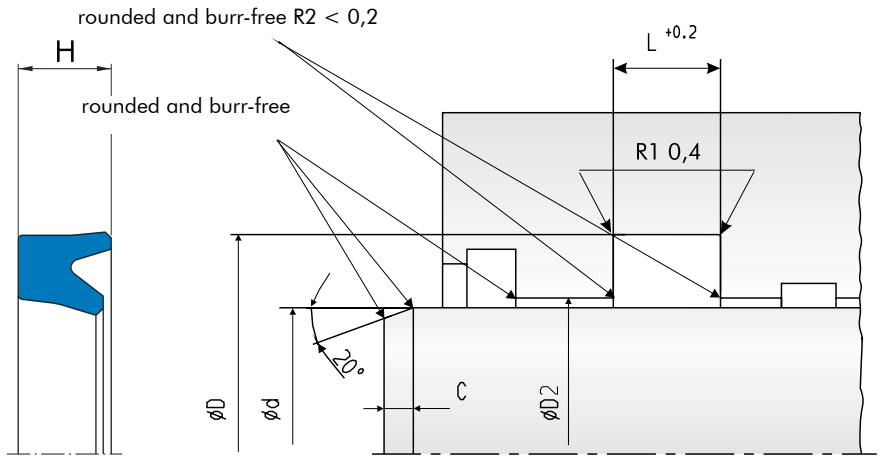
Further dimensions on request

* a = axially accessible housing; h = by hand; w = with fitting tool

Housing	d	D	H	L	Profile	C	Installation*	Material	Article No.
	95	110	11,8	13	7,5	5,5	h	95 AU V142	24369674
	95	115	11,4	13	10	6,0	w	95 AU V142	24265228
	95	115	12	13,2	10	6,0	w	95 AU V142	24374811
	100	115	9	9,9	7,5	5,5	h	95 AU V142	24374763
	100	115	10	11	7,5	5,5	h	95 AU V142	24235802
	100	115	10,9	12	7,5	5,5	h	95 AU V142	24266877
	100	115	11,4	13	7,5	5,5	h	95 AU V142	24223314
	100	120	11,4	13	10	6,0	w	95 AU V142	24223316
	100	120	12	13,2	10	6,0	w	95 AU V142	24374793
ISO	100	120	14,6	16	10	6,0	h	95 AU V142	24187222
	105	115	10	11	5	4,5	h	95 AU V142	24366780
	105	115	12	13	5	4,5	h	95 AU V142	24213883
	105	120	11,4	12,5	7,5	5,5	h	95 AU V142	24300392
	105	125	14,6	16	10	6,0	h	95 AU V142	24223317
	110	120	7,7	8,5	5	4,5	h	95 AU V142	24369546
	110	125	9	9,9	7,5	5,5	h	95 AU V142	24374786
ISO	110	125	9,6	10,6	7,5	5,5	h	95 AU V142	24368411
	110	125	10,9	12	7,5	5,5	h	95 AU V142	24239427
	110	125	12	13	7,5	5,5	h	95 AU V142	24242341
	110	130	11,8	13	10	6,0	h	95 AU V142	24376016
ISO	110	130	14,6	16	10	6,0	w	95 AU V142	24223318
	115	130	10,9	12	7,5	5,5	h	95 AU V142	24251889
	115	135	14,6	16	10	6,0	w	95 AU V142	24223319
	115	140	17,3	19	12,5	6,5	w	95 AU V142	24361949
	120	135	10,9	12	7,5	5,5	h	95 AU V142	24360190
	120	140	14,6	16	10	6,0	h	95 AU V142	24223320
	120	145	17,3	19	12,5	6,5	w	95 AU V142	24371176
	125	140	10,9	12	7,5	5,5	h	95 AU V142	24251890
ISO	125	145	14,6	16	10	6,0	h	95 AU V142	24223321
	125	155	17,3	19	15	7,5	w	95 AU V142	24371643
	130	140	15	16	5	4,5	h	95 AU V142	24213884
	130	145	10	11	7,5	5,5	h	95 AU V142	24359621
	130	145	13,7	15	7,5	5,5	h	95 AU V142	24362610
	130	145	14,6	16	7,5	5,5	h	95 AU V142	24358619
	130	150	14,6	16	10	6,0	h	95 AU V142	24223322
	130	160	17,3	19	15	7,5	w	95 AU V142	24370486
	135	155	14,6	16	10	6,0	a	95 AU V142	24360106
	135	165	17,3	19	15	7,5	w	95 AU V142	24362625

Further dimensions on request

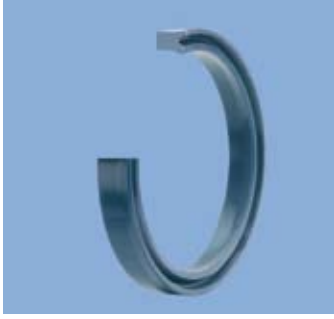
* a = axially accessible housing; h = by hand; w = with fitting tool



Housing	d	D	H	L	Profile	C	Installation*	Material	Article No.
	140	152	8,6	9,5	6	5,0	h	95 AU V142	49003440
	140	160	11,8	13	10	6,0	a	95 AU V142	24376017
ISO	140	160	14,6	16	10	6,0	h	95 AU V142	24223323
	140	170	17,3	19	15	7,5	w	95 AU V142	24377812
	145	157	8,5	9,5	6	5,0	h	95 AU V142	24380733
	145	165	14,6	16	10	6,0	h	95 AU V142	24375686
	150	170	11,8	13	10	6,0	h	95 AU V142	24295710
	150	170	14,6	16	10	6,0	h	95 AU V142	24223324
	150	180	17,3	19	15	7,5	w	95 AU V142	24223325
	155	175	14,6	16	10	6,0	h	95 AU V142	49019096
	160	175	14,6	16	7,5	5,5	h	95 AU V142	24374166
	160	180	14,6	16	10	6,0	h	95 AU V142	24266878
	160	180	17,3	19	10	6,0	h	95 AU V142	24362611
ISO	160	185	14,6	16	12,5	6,5	h	95 AU V142	24223326
	160	190	17,3	19	15	7,5	w	95 AU V142	00530551
	165	180	14,6	16	7,5	5,5	h	95 AU V142	24363184
	165	185	14,6	16	10	6,0	h	95 AU V142	24370604
	170	190	14,6	16	10	6,0	h	95 AU V142	24338964
	175	195	14,6	16	10	6,0	h	95 AU V142	49030797
	180	200	11,8	13	10	6,0	h	95 AU V142	24374656
	180	200	14,6	16	10	6,0	h	95 AU V142	24223327
ISO	180	205	14,6	16	12,5	6,5	h	95 AU V142	24223328
	180	210	17,3	19	15	7,5	w	95 AU V142	24375978
ISO	180	210	22,8	25	15	7,5	w	95 AU V142	24359904
	185	200	11,4	12,5	7,5	5,5	h	95 AU V142	24373150
	190	210	13,7	15	10	6,0	h	95 AU V142	24368634

Further dimensions on request

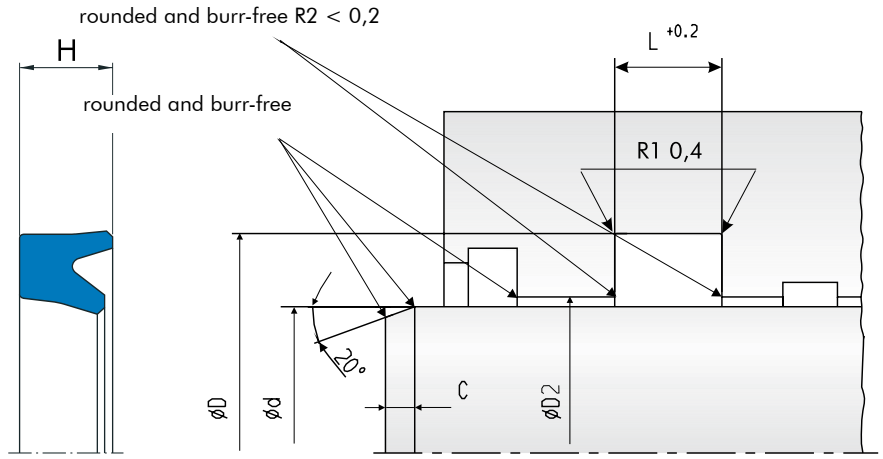
* a = axially accessible housing; h = by hand; w = with fitting tool



Housing	d	D	H	L	Profile	C	Installation*	Material	Article No.
	190	210	14,6	16	10	6,0	h	95 AU V142	24328527
	190	215	17,1	18,8	12,5	6,5	h	95 AU V142	24370226
	200	215	11,4	12,5	7,5	5,5	h	95 AU V142	24339703
	200	220	14,6	16	10	6,0	h	95 AU V142	24223329
ISO	200	225	14,6	16	12,5	6,5	h	95 AU V142	24223330
	205	235	21,8	24	15	7,5	w	95 AU V142	24361564
	210	230	14,6	16	10	6,0	h	95 AU V142	24337781
	215	235	14,6	16	10	6,0	h	95 AU V142	24356092
	215	235	14,6	16	10	6,0	h	95 AU V142	49030353
	215	240	18,2	20	12,5	6,5	h	95 AU V142	24372392
	215	245	20,9	23	15	7,5	h	95 AU V142	24362845
	220	240	14,6	16	10	6,0	h	95 AU V142	24223331
	220	250	17,3	19	15	7,5	h	95 AU V142	24223332
ISO	220	250	18,3	20	15	7,5	h	95 AU V142	24375979
	220	250	21,8	24	15	7,5	h	95 AU V142	24367393
	225	245	14,6	16	10	6,0	h	95 AU V142	24376131
	230	250	14,6	16	10	6,0	h	95 AU V142	24223336
	235	255	14,6	16	10	6,0	h	95 AU V142	24366784
	240	260	14,6	16	10	6,0	h	95 AU V142	24290247
	240	270	17,3	19	15	7,5	h	95 AU V142	24352222
	240	270	18	19,8	15	7,5	h	95 AU V142	24314612
	245	267	14,1	15,5	11	6,5	h	95 AU V142	24362532
	250	270	14,6	16	10	6,0	h	95 AU V142	24291160
	250	280	17,3	19	15	7,5	h	95 AU V142	24223333
	250	280	20,9	23	15	7,5	h	95 AU V142	24373997
	250	280	22,8	25	15	7,5	h	95 AU V142	49009475
	255	275	14,6	16	10	6,0	h	95 AU V142	49004326
	260	280	14,6	16	10	6,0	h	95 AU V142	24339213
	260	290	18,2	20	15	7,5	h	95 AU V142	00526753
	260	290	20,9	23	15	7,5	h	95 AU V142	00528155
	265	285	14,6	16	10	6,0	h	95 AU V142	49039551
	270	290	14,6	16	10	6,0	h	95 AU V142	24331910
	270	300	17,3	19	15	7,5	h	95 AU V142	49001749
	270	300	22,5	24	15	7,5	h	95 AU V142	24360583
	275	305	17,3	19	15	7,5	h	95 AU V142	24327509
	280	300	15	16,5	10	6,0	h	95 AU V142	24359724
	280	310	17,3	19	15	7,5	h	95 AU V142	24223334
	285	315	17,3	19	15	7,5	h	95 AU V142	00531811

Further dimensions on request

* a = axially accessible housing; h = by hand; w = with fitting tool



Housing	d	D	H	L	Profile	C	Installation*	Material	Article No.
	290	320	17,3	19	15	7,5	h	95 AU V142	24356384
	300	330	17,3	19	15	7,5	h	95 AU V142	24351902
	300	330	21,5	23,6	15	7,5	h	95 AU V142	24377304
	300	330	21,8	24	15	7,5	h	95 AU V142	24361028
	320	340	14,6	16	10	10	h	95 AU V142	24357237
	320	350	22,8	25	15	11	h	95 AU V142	24359549
	320	360	29,1	32	20	14	h	95 AU V142	24359550
	330	360	22,8	25	15	11	h	95 AU V142	24359743
	340	360	14,6	16	10	10	h	95 AU V142	24369208
	340	370	22,8	26	15	11	h	95 AU V142	24360008
	345	365	14,6	16	10	10	h	95 AU V142	49002919
	350	370	14,6	16	10	10	h	95 AU V142	24357238
	350	380	22,8	25	15	11	h	95 AU V142	24359746
	360	380	14,6	16	10	10	h	95 AU V142	24359719
	360	400	29,1	32	20	14	h	95 AU V142	49022458
	370	400	22,8	25	15	11	h	95 AU V142	24359749
	370	400	23,8	26	15	11	h	95 AU V142	49036122
	380	400	14,6	16	10	10	h	95 AU V142	24359750
	380	410	22,8	25	15	11	h	95 AU V142	49001346
	380	420	29,1	32	20	14	h	95 AU V142	24359751
	385	415	23,8	26	15	11	h	95 AU V142	00527751
	390	420	22,8	25	15	11	h	95 AU V142	24359752

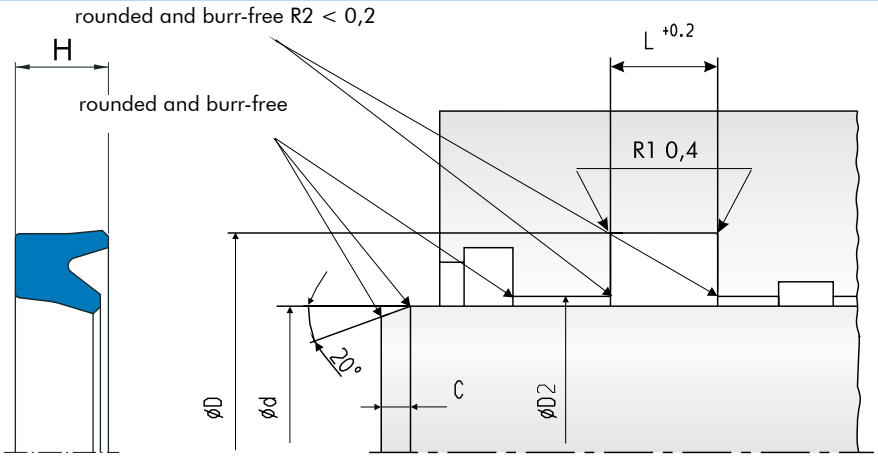
Further dimensions on request

* a = axially accessible housing; h = by hand; w = with fitting tool

Housing	d	D	H	L	Profile	C	Installation*	Material	Article No.
	400	420	14,6	16	10	10	h	95 AU V142	24359753
	400	430	22,8	25	15	11	h	95 AU V142	24359755
	400	440	29,1	32	20	14	h	95 AU V142	24359754
	410	430	14,6	16	10	10	h	95 AU V142	24357239
	420	440	14,6	16	10	10	h	95 AU V142	24379339
	420	450	23,8	26	15	11	h	95 AU V142	24359756
	420	460	29,1	32	20	14	h	95 AU V142	24359757
	430	450	14,6	16	10	10	h	95 AU V142	24370225
	430	460	22,8	25	15	11	h	95 AU V142	24359758
	440	460	14,6	16	10	10	h	95 AU V142	24357240
	440	470	22,8	25	15	11	h	95 AU V142	24370501
	450	470	14,6	16	10	10	h	95 AU V142	24359760
	450	480	22,8	25	15	11	h	95 AU V142	24359761
	450	490	29,1	32	20	14	h	95 AU V142	24359763
	460	480	14,6	16	10	10	h	95 AU V142	49006630
	460	500	29,1	32	20	14	h	95 AU V142	24374652
	480	500	14,6	16	10	10	h	95 AU V142	24357241
	500	520	14,6	16	10	8	h	94 AU 925	49017450
	520	540	14,6	16	10	8	h	94 AU 925	49015056
	540	560	14,6	16	10	8	h	94 AU 925	49066449
	560	580	14,6	16	10	8	h	94 AU 925	49066450
	580	600	14,6	16	10	8	h	94 AU 925	49066451
	600	620	14,6	16	10	8	h	94 AU 925	49029053
	620	645	18,2	20	12,5	10	h	94 AU 925	49066482
	640	665	18,2	20	12,5	10	h	94 AU 925	49066483
	660	685	18,2	20	12,5	10	h	94 AU 925	49064940
	680	705	18,2	20	12,5	10	h	94 AU 925	49066484
	700	725	18,2	20	12,5	10	h	94 AU 925	49066485
	720	745	18,2	20	12,5	10	h	94 AU 925	49054686
	740	765	18,2	20	12,5	10	h	94 AU 925	49066486
	760	785	18,2	20	12,5	10	h	94 AU 925	24380543
	780	805	18,2	20	12,5	10	h	94 AU 925	49032355
	800	825	18,2	20	12,5	10	h	94 AU 925	49028614

Further dimensions on request

* a = axially accessible housing; h = by hand; w = with fitting tool

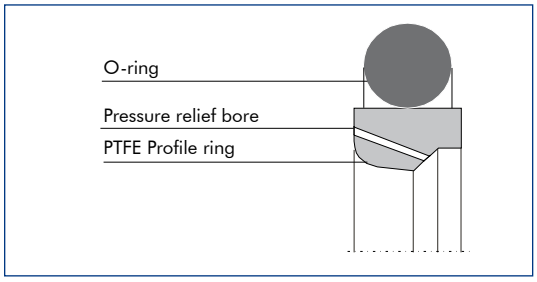


Housing	d	D	H	L	Profile	C	Installation*	Material	Article No.
	820	845	18,2	20	12,5	10	h	94 AU 925	49066487
	840	865	18,2	20	12,5	10	h	94 AU 925	49066488
	860	885	18,2	20	12,5	10	h	94 AU 925	49066489
	880	905	18,2	20	12,5	10	h	94 AU 925	49062164
	900	925	18,2	20	12,5	10	h	94 AU 925	49066490
	920	945	18,2	20	12,5	10	h	94 AU 925	24378523
	940	965	18,2	20	12,5	10	h	94 AU 925	49022199
	960	990	22,8	25	15	11	h	94 AU 925	49066491
	980	1010	22,8	25	15	11	h	94 AU 925	49066492
	1000	1030	22,8	25	15	11	h	94 AU 925	49066493

Further dimensions on request

* a = axially accessible housing; h = by hand; w = with fitting tool

Merkel Rod Seal OMS-MR PR



Product description

Two-piece seal set for sealing piston rods, consisting of a PTFE Profile ring with an integrated pressure relief function, plus an O-ring as a prestressing element. Patented product design.
(Patent No.: DE 10117662 CI)

Product advantages

- interchangeable with housings of the OMS-MR series
- enhanced operating reliability of sealing systems with tough operating parameters (no continuous pressure build-up in the intermediate space
- extended service life of sealing systems due to stable long term behavior (reduced loads on the sealing system from friction and wear)

Material

PTFE profile ring

Material	Designation	Color
PTFE-glass-fiber-MoS2 compound	PTFE GM201	light-gray
PTFE-carbon-fiber compound	PTFE C104	dark-gray

O-ring

Material	Designation
Nitrile rubber	NBR
Fluor caoutchouc	FKM

Other material combinations available on request.

Applications

- Primary seal in a sealing system
- Long stroke (greater than 400 mm)
- High running speed when the piston rod is extended (greater than 0.5 m/s)
- Sizeable velocity differences in dependence on the direction of motion
  (v_{ext} greater than 8x v_{retr})
- Fast pressure drop in the main chamber

Field of application

Material	PTFE GM201/NBR PTFE C104/NBR
Hydraulic oils, HL, HLP	-30 ... +100 °C
HFA fluids	+5 ... +60 °C
HFB fluids	+5 ... +60 °C
HFC fluids	-30 ... +60 °C
HFD fluids	-
Water	+5 ... +100 °C
HETG (rape-seed oil)	–30 ... +80 °C
HEES (synth. ester)	–30 ... +80 °C
HEPG (glycol)	–30 ... +60 °C
Mineral greases	–30 ... +100 °C
Pressure	40 MPa
Running speed	5 m/s

The figures given are maximum values and must not be applied simultaneously.

Surface finish

Peak-to-valley heights	R_a	R_{max}
Sliding surface	0,05 ... 0,3 µm	<2,5 µm
Groove base	<1,6 µm	<6,3 µm
Groove sides	<3,0 µm	<15,0 µm

Material content Mr > 50 % to max. 90 %, with cut depth c = Rz/2 and reference line Cref = 0 %

The long term behavior of a sealing element and its dependability against early failures are crucially influenced by the quality of the counterface.

Therefore a precise description and assessment of the surface is critical.
Based on recent findings, we recommend supplementing the above definition of surface finish for the sliding surface by the characteristics detailed in the table below. With these new characteristics derived from the material content, previous more general descriptions of the material content are significantly improved, especially in regard to surface roughness.
See also *Merkel Technical Manual*.

Surface finish of the sliding surfaces

Characteristic value	Limit	
Ra	> 0,05µm	< 0,30µm
Rmax	< 2,5µm	
Rpkx	< 0,5µm	
Rpk	< 0,5µm	
Rk	>0,25µm	<0,7µm
Rvk	>0,2µm	<0,65µm
Rvkx	>0,2µm	<2,0µm

The limit values listed in the table do not currently apply for ceramic or semi-ceramic counterfaces.
See also *Merkel Technical Manual*.

Gap dimension

The dimension D2 is determined by factoring in the maximum permissible extrusion gap, the tolerances, the guide clearance and the deflection of the guide under load.
The maximum permissible extrusion gap with a one-sided position of the piston rod is significantly determined by the maximum operating pressure and the temperature-dependent dimensional stability of the seal material.
See also *Merkel Technical Manual*.

Profile dimension		Max. permissible gap dimension			
L	Profile	16 MPa	26 MPa	32 MPa	40 MPa
4,2	5,35	0,5	0,4	0,3	-
6,3	7,55	0,55	0,45	0,35	0,3
8,1	10,25	0,6	0,5	0,4	0,4
8,1	12	0,7	0,6	0,55	0,5

At an operating temperature of above 90°C, and simultaneous exposure to an operating pressure of more than 26 MPa, we recommend the use of the material compound PTFE B602 and PTFE C104.

Tolerances

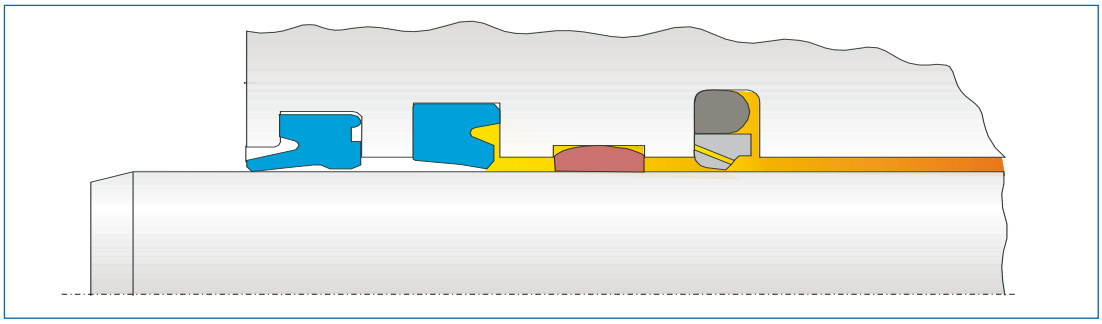
Diameter D	Tolerance
< 500	H8
> 500	H7

The tolerance for the diameter d and D2 is specified in connection with the gap dimension calculation. In typical hydraulic applications up to a nominal dimension of 1,000 mm, the tolerance fields f7 and f8 or H7 and H8 are usually chosen.

Installation & assembly

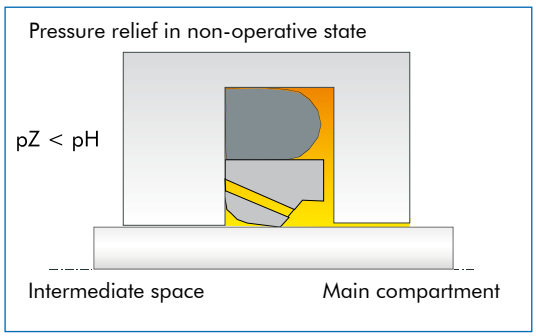
Reliable seal function is dependent on correct installation.
See also *Merkel Technical Manual*.

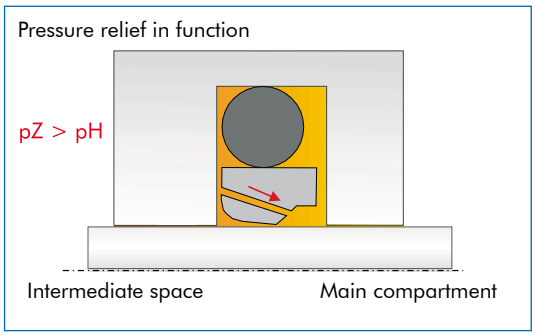
Functional principle



III. 2

The Omegat OMS-MR PR features an integrated pressure relief function. As soon as the pressure in the intermediate space pz becomes greater than the main-compartment pressure pH (caused, for example, by unfavorable velocity conditions during extension and retraction), the seal can be relied on to relieve the pressure. The sealing function of the Omegat OMS-MR PR corresponds to that of the field-proven Omegat seals.





pZ = pressure in the intermediate space; pH = pressure in main compartment

Additional product description for Omegat OMS-MR PR

Intermediate-space pressure

In operation, the space between the primary and secondary seals is filled with hydraulic medium after a few cycles. The further entry of media leads to an increase of the pressure in the intermediate space. If a U-packing is used as the secondary seal, then it will act as a volume compensator under pressure by reason of the mold-release volume, thus contributing towards reducing the general pressure level. Normally, the pressure in the intermediate space will settle at up to 5 MPa, in dependence on the operating parameters, and is then reduced again with a temporal offset to the main compartment's pressure during the return stroke.

Pressure build-up

In the case of a large stroke length (> 400 mm), and a high running speed (> 0.5 m/s) while the rod is being extended, but also as a consequence of vibrations and in the case of major differences in velocity in dependence on the direction of motion (v_{retr} greater than 8x v_{ext}), a comparatively larger volume of oil is released into the intermediate space under the sealing edge than comes out of it. If these or similar operating parameters apply, a significantly increased pressure level will be formed in the intermediate space. The higher pressure is reduced incompletely during the return stroke, and can be accumulated over a number of cycles. The pressure level can here rise continuously until it exceeds the operating pressure.
The increased pressure in the intermediate space results in an increased amount of friction.

The temperature rises, and thus not only fosters deformation of the PTFE Profile ring of the primary seal under load, but also reduces the extrusion resistance of the secondary seal. Because of the increased friction, moreover, intensified wear can be expected, and due to the frictional heat produced, accelerated aging of the hydraulic medium can also be anticipated.

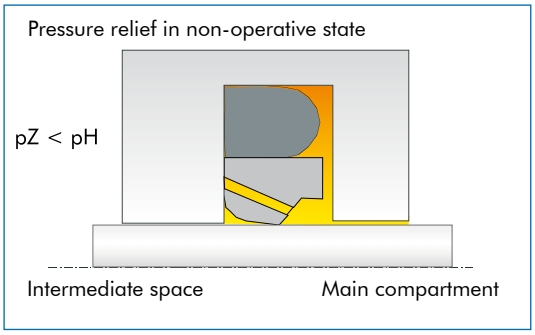
If, as a result of the above-mentioned phenomena, the pressure in the intermediate space is significantly higher than in the main compartment, then the prestressing element of the primary seal (O-ring) will be pushed towards the main compartment. The PTFE Profile ring of the primary seal is thereby twisted over the neutral position towards the main compartment; this movement causes the sealing edge to become gradually more rounded, and the sealing function of the primary seal is disturbed.

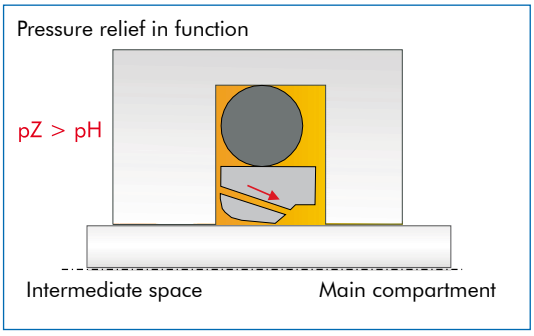
As this goes on, the profile ring may tilt completely to the main compartment, which will ultimately lead to extrusion of the primary and secondary seals, and thus to the system's failure. Leakage will only become visible outside the sealing system, when the secondary seal is no longer performing its function.

Pressure relief

Building successfully on the field-proven functionality of the Omegat series, the Omegat OMS-MR PR possesses a pressure-relief feature integrated into the Profile ring. As soon as the pressure in the intermediate space is greater than in the main compartment, the pressure-relief bore is opened, and can be relied on to relieve the pressure in the intermediate space down to the pressure in the main compartment. A lasting inclusion of overpressure in the intermediate space is not possible here.

In operation, the pressure in the main compartment is higher than in the intermediate space. The pressure-relief bore is closed in contact between the PTFE Profile ring and the wall of the compartment (Fig. 01). If the pressure in the intermediate space rises to a level above that in the main compartment, then the contact between the PTFE Profile ring and the wall is broken (Fig. 02). Since the pressure is equalized directly via the pressure-relief bore, the prestressing element remains on the side facing the intermediate space. The Profile ring will not tilt towards the main compartment.





pZ = pressure in the intermediate space; pH = pressure in main compartment

Fig. 01

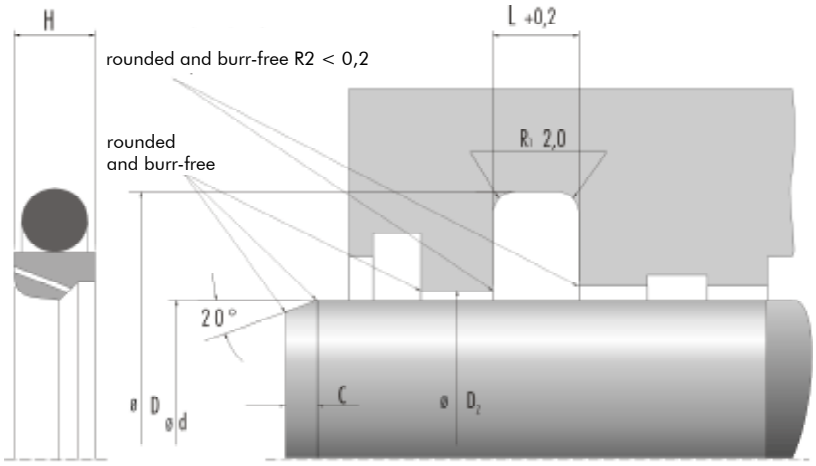
Fig. 02

With the patented pressure-relief feature, the pressure in the intermediate space is held independently of the operating conditions at a level favorable for continuous operation. By virtue of the low thermal and mechanical stress on the sealing elements, a stable long term behavior is achieved, and the sealing system's service life is extended.

The functionality of the pressure-relief feature renders the sealing system tolerant to the external influences acting on it during operation. Operating reliability is thus enhanced across the board by using the Omegat OMS-MR PR.

Using the Omegat OMS-MR PR makes an important contribution towards the reliability and long lifetimes of hydraulic cylinders.

Using the Omegat OMS-MR PR will eliminate downtimes caused by intermediate-space pressure, thus substantially reducing your complaint-related costs and cutting the amount of maintenance required by up to 30 %.

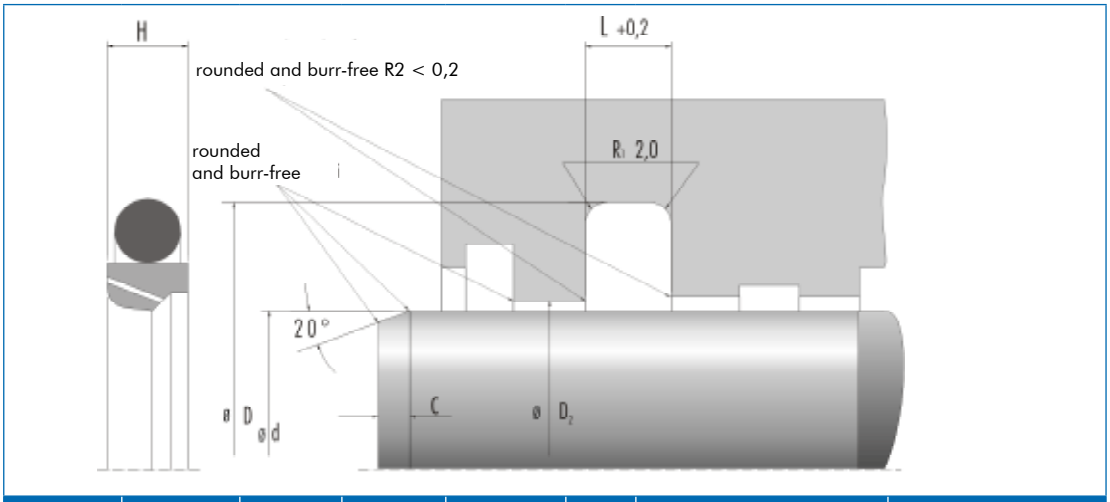


d	D	H	L	Profile	C	Material	Article No.
50	65,1	5,9	6,3	7,55	5,5	PTFE C104/NBR	49029429
50	65,1	5,9	6,3	7,55	5,5	PTFE GM201/NBR	49004614
55	70,1	5,9	6,3	7,55	5,5	PTFE C104/NBR	49019333
55	70,1	5,9	6,3	7,55	5,5	PTFE GM201/NBR	49014635
60	75,1	5,9	6,3	7,55	5,5	PTFE GM201/NBR	49012253
65	80,1	5,9	6,3	7,55	5,5	PTFE C104/NBR	49021364
70	85,1	5,9	6,3	7,55	5,5	PTFE C104/NBR	49017738
70	85,1	5,9	6,3	7,55	5,5	PTFE GM201/NBR	49008472
75	90,1	5,9	6,3	7,55	5,5	PTFE C104/NBR	49018476
75	90,1	5,9	6,3	7,55	5,5	PTFE GM201/NBR	49022320
80	95,1	5,9	6,3	7,55	5,5	PTFE GM201/NBR	49016403
85	100,1	5,9	6,3	7,55	5,5	PTFE C104/NBR	49018477
85	100,1	5,9	6,3	7,55	5,5	PTFE GM201/NBR	49018521
90	105,1	5,9	6,3	7,55	5,5	PTFE C104/NBR	49017739
95	110,1	5,9	6,3	7,55	5,5	PTFE C104/NBR	49021365
95	110,1	5,9	6,3	7,55	5,5	PTFE GM201/NBR	49023416
100	115,1	5,9	6,3	7,55	5,5	PTFE C104/NBR	49021366
100	115,1	5,9	6,3	7,55	5,5	PTFE GM201/NBR	49020572
105	120,1	5,9	6,3	7,55	5,5	PTFE GM201/NBR	49003864
110	125,1	5,9	6,3	7,55	5,5	PTFE C104/NBR	49017740
110	125,1	5,9	6,3	7,55	5,5	PTFE GM201/NBR	49012225
115	130,1	5,9	6,3	7,55	5,5	PTFE GM201/NBR	49018445
120	135,1	5,9	6,3	7,55	5,5	PTFE C104/NBR	49017277
120	135,1	5,9	6,3	7,55	5,5	PTFE GM201/NBR	49012945
125	140,1	5,9	6,3	7,55	5,5	PTFE C104/NBR	49017741
125	140,1	5,9	6,3	7,55	5,5	PTFE GM201/NBR	49010807

Further dimensions on request

d	D	H	L	Profile	C	Material	Article No.
130	145,1	5,9	6,3	7,55	5,5	PTFE C104/NBR	49036920
130	145,1	5,9	6,3	7,55	5,5	PTFE GM201/NBR	49012252
135	150,1	5,9	6,3	7,55	5,5	PTFE C104/NBR	49018331
140	155,1	5,9	6,3	7,55	5,5	PTFE C104/NBR	49024657
140	155,1	5,9	6,3	7,55	5,5	PTFE GM201/NBR	49004553
145	160,1	5,9	6,3	7,55	5,5	PTFE C104/NBR	49017742
150	165,1	5,9	6,3	7,55	5,5	PTFE C104/NBR	49020172
150	165,1	5,9	6,3	7,55	5,5	PTFE GM201/NBR	49005153
155	170,1	5,9	6,3	7,55	5,5	PTFE C104/NBR	49018944
160	175,1	5,9	6,3	7,55	5,5	PTFE C104/NBR	49017743
170	185,1	5,9	6,3	7,55	5,5	PTFE C104/NBR	49018943
170	185,1	5,9	6,3	7,55	5,5	PTFE GM201/NBR	49015207
180	195,1	5,9	6,3	7,55	5,5	PTFE C104/NBR	49017744
180	195,1	5,9	6,3	7,55	5,5	PTFE GM201/NBR	49023809
190	205,1	5,9	6,3	7,55	5,5	PTFE GM201/NBR	49023810
200	220,5	7,6	8,1	10,25	8	PTFE C104/NBR	49017745
200	220,5	7,6	8,1	10,25	8	PTFE GM201/NBR	49023811
210	230,5	7,6	8,1	10,25	8	PTFE C104/NBR	49015913
210	230,5	7,6	8,1	10,25	8	PTFE GM201/NBR	49023822
215	235,5	7,6	8,1	10,25	8	PTFE C104/NBR	49023880
220	240,5	7,6	8,1	10,25	8	PTFE C104/NBR	49017746
230	250,5	7,6	8,1	10,25	8	PTFE GM201/NBR	49004615
240	260,5	7,6	8,1	10,25	8	PTFE C104/NBR	49018772
250	270,5	7,6	8,1	10,25	8	PTFE C104/NBR	49017747
250	270,5	7,6	8,1	10,25	8	PTFE GM201/NBR	49009053
260	284	7,6	8,1	12	8	PTFE C104/NBR	49019084
265	289	7,6	8,1	12	8	PTFE C104/NBR	49017636
280	304	7,6	8,1	12	8	PTFE C104/NBR	49017748
295	319	7,6	8,1	12	8	PTFE C104/NBR	49017637
310	334	7,6	8,1	12	8	PTFE C104/NBR	49023881
320	344	7,6	8,1	12	8	PTFE C104/NBR	49024658
330	354	7,6	8,1	12	8	PTFE GM201/NBR	49004616
335	359	7,6	8,1	12	8	PTFE C104/NBR	49017638
340	364	7,6	8,1	12	8	PTFE C104/NBR	49021631
355	379	7,6	8,1	12	8	PTFE C104/NBR	49017750
360	384	7,6	8,1	12	8	PTFE C104/NBR	49024660
375	399	7,6	8,1	12	8	PTFE C104/NBR	49026725
380	404	7,6	8,1	12	8	PTFE C104/NBR	49017639

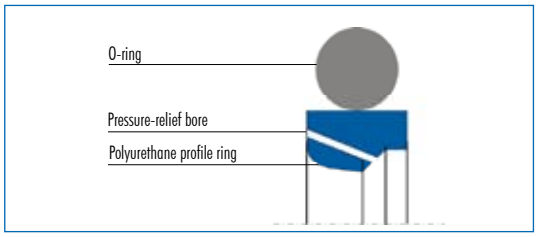
Further dimensions on request



d	D	H	L	Profile	C	Material	Article No.
400	424	7,6	8,1	12	8	PTFE C104/NBR	49017751
470	494	7,6	8,1	12	8	PTFE C104/NBR	49017641
530	554	7,6	8,1	12	8	PTFE GM201/NBR	49033643
545	569	7,6	8,1	12	8	PTFE C104/NBR	49035524
590	614	7,6	8,1	12	8	PTFE C104/NBR	49020078
600	642	7,6	8,1	12	8	PTFE C104/NBR	49017643
630	654	7,6	8,1	12	8	PTFE C104/NBR	49023709
670	697,3	8,7	9,5	13,65	11	PTFE C104/NBR	49017644
730	757,3	8,7	9,5	13,65	11	PTFE C104/NBR	49018768
750	777,3	8,7	9,5	13,65	11	PTFE C104/NBR	49017645

Further dimensions on request

Merkel Omegat OMSU-MR PR



Product description

Two-piece seal set for sealing piston rods, consisting of a Polyurethane Profile ring with an integrated pressure-relief function and an O-ring as the prestressing element.

Product advantages

- high operating reliability due to integrated pressure-relief feature

Material

Polyurethane profile ring

Material	Designation	Color
Polyurethane	95 AU V142	dark-blue

O-ring

Material	Designation
Nitrile rubber	NBR

Application

- can be used as an individual seal in conjunction with a double wiper
- operating pressure up to 16 MPa

Field of application

Material	95 AU V142/NBR
Hydraulic oils, HL, HLP	-30 ... +100 °C
HFA fluids	+5 ... +50 °C
HFB fluids	+5 ... +50 °C
HFC fluids	–30 ... +40 °C
HFD fluids	-
Water	+5 ... +50 °C
HETG (rape-seed oil)	–30 ... +60 °C
HEES (synth. ester)	–30 ... +80 °C
HEPG (glycol)	–30 ... +50 °C
Mineral greases	–30 ... +100 °C
Pressure	16 MPa
Running speed	0,5 m/s

The figures given are maximum values and must not be applied simultaneously.

Surface finish

Peak-to-valley heights	R_a	R_{max}
Sliding surface	0,05 ... 0,3 µm	<2,5 µm
Groove base	<1,6 µm	<6,3 µm
Groove sides	<3,0 µm	<15,0 µm

Material content Mr > 50 % to max. 90 %, with cut depth c = Rz/2 and reference line Cref = 0 %

The long term behavior of a sealing element and its dependability against early failures are crucially influenced by the quality of the counterface. Therefore a precise description and assessment of the surface is critical.

Based on recent findings, we recommend supplementing the above definition of surface finish for the sliding surface by the characteristics detailed in the table below. With these new characteristics derived from the material content, previous more general descriptions of the material content are significantly improved, especially in regard to surface roughness.
See also *Merkel Technical Manual*.

Surface finish of the sliding surfaces

Characteristic value	Limit	
Ra	> 0,05µm	< 0,30µm
Rmax	< 2,5µm	
Rpkx	< 0,5µm	
Rpk	< 0,5µm	
Rk	>0,25µm	<0,7µm
Rvk	>0,2µm	<0,65µm
Rvkx	>0,2µm	<2,0µm

The limit values listed in the table do not currently apply for ceramic or semi-ceramic counterfaces.

Gap dimension

The dimension D2 is determined by factoring in the maximum permissible extrusion gap, the tolerances, the guide clearance, the deflection of the guide under load, and the pipe expansion.
See also *Merkel Technical Manual*.

The maximum permissible extrusion gap with a one-sided position of the piston rod is significantly determined by the maximum operating pressure and the temperature-dependent dimensional stability of the seal material.

Profile dimension		Max. permissible gap dimension	
L	Profile	8 MPa	16 MPa
6,3	7,55	0,5	0,2
8,1	10,25	0,55	0,25
8,1	12	0,6	0,3
9,5	13,65	0,6	0,35

Tolerances

Diameter	Tolerance
D	H8

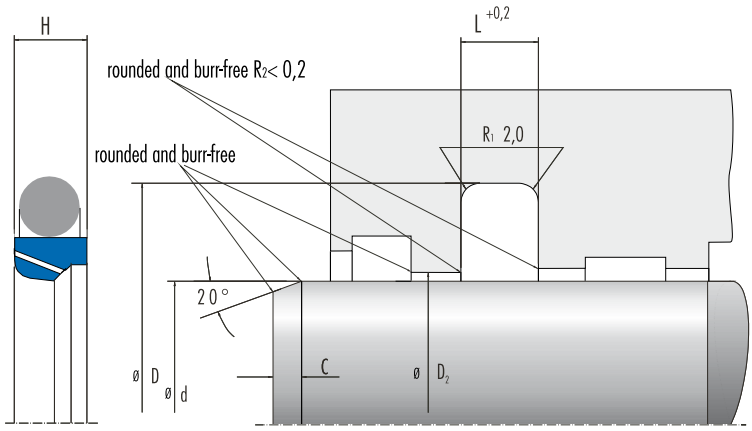
The tolerance for the diameters d and D2 is specified in connection with the gap dimension calculation. In typical hydraulic applications up to a nominal dimension of 1,000 mm, the tolerance fields f7 and f8 or H7 and H8 are usually chosen.

Design notes

Please note our general design remarks in the *Merkel Technical Manual*.

Installation & assembly

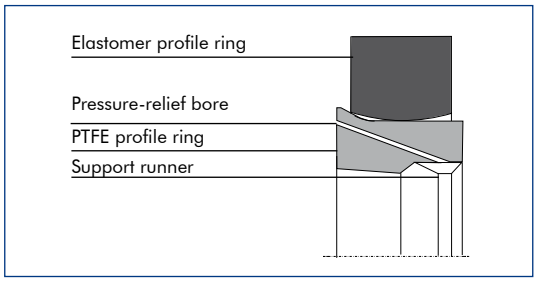
Reliable seal function is dependent on correct installation. *See also Merkel Technical Manual*



d	D	H	L	Profile	C	Material	Article No.
50	65,1	5,9	6,3	7,55	5,5	95 AU V142/NBR	49018575
55	70,1	5,9	6,3	7,55	5,5	95 AU V142/NBR	49018576
100	115,1	5,9	6,3	7,55	5,5	95 AU V142/NBR	49054300
105	120,1	5,9	6,3	7,55	5,5	95 AU V142/NBR	49017448
115	130,1	5,9	6,3	7,55	5,5	95 AU V142/NBR	49054301
140	155,1	5,9	6,3	7,55	5,5	95 AU V142/NBR	49022717
150	165,1	5,9	6,3	7,55	5,5	95 AU V142/NBR	49022718
180	195,1	5,9	6,3	7,55	5,5	95 AU V142/NBR	49023802
190	205,1	5,9	6,3	7,55	5,5	95 AU V142/NBR	49023803
200	220,5	7,6	8,1	10,25	8	95 AU V142/NBR	49023804
210	230,5	7,6	8,1	10,25	8	95 AU V142/NBR	49023806
230	250,5	7,6	8,1	10,25	8	95 AU V142/NBR	49028779
280	304,0	7,6	8,1	12	8	95 AU V142/NBR	49033851

Further dimensions on request.

Merkel Rod Seal OMS-S PR



Product description

Two-piece seal set for sealing piston rods, consisting of a PTFE profile ring with an integrated pressure-relief function, a support runner and an elastomer profile ring as the prestressing element (Patent No.: DE 10117662 CI)

Product advantages

- interchangeable with housings of the OMS-S series
- enhanced operating reliability of sealing systems with tough operating parameters (no continuous pressure build-up in the intermediate space)
- extended service life of sealing systems due to stable long term behavior (improved stability against twisting due to the support runner)
- high resistance to extrusion (large deformation volume of the PTFE profile ring)

Material

PTFE profile ring

Material	Designation	Color
PTFE-glass-fiber-MoS2 compound	PTFE GM201	light-gray
PTFE-carbon-fiber compound	PTFE C104	dark-gray

Elastomer profile ring

Material	Designation
Nitrile rubber	NBR

Other material combinations are available on request.

Applications

- Primary seal in a sealing system
- Long stroke (greater than 400 mm)
- High Running speed when the piston rod is extended (greater than 0.5 m/s)
- Sizeable velocity differences in dependence on the direction of motion (vext greater than 8x vretr)
- Fast pressure drop in the main compartment
- Large diameters (greater than 200 mm)

Field of application

Material	PTFE GM201/NBR PTFE C104/NBR
Hydraulic oils, HL, HLP	-30 ... +100 °C
HFA fluids	+5 ... +60 °C
HFB fluids	+5 ... +60 °C
HFC fluids	-30 ... +60 °C
HFD fluids	-
Water	+5 ... +100 °C
HETG (rape-seed oil)	–30 ... +80 °C
HEES (synth. ester)	–30 ... +80 °C
HEPG (glycol)	–30 ... +60 °C
Mineral greases	–30 ... +100 °C
Pressure	40 MPa
Running speed	5 m/s

The figures given are maximum values and must not be applied simultaneously.

Surface finish

Peak-to-valley heights	R_a	R_{max}
Sliding surface	0,05 ... 0,3 µm	<2,5 µm
Groove base	<1,6 µm	<6,3 µm
Groove sides	<3,0 µm	<15,0 µm

Material content Mr > 50 % to max. 90 %, with cut depth c = Rz/2 and reference line Cref = 0 %

The long term behavior of a sealing element and its dependability against early failures are crucially influenced by the quality of the counterface. Therefore a precise description and assessment of the surface is critical.
Based on recent findings, we recommend supplementing the above definition of surface finish for the sliding surface by the characteristics detailed in the table below. With these new characteristics derived from the material content, the hitherto merely general description of the material content previous more general descriptions of the material content are significantly improved, especially in regard to surface roughness. *See also Merkel Technical Manual.*

Surface finish of the sliding surfaces

Characteristic value	Limit	
Ra	> 0,05µm	< 0,30µm
Rmax	< 2,5µm	
Rpkx	< 0,5µm	
Rpk	< 0,5µm	
Rk	>0,25µm	<0,7µm
Rvk	>0,2µm	<0,65µm
Rvkx	>0,2µm	<2,0µm

The limit values listed in the table do not currently apply for ceramic or semi-ceramic counterfaces.
See also Merkel Technical Manual.

Gap dimension

The dimension D2 is determined by factoring in the maximum permissible extrusion gap, the tolerances, the guide clearance, the deflection of the guide under load, and the pipe expansion.
The maximum permissible extrusion gap with a one-sided position of the piston rod is significantly determined by the maximum operating pressure and the temperature-dependent dimensional stability of the seal material. *See also Merkel Technical Manual.*

Profile dimension		Max. permissible gap dimension			
L	Profile	16 MPa	26 MPa	32 MPa	40 MPa
12,5	12,5	0,75	0,65	0,55	0,5
15	15	0,75	0,65	0,55	0,5
17,5	17,5	0,75	0,65	0,55	0,5
20	20	0,8	0,7	0,6	0,55

At an operating temperature of above 90°C, and simultaneous exposure to an operating pressure of more than 26 MPa, we recommend the use of the material compounds PTFE B602 and PTFE C104.

Tolerances

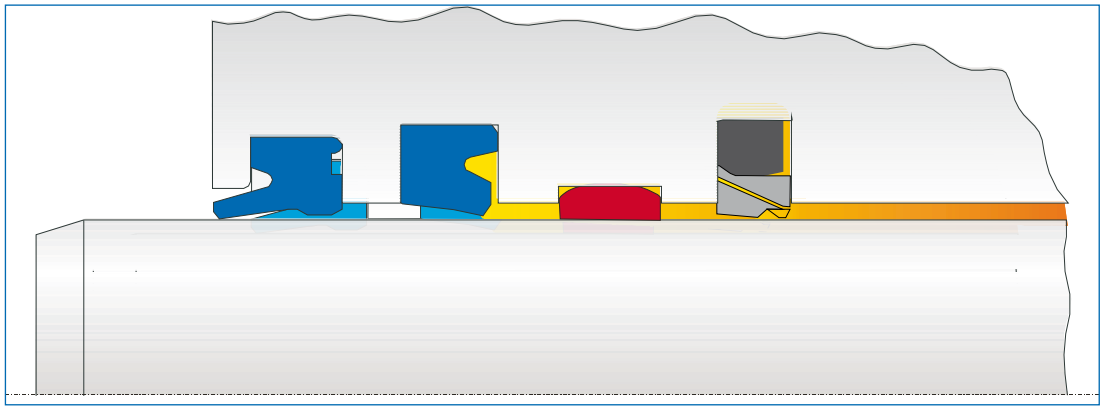
Diameter	Tolerance
D	H7

The tolerance for the diameters d and D2 is specified in connection with the gap dimension calculation. In typical hydraulic applications up to a nominal dimension of 1,000 mm, the tolerance fields f7 and f8 or H7 and H8 are usually chosen.

Design notes
Please note our general design remarks in the *Merkel Technical Manual*.

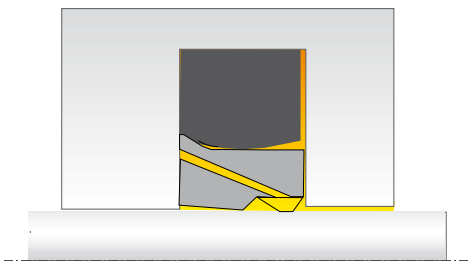
Installation & assembly
Reliable seal function is dependent on correct installation. See also Merkel Technical Manual
See also *Merkel Technical Manual*.

Functional principle

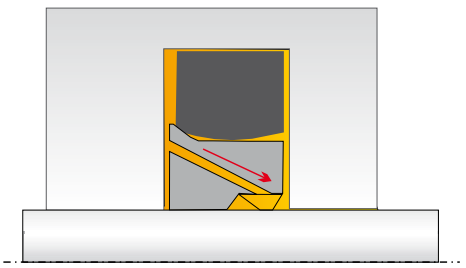


The Omegat OMS-S PR features an integrated pressure relief function. As soon as the pressure in the intermediate space pz becomes greater than the main-compartment pressure pH (caused, for example, by unfavorable velocity conditions during extension and retraction), the seal can be relied on to relieve the pressure. The sealing function of the Omegat OMS-S PR corresponds to that of the field-proven Omegat seals.

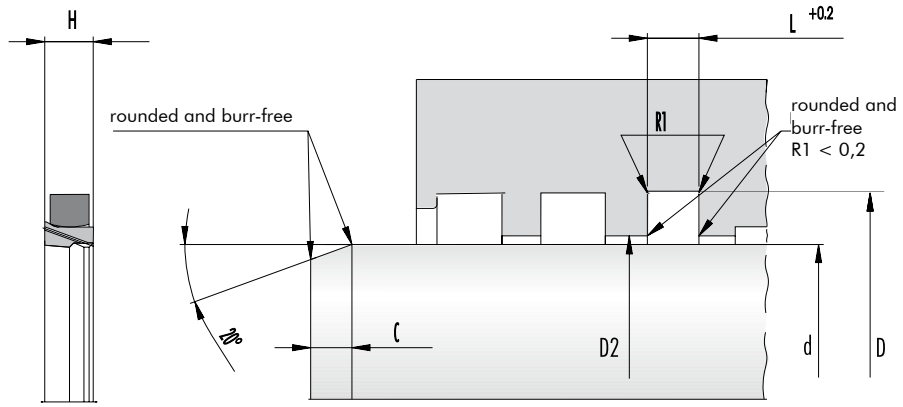
Position in compartment – operation relief
pZ < pH



Position in compartment during pressure
pZ > pH

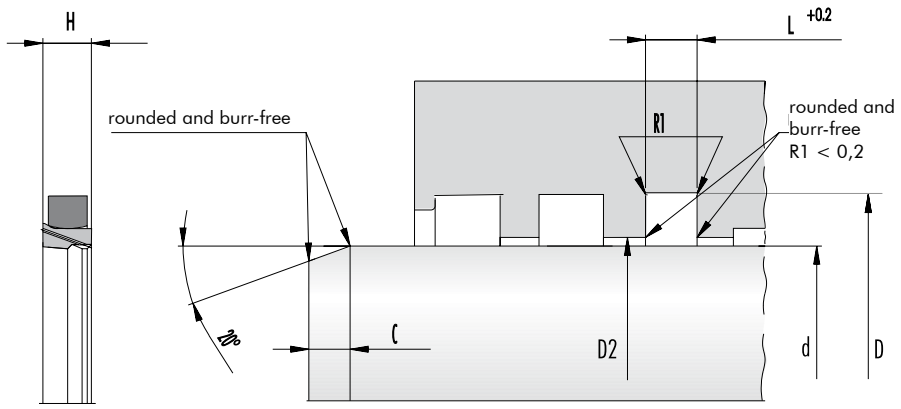


pZ = pressure in the intermediate space; pH = pressure in main compartment



d	D	H	L	Profile	C	R1	Material	Article No
320	350	14	15	15	12	0,8	PTFE GM201/NBR	49003542
340	370	14	15	15	12	0,8	PTFE GM201/NBR	530525
350	380	14	15	15	12	0,8	PTFE C104/NBR	49040590
360	390	14	15	15	12	0,8	PTFE GM201/NBR	49035736
380	410	14	15	15	12	0,8	PTFE GM201/NBR	49027663
400	430	14	15	15	12	0,8	PTFE GM201/NBR	49017441
410	440	14	15	15	12	0,8	PTFE GM201/NBR	49045104
420	450	14	15	15	12	0,8	PTFE GM201/NBR	49010869
450	480	14	15	15	12	0,8	PTFE GM201/NBR	49017442
490	520	14	15	15	12	0,8	PTFE GM201/NBR	49022435
500	530	14	15	15	12	0,8	PTFE GM201/NBR	49008121
530	565	16,4	17,5	17,5	12	1,2	PTFE GM201/NBR	49026032
540	575	16,4	17,5	17,5	12	1,2	PTFE GM201/NBR	49030424
570	605	16,4	17,5	17,5	12	1,2	PTFE GM201/NBR	49017443
570	605	16,4	17,5	17,5	12	1,2	PTFE C104/NBR	49024945
580	615	16,4	17,5	17,5	12	1,2	PTFE GM201/NBR	49015661
620	655	16,4	17,5	17,5	12	1,2	PTFE GM201/NBR	49014784
620	655	16,4	17,5	17,5	12	1,2	PTFE C104/NBR	49027857
640	675	16,4	17,5	17,5	12	1,2	PTFE C104/NBR	49046152
680	715	16,4	17,5	17,5	12	1,2	PTFE GM201/NBR	49026183
710	750	18,7	20	20	12	1,2	PTFE GM201/NBR	49017446
720	760	18,7	20	20	12	1,2	PTFE GM201/NBR	49004522
730	770	18,7	20	20	12	1,2	PTFE GM201/NBR	49015650
780	820	18,7	20	20	12	1,2	PTFE GM201/NBR	49032356
790	830	18,7	20	20	12	1,2	PTFE GM201/NBR	49015649
800	840	18,7	20	20	12	1,2	PTFE GM201/NBR	49015797

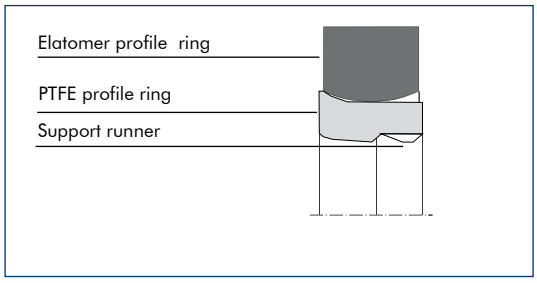
Further dimensions on request.



d	D	H	L	Profile	C	R1	Material	Article No
830	870	18,7	20	20	12	1,2	PTFE GM201/NBR	49003543
900	940	18,7	20	20	12	1,2	PTFE GM201/NBR	49006257
920	960	18,7	20	20	12	1,2	PTFE GM201/NBR	49011973
940	980	18,7	20	20	12	1,2	PTFE GM201/NBR	49022200
960	1000	18,7	20	20	12	1,2	PTFE GM201/NBR	49021789
990	1030	18,7	20	20	12	1,2	PTFE C104/NBR	49045107
1000	1040	18,7	20	20	12	1,2	PTFE GM201/NBR	49017447

Further dimensions on request.

Merkel Rod Seal OMS-S SR



Product description

Two-piece seal set for sealing piston rods, consisting of a PTFE profile ring, a support runner and an elastomer profile ring as the prestressing element.

Product advantages

- can be used as an individual seal in a sealing system with a double wiper (short-stroke)
- stable long term behavior due to high stability against twisting (support runner)
- consistently high sealing effect due to optimized force flow to the sealing edge (elastomer profile ring)
- high resistance to extrusion (large deformation volume)
- shaft-friendly seal material

Material

PTFE profile ring

Material	Designation	Color
PTFE-glass-fiber-MoS2 compound	PTFE GM201	light-gray
PTFE-carbon-fiber compound	PTFE C104	dark-gray

Elastomer profile ring

Material	Designation
Nitrile rubber	NBR

Other material combinations available on request.

Applications

- Short stroke (up to 10 mm)
- Diameters from 310 mm

Field of application

Material	PTFE GM201/NBR PTFE C104/NBR
Hydraulic oils, HL, HLP	-30 ... +100 °C
HFA fluids	+5 ... +60 °C
HFB fluids	+5 ... +60 °C
HFC fluids	-30 ... +60 °C
HFD fluids	-
Water	+5 ... +100 °C
HETG (rape-seed oil)	–30 ... +80 °C
HEES (synth. ester)	–30 ... +80 °C
HEPG (glycol)	–30 ... +60 °C
Mineral greases	–30 ... +100 °C
Pressure	40 MPa
Running speed	5 m/s

The figures given are maximum values and must not be applied simultaneously.

Surface finish

Peak-to-valley heights	R_a	R_{max}
Sliding surface	0,05 ... 0,3 µm	<2,5 µm
Groove base	<1,6 µm	<6,3 µm
Groove sides	<3,0 µm	<15,0 µm

Material content Mr > 50 % to max. 90 %, with cut depth c = Rz/2 and reference line Cref = 0 %

The long term behavior of a sealing element and its dependability against early failures are crucially influenced by the quality of the counterface. Therefore a precise description and assessment of the surface is critical.

Based on recent findings, we recommend supplementing the above definition of surface finish for the sliding surface by the characteristics detailed in the table below. With these new characteristics derived from the material content, previous more general descriptions of the material content are significantly improved, especially in regard to surface roughness. *See also Merkel Technical Manual.*

Surface finish sliding surfaces

Characteristic value	Limit	
Ra	> 0,05µm	< 0,30µm
Rmax	< 2,5µm	
Rpkx	< 0,5µm	
Rpk	< 0,5µm	
Rk	>0,25µm	<0,7µm
Rvk	>0,2µm	<0,65µm
Rvkx	>0,2µm	<2,0µm

The limit values listed in the table do not currently apply for ceramic or semi-ceramic counterfaces.
See also *Merkel Technical Manual*.
- Hardness of the counter surface55 – 60 HRC at a hardness penetration depth of > 0.5 mm.

Gap dimension

The dimension D2 is determined by factoring in the maximum permissible extrusion gap, the tolerances, the guide clearance, the deflection of the guide under load, and the pipe expansion (see also Merkel Technical Manual). The maximum permissible extrusion gap with a one-sided position of the piston rod is significantly determined by the maximum operating pressure and the temperature-dependent dimensional stability of the seal material.

Profile dimension		Max. permissible gap dimension			
L	Profile	16 MPa	26 MPa	32 MPa	40 MPa
12,5	12,5	0,75	0,65	0,55	0,5
15	15	0,75	0,65	0,55	0,5
17,5	17,5	0,75	0,65	0,55	0,5
20	20	0,8	0,7	0,6	0,55

At an operating temperature of above 90°C, and simultaneous exposure to an operating pressure of more than 26 MPa, we recommend the use of the material PTFE C104.

Tolerances

Diameter	Tolerance
D	H7

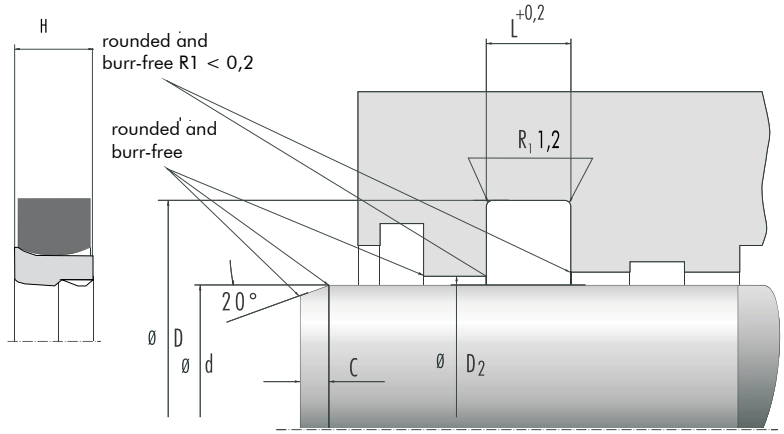
The tolerance for the diameters d and D2 is specified in connection with the gap dimension calculation. In typical hydraulic applications up to a nominal dimension of 1,000 mm, the tolerance fields f7 and f8 or H7 and H8 are usually chosen.

Design notes

Please note our general design remarks in the *Merkel Technical Manual*.

Installation & assembly

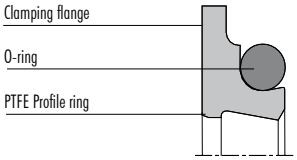
Reliable seal function is dependent on correct installation. See also Merkel Technical Manual
See also Merkel Technical Manual.



d	D	H	L	Profile	C	Material	Article No.
320	350	14	15	15	12	PTFE GM201/NBR	49010399
335	365	14	15	15	12	PTFE GM201/NBR	49008977
360	390	14	15	15	12	PTFE GM201/NBR	49009466
380	410	14	15	15	12	PTFE GM201/NBR	49019719
400	430	14	15	15	12	PTFE GM201/NBR	49012521
410	440	14	15	15	12	PTFE GM201/NBR	49019718
420	450	14	15	15	12	PTFE GM201/NBR	49008823
445	475	14	15	15	12	PTFE GM201/NBR	49004006
465	495	14	15	15	12	PTFE GM201/NBR	49009445
475	505	14	15	15	12	PTFE GM201/NBR	49012522
495	525	14	15	15	12	PTFE GM201/NBR	49010395
520	555	16,4	17,5	17,5	12	PTFE GM201/NBR	49008976
525	560	16,4	17,5	17,5	12	PTFE GM201/NBR	49012523
570	605	16,4	17,5	17,5	12	PTFE GM201/NBR	49009446
585	620	16,4	17,5	17,5	12	PTFE GM201/NBR	49012524
635	670	16,4	17,5	17,5	12	PTFE GM201/NBR	49012440
675	710	16,4	17,5	17,5	12	PTFE GM201/NBR	49012441
745	785	18,7	20	20	12	PTFE GM201/NBR	49012492
815	855	18,7	20	20	12	PTFE GM201/NBR	49012493
820	860	20	20	20	12	PTFE GM201/NBR	00528717
910	950	18,7	20	20	12	PTFE GM201/NBR	49012494

Further dimensions on request.

Merkel Omegat OMS-DR HB



Product description

Two-piece rod seal set, consisting of a PTFE profile ring with a retaining flange for securing it against turning and an O-ring as the prestressing element.

Product advantages

- Secured against turning during redational movements by axial clamping to the retaining flange
- High operating reliability due to sturdy profile ring made of PTFE compound
- High resistance to extrusion due to choice of appropriate materials (frictional heat)
- Not affected by air in the hydraulic system (installation)
- Very good sealing effect for linear and rotational movements
- Shaft-friendly seal material

Material

PTFE profile ring

Material	Designation	Color
PTFE-carbon-fiber compound	PTFE C 104	dark-gray

O-ring

Material	Designation
Fluoroelastomer	FKM

Other material combinations on request.

Applications

- Combined rotary-linear movements
- Redational movements
- Swiveling movements

Field of application

Material	PTFE C104/FKM
Hydraulic oils, HL, HLP	-10° ... +200° C
HFA fluids	+5° ... +60° C
HFB fluids	+5° ... +60° C
HFC fluids	–10° ... +40° C
HFD fluids	-10° ... +200° C
Water	+5° ... +100° C
HETG (rape-seed oil)	–10° ... +80° C
HEES (synth. ester)	–10° ... +100° C
HEPG (glycol)	–10° ... +80° C
Mineral greases	–10° ... +200° C
Pressure	26 MPa
Running speed	5 m/s

The figures given are maximum values and must not be applied simultaneously.

Especially in the event of redational movements, the permissible limit values are crucially influenced by the entry and removal of the frictional energy (heat). Given an oil temperature (tank) of T = 60°C, the following load collectives are possible (example):

Movement	Pressure (MPa)	Running speed (m/s)	Duration (s)
Static	26	-	300
Linear movement (no rotation)	26	0,5	-
Rotation (no linear movement)	3	3	30
Rotary-linear movement	3	4	30

We will be pleased to advise you.

Surface finish

Peak-to-valley heights	R_a	R_{max}
Sliding surface	0,05 ... 0,3 µm	<2,5 µm
Groove base	<1,6 µm	<6,3 µm
Groove sides	<3,0 µm	<15,0 µm

Material content Mr > 50 % to max. 90 %, with cut depth c = Rz/2 and reference line Cref = 0 %

The long term behavior of a sealing element and its dependability against early failures are crucially influenced by the quality of the counterface. Therefore a precise description and assessment of the surface is critical.

Based on recent findings, we recommend supplementing the above definition of surface finish for the sliding surface by the characteristics detailed in the table below. With these new characteristics derived from the material content, previous more general descriptions of the material content are significantly improved, especially in regard to surface roughness. See also *Merkel Technical Manual*.

Surface finish of the sliding surfaces

Characteristic value	Limit	
Ra	> 0,05µm	< 0,30µm
Rmax	< 2,5µm	
Rpkx	< 0,5µm	
Rpk	< 0,5µm	
Rk	>0,25µm	<0,7µm
Rvk	>0,2µm	<0,65µm
Rvkx	>0,2µm	<2,0µm

The limit values listed in the table do not currently apply for ceramic or semi-ceramic counter-running surfaces.
- Hardness of the counter surface55 – 60 HRC at a hardness penetration depth of > 0.5 mm.
- In applications with a purely redational or swiveling movement, the running area should be achieved by plunge grinding

See also *Merkel Technical Manual*.

Gap dimension

The dimension D2 is determined by factoring in the maximum permissible extrusion gap, the tolerances, the guide clearance, and the deflection of the guide under load.
The maximum permissible extrusion gap with a one-sided position of the piston rod is significantly determined by the maximum operating pressure and the temperature-dependent dimensional stability of the seal material.
See also *Merkel Technical Manual*.

Profile dimension		Max. permissible gap dimension			
L	Profile	16 MPa	26 MPa	32 MPa	40 MPa
7,1	5,25	0,55	0,45	-	-
9,5	7	0,6	0,5	-	-

Tolerances

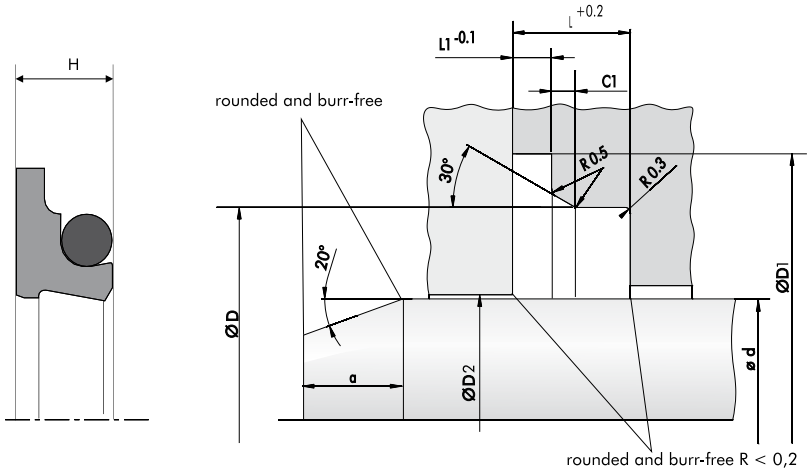
Diameter	Tolerance
D	H8
D_1	+0,1

The tolerance for the diameters d and D2 is specified in connection with the gap dimension calculation. In typical hydraulic applications up to a nominal dimension of 1,000 mm, the tolerance fields f7 and f8 or H7 and H8 are usually chosen.

Design notes
For installation, an axially accessible housing is required.
The radial mobility in the vicinity of the seal should not be greater than +/- 0.1 mm.
Radial movement at a high frequency may lead to impairment of the sealing effect.
Please note our general design remarks in the *Merkel Technical Manual*.

Installation & assembly
For an optimum result, the installation sequence described below should be complied with.
- Fit O-ring on the PTFE profile ring.
- Insert seal set (profile ring with O-ring) into the housing, with the O-ring in front.
- Loosely pre-mount the cover plate.
- Install and align the piston rod.
- Tighten the cover plate with tightening screws evenly (crosswise).

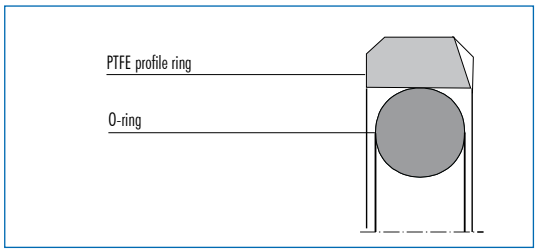
Please note our general remarks on hydraulic seal assembly in the *Merkel Technical Manual*.



d	D	D1	H	L	L1	Profile	C	C1	Material	Article No.
50	60,5	67,5	6	7,1	1,8	5,25	6	1,4	PTFE C104/FKM	49039487
55	65,5	72,5	6	7,1	1,8	5,25	6	1,4	PTFE C104/FKM	49029740
60	70,5	77,5	6	7,1	1,8	5,25	6	1,4	PTFE C104/FKM	49039488
65	75,5	82,5	6	7,1	1,8	5,25	6	1,4	PTFE C104/FKM	49039489
70	80,5	87,5	6	7,1	1,8	5,25	6	1,4	PTFE C104/FKM	49013105
80	90,5	97,5	6	7,1	1,8	5,25	6	1,4	PTFE C104/FKM	49018110
90	100,5	107,5	6	7,1	1,8	5,25	6	1,4	PTFE C104/FKM	49026577
100	110,5	117,5	6	7,1	1,8	5,25	6	1,4	PTFE C104/FKM	49034130
105	115,5	122,5	6	7,1	1,8	5,25	6	1,4	PTFE C104/FKM	49017975
120	130,5	137,5	6	7,1	1,8	5,25	6	1,4	PTFE C104/FKM	49020657
145	155,5	162,5	6	7,1	1,8	5,25	6	1,4	PTFE C104/FKM	49018107
170	184	192	8,6	9,5	2,8	7	8	1,6	PTFE C104/FKM	00530170
185	195,5	202,5	6	7,1	1,8	5,25	6	1,4	PTFE C104/FKM	49030376
190	200,5	207,5	6	7,1	1,8	5,25	6	1,4	PTFE C104/FKM	49018363
190	204	212	8,6	9,5	2,8	7	8	1,6	PTFE C104/FKM	00530171
220	234	242	8,6	9,5	2,8	7	8	1,6	PTFE C104/FKM	00530172
280	294	302	8,6	9,5	2,8	7	8	1,6	PTFE C104/FKM	00530173
315	329	337	8,6	9,5	2,8	7	8	1,6	PTFE C104/FKM	00530174
340	354	362	8,6	9,5	2,8	7	8	1,6	PTFE C104/FKM	00530175
380	394	402	8,6	9,5	2,8	7	8	1,6	PTFE C104/FKM	00530176

Further dimensions on request.

Merkel Omegat OMK-MR



Product description

Two-piece seal set for sealing pistons, consisting of a PTFE profile ring and an O-ring as the prestressing element.

Product advantages

- enhanced operating reliability with tough operating parameters
- no „blow by“ with fast load changes, due to pressure activation grooves
- very good pressure resistance capability and hardness
- good thermal conductivity
- high resistance to abrasion
- low friction, stick-slip-free

Material

PTFE profile ring

Material	Designation	Color
PTFE-glass-fiber-MoS2 compound	PTFE GM201	light-gray
PTFE-carbon-fiber compound	PTFE C104	dark-gray

Other material combinations are available on request.

Material

O-ring

Material	Designation
Nitrile rubber	NBR

Other material combinations are available on request.

Application

The OMK-MR is used with pistons stressed from both sides in:
injection-molding machines, presses, agricultural machinery, truck loading cranes, control and regulating devices, rolling mills, handling equipment, marine hydraulics.

Field of application

Material	PTFE GM201/NBR PTFE C104/NBR
Hydraulic oils, HL, HLP	-30 ... +100 °C
HFA fluids	+5 ... +60 °C
HFB fluids	+5 ... +60 °C
HFC fluids	–30 ... +60 °C
HFD fluids	-
Water	+5 ... +100 °C
HETG (rape-seed oil)	–30 ... +80 °C
HEES (synth. ester)	–30 ... +80 °C
HEPG (glycol)	–30 ... +60 °C
Mineral greases	–30 ... +100 °C
Pressure	40 MPa
Running speed	5 m/s

The figures given are maximum values and must not be applied simultaneously.

Surface finish

Peak-to-valley heights	R_a	R_{max}
Sliding surface	0,05 … 0,3 µm	<2,5 µm
Groove base	<1,6 µm	<6,3 µm
Groove sides	<3,0 µm	<15,0 µm

Material content Mr > 50 % to max. 90 %, with cut depth c = Rz/2 and reference line Cref = 0 %

The long term behavior of a sealing element and its dependability against early failures are crucially influenced by the quality of the counterface. Therefore a precise description and assessment of the surface is critical.
Based on recent findings, we recommend supplementing the above definition of surface finish for the sliding surface by the characteristics detailed in the table below. With these new characteristics derived from the material content, previous more general descriptions of the material content are significantly improved, especially in regard to surface roughness *See also Merkel Technical Manual*.

Surface finish of the sliding surfaces

Characteristic value	Limit	
Ra	> 0,05µm	< 0,30µm
Rmax	< 2,5µm	
Rpkx	< 0,5µm	
Rpk	< 0,5µm	
Rk	>0,25µm	<0,7µm
Rvk	>0,2µm	<0,65µm
Rvkx	>0,2µm	<2,0µm

The limit values listed in the table do not currently apply for ceramic or semi-ceramic counterfaces.

Gap dimension

The dimension d2 is determined by factoring in the maximum permissible extrusion gap, the tolerances, the guide clearance, the deflection of the guide under load, and the pipe expansion. (See also Merkel Technical Manual).
The maximum permissible extrusion gap with a one-sided position of the piston is significantly determined by the maximum operating pressure and the temperature-dependent dimensional stability of the seal material.

Profile dimension		Max. permissible gap dimension			
L	Profile	16 MPa	26 MPa	32 MPa	40 MPa
2,2	2,45	0,35	0,3	–	–
3,2	3,75	0,4	0,35	–	–
4,2	5,5	0,5	0,4	0,3	–
6,3	7,75	0,55	0,45	0,4	0,35
8,1	10,5	0,6	0,5	0,45	0,45
8,1	12,25	0,7	0,6	0,55	0,5
9,5	14,0	0,75	0,65	0,6	0,55

At an operating temperature of above 90°C, and simultaneous exposure to an operating pressure of more than 26 MPa, we recommend the use of the material compound PTFE B602 and PTFE C104.

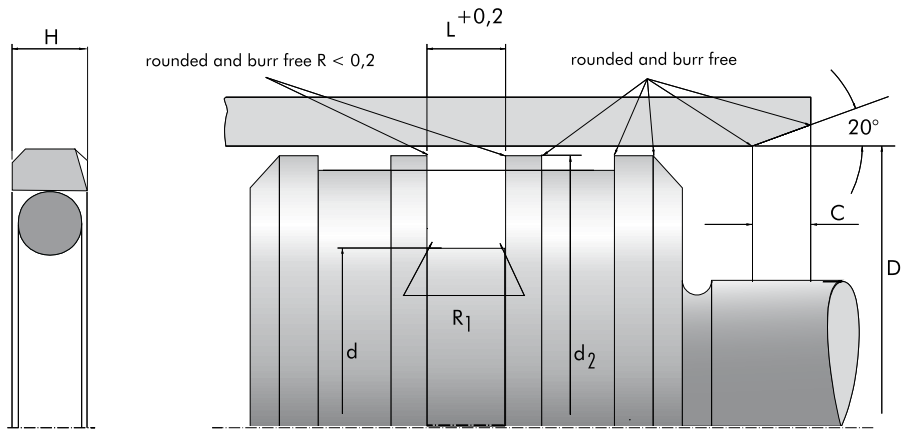
Tolerances

Diameter d	Tolerance
< 500	h8
> 500	h7

The tolerance for the diameters D and d2 is specified in connection with the gap dimension calculation. In typical hydraulic applications up to a nominal dimension of 1,000 mm, the tolerance fields f7 and f8 or H7 and H8 are usually chosen.

Design notes
Please note our general design remarks in the *Merkel Technical Manual*.

Installation & assembly
Please note our general remarks on hydraulic seal assembly in the *Merkel Technical Manual*.

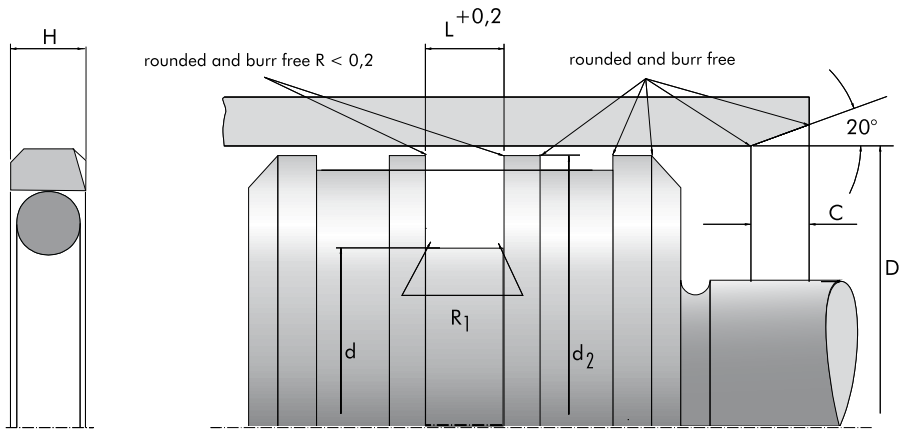


D	d	H	L	Profile	C	R1	Material	Article No.
70	59	4	4,2	5,5	6,0	0,8	PTFE GM201 /NBR	24131860
70	59	4	4,2	5,5	6,0	0,8	PTFE C104/NBR	49021488
70	54,5	5,9	6,3	7,75	8,0	1,2	PTFE GM201/NBR	24131887
70	54,5	5,9	6,3	7,75	8,0	1,2	PTFE C104/NBR	49030513
75	64	4	4,2	5,5	6,0	0,8	PTFE GM201/NBR	24145486
75	59,5	5,9	6,3	7,75	8,0	1,2	PTFE GM201/NBR	24213523
80	64,5	5,9	6,3	7,75	8,0	1,2	PTFE GM201/NBR	24101263
80	64,5	5,9	6,3	7,75	8,0	1,2	PTFE C104/NBR	49018495
80	59	7,7	8,1	10,5	10,5	2,0	PTFE GM201/NBR	24131888
85	69,5	5,9	6,3	7,75	8,0	1,2	PTFE GM201/NBR	24223623
85	69,5	5,9	6,3	7,75	8,0	1,2	PTFE C104/NBR	49054674
85	64	7,7	8,1	10,5	10,5	2,0	PTFE GM201/NBR	24213524
90	74,5	5,9	6,3	7,75	8,0	1,2	PTFE GM201/NBR	24131861
90	74,5	5,9	6,3	7,75	8,0	1,2	PTFE C104/NBR	49018496
90	69	7,7	8,1	10,5	10,5	2,0	PTFE GM201/NBR	24131889
95	79,5	5,9	6,3	7,75	8,0	1,2	PTFE GM201/NBR	24199482
95	79,5	5,9	6,3	7,75	8,0	1,2	PTFE C104/NBR	49000291
95	74	7,7	8,1	10,5	10,5	2,0	PTFE GM201/NBR	24075603
100	89	4	4,2	5,5	6,0	0,8	PTFE GM201/NBR	24328829
100	84,5	5,9	6,3	7,75	8,0	1,2	PTFE GM201/NBR	24107904
100	84,5	5,9	6,3	7,75	8,0	1,2	PTFE C104/NBR	49002075
100	79	7,7	8,1	10,5	10,5	2,0	PTFE GM201/NBR	24077512
105	89,5	5,9	6,3	7,75	8,0	1,2	PTFE GM201/NBR	24187281
105	89,5	5,9	6,3	7,75	8,0	1,2	PTFE C104/NBR	49018497
110	94,5	5,9	6,3	7,75	8,0	1,2	PTFE GM201/NBR	24131862
110	94,5	5,9	6,3	7,75	8,0	1,2	PTFE C104/NBR	49020706

Further dimensions on request.

D	d	H	L	Profile	C	R1	Material	Article No.
110	89	7,7	8,1	10,5	10,5	2,0	PTFE GM201/NBR	24077514
112	91	7,7	8,1	10,5	10,5	2,0	PTFE C104/NBR	49054805
115	99,5	5,9	6,3	7,75	8,0	1,2	PTFE GM201/NBR	24131863
115	94	7,7	8,1	10,5	10,5	2,0	PTFE GM201/NBR	24131890
120	104,5	5,9	6,3	7,75	8,0	1,2	PTFE GM201/NBR	24186464
120	104,5	5,9	6,3	7,75	8,0	1,2	PTFE C104/NBR	49018498
120	99	7,7	8,1	10,5	10,5	2,0	PTFE GM201/NBR	24199999
122	106,5	5,9	6,3	7,75	8,0	1,2	PTFE C104/NBR	49055074
125	109,5	5,9	6,3	7,75	8,0	1,2	PTFE GM201/NBR	24109478
125	109,5	5,9	6,3	7,75	8,0	1,2	PTFE C104/NBR	49000292
125	104	7,7	8,1	10,5	10,5	2,0	PTFE GM201/NBR	24093346
130	114,5	5,9	6,3	7,75	8,0	1,2	PTFE GM201/NBR	24145852
130	114,5	5,9	6,3	7,75	8,0	1,2	PTFE C104/NBR	49041763
130	109	7,7	8,1	10,5	10,5	2,0	PTFE GM201/NBR	24077517
140	119	7,7	8,1	10,5	10,5	2,0	PTFE GM201/NBR	24075607
140	119	7,7	8,1	10,5	10,5	2,0	PTFE C104/NBR	49000293
149	128	7,7	8,1	10,5	10,5	2,0	PTFE C104/NBR	49000294
150	129	7,7	8,1	10,5	10,5	2,0	PTFE GM201/NBR	24075609
150	129	7,7	8,1	10,5	10,5	2,0	PTFE C104/NBR	49018499
160	139	7,7	8,1	10,5	10,5	2,0	PTFE GM201/NBR	24075673
160	139	7,7	8,1	10,5	10,5	2,0	PTFE C104/NBR	49018500
170	149	7,7	8,1	10,5	10,5	2,0	PTFE GM201/NBR	24131864
175	154	7,7	8,1	10,5	10,5	2,0	PTFE C104/NBR	49012838
180	159	7,7	8,1	10,5	10,5	2,0	PTFE GM201/NBR	24131865
180	159	7,7	8,1	10,5	10,5	2,0	PTFE C104/NBR	49000295
190	169	7,7	8,1	10,5	10,5	2,0	PTFE GM201/NBR	24131866
200	179	7,7	8,1	10,5	10,5	2,0	PTFE GM201 /NBR	24131867
210	189	7,7	8,1	10,5	10,5	2,0	PTFE GM201/NBR	24138658
210	189	7,7	8,1	10,5	10,5	2,0	PTFE C104/NBR	49036993
215	194	7,7	8,1	10,5	10,5	2,0	PTFE C104/NBR	49000267
220	199	7,7	8,1	10,5	10,5	2,0	PTFE GM201/NBR	24131868
220	199	7,7	8,1	10,5	10,5	2,0	PTFE C104/NBR	49045372
224	204	7,7	8,1	10,5	10,5	2,0	PTFE C104/NBR	49037026
230	209	7,7	8,1	10,5	10,5	2,0	PTFE GM201/NBR	24145853
230	209	7,7	8,1	10,5	10,5	2,0	PTFE C104/NBR	49000268
240	219	7,7	8,1	10,5	10,5	2,0	PTFE GM201/NBR	24107902
250	229	7,7	8,1	10,5	10,5	2,0	PTFE GM201/NBR	24131869
250	229	7,7	8,1	10,5	10,5	2,0	PTFE C104/NBR	49000269

Further dimensions on request.

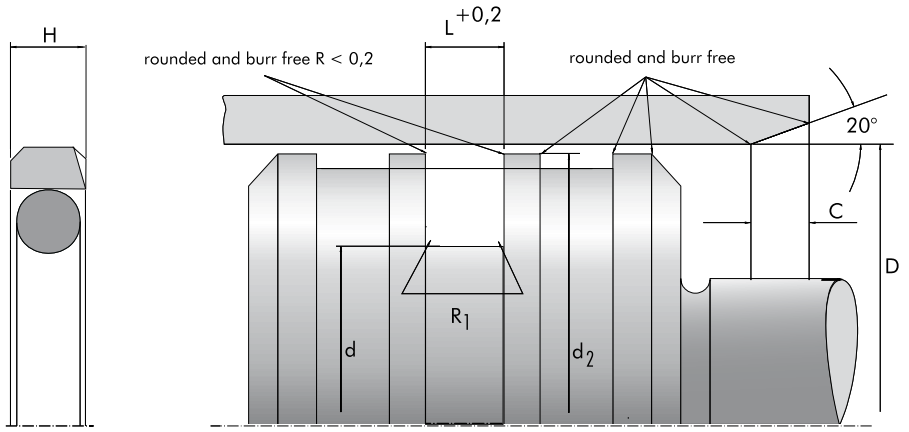


D	d	H	L	Profile	C	R1	Material	Article No.
255	234	7,7	8,1	10,5	10,5	2,0	PTFE C104/NBR	49030541
260	239	7,7	8,1	10,5	10,5	2,0	PTFE GM201/NBR	24223625
268	247	7,7	8,1	10,5	10,5	2,0	PTFE C104/NBR	49000270
270	249	7,7	8,1	10,5	10,5	2,0	PTFE GM201/NBR	24121481
280	259	7,7	8,1	10,5	10,5	2,0	PTFE GM201/NBR	24120265
280	259	7,7	8,1	10,5	10,5	2,0	PTFE C104/NBR	49035216
290	269	7,7	8,1	10,5	10,5	2,0	PTFE GM201/NBR	24275640
300	279	7,7	8,1	10,5	10,5	2,0	PTFE GM201/NBR	24179922
300	279	7,7	8,1	10,5	10,5	2,0	PTFE C104/NBR	49009207
310	289	7,7	8,1	10,5	10,5	2,0	PTFE GM201/NBR	24248946
310	289	7,7	8,1	10,5	10,5	2,0	PTFE C104/NBR	00533523
320	299	7,7	8,1	10,5	10,5	2,0	PTFE GM201/NBR	24131870
330	305,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24105259
340	315,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24213529
350	325,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24199746
350	352,5	7,7	8,1	12,25	10,5	2,0	PTFE C104/NBR	49023944
360	335,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24118300
370	345,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24275649
380	356	7,7	8,1	12	10,5	2,0	PTFE GM201/NBR	24194142
385	360,5	7,7	8,1	12,25	10,5	2,0	PTFE C104/NBR	49026723
390	365,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24145902
395	370,5	7,7	8,1	12,25	10,5	2,0	PTFE C104/NBR	49023945
400	375,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24123281
410	385,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24145195
420	395,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24240756
430	405,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24275683

Further dimensions on request.

D	d	H	L	Profile	C	R1	Material	Article No.
435	410,5	7,7	8,1	12,25	10,5	2,0	PTFE C104/NBR	49023946
440	415,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24194521
450	425,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24275678
460	435,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24174791
460	435,5	7,7	8,1	12,25	10,5	2,0	PTFE C104/NBR	49044247
465	440,5	7,7	8,1	12,25	10,5	2,0	PTFE C104/NBR	49004010
470	445,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24275646
480	455,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24194143
490	465,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24275481
500	475,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24268696
510	485,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24275681
510	485,5	7,7	8,1	12,25	10,5	2,0	PTFE C104/NBR	49022888
520	495,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24275655
530	505,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24275659
540	515,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24275684
540	515,5	7,7	8,1	12,25	10,5	2,0	PTFE C104/NBR	49023947
550	525,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24275665
560	535,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24275667
560	535,5	7,7	8,1	12,25	10,5	2,0	PTFE C104/NBR	49008962
570	545,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24275476
580	555,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24275661
590	565,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24275666
600	575,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24145899
610	585,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24233565
620	595,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24275675
630	605,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24275647
630	605,5	7,7	8,1	12,25	10,5	2,0	PTFE C104/NBR	49023948
640	615,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24275668
640	615,5	7,7	8,1	12,25	10,5	2,0	PTFE C104/NBR	49008963
650	625,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24268700
660	635,5	7,7	8,1	12,25	10,5	2,0	PTFE GM201/NBR	24275637
670	642	9	9,5	14	13,0	2,0	PTFE GM201/NBR	24275660
680	652	9	9,5	14	13,0	2,0	PTFE GM201/NBR	24275682
680	652	9	9,5	14	13,0	2,0	PTFE C104/NBR	49023949
690	662	9	9,5	14	13,0	2,0	PTFE GM201/NBR	24275676
700	672	9	9,5	14	13,0	2,0	PTFE GM201/NBR	24268834
710	682	9	9,5	14	13,0	2,0	PTFE GM201/NBR	24275674
720	692	9	9,5	14	13,0	2,0	PTFE GM201/NBR	24275650

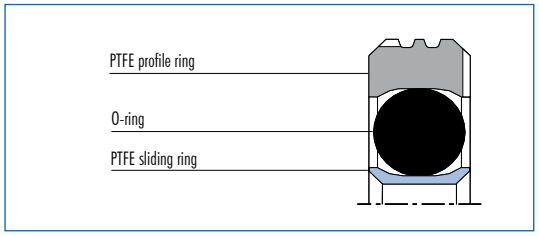
Further dimensions on request.



D	d	H	L	Profile	C	R1	Material	Article No.
730	702	9	9,5	14	13,0	2,0	PTFE GM201/NBR	24275671
740	712	9	9,5	14	13,0	2,0	PTFE GM201/NBR	24275664
740	712	9	9,5	14	13,0	2,0	PTFE C104/NBR	49023950
750	722	9	9,5	14	13,0	2,0	PTFE GM201/NBR	24275663
760	732	9	9,5	14	13,0	2,0	PTFE GM201/NBR	24275679
770	742	9	9,5	14	13,0	2,0	PTFE GM201/NBR	24275644
780	752	9	9,5	14	13,0	2,0	PTFE GM201/NBR	24275662
790	762	9	9,5	14	13,0	2,0	PTFE GM201/NBR	24275658
800	772	9	9,5	14	13,0	2,0	PTFE GM201/NBR	24275645
810	782	9	9,5	14	13,0	2,0	PTFE GM201/NBR	24275670
820	792	9	9,5	14	13,0	2,0	PTFE GM201/NBR	24275685
830	802	9	9,5	14	13,0	2,0	PTFE GM201/NBR	24275673
830	802	9	9,5	14	13,0	2,0	PTFE C104/NBR	49023951
850	822	9	9,5	14	13,0	2,0	PTFE GM201/NBR	24275652
860	832	9	9,5	14	13,0	2,0	PTFE GM201/NBR	24275648
870	842	9	9,5	14	13,0	2,0	PTFE GM201/NBR	24275651
880	852	9	9,5	14	13,0	2,0	PTFE GM201/NBR	24275657
890	862	9	9,5	14	13,0	2,0	PTFE GM201/NBR	24275669
900	872	9	9,5	14	13,0	2,0	PTFE GM201/NBR	24275677
930	902	9	9,5	14	13,0	2,0	PTFE GM201/NBR	24275653
950	922	9	9,5	14	13,0	2,0	PTFE GM201/NBR	24275638

Further dimensions on request.

Merkel Omegat OMK-DR HB



Product description

Three-piece piston seal set, consisting of a PTFE profile ring, an O-ring as the prestressing element, and a PTFE sliding ring in the groove base.

Product advantages

- secured against turning during redational movements by profiled contact face to the O-ring
- optimized friction contact condition during redational movement due to PTFE sliding ring in the groove base
- high sealing effect and favorable frictional behavior due to pressure relief of the grooved running surface
- fast, reliable activation at pressure changes due to pressure activation grooves
- high operating reliability due to sturdy profile ring made of PTFE compound
- shaft-friendly seal material

Material

PTFE profile ring

Material	Designation	Color
PTFE-glass-fiber-MoS2 compound	PTFE GM201	light-gray

O-ring

Material	Designation
Fluoroelastomer	FKM

PTFE sliding ring

Material	Designation	Color
PTFE	PTFE V039	blue

Application

- Combined rotary-linear movements
- Rotational movements
- Swiveling movements

Field of application

Material	PTFE GM201/FKM
Hydraulic oils, HL, HLP	-10 ... +200 °C
HFA fluids	+5 ... +60 °C
HFB fluids	+5 ... +60 °C
HFC fluids	–10 ... +40 °C
HFD fluids	-10 ... +200 °C
Water	+5 ... +100 °C
HETG (rape-seed oil)	–10 ... +80 °C
HEES (synth. ester)	–10 ... +100 °C
HEPG (glycol)	–10 ... +80 °C
Mineral greases	–10 ... +200 °C
Pressure	26 MPa
Running speed	5 m/s

The figures given are maximum values and must not be applied simultaneously.

Especially in the event of redational movements, the permissible limit values are crucially influenced by the entry and removal of the frictional energy (heat). Given an oil temperature (tank) of T = 60°C, the following load collectives are possible (example):

Movement	Pressure (MPa)	Running speed (m/s)	Duration (s)
Static	26	-	300
Stroke movement (no rotation)	26	0,5	-
Rotation (no linear movement)	3	3	30

We will be pleased to advise you.

Surface finish

Peak-to-valley heights	R_a	R_{max}
Sliding surface	0,05 ... 0,3 µm	<2,5 µm
Groove base	<1,6 µm	<6,3 µm
Groove sides	<3,0 µm	<15,0 µm

Material content Mr > 50 % to max. 90 %, with cut depth c = Rz/2 and reference line Cref = 0 %

The long term behavior of a sealing element and its dependability against early failures are crucially influenced by the quality of the counterface. Therefore a precise description and assessment of the surface is critical.
Based on recent findings, we recommend supplementing the above definition of surface finish for the sliding surface by the characteristics detailed in the table below. With these new characteristics derived from the material content, the hitherto merely general description of the material content previous more general descriptions of the material content are significantly improved, especially in regard to surface roughness.. *See also Merkel Technical Manual.*

Surface finish of the sliding surfaces

Characteristic value	Limit	
Ra	> 0,05µm	< 0,30µm
Rmax	< 2,5µm	
Rpkx	< 0,5µm	
Rpk	< 0,5µm	
Rk	>0,25µm	<0,7µm
Rvk	>0,2µm	<0,65µm
Rvkx	>0,2µm	<2,0µm

The limit values listed in the table do not currently apply for ceramic or semi-ceramic counterfaces.

Gap dimension

The dimension d2 is determined by factoring in the maximum permissible extrusion gap, the tolerances, the guide clearance, the deflection of the guide under load, and the pipe expansion.
See also *Merkel Technical Manual*.
The maximum permissible extrusion gap with a one-sided position of the piston is significantly determined by the maximum operating pressure and the temperature-dependent dimensional stability of the seal material.

Profile dimension		Max. permissible gap dimension	
L	Profile	16 MPa	26 MPa
6,3	7,75	0,55	0,45
8,1	10,5	0,6	0,5
8,1	12,25	0,7	0,6

Tolerances

Diameter	Tolerance
d	h7

The tolerance for the diameters D and d2 is specified in connection with the gap dimension calculation. In typical hydraulic applications up to a nominal dimension of 1,000 mm, the tolerance fields H7 and H8 f7 or h7 and h8 are usually chosen.

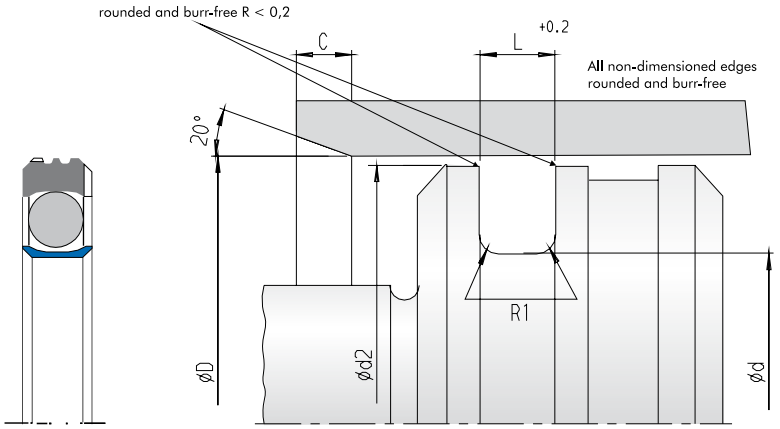
Design notes
Please note our general design remarks in the *Merkel Technical Manual*.

Installation & assembly

For an optimum result, the installation sequence described below should be complied with:

- Stretch the PTFE sliding ring and fit it in the groove.
- The sliding ring is manufactured to be significantly smaller than the nominal diameter. The recovery of the PTFE sliding ring lasts only a brief moment. Additional calibration is not required.
- Stretch the O-ring and place it in the groove without twisting it.
- Use a fitting tool or (in the event of larger diameters) two special installation strips (Order No. 24346745) to stretch the PTFE profile ring evenly over the diameter and engage it in the groove. Local overstretching must, at all costs, be avoided here.
- Calibrate the PTFE profile ring (making sure that the lead-in chamfer is sufficiently large).
- The PTFE profile ring can (e.g. in water) be heated up to approx. 80°C in order to facilitate installation.

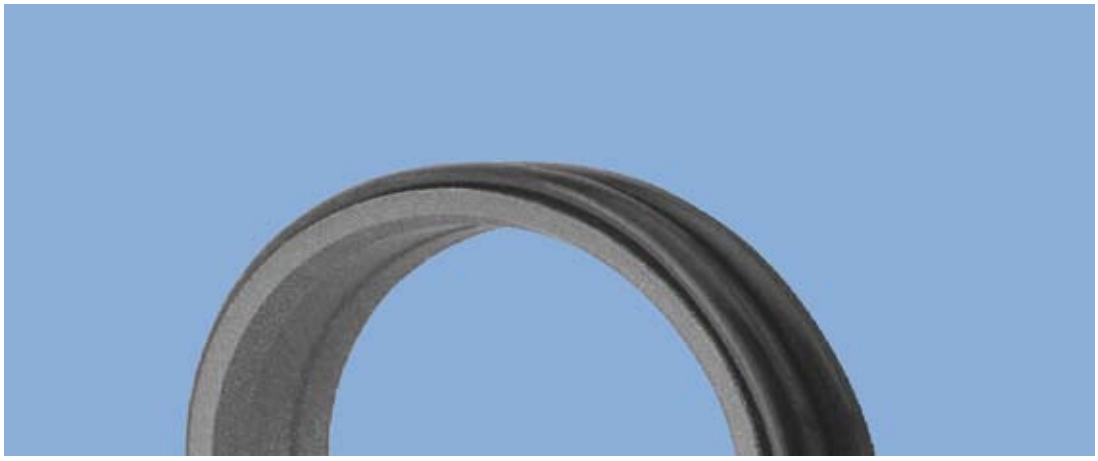
Please note our general remarks on hydraulic seal assembly in the *Merkel Technical Manual, "Installing Hydraulic Seals"*.

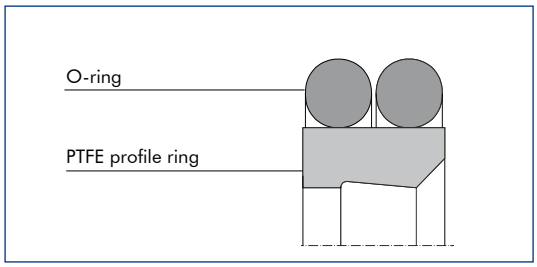


D	d	H	L	Profile	C	R1	Material	Article No.
120	104,5	5,9	6,3	7,75	8	1,2	PTFE GM201/FKM	24331585
125	109,5	5,9	6,3	7,75	8	1,2	PTFE GM201/FKM	24330873
145	129,5	5,9	6,3	7,75	8	1,2	PTFE GM201/FKM	24352019
150	134,5	5,9	6,3	7,75	8	1,2	PTFE GM201/FKM	24330874
160	144,5	5,9	6,3	7,75	8	1,2	PTFE GM201/FKM	24329425
175	159,5	5,9	6,3	7,75	8	1,2	PTFE GM201/FKM	24329426
180	164,5	5,9	6,3	7,75	8	1,2	PTFE GM201/FKM	24350009
190	174,5	5,9	6,3	7,75	8	1,2	PTFE GM201/FKM	24355572
210	189	7,7	8,1	10,5	10	2	PTFE GM201/FKM	24329427
230	209	7,7	8,1	10,5	10	2	PTFE GM201/FKM	24330876
240	219	7,7	8,1	10,5	10	2	PTFE GM201/FKM	24339593
250	229	7,7	8,1	10,5	10	2	PTFE GM201/FKM	24332543
260	239	7,7	8,1	10,5	10	2	PTFE GM201/FKM	49035449
265	244	7,7	8,1	10,5	10	2	PTFE GM201/FKM	24330877
270	249	7,7	8,1	10,5	10	2	PTFE GM201/FKM	24332001
280	259	7,7	8,1	10,5	10	2	PTFE GM201/FKM	24336129
290	269	7,7	8,1	10,5	10	2	PTFE GM201/FKM	24360276
300	279	7,7	8,1	10,5	10	2	PTFE GM201/FKM	24353159
310	289	7,7	8,1	10,5	10	2	PTFE GM201/FKM	24330878
330	309	7,7	8,1	10,5	10	2	PTFE GM201/FKM	24379255
360	339	7,7	8,1	10,5	10	2	PTFE GM201/FKM	24330879
375	354	7,7	8,1	10,5	10	2	PTFE GM201/FKM	24330308

Further dimensions on request.

Merkel Double Wiper PT 1





Product description

Double wiper, consisting of a PTFE profile ring with one sealing and one wiping edge, plus two O-rings as prestressing elements.

Product advantages

- enhanced functional reliability of the sealing system, due to additional sealing edge
- high operating reliability, due to sturdy profile ring made of PTFE compound (can briefly withstand the full operating pressure)
- very good wiping capability for dirt adhering, due to dimensionally stable wiping edge
- excellent control and positioning characteristics due to favorable frictional behavior (stick-slip-free)

Material

PTFE profile ring

Material	Designation	Color
PTFE-glass-fiber-MoS2 compound	PTFE GM201	light-gray

Material

O-ring

Material	Designation
Nitrile rubber	NBR
Fluoroelastomer	FKM

Other material combinations are available on request.

Applications

- Double wiper for improving overall sealing capabilities. The PT 1 is preferably used in conjunction with our rod seals OMS-MR PR, T 20 or LF 300.

Field of application

Material	PTFE GM201/NBR
Hydraulic oils, HL, HLP	-30 ... +100 °C
HFA fluids	+5 ... +60 °C
HFB fluids	+5 ... +60 °C
HFC fluids	-30 ... +60 °C
HFD fluids	-
Water	+5 ... +100 °C
HETG (rape-seed oil)	–30 ... +80 °C
HEES (synth. ester)	–30 ... +80 °C
HEPG (glycol)	–30 ... +60 °C
Mineral greases	–30 ... +100 °C
Running speed	5 m/s

The figures given are maximum values and must not be applied simultaneously.

Surface finish

Peak-to-valley heights	R_a	R_{max}
Sliding surface	0,05 … 0,3 µm	<2,5 µm
Groove base	<1,6 µm	<6,3 µm
Groove sides	<3,0 µm	<15,0 µm

Material content Mr > 50 % to max. 90 %, with cut depth c = Rz/2 and reference line Cref = 0 %

The long term behavior of a sealing element and its dependability against early failures are crucially influenced by the quality of the counterface. Therefore a precise description and assessment of the surface is critical.
Based on recent findings, we recommend supplementing the above definition of surface finish for the sliding surface by the characteristics detailed in the table below. With these new characteristics derived from the material content, previous more general descriptions of the material content are significantly improved, especially in regard to surface roughness. See also *Merkel Technical Manual*.

Surface finish of the sliding surfaces

Characteristic value	Limit	
Ra	> 0,05µm	< 0,30µm
Rmax	< 2,5µm	
Rpkx	< 0,5µm	
Rpk	< 0,5µm	
Rk	>0,25µm	<0,7µm
Rvk	>0,2µm	<0,65µm
Rvkx	>0,2µm	<2,0µm

The limit values listed in the table do not currently apply for ceramic or semi-ceramic counterfaces. See also *Merkel Technical Manual*.

Tolerances

Diameter	Tolerance
D	H9
D1	H10

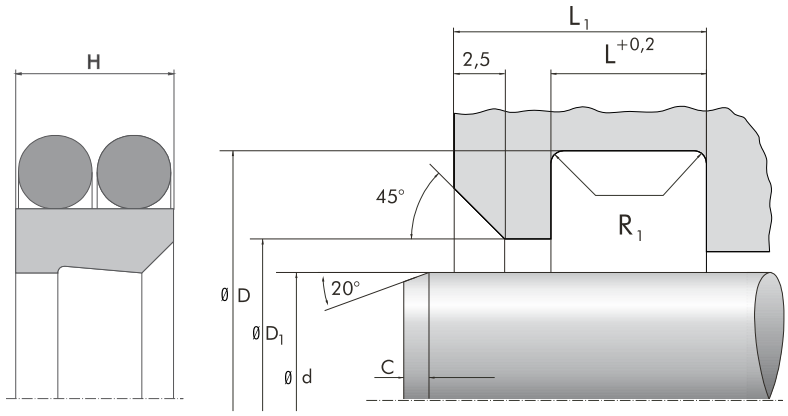
The tolerance for the diameter d is specified in connection with the gap dimension calculation for the primary seal. In typical hydraulic applications up to a nominal dimension of 1,000 mm, the tolerance fields f7 and f8 are usually chosen.

Design notes

We recommend a pressure-relief bore. In the case of upstream seals with a good return capability, a pressure-relief feature is not necessary.

Installation & assembly

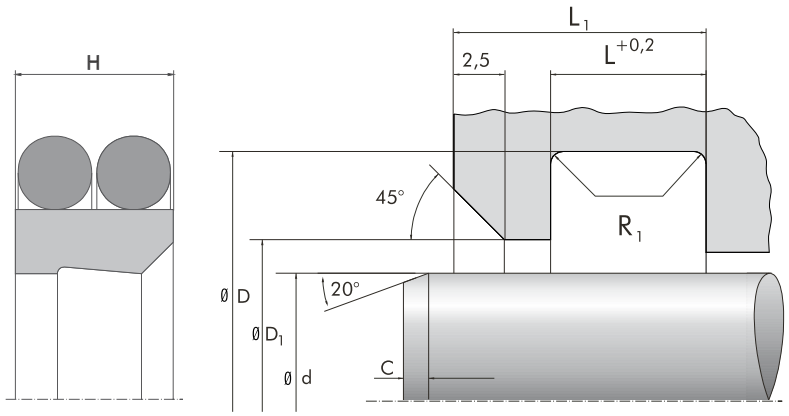
Reliable seal function is dependent on correct installation. See also Merkel Technical Manual See also *Merkel Technical Manual*.



All edges rounded and burr-free

d	D	D1	H	L	L1	Profile	C	R_1	Material	Article No.
40	48,8	41,5	6	6,3	10.3	4,4	3	1,2	PTFE GM201/NBR	49023486
45	53,8	46,5	6	6,3	10.3	4,4	3	1,2	PTFE GM201/NBR	49016648
50	58,8	51,5	6	6,3	10.3	4,4	3	1,2	PTFE GM201/NBR	49004617
55	63,8	56,5	6	6,3	10.3	4,4	3	1,2	PTFE GM201/NBR	49014632
60	68,8	61,5	6	6,3	10.3	4,4	3	1,2	PTFE GM201/NBR	00531996
65	73,8	66,5	6	6,3	10.3	4,4	3	1,2	PTFE GM201/NBR	24380154
70	82,2	72,0	7,7	8,1	12.1	6,1	4	2	PTFE GM201/NBR	24371776
75	87,2	77,0	7,7	8,1	12.1	6,1	4	2	PTFE GM201/NBR	49018473
80	92,2	82,0	7,7	8,1	12.1	6,1	4	2	PTFE GM201/NBR	49016404
85	97,2	87,0	7,7	8,1	12.1	6,1	4	2	PTFE GM201/NBR	24380155
95	107,2	97,0	7,7	8,1	12.1	6,1	4	2	PTFE GM201/NBR	24379210
100	112,2	102,0	7,7	8,1	12.1	6,1	4	2	PTFE GM201/NBR	24380032
105	117,2	107,0	7,7	8,1	12.1	6,1	4	2	PTFE GM201/NBR	24380095
110	122,2	112,0	7,7	8,1	12.1	6,1	4	2	PTFE GM201/NBR	24380092
120	132,2	122,0	7,7	8,1	12.1	6,1	4	2	PTFE GM201/NBR	49012837
125	137,2	127,0	7,7	8,1	12.1	6,1	6	2	PTFE GM201/NBR	24380156
130	142,2	132,0	7,7	8,1	12.1	6,1	6	2	PTFE GM201/NBR	49023823
140	156	142,0	11	11,5	15.5	8	6	2	PTFE GM201/NBR	49004558
145	161	147,0	11	11,5	15.5	8	6	2	PTFE GM201/NBR	24380702
150	166	152,0	11	11,5	15.5	8	6	2	PTFE GM201/NBR	49005139
155	171	157,0	11	11,5	15.5	8	6	2	PTFE GM201/NBR	24380703
160	176	162,0	11	11,5	15.5	8	6	2	PTFE GM201/NBR	49015836
170	186	172,0	11	11,5	15.5	8	6	2	PTFE GM201/NBR	24380704
175	191	177,0	11	11,5	15.5	8	6	2	PTFE GM201/NBR	24362382
180	196	182,0	11	11,5	15.5	8	6	2	PTFE GM201/NBR	00531957
200	216	202,0	11	11,5	15.5	8	6	2	PTFE GM201/NBR	24342233

Further dimensions on request.

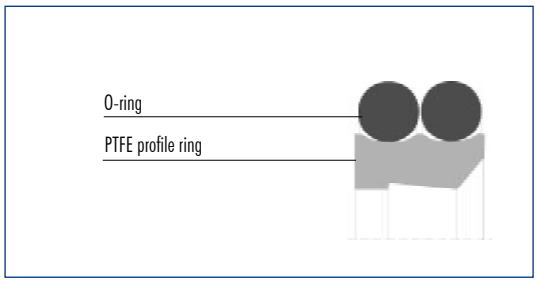


All edges rounded and burr-free

d	D	D1	H	L	L1	Profile	C	R_1	Material	Article No.
210	226	212,0	11	11,5	15.5	8	8	2	PTFE GM201/NBR	24380705
220	236	222,0	11	11,5	15.5	8	8	2	PTFE GM201/NBR	49002400
230	246	232,0	11	11,5	15.5	8	8	2	PTFE GM201/NBR	49004618
240	256	242,0	11	11,5	15.5	8	8	2	PTFE GM201/NBR	00533355
250	266	252,0	11	11,5	15.5	8	8	2	PTFE GM201/NBR	49009052
280	296	282,0	11	11,5	15.5	8	8	2	PTFE GM201/NBR	49004005
310	326	312,0	11	11,5	15.5	8	8	2	PTFE GM201/NBR	49009461
320	336	322,0	11	11,5	15.5	8	8	2	PTFE GM201/NBR	49010398
330	346	332,0	11	11,5	15.5	8	8	2	PTFE GM201/NBR	49004619
335	351	337,0	11	11,5	15.5	8	8	2	PTFE GM201/NBR	49008975
360	376	362,0	11	11,5	15.5	8	8	2	PTFE GM201/NBR	49009462
380	396	382,0	11	11,5	15.5	8	8	2	PTFE GM201/NBR	49019716
400	424	402,5	14,8	15,5	15.6	12	8	2	PTFE GM201/NBR	49012517
410	434	412,5	14,8	15,5	15.7	12	8	2	PTFE GM201/NBR	49019717
420	444	422,5	14,8	15,5	15.8	12	8	2	PTFE GM201/NBR	49008822
510	534	512,5	14,8	15,5	15.9	12	8	2	PTFE GM201/NBR	49006826
520	544	522,5	14,8	15,5	15.10	12	8	2	PTFE GM201/NBR	49008973
570	594	572,5	14,8	15,5	15.11	12	8	2	PTFE GM201/NBR	49009444
620	644	622,5	14,8	15,5	15.12	12	8	2	PTFE GM201/NBR	49027854
640	664	642,5	14,8	15,5	15.13	12	8	2	PTFE GM201/NBR	00532207

Further dimensions on request.

Merkel Double Wiper PT 1 DR-HB



Product description

Double wiper, consisting of a PTFE profile ring with one sealing and one wiping edge, plus two O-rings as prestressing elements.

Product advantages

- enhanced functional reliability of the sealing system due to additional sealing edge
- high operating reliability, due to sturdy profile ring made of PTFE compound (can briefly withstand the maximum operating pressure)
- very good wiping capability for dirt adhering, due to dimensionally stable wiping edge
- secured against turning during redational movements by profiled contact surface to the O-ring
- stick-slip-free operation, due to choice of appropriate material (coefficient of friction)
- shaft-friendly seal material

Material

PTFE profile ring

Material	Designation	Color
PTFE-glass-fiber-MoS_2-compound	PTFE GM201	light-gray

O-ring

Material	Designation
Fluoroelastomer	FKM

Applications

- Combined redary-stroke movements
- Redational movements
- Swiveling movements

Field of application

Material	PTFE GM201/FKM
Hydraulic oils, HL, HLP	-10 ... +200 °C
HFA fluids	+5 ... +60 °C
HFB fluids	+5 ... +60 °C
HFC fluids	–10 ... +40 °C
HFD fluids	-10 ... +200 °C
Water	+5 ... +100 °C
HETG (rape-seed oil)	–10 ... +80 °C
HEES (synth. ester)	–10 ... +100 °C
HEPG (glycol)	–10 ... +80 °C
Mineral greases	–10 ... +200 °C
Running speed	5 m/s

The figures given are maximum values and must not be applied simultaneously.

Especially in the event of redational movements, the permissible limit values are crucially influenced by the entry and removal of the frictional energy (heat). Given an oil temperature (tank) of T = 60°C, the following load collectives are possible (example):

Movement	Pressure (MPa)	Running speed (m/s)	Duration (s)
Linear movement (no rotation)	-	5	-
Rotation (no linear movement)	-	3	30
Rotary-linear movement	-	4	30

We will be pleased to advise you.

Surface finish

Peak-to-valley heights	R_a	R_{max}
Sliding surface	0,05 ... 0,3 µm	<2,5 µm
Groove base	<1,6 µm	<6,3 µm
Groove sides	<3,0 µm	<15,0 µm

Material content Mr > 50 % to max. 90 %, with cut depth c = Rz/2 and reference line Cref = 0 %

The long term behavior of a sealing element and its dependability against early failures are crucially influenced by the quality of the counterface. Therefore a precise description and assessment of the surface is critical.

Based on recent findings, we recommend supplementing the above definition of surface finish for the sliding surface by the characteristics detailed in the table below. With these new characteristics derived from the material content, previous more general descriptions of the material content are significantly improved, especially in regard to surface roughness. *See also Merkel Technical Manual.*

Surface finish of the sliding surfaces

Characteristic value	Limit	
Ra	> 0,05µm	< 0,30µm
Rmax	< 2,5µm	
Rpkx	< 0,5µm	
Rpk	< 0,5µm	
Rk	>0,25µm	<0,7µm
Rvk	>0,2µm	<0,65µm
Rvkx	>0,2µm	<2,0µm

The limit values listed in the table do not currently apply for ceramic or semi-ceramic counterfaces.
-Hardness of the counter surface55 – 60 HRC at a hardness penetration depth of > 0.5 mm.
-In applications with a purely redational or swiveling movement, the running area should be achieved by plunge grinding.
See also *Merkel Technical Manual*.

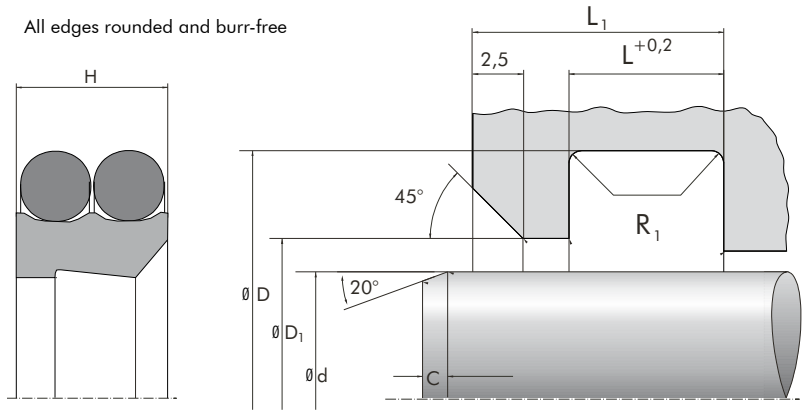
Tolerances

Diameter	Tolerance
D	H9
D_1	H10

The tolerance for the diameter d is specified in connection with the gap dimension calculation for the primary seal. In typical hydraulic applications up to a nominal dimension of 1,000 mm, the tolerance fields f7 and f8 are usually chosen.

Design notes
In conjunction with seals lacking an adequate return capability, we recommend providing a pressure-relief bore in the space between the seal and the double wiper.

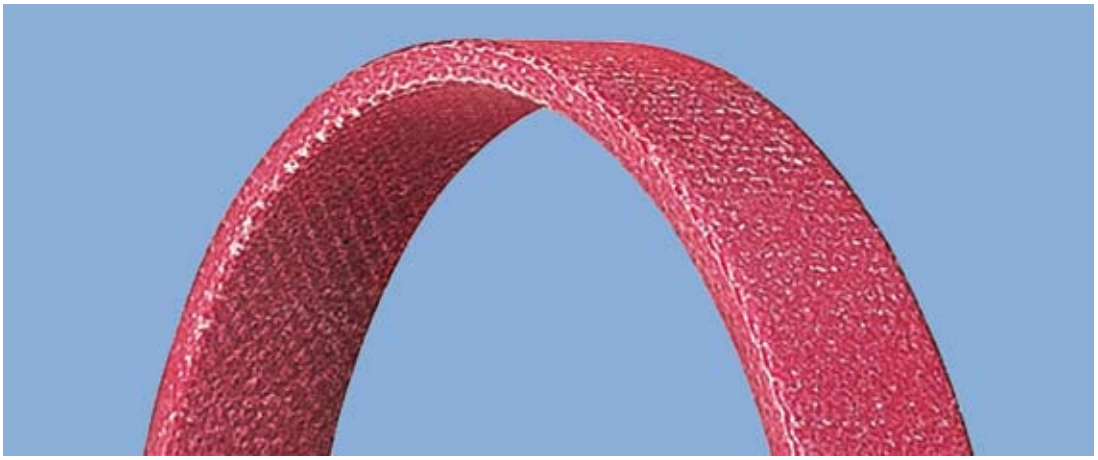
Installation & assembly
Please note our general remarks on hydraulic seal assembly in the *Merkel Technical Manual.*

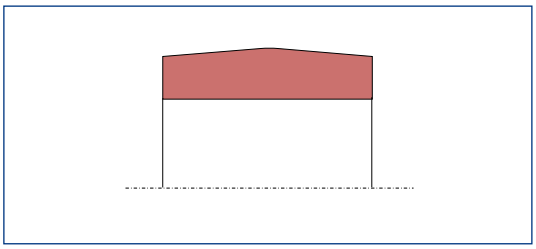


d	D	D1	H	L	L1	Profile	C	R1	Material	Article No.
50	58,8	51,5	6	6,3	10,3	4,4	3	1,2	PTFE GM201/FKM	24377837
65	73,8	66,5	6	6,3	10,3	4,4	3	1,2	PTFE GM201/FKM	24377839
75	87,2	77,0	7,7	8,1	12,1	6,1	6	2	PTFE GM201/FKM	24380996
80	92,2	82,0	7,7	8,1	12,1	6,1	6	2	PTFE GM201/FKM	00531189
90	102,2	92,0	7,7	8,1	12,1	6,1	6	2	PTFE GM201/FKM	49026576
105	117,2	107,0	7,7	8,1	12,1	6,1	6	2	PTFE GM201/FKM	24376156
120	132,2	122,0	7,7	8,1	12,1	6,1	6	2	PTFE GM201/FKM	49020656
140	156	142,0	11	11,5	15,5	8	6	2	PTFE GM201/FKM	24376157
145	157,2	143,2	7,7	8,1	12,1	6,1	6	2	PTFE GM201/FKM	49018111
150	166	152,0	11	11,5	15,5	8	6	2	PTFE GM201/FKM	24376158
180	196	182,0	11	11,5	15,5	8	6	2	PTFE GM201/FKM	24376159
185	201	187,0	11	11,5	15,5	8	6	2	PTFE GM201/FKM	49030375
190	206	192,0	11	11,5	15,5	8	6	2	PTFE GM201/FKM	49018362
200	216	202,0	11	11,5	15,5	8	6	2	PTFE GM201/FKM	24379068
230	246	232,0	11	11,5	15,5	8	6	2	PTFE GM201/FKM	24376178
235	251	237,0	11	11,5	15,5	8	6	2	PTFE GM201/FKM	49023239
240	256	242,0	11	11,5	15,5	8	6	2	PTFE GM201/FKM	24380799
250	266	252,0	11	11,5	15,5	8	6	2	PTFE GM201/FKM	00532892
260	276	262,0	11	11,5	15,5	8	6	2	PTFE GM201/FKM	49017142

Further dimensions on request.

Merkel Guivex SBK Guide Bush





Product description

Profiled rod-type guide bush made of resin bonded fabric. Patented product design (patent No.: PCT/EP95/03874)

Product advantages

Intended, among others, for standardized housings as per ISO 10766

- can replace current housings of type SB and SF
- high radial load capacity
- very good guide-length utilization based on uniform stress distribution
- enhanced penetration of lubricating media based on optimized stress distribution within the contact zone between the guide bush and the counter surface (favorable frictional behavior)
- reduced propensity for stick-slip
- excellent sliding behavior over a short guiding distance (no jamming)

Material

Material	Designation	Color
Resin bonded fabric	HGW HG650	red
Resin bonded fabric	HGW HG517	dark-gray

The choice of material depends on the diameter involved.

Applications

- Long-stroke cylinder (piston-rod deflection)
- Short guiding distance (piston-rod tilting)
- Short stroke (inappropriate lubrication)
- Frictionally optimized sealing systems
- Replacement for metallic guides

Field of application

Guivex guide bushes can be used in all hydraulic fluids normally found in hydraulic systems such as oils and greases based on mineral oils, water, fire-resistant hydraulic fluids (HFA, HFB, HFC, HFD) and biodegradable hydraulic fluids (HETG, HEES, HEPG).
The maximum permissible operating temperature is 120°C

Surface finish

Peak-to-valley heights	R_a	R_{max}
Sliding surface	0,05 ... 0,3 µm	<2,5 µm
Groove base	<1,6 µm	<6,3 µm
Groove sides	<3,0 µm	<15,0 µm

Material content Mr >50% to max. 90% with cut depth c = Rz/2 and reference line Cref = 0%

The long term behavior of a sealing element and its dependability against early failures are crucially influenced by the quality of the counterface. Therefore a precise description and assessment of the surface is critical.

Based on recent findings, we recommend supplementing the above definition of surface finish for the sliding surface by the characteristics detailed in the table below. With these new characteristics derived from the material content, previous more general descriptions of the material content are significantly improved, especially in regard to surface roughness. See also Merkel Technical Manual.
. *(See section with additional information on surfaces and Merkel Technical Manual).*

Surface finish of the sliding surfaces

Characteristic value	Limit	
Ra	> 0,05µm	< 0,30µm
Rmax	< 2,5µm	
Rpkx	< 0,5µm	
Rpk	< 0,5µm	
Rk	>0,25µm	<0,7µm
Rvk	>0,2µm	<0,65µm
Rvkx	>0,2µm	<2,0µm

The limit values listed in the table do not apply, at the present stage, to ceramic or partly ceramic counterfaces.

Tolerances

Diameter D1
H9

Manufacturing tolerances

Profile thickness
-0,01 ... -0,06

The tolerance regarding diameters d and DF is determined in connection with the calculation of the gap dimension. Tolerance zones f7 and f8 and/or H7 and H8 are usually selected for typical hydraulic applications with a nominal size of up to 1,000mm.

Surface load

The value for the specific surface pressure depends on the operating temperature and the scope of elastic deformation (spring deflection) of the guiding element involved. The maximum possible spring deflection in a sealing system is limited by the minimum gap dimension downstream of the primary seal. (See *Merkel Technical Manual*)

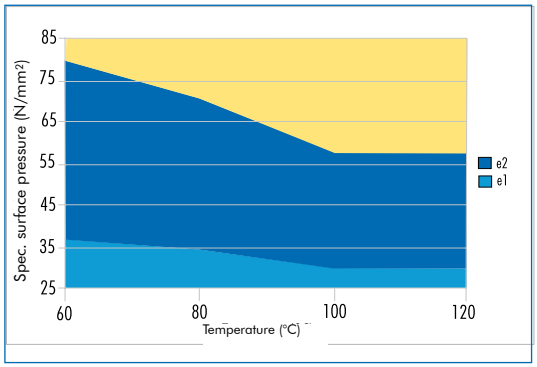
Spring deflection

e1 = 0,1 at s = 2,5

e1 = 0,15 at s = 4

e2 = 0,15 at s = 2,5

e2 = 0,2 at s = 4



Spec. surface pressure under parallel loads

Design notes

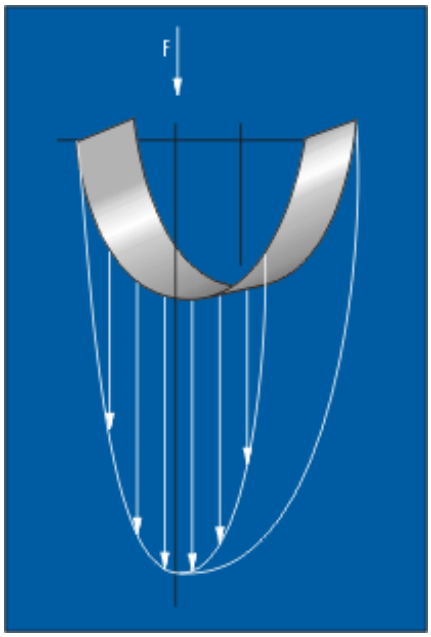
Diameter D1 indicated in the article list should be viewed solely in connection with the guide bush. The corresponding diameter of the connected seal housing must be in tune with the sealing element involved.
Please note our general remarks on design in the *Merkel Technical Manual*

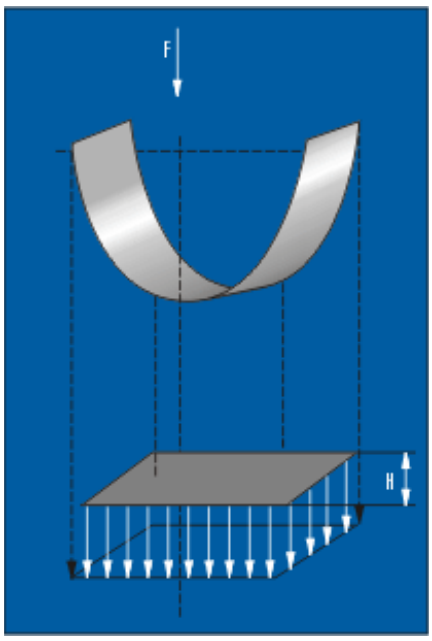
Assembly

Please note our general remarks on the assembly of hydraulic seals in the *Merkel Technical Manual*.

Side load

Side loads within the contact area between the guide and the counter surface are not linear. The guiding width required can be calculated by applying the formulas indicated below on the basis of the projected area. The non-linear progression of side load pressures is taken into account in the contact pressure value.
It may be advisable to reduce the loads by selecting a broader guide in individual cases to obtain an extended service life.





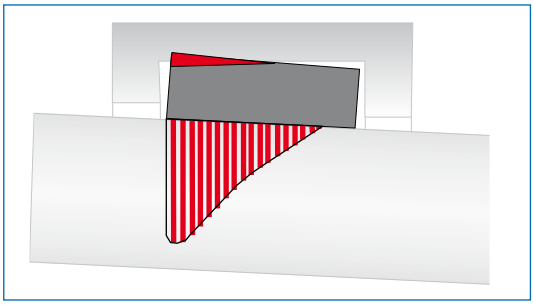
F = P x A
A = d x H
H = F / (d x P)

H = Guide bandwidth [mm]
F = Radial loads [N]
A = Projected area [mm²]

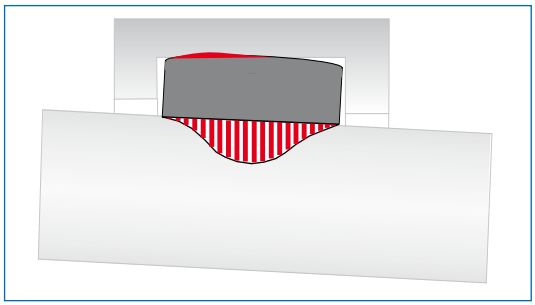
P = perm. surface pressure [N/mm²]
d = Rod diameter with rod guide; Piston diameter with piston guide [mm]

Operating principle

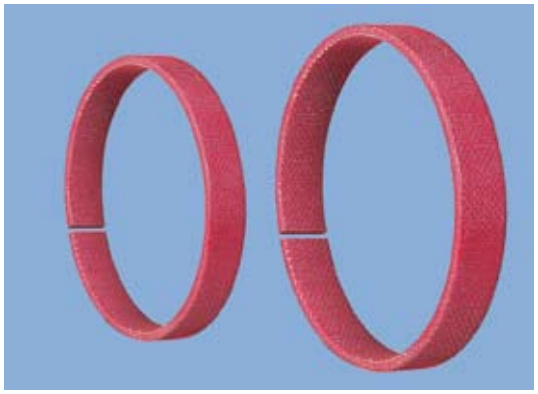
Rectangular guide bushes:
Stress peaks within the edge area



Guivex guide bush:
uniform stress distribution



Additional product description – Guide strips



Side load

The use of guide elements makes it possible to achieve low-friction and low-wear between the moving components of a hydraulic cylinder. Any side loads emerging during operation are absorbed effectively and any metal to metal contact between the piston rod and/or the piston barrel and the surrounding housing components is precluded.
The scope of the maximum side load is essentially determined by the geometrical marginal conditions and the properties of the guide element involved.

Excessive stresses

The guide play and elastic deformation of the elements under load results in an angular deviation between the piston rod and/or the piston barrel and the counter surfaceduring operation. Consequently, guides inside hydraulic cylinders will not remain parallel, but primarily stressed at the edges.
In this case, the permissible side load of the guide is defined by the lower maximum load up to edge break and not by the maximum compressive strength of the material. Excessive stresses within the edge area (Figure 01) make the penetration of lubricating media more difficult, too. The hydraulic medium is wiped along the edge stressed on the guide element and the lubricating film is reduced to a minimum, thus leading to stick-slip effects and greater wear.

Profiling

Guivex guide bushes are provided with a convex profiling oriented towards the groove base. The side load applied is distributed evenly over the width of the guide element here. The maximum contact pressure value remains within the medium range and stress peaks on the edges are reduced (Figure 02).

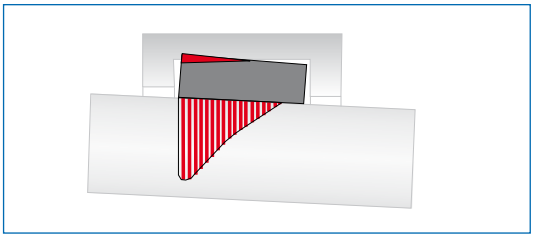


Figure 01: Rectangular guide bush
Excessive stress within the edge area

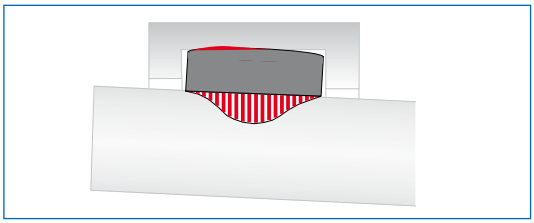


Figure 02: Guivex guide bush
Uniform stress distribution

Sliding properties

Guivex guide bushes made of HGW HG517 and HGW HG 650 materials are compounded with graphite and/or PTFE in order to achieve a better dry-running behavior. As a result, guide bushes made of resin bonded fabric exhibit excellent sliding properties, due to the material properties alone, even in the event of inappropriate lubrication.
The absorption of lubricating media within the area comprised between the guide and the counter surfaceis greatly enhanced by the patented profiling of Guivex guide bushes. Consequently, the sliding behavior is also improved by the Guivex geometry with correspondingly positive effects in terms of service life and stick-slip behavior.

Radial load capacity

Merkel resin bonded fabric materials are characterized by a high degree of load capacity.

The impact of the operating temperature on the load capacity of resin bonded fabric guide bushes is restricted, of course, when using duroplastic resin bonded fabric quality HGW HG517. The resin matrix of our material HGW HG650 includes both duroplastic and thermoplastic constituents. If permissible side loads are simultaneously less dependent on temperatures, the flexibility will be noticeably improved for assembly with small diameters.

Purely thermoplastic basic materials like polyester, for example, exhibit a temperature-dependent material behavior. Permissible cross loads are greatly reduced under the effect of rising operating temperatures. (See Figure 03).

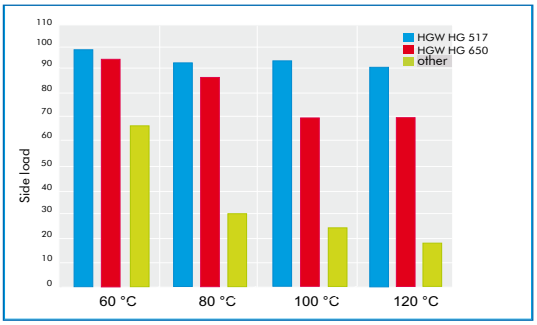


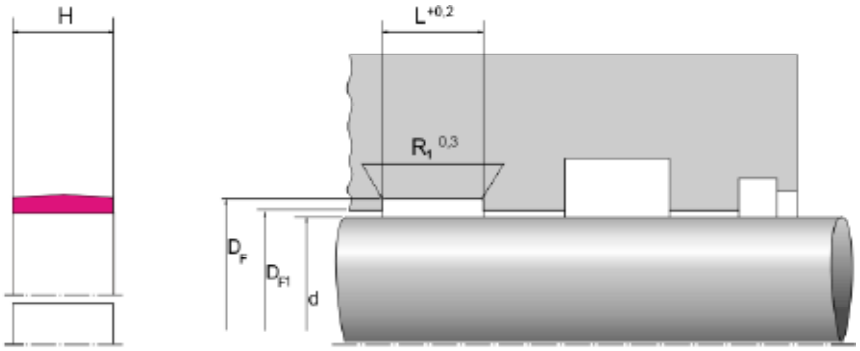
Figure 03: Resin bonded fabric materials in comparison of load capacity among plane-parallel guides depending on the operating temperature involved.

Forces are always introduced within the medium range of the guide bush in conjunction with the patented Guivex geometry. The maximum permissible cross load is not reduced here by excess stress at the edges. Uniform movements along the stroke, coupled with a high radial load capacity, can be achieved even in conjunction with short guide lengths and long-stroke cylinders with high angular offset to be expected.

The absorption of lubricating media within the area comprised between the guide and the counter surfaceis greatly enhanced by the patented profiling of Guivex guide bushes. Consequently, Guivex guide bushes exhibit a favorable frictional behavior with correspondingly positive effects in terms of service life and stick-slip behavior.

Forces are always introduced within the midsection of the guide bush. Uniform movements along the stroke, coupled with a high radial load capacity, can be achieved even in conjunction with short guide lengths and long-stroke cylinders with the large angular offset to be expected. The system of guides inside the hydraulic cylinder will not be inclined to jam over a short guide distance either.

The use of Guivex guide bushes makes a vital contribution to the functional reliability and dependability of hydraulic cylinders.



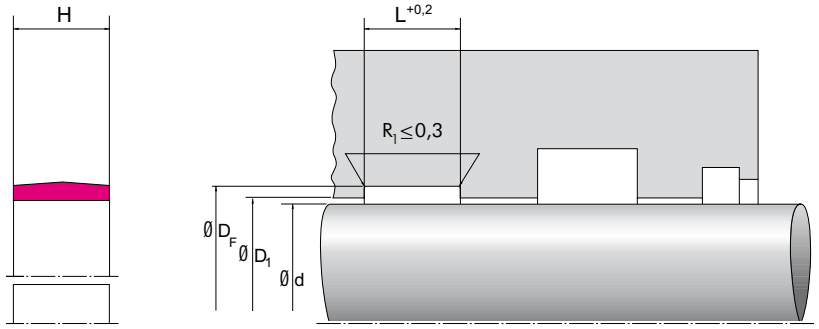
All non-dimensioned edges rounded and burr-free

ISO	d	D_F	D_1	L	H	Profile	Material	Article No.
	30	35	31,6	9,7	9,5	2,5	HGW HG650	49006029
ISO	40	45	41,6	9,7	9,5	2,5	HGW HG650	49006608
	40	45	41,6	15	14,8	2,5	HGW HG650	49006206
ISO	45	50	46,6	9,7	9,5	2,5	HGW HG650	49006207
ISO	50	55	51,6	9,7	9,5	2,5	HGW HG650	49001908
	50	55	51,6	15	14,8	2,5	HGW HG650	49006209
	55	60	56,6	9,7	9,5	2,5	HGW HG650	49001907
	55	60	56,6	15	14,8	2,5	HGW HG650	49006210
	60	65	61,6	9,7	9,5	2,5	HGW HG650	49002920
	60	65	61,6	15	14,8	2,5	HGW HG650	49002006
	60	68	62,5	15	14,8	4	HGW HG650	49005283
	65	70	66,6	9,7	9,5	2,5	HGW HG650	49006214
	65	70	66,6	15	14,8	2,5	HGW HG650	49006215
ISO	70	75	71,6	9,7	9,5	2,5	HGW HG650	49006216
	70	75	71,6	15	14,8	2,5	HGW HG650	49002007
	75	80	76,6	9,7	9,5	2,5	HGW HG650	49006217
	75	80	76,6	15	14,8	2,5	HGW HG650	49006218
	75	80	76,6	25	24,5	2,5	HGW HG650	49018480
ISO	80	85	81,6	9,7	9,5	2,5	HGW HG650	49006219
ISO	80	85	81,6	15	14,8	2,5	HGW HG650	49002010
	80	85	81,6	25	24,5	2,5	HGW HG650	49030314
	85	90	86,6	9,7	9,5	2,5	HGW HG650	49006220
	85	90	86,6	15	14,8	2,5	HGW HG650	49006221
	85	90	86,6	25	24,5	2,5	HGW HG650	49018481
ISO	90	95	91,6	9,7	9,5	2,5	HGW HG650	49006222
	90	95	91,6	25	24,5	2,5	HGW HG650	49006223

Further dimensions on request.

ISO	d	D_F	D_1	L	H	Profile	Material	Article No.
	95	100	96,6	9,7	9,5	2,5	HGW HG650	49006224
	95	100	96,6	15	14,8	2,5	HGW HG650	49006225
ISO	100	105	101,6	9,7	9,5	2,5	HGW HG650	49006226
ISO	100	105	101,6	15	14,8	2,5	HGW HG650	49006227
	105	110	106,6	9,7	9,5	2,5	HGW HG650	49006228
	105	110	106,6	15	14,8	2,5	HGW HG650	49006229
ISO	110	115	111,6	9,7	9,5	2,5	HGW HG650	49006230
ISO	110	115	111,6	15	14,8	2,5	HGW HG650	49006231
	110	118	112,5	40	39,5	4	HGW HG650	49009506
	115	120	116,6	15	14,8	2,5	HGW HG650	49006232
	120	125	121,6	9,7	9,5	2,5	HGW HG650	49006233
	120	125	121,6	15	14,8	2,5	HGW HG650	49006234
	120	125	121,6	25	24,5	2,5	HGW HG650	49018492
ISO	125	130	126,6	9,7	9,5	2,5	HGW HG650	49006235
ISO	125	130	126,6	15	14,8	2,5	HGW HG650	49006236
	125	130	126,6	25	24,5	2,5	HGW HG650	49006237
	130	135	131,6	15	14,8	2,5	HGW HG650	49006238
	130	138	132,5	25	24,5	4	HGW HG650	49012430
	135	140	136,6	15	14,8	2,5	HGW HG650	49006239
ISO	140	145	141,6	9,7	9,5	2,5	HGW HG650	49006240
ISO	140	145	141,6	15	14,8	2,5	HGW HG650	49006241
	140	145	141,6	25	24,5	2,5	HGW HG650	49006242
	140	145	141,6	40	39,5	2,5	HGW HG650	49009456
	145	150	146,6	15	14,8	2,5	HGW HG650	49006243
	150	155	151,6	15	14,8	2,5	HGW HG650	49006244
	155	160	156,6	15	14,8	2,5	HGW HG650	49006245
x	160	165	161,6	15	14,8	2,5	HGW HG650	49006247
	160	165	161,6	25	24,5	2,5	HGW HG650	49006248
	170	175	171,6	15	14,8	2,5	HGW HG650	49006250
	170	175	171,6	25	24,5	2,5	HGW HG650	49006249
x	180	185	181,6	9,7	9,5	2,5	HGW HG650	49006251
x	180	185	181,6	15	14,8	2,5	HGW HG650	49006253
	180	185	181,6	25	24,5	2,5	HGW HG650	49006252
	185	190	186,6	15	14,8	2,5	HGW HG650	49030377
	190	195	191,6	15	14,8	2,5	HGW HG650	49006254
	190	195	191,6	20	19,8	2,5	HGW HG650	49019432
x	200	205	201,6	15	14,8	2,5	HGW HG650	49006259
x	200	205	201,6	25	24,5	2,5	HGW HG650	49006258

Further dimensions on request.



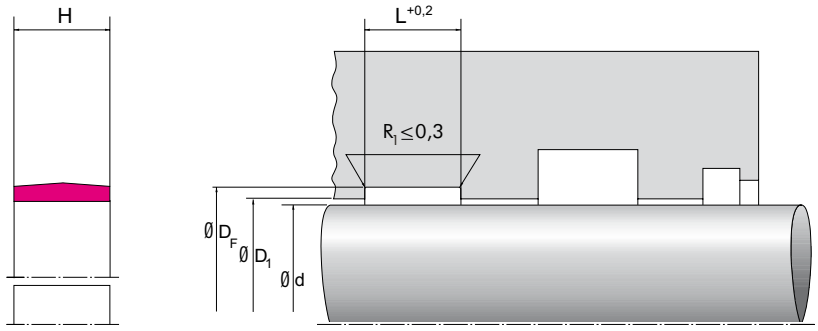
All non-dimensioned edges rounded and burr-free

ISO	d	D_F	D_1	L	H	Profile	Material	Article No.
	210	215	211,6	15	14,8	2,5	HGW HG650	49006260
ISO	220	225	221,6	15	14,8	2,5	HGW HG650	49006281
ISO	220	225	221,6	25	24,5	2,5	HGW HG650	49006282
	230	235	231,6	15	14,8	2,5	HGW HG650	49006283
	230	235	231,6	25	24,5	2,5	HGW HG650	49006284
	235	240	236,6	15	14,8	2,5	HGW HG650	49023262
	240	245	241,6	15	14,8	2,5	HGW HG650	49006285
ISO	250	255	251,6	15	14,8	2,5	HGW HG650	49006286
ISO	250	255	251,6	25	24,5	2,5	HGW HG650	49006287
	270	275	271,6	25	24,5	2,5	HGW HG650	49006288
ISO	280	285	281,6	15	14,8	2,5	HGW HG650	49006290
ISO	280	285	281,6	25	24,5	2,5	HGW HG650	49006289
	290	298	292,5	25	24,5	4	HGW HG650	49006291
	300	308	302,5	25	24,5	4	HGW HG600	24380482
	300	308	302,5	40	39,5	4	HGW HG600	24379155
	310	315	311,6	15	14,8	2,5	HGW HG600	49030765
	310	315	311,6	25	24,5	2,5	HGW HG600	49009463
	320	325	321,6	15	14,8	2,5	HGW HG600	24380778
ISO	320	325	321,6	25	24,5	2,5	HGW HG600	24380272
	320	325	321,6	30	29,5	2,5	HGW HG600	49023545
	320	328	322,5	25	24,5	4	HGW HG600	24379076
	320	328	322,5	30	29,5	4	HGW HG600	528486
	320	328	322,5	40	39,5	4	HGW HG600	532132
	330	335	331,6	25	24,5	2,5	HGW HG600	49012803
	330	338	332,5	25	24,5	4	HGW HG600	24379040
	340	345	341,6	15	14,8	2,5	HGW HG600	49017086

Further dimensions on request.

ISO	d	D_F	D_1	L	H	Profile	Material	Article No.
	340	348	342,5	25	24,5	4	HGW HG600	49033379
	340	348	342,5	40	39,5	4	HGW HG600	49022823
	350	355	351,6	25	24,5	2,5	HGW HG600	49013954
	350	358	352,5	25	24,5	4	HGW HG600	24379041
	350	358	352,5	40	39,5	4	HGW HG600	49027147
ISO	360	365	361,6	25	24,5	2,5	HGW HG600	24380275
	360	365	361,6	40	39,5	2,5	HGW HG600	49023372
ISO	360	368	362,5	25	24,5	4	HGW HG600	24375318
	360	368	362,5	40	39,5	4	HGW HG600	531873
	370	375	371,6	15	14,8	2,5	HGW HG600	49030767
	370	378	372,5	25	24,5	4	HGW HG600	24379042
	370	378	372,5	35	34,5	4	HGW HG600	49000975
	380	385	381,6	25	24,5	2,5	HGW HG600	531516
	380	388	382,5	25	24,5	4	HGW HG600	24379138
	380	388	382,5	40	39,5	4	HGW HG600	24379245
	390	395	391,6	25	24,5	2,5	HGW HG600	24380276
	400	405	401,6	15	14,8	2,5	HGW HG600	24380781
	400	405	401,6	25	24,5	2,5	HGW HG600	49012525
	400	405	401,6	30	29,5	2,5	HGW HG600	528993
	400	408	402,5	25	24,5	4	HGW HG600	24375319
	400	408	402,5	40	39,5	4	HGW HG600	526027
	410	415	411,6	15	14,8	2,5	HGW HG600	49030768
	410	415	411,6	25	24,5	2,5	HGW HG600	49023906
	410	418	412,5	25	24,5	4	HGW HG600	49019715
	420	425	421,6	25	24,5	2,5	HGW HG600	527921
	420	428	422,5	25	24,5	4	HGW HG600	24379043
	420	428	422,5	40	39,5	4	HGW HG600	24379322
	440	445	441,6	25	24,5	2,5	HGW HG600	49037170
	440	448	442,5	25	24,5	4	HGW HG600	24375320
	440	448	442,5	40	39,5	4	HGW HG600	526028
	450	458	452,5	25	24,5	4	HGW HG600	24380453
	450	458	452,5	40	39,5	4	HGW HG600	49010449
	460	465	461,6	25	24,5	2,5	HGW HG600	49001818
	460	468	462,5	25	24,5	4	HGW HG600	24375321
	470	475	471,6	15	14,8	2,5	HGW HG600	49012900
	470	478	472,5	40	39,5	4	HGW HG600	49033424
	480	488	482,5	40	39,5	4	HGW HG600	49027148
	490	495	491,6	40	39,5	2,5	HGW HG600	49037274

Further dimensions on request.



All non-dimensioned edges rounded and burr-free

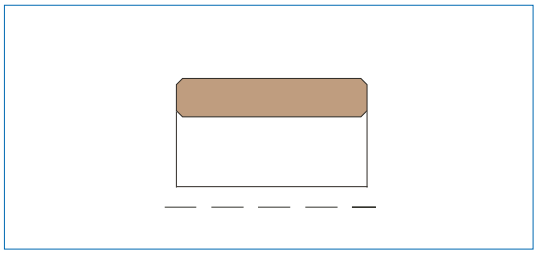
ISO	d	D_F	D_1	L	H	Profile	Material	Article No.
	500	508	502,5	20	19,8	4	HGW HG600	24378392
	500	508	502,5	25	24,5	4	HGW HG600	24375322
	500	508	502,5	35	34,5	4	HGW HG600	49015387
	500	508	502,5	40	39,5	4	HGW HG600	24379324
	510	515	511,6	25	24,5	2,5	HGW HG600	49006851
	510	518	512,5	25	24,5	4	HGW HG600	530266
	520	525	521,6	30	29,5	2,5	HGW HG600	49015060
	520	528	522,5	25	24,5	4	HGW HG600	49033459
	520	528	522,5	40	39,5	4	HGW HG600	49008972
	530	538	532,5	25	24,5	4	HGW HG600	24375323
	530	538	532,5	40	39,5	4	HGW HG600	49004922
	540	545	541,6	25	24,5	2,5	HGW HG600	49030392
	540	548	542,5	40	39,5	4	HGW HG600	49018518
	550	558	552,5	25	24,5	4	HGW HG600	49016779
	550	558	552,5	40	39,5	4	HGW HG600	49005155
	560	568	562,5	25	24,5	4	HGW HG600	24375324
	570	578	572,5	25	24,5	4	HGW HG600	49017391
	570	578	572,5	40	39,5	4	HGW HG600	49009448
	580	588	582,5	40	39,5	4	HGW HG600	49015645
	600	605	601,6	25	24,5	2,5	HGW HG600	528326
	600	608	602,5	25	24,5	4	HGW HG600	24375325
	600	608	602,5	40	39,5	4	HGW HG600	49003964
	620	625	621,6	15	14,8	2,5	HGW HG600	49006971
	620	628	622,5	25	24,5	4	HGW HG600	49027856
	630	638	632,5	25	24,5	4	HGW HG600	524927

Further dimensions on request.

ISO	d	D_F	D_1	L	H	Profile	Material	Article No.
	800	808	802,5	20	19,8	4	HGW HG600	49027818
	800	808	802,5	25	24,5	4	HGW HG600	526190
	800	808	802,5	40	39,5	4	HGW HG600	49013811
	820	828	822,5	25	24,5	4	HGW HG600	528715
	820	828	822,5	40	39,5	4	HGW HG600	528716
	850	858	852,5	30	29,5	4	HGW HG600	49032627
	850	858	852,5	40	39,5	4	HGW HG600	49028808
	890	898	892,5	20	19,8	4	HGW HG600	49003043
	890	898	892,5	35	34,5	4	HGW HG600	49020525
	900	905	901,6	25	24,5	2,5	HGW HG600	49031446
	900	905	901,6	40	39,5	2,5	HGW HG600	49027876
	900	908	902,5	25	24,5	4	HGW HG600	49006198
	900	908	902,5	40	39,5	4	HGW HG600	49013808
	910	918	912,5	40	39,5	4	HGW HG600	49012499
	920	928	922,5	40	39,5	4	HGW HG600	49008663
	950	958	952,5	20	19,8	4	HGW HG600	49023593
	950	958	952,5	30	29,5	4	HGW HG600	49032624
	950	958	952,5	40	39,5	4	HGW HG600	49011612
	970	978	972,5	40	39,5	4	HGW HG600	49026039
	990	998	992,5	40	39,5	4	HGW HG600	49039185
	1000	1008	1002,5	25	24,5	4	HGW HG600	49017423

Further dimensions on request.

Merkel SF Guide Ring



Product description

Non-metallic guide ring, either cut to size and ready for installation, or supplied as yard ware.

Product advantages

Non-metallic guide element for rods, for standardized housings as per ISO 10766, too
- low friction, stick-slip-free

Material

Material	Designation	Color
PTFE-bronze compound	PTFE B500	brown

Applications

Injection molding machines, control and regulating instruments, hand-held equipment

Field of application

Merkel SF Guide Ring can be used in all hydraulic fluids normally found in hydraulic systems such as oils and greases based on mineral oils, fire-resistant hydraulic fluids (HFD) and biodegradable hydraulic fluids (HETG, HEES, HEPG). We do not recommend to used Guide Rings SF in water or water based fluids (HFA, HFB, HFC).
The maximum permissible operating temperature is 120 °C

Surface finish

Peak-to-valley heights	R_a	R_{max}
Sliding surface	0,05 ... 0,3 µm	<2,5 µm
Groove base	<1,6 µm	<6,3 µm
Groove sides	<3,0 µm	<15,0 µm

Material content Mr >50% to max. 90% with cut depth c = Rz/2 and reference line Cref = 0%

Design notes

Please note our general remarks on design in the *Merkel Technical Manual*.

Manufacturing tolerance

L2	Manufacturing tolerance
>20 ... 80	... 0,5
>80 ... 250	... 1,0
>250 ... 500	... 1,5
>500 ... 1000	... 2,0
>1000 ... 2000	... 3,0
>2000 ... 4000	... 4,0

Recommended tolerances

D_1
H8

The tolerance for dimensions d and D_F must be viewed in connection with the seal used. Diameter D_1 stated in the table of dimensions must be considered exclusively in conjunction with the guide ring. The corresponding diameter of the connected seal housing has to be adapted to the sealing element involved.

Profile thickness

Profile thickness S
–0,05

Surface load

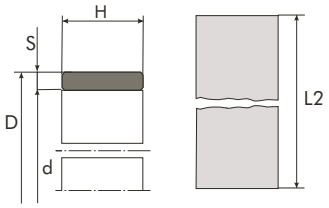
p <15 N/mm² ... 20 °C
p <7,5 N/mm² ... 80 °C
p <5 N/mm² ... 120 °C

Sliding speed, see sealing system.

Cutting rolls to size

The dimensions indicated below are available as rolls ware from stock. Stretched length L2 of sections cut to size must be determined in line with the formula of calculation. Gap k arising after assembly is required for thermal expansion purposes. We recommend therefore that the strips be cut straight. Butt joint tips may be damaged by fissures. Our cutter (article N. 507228) makes it possible to cut sections to size in a time-saving and accurate manner.

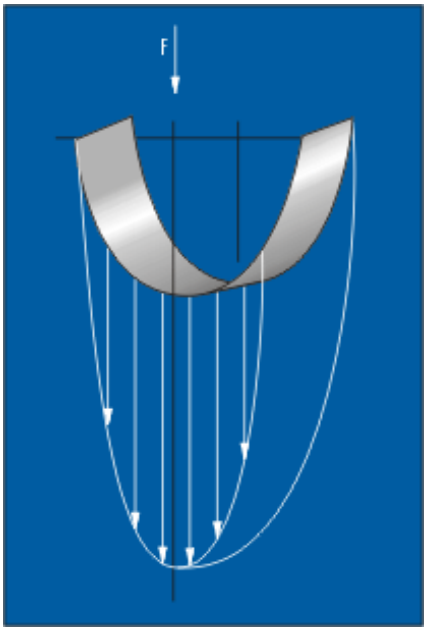
Calculating stretched length L2 for pistons: L2 = (d + S) x 3,11 – 0,5

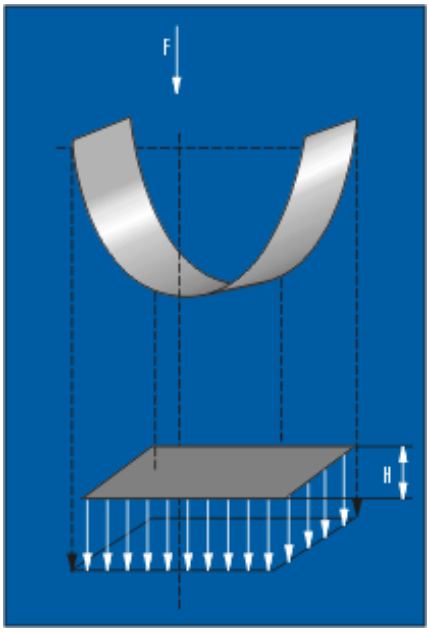


Groove length L	Strip thickness S	Article No.
8	2,5	24226174
9,7	2,5	24102775
10	2,5	24102563
12	2,5	24099191
15	2,5	24102564
20	2,5	24076217
25	2,5	24107955
15	4	24160019
20	4	24238052
25	4	24148093

Surface force

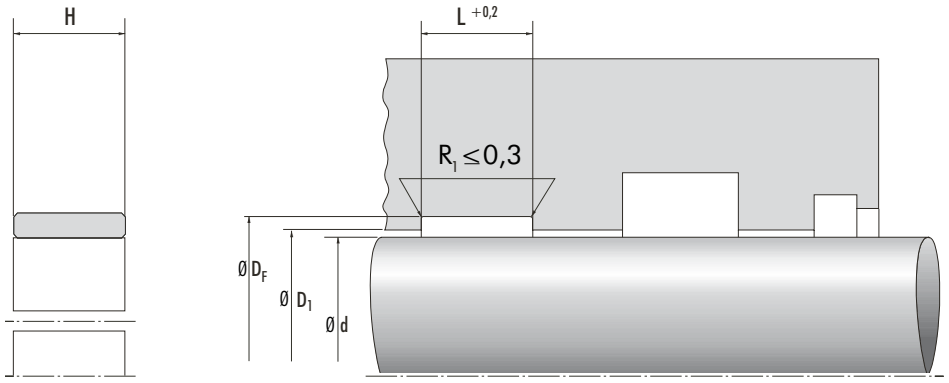
Pressure distribution over guide rings is not linear. The non-linear pressure progression within the contact area has been duly taken into account when determining the permissible specific surface contact pressure value. Permissible loads for guide strips are calculated by multiplying the projected area with the permissible specific surface contact pressure value. However, the angular offset of the piston likely to arise when using the recommended guide elements is duly taken into consideration in the permissible specific surface contact pressure value mentioned here.





F = P x A
A = d x H
H = F / (d x P)

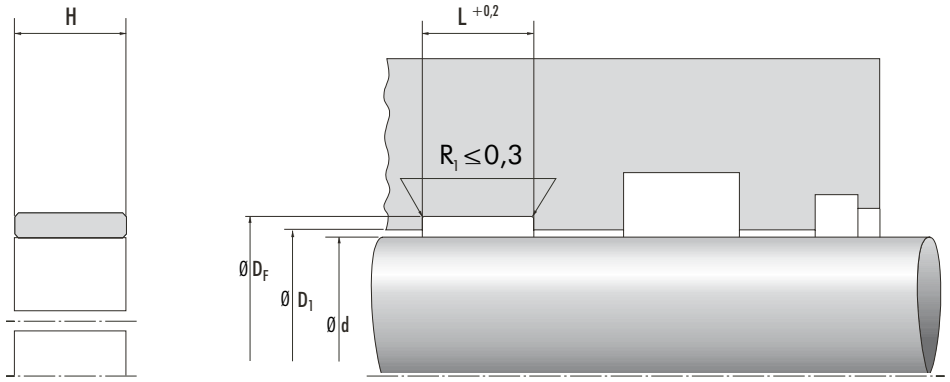
H = Guide bandwidth [mm]
F = Radial loads [N]
A = Projected area [mm²]
P = Perm. surface pressing value [N/mm²]
d = Rod diameter with rod guide; piston diameter with piston guide [mm].



All non-dimensioned edges rounded and burr-free

ISO	d	D_F	D_1	L	H	Profile	Material	Article No.
ISO	50	55	51,2	5,6	5,5	2,5	PTFE B500	24110082
ISO	50	55	51,2	9,7	9,6	2,5	PTFE B500	24169558
	50	55	51,6	15	14,8	2,5	PTFE B500	24203345
	55	60	56,2	9,7	9,6	2,5	PTFE B500	24160646
	55	60	56,6	15	14,8	2,5	PTFE B500	24275190
	56	61	57,2	5,6	5,5	2,5	PTFE B500	24300111
ISO	56	61	57,2	9,7	9,6	2,5	PTFE B500	24245671
	56	61	57,6	15	14,8	2,5	PTFE B500	24316593
	58	63	59,2	9,7	9,6	2,5	PTFE B500	24333829
	60	65	61,2	9,7	9,6	2,5	PTFE B500	24165598
	60	65	61,6	15	14,8	2,5	PTFE B500	24203612
ISO	63	68	64,2	9,7	9,6	2,5	PTFE B500	24300114
	63	68	64,6	15	14,8	2,5	PTFE B500	24275191
	65	70	66,2	9,7	9,6	2,5	PTFE B500	24300116
ISO	70	75	71,2	9,7	9,6	2,5	PTFE B500	24300118
	75	80	76,2	9,7	9,6	2,5	PTFE B500	24300120
	75	80	76,6	15	14,8	2,5	PTFE B500	24244742
ISO	80	85	81,2	9,7	9,6	2,5	PTFE B500	24300122
ISO	80	85	81,6	15	14,8	2,5	PTFE B500	24266958
	80	85	81,6	25	25	2,5	PTFE B500	24265250
	85	90	86,2	9,7	9,6	2,5	PTFE B500	24167352
	85	90	86,6	15	14,8	2,5	PTFE B500	24244741
ISO	90	95	91,2	9,7	9,6	2,5	PTFE B500	24300125
ISO	90	95	91,6	15	14,8	2,5	PTFE B500	24291194
	95	100	96,2	9,7	9,6	2,5	PTFE B500	24300127
ISO	100	105	101,2	9,7	9,6	2,5	PTFE B500	24300129

Further dimensions on request.



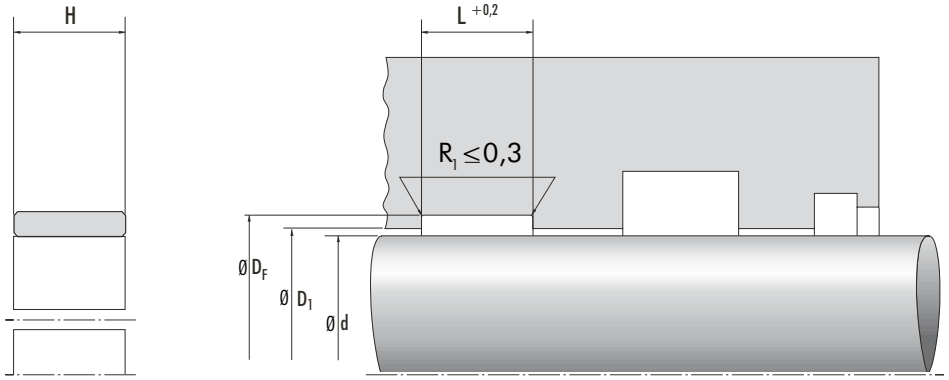
All non-dimensioned edges rounded and burr-free

ISO	d	D_F	D_1	L	H	Profile	Material	Article No.
ISO	100	105	101,6	15	14,8	2,5	PTFE B500	24250627
	100	105	101,6	20	19,5	2,5	PTFE B500	24260605
	100	105	101,6	25	24,5	2,5	PTFE B500	24342265
	100	108	102,5	15	14,8	4	PTFE B500	24327233
	105	110	106,2	9,7	9,6	2,5	PTFE B500	24300131
ISO	110	115	111,2	9,7	9,6	2,5	PTFE B500	24300133
ISO	110	115	111,6	15	14,8	2,5	PTFE B500	24293684
	110	115	111,6	20	19,5	2,5	PTFE B500	24166931
	110	115	111,6	25	25	2,5	PTFE B500	24292915
	110	118	112,5	15	14,8	4	PTFE B500	24327234
	115	120	116,2	9,7	9,6	2,5	PTFE B500	24300135
	115	120	116,6	20	19,5	2,5	PTFE B500	24242172
	120	125	121,2	9,7	9,6	2,5	PTFE B500	24300137
	120	125	121,6	15	14,8	2,5	PTFE B500	24300138
ISO	125	130	126,2	9,7	9,6	2,5	PTFE B500	24300140
ISO	125	130	126,6	15	14,8	2,5	PTFE B500	24300141
	125	130	126,6	20	19,5	2,5	PTFE B500	24230162
	130	135	131,2	9,7	9,6	2,5	PTFE B500	24300143
	130	135	131,6	15	14,8	2,5	PTFE B500	24300144
	130	135	131,6	25	25	2,5	PTFE B500	24262562
	135	140	136,2	9,7	9,6	2,5	PTFE B500	24300146
ISO	140	145	141,6	15	14,8	2,5	PTFE B500	24300149
	140	145	141,6	20	19,5	2,5	PTFE B500	24328413
	140	145	141,6	25	24,5	2,5	PTFE B500	24256885
	140	148	142,5	15	14,8	4	PTFE B500	24327236
	145	150	146,2	9,7	9,6	2,5	PTFE B500	24248043

Further dimensions on request.

ISO	d	D_F	D_1	L	H	Profile	Material	Article No.
	195	200	196,2	9,7	9,6	2,5	PTFE B500	24242182
ISO	200	205	201,6	15	14,8	2,5	PTFE B500	24154721
	200	205	201,6	25	25	2,5	PTFE B500	24266925
	200	208	202,5	25	24,5	4	PTFE B500	24299021
	210	215	211,2	9,7	9,6	2,5	PTFE B500	24300159
	210	215	211,6	15	14,8	2,5	PTFE B500	24300160
	210	215	211,6	20	19,5	2,5	PTFE B500	24239042
ISO	220	225	221,2	9,7	9,6	2,5	PTFE B500	24300161
ISO	220	225	221,6	15	14,8	2,5	PTFE B500	24300162
	220	225	221,6	20	19,5	2,5	PTFE B500	24157304
	230	235	231,6	15	14,8	2,5	PTFE B500	24154716
	230	235	231,6	20	19,5	2,5	PTFE B500	24342108
	240	245	241,2	9,7	9,7	2,5	PTFE B500	24258216
	240	245	241,6	15	14,8	2,5	PTFE B500	24223045
	240	245	241,6	25	24,5	2,5	PTFE B500	24314554
	245	250	246,6	25	24,5	2,5	PTFE B500	24311377
ISO	250	255	251,6	15	14,8	2,5	PTFE B500	24300163
	260	265	261,6	15	14,8	2,5	PTFE B500	24300164
	270	275	271,6	25	25	2,5	PTFE B500	24262561
ISO	280	285	281,6	15	14,8	2,5	PTFE B500	24300166
	290	295	291,6	15	14,8	2,5	PTFE B500	24300167
	300	305	301,6	15	14,8	2,5	PTFE B500	24300168
	300	305	301,6	25	24,5	2,5	PTFE B500	24348072
	310	315	311,6	15	14,8	2,5	PTFE B500	24300169
	325	330	326,6	25	25	2,5	PTFE B500	24293821
	330	335	331,6	15	14,8	2,5	PTFE B500	24300172
	330	335	331,6	25	24,5	2,5	PTFE B500	24300173
	340	345	341,6	15	14,8	2,5	PTFE B500	24300174
	340	345	341,6	25	24,5	2,5	PTFE B500	24162997
	350	355	351,6	15	14,8	2,5	PTFE B500	24300175
	350	355	351,6	25	24,5	2,5	PTFE B500	24300176
	350	358	352,5	25	24,5	4	PTFE B500	24337998
x	360	365	361,6	15	14,8	2,5	PTFE B500	24300177
	360	368	362,5	25	24,5	4	PTFE B500	24342011
	390	395	391,6	15	14,8	2,5	PTFE B500	24350238
	390	395	391,6	25	24,5	2,5	PTFE B500	24336658
	390	398	392,5	25	24,5	4	PTFE B500	24355839
	400	405	401,6	15	15	2,5	PTFE B500	24274959

Further dimensions on request.



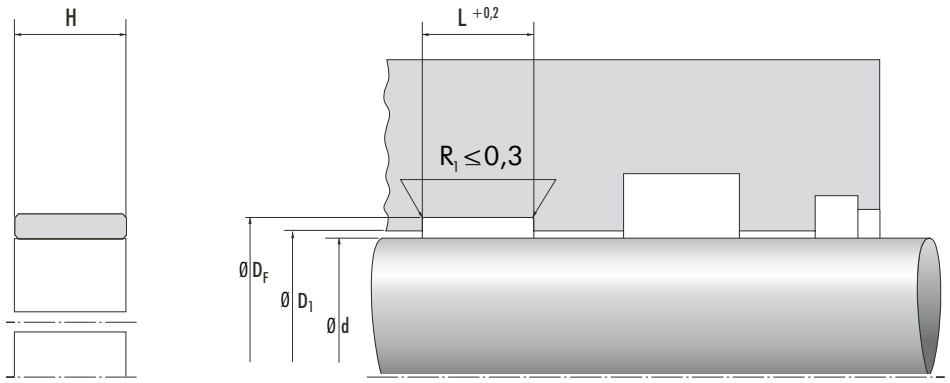
All non-dimensioned edges rounded and burr-free

ISO	d	D_F	D_1	L	H	Profile	Material	Article No.
	330	335	331,6	25	24,5	2,5	PTFE B500	24300173
	340	345	341,6	15	14,8	2,5	PTFE B500	24300174
	340	345	341,6	25	24,5	2,5	PTFE B500	24162997
	350	355	351,6	15	14,8	2,5	PTFE B500	24300175
	350	355	351,6	25	24,5	2,5	PTFE B500	24300176
	350	358	352,5	25	24,5	4	PTFE B500	24337998
ISO	360	365	361,6	15	14,8	2,5	PTFE B500	24300177
	360	368	362,5	25	24,5	4	PTFE B500	24342011
	390	395	391,6	15	14,8	2,5	PTFE B500	24350238
	390	395	391,6	25	24,5	2,5	PTFE B500	24336658
	390	398	392,5	25	24,5	4	PTFE B500	24355839
	400	405	401,6	15	15	2,5	PTFE B500	24274959
	400	408	402,5	25	24,5	4	PTFE B500	24269425
	410	415	411,6	25	25	2,5	PTFE B500	24296901
	420	425	421,6	20	19,5	2,5	PTFE B500	24230161
	420	425	421,6	25	24,5	2,5	PTFE B500	24233817
	420	428	422,5	25	24,5	4	PTFE B500	24269684
	425	430	426,6	25	25	2,5	PTFE B500	24261535
	430	435	431,6	20	19,5	2,5	PTFE B500	24203171
	430	435	431,6	25	24,5	2,5	PTFE B500	24348071
	435	440	436,6	25	24,5	2,5	PTFE B500	24162988
	440	445	441,6	25	24,5	2,5	PTFE B500	24344261
	450	455	451,6	15	14,8	2,5	PTFE B500	24265878
	450	455	451,6	25	25	2,5	PTFE B500	24257338
	450	458	452,5	25	24,5	4	PTFE B500	24294991
	460	465	461,6	25	24,5	2,5	PTFE B500	24308715

Further dimensions on request.

ISO	d	D_F	D_1	L	H	Profile	Material	Article No.
	520	525	521,6	20	20	2,5	PTFE B500	24242786
	540	545	541,6	0	24,5	2,5	PTFE B500	24358194
	540	548	542,5	25	24,5	4	PTFE B500	24332687
	550	555	551,6	25	24,5	2,5	PTFE B500	24344262
	560	568	562,5	25	24,5	4	PTFE B500	24274998
	570	575	571,5	25	25	2,5	PTFE B500	24263227
	580	588	582,5	25	24,5	4	PTFE B500	24307426
	590	595	591,6	25	25	2,5	PTFE B500	24290939
	600	605	601,6	15	14,8	2,5	PTFE B500	24316132
	600	605	601,6	20	19,5	2,5	PTFE B500	24300403
	600	608	602,5	25	24,5	4	PTFE B500	24354936
	620	625	621,6	20	19,5	2,5	PTFE B500	24291416
	620	625	621,6	25	24,5	2,5	PTFE B500	24354129
	630	635	631,6	20	19,5	2,5	PTFE B500	24361332
	630	635	631,6	25	25	2,5	PTFE B500	24263904
	640	648	642,5	25	24,5	4	PTFE B500	24298429
	650	658	652,5	25	24,5	4	PTFE B500	24293967
	670	675	671,6	25	24,5	2,5	PTFE B500	24162996
	670	678	672,5	25	24,5	4	PTFE B500	24361116
	675	680	676,6	25	25	2,5	PTFE B500	24261537
	700	705	701,6	15	14,8	2,5	PTFE B500	24234909
	700	705	701,6	25	24,5	2,5	PTFE B500	24223046
	700	708	702,5	30	30	4	PTFE B500	24262945
	710	718	712,5	15	14,8	4	PTFE B500	24216172
	720	728	722,5	25	24,5	4	PTFE B500	24359660
	730	738	732,5	25	24,5	4	PTFE B500	24263632
	735	740	736,6	25	24,5	2,5	PTFE B500	24163718
	740	748	742,5	20	19,5	4	PTFE B500	24344397
	740	748	742,5	25	24,5	4	PTFE B500	24243175
	750	755	751,6	25	24,5	2,5	PTFE B500	24227972
	790	798	792,5	25	24,5	4	PTFE B500	24351827
	800	808	802,5	25	24,5	4	PTFE B500	24295216
	800	805	801,6	25	24,5	2,5	PTFE B500	24162994
	820	828	822,5	20	19,5	4	PTFE B500	24238051
	830	838	832,5	25	24,5	4	PTFE B500	24344381
	850	858	852,5	25	24,5	4	PTFE B500	24314615
	890	898	892,5	15	15	4	PTFE B500	24263607
	890	898	892,5	25	24,5	4	PTFE B500	24263885

Further dimensions on request.

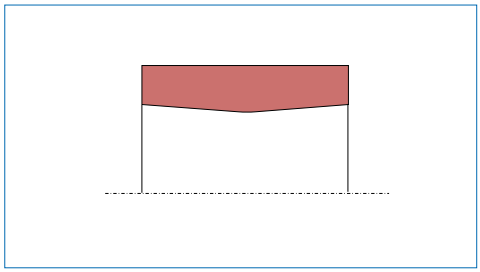


All non-dimensioned edges rounded and burr-free

ISO	d	D_F	D_1	L	H	Profile	Material	Article No.
	735	740	736,6	25	24,5	2,5	PTFE B500	24163718
	740	748	742,5	20	19,5	4	PTFE B500	24344397
	740	748	742,5	25	24,5	4	PTFE B500	24243175
	750	755	751,6	25	24,5	2,5	PTFE B500	24227972
	790	798	792,5	25	24,5	4	PTFE B500	24351827
	800	808	802,5	25	24,5	4	PTFE B500	24295216
	800	805	801,6	25	24,5	2,5	PTFE B500	24162994
	820	828	822,5	20	19,5	4	PTFE B500	24238051
	830	838	832,5	25	24,5	4	PTFE B500	24344381
	850	858	852,5	25	24,5	4	PTFE B500	24314615
	890	898	892,5	15	15	4	PTFE B500	24263607
	890	898	892,5	25	24,5	4	PTFE B500	24263885
	900	908	902,5	25	24,5	4	PTFE B500	24257241
	950	958	952,5	25	24,5	4	PTFE B500	24233242
	975	983	977,5	25	24,5	4	PTFE B500	24361413

Further dimensions on request.

Merkel Guivex KBK Guide Bush



Product description

Profiled piston guide bush made of resin bonded fabric. Patented product design (patent No.: PCT/EP95/03874)

Product advantages

intended, among others, for standardized housings as per ISO 10766

- interchangeable with current housings of type KB and KF
- high radial load capacity
- very good guide-length utilization based on uniform stress distribution
- enhanced penetration of lubricating media based on optimized stress distribution within the contact zone between the guide bush and the counter surface(favorable frictional behavior)
- reduced propensity for stick-slip
- excellent sliding behavior over a short guiding distance (no jamming)

Material

Material	Designation	Color
Resin bonded fabric	HGW HG650	red
Resin bonded fabric	HGW HG517	dark-gray

The choice of material depends on the diameter involved.

Applications

- Long-stroke cylinder (piston-rod deflection)
- Short guiding distance (piston tilting)
- Short stroke (inappropriate lubrication)
- Frictionally optimized sealing systems
- Replacement for metallic guides

Field of application

Guivex guide bushes can be used in all hydraulic fluids normally found in hydraulic systems such as oils and greases based on mineral oils, water, fire-resistant hydraulic fluids (HFA, HFB, HFC, HFD) and biodegradable hydraulic fluids (HETG, HEES, HEPG).
The maximum permissible operating temperature is 120 °C

Surface finish

Peak-to-valley heights	R_a	R_{max}
Sliding surface	0,05 … 0,3 µm	≤<2,5 µm
Groove base	≤<1,6 µm	≤<6,3 µm
Groove sides	≤<3,0 µm	≤<15,0 µm

Material content Mr >50% to max. 90% with cut depth c = Rz/2 and reference line Cref = 0%

The long term behavior of a sealing element and its dependability against early failures are crucially influenced by the quality of the counterface. Therefore a precise description and assessment of the surface is critical.

Based on recent findings, we recommend supplementing the above definition of surface finish for the dynamic surface by the characteristics detailed in the table below. With these new characteristics derived from the material content, previous more general descriptions of the material content are significantly improved, especially in regard to surface roughness. *See also Merkel Technical Manual.*

Surface finish of the sliding surfaces

Characteristic value	Limit	
Ra	> 0,05µm	< 0,30µm
Rmax	< 2,5µm	
Rpkx	< 0,5µm	
Rpk	< 0,5µm	
Rk	>0,25µm	<0,7µm
Rvk	>0,2µm	<0,65µm
Rvkx	>0,2µm	<2,0µm

The limit values listed in the table do not apply, at the present stage, to ceramic or partly ceramic counterfaces.

Tolerances

Diameter D1
h9

Manufacturing tolerances

Profile thickness
-0,01 ... -0,06

The tolerance regarding diameters d_F and D is determined in connection with the calculation of the gap dimension. Tolerance zones H7 and H8 and/or h7 and h8 are usually selected for typical hydraulic applications with a nominal size of up to 1,000mm.

Surface load

The value for the specific surface pressure depends on the operating temperature and the scope of elastic deformation (spring deflection) of the guiding element involved. The maximum possible spring deflection in a sealing system is limited by the minimum gap dimension downstream of the primary seal. (See also Merkel Technical Manual)

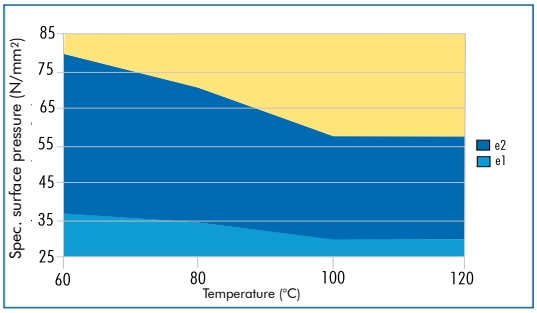
Spring deflection

e1 = 0,1 at s = 2,5

e1 = 0,15 at s = 4

e2 = 0,15 at s = 2,5

e2 = 0,2 at s = 4



Spec. surface pressure under parallel loads

Design notes

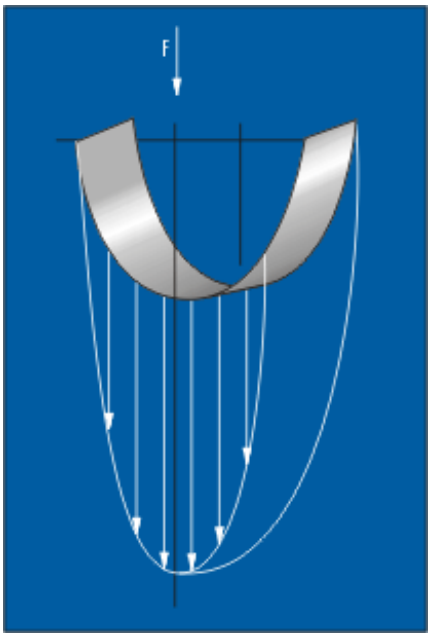
Diameter d1 indicated in the table of dimensions should be viewed solely in connection with the guide bush. The corresponding diameter of the connected seal housing must be in tune with the sealing element involved.

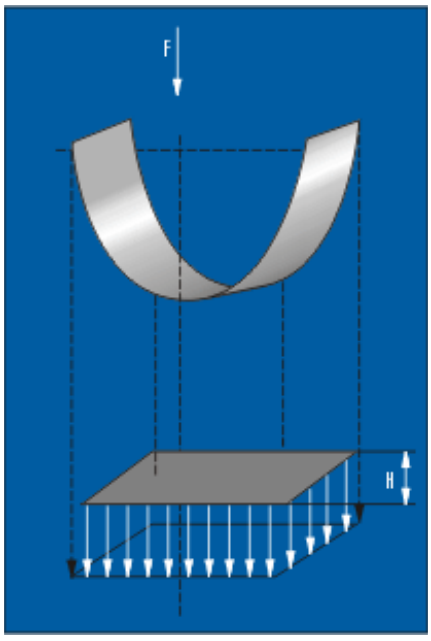
Installation & assembly

Please note our general remarks on the installation of hydraulic seals in the Merkel Technical Manual.

Side load

Pressure within the contact area between the guide and the counter surfaceis not linear. The guiding width required can be calculated by applying the formulas mentioned below on the basis of the projected area. The non-linear progression of the contact pressure process is taken into account in the surface pressure value.
It may be advisable to reduce the loads by selecting a broader guide in individual cases to obtain an extended service life.





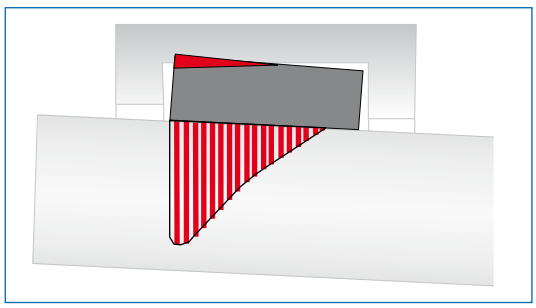
F = P x A
A = d x H
H = F / (d x P)

H = Guide bandwidth [mm]
F = Radial loads [N]
A = Projected area [mm²]

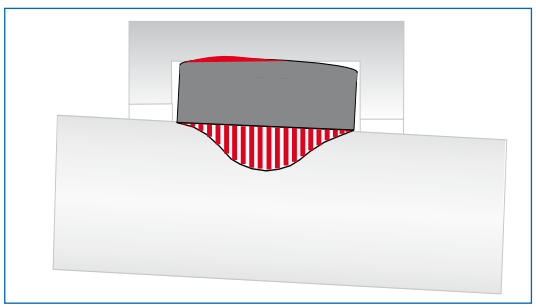
P = perm. surface pressure [N/mm²]
d = Rod diameter with rod guide; Piston diameter with piston guide [mm]

Operating principle

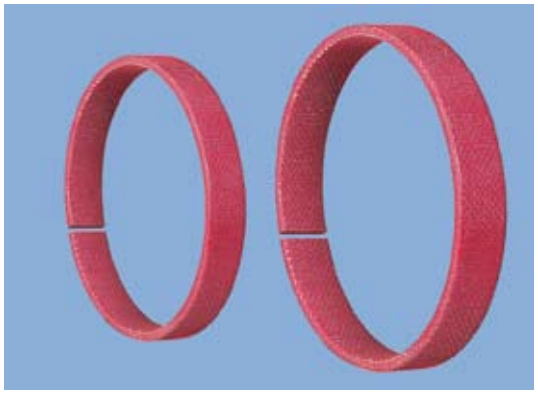
Rectangular guide bushes:
Stress peaks within the edge area



Guivex guide bush:
uniform stress distribution



Additional product description – Guide strips



Side load

The use of guide elements makes it possible to achieve a low-friction and low-wear relative motion between the mobile components of the hydraulic cylinder. Any side loads arising during operation are absorbed effectively and any undesirable metal to metal contact between the piston rod and/or the piston barrel and the surrounding housing components is reduced.
The scope of the maximum side load is essentially determined by the geometrical marginal conditions and the properties of the guide element involved.

Excessive stresses

The guide play and elastic deformation of the partners under loads result in an angular deviation between the piston rod and/or the piston barrel and the counter surfaceduring operation. Consequently, guides inside hydraulic cylinders will not be ideally parallel, but primarily stressed at the edges.
In this case, the permissible side load of the guide is defined by the lower maximum load up to edge break and not by the maximum compressive strength of the material. Excessive stresses within the edge area (Figure 01) make the penetration of lubricating media more difficult, too. The hydraulic medium is wiped along the edge stressed on the guide element and the lubricating film is reduced to a minimum, thus leading to stick-slip effects and more significant wear.

Profiling

Guivex guide bushes are provided with a convex profiling oriented towards the groove base. The side load applied is distributed evenly over the width of the guide element here. The maximum contact pressure value remains within the medium range and excessive stresses are reduced at the edges (Figure 02).

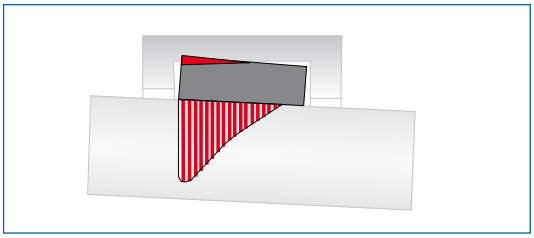


Figure 01: Rectangular guide bush
Excessive stress within the edge area

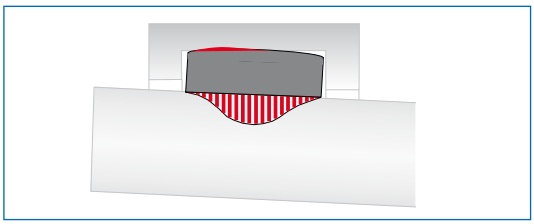


Figure 02: Guivex guide bush
Uniform stress distribution

Sliding properties

Guivex guide bushes made of HGW HG517 and HGW HG 650 materials are compounded with graphite and/or PTFE in order to achieve a better dry-running behavior. As a result, guide bushes made of resin bonded fabric exhibit excellent sliding properties, due to the material properties alone, even in the event of inappropriate lubrication.

The absorption of lubricating media within the area comprised between the guide and the counter surfaceis greatly enhanced by the patented profiling of Guivex guide bushes. Consequently, the sliding behavior is also improved by the Guivex geometry with correspondingly positive effects in terms of service life and stick-slip behavior.

Radial load capacity

Merkel resin bonded fabric materials are characterized by a high degree of radial load capacity.

The impact of the operating temperature on the load capacity of resin bonded fabric guide bushes is restricted, of course, when using duroplastic resin bonded fabric quality HGW HG517. The resin matrix of our material HGW HG650 includes both duroplastic and thermoplastic constituents. If permissible cross loads are simultaneously less dependent on temperatures, the flexibility will be tangibly enhanced for assembly with small diameters.

Purely thermoplastic basic materials like polyester, for example, exhibit a temperature-dependent material behavior. Permissible cross loads are greatly reduced under the effect of rising operating temperatures. (See Figure 03).

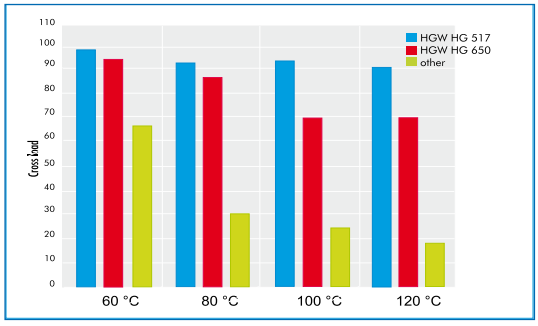


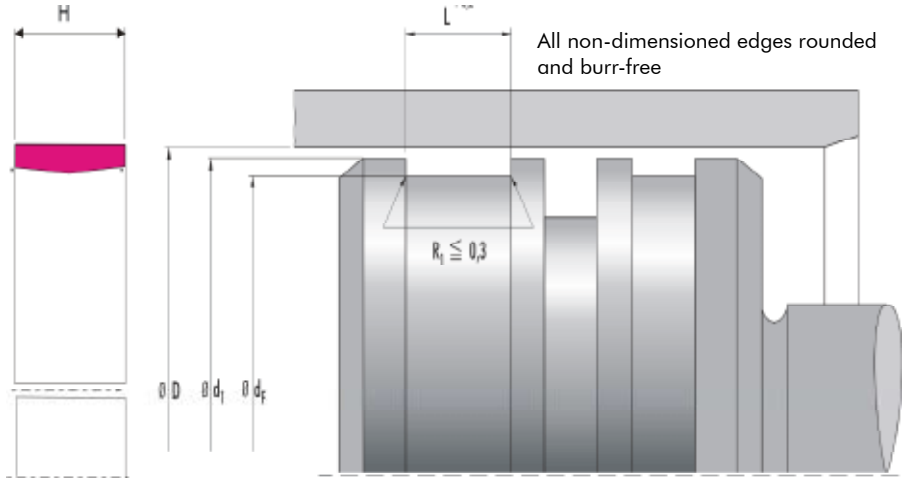
Figure 03: Resin bonded fabric materials in comparison of load capacity among plane-parallel guides depending on the operating temperature involved.

Forces are always introduced within the medium range of the guide bush in conjunction with the patented Guivex geometry. The maximum permissible cross load is not reduced here by excess stresses within the edge area. Uniform movements along the stroke, coupled with a high radial load capacity, can be achieved even in conjunction with short guide lengths and long-stroke cylinders with the large angular offset to be expected.

The absorption of lubricating media within the area comprised between the guide and the counter surfaceis greatly enhanced by the patented profiling of Guivex guide bushes. Consequently, Guivex guide bushes exhibit a favorable frictional behavior with correspondingly positive effects in terms of service life and stick-slip behavior.

Forces are always introduced within the medium range of the guide bush. Uniform movements along the stroke, coupled with a high radial load capacity, can be achieved even in conjunction with short guide lengths and long-stroke cylinders with the large angular offset to be expected. The system of guides inside the hydraulic cylinder will not be inclined to jam over a short guide distance either.

The use of Guivex guide bushes makes a vital contribution to the functional reliability and dependability of hydraulic cylinders.

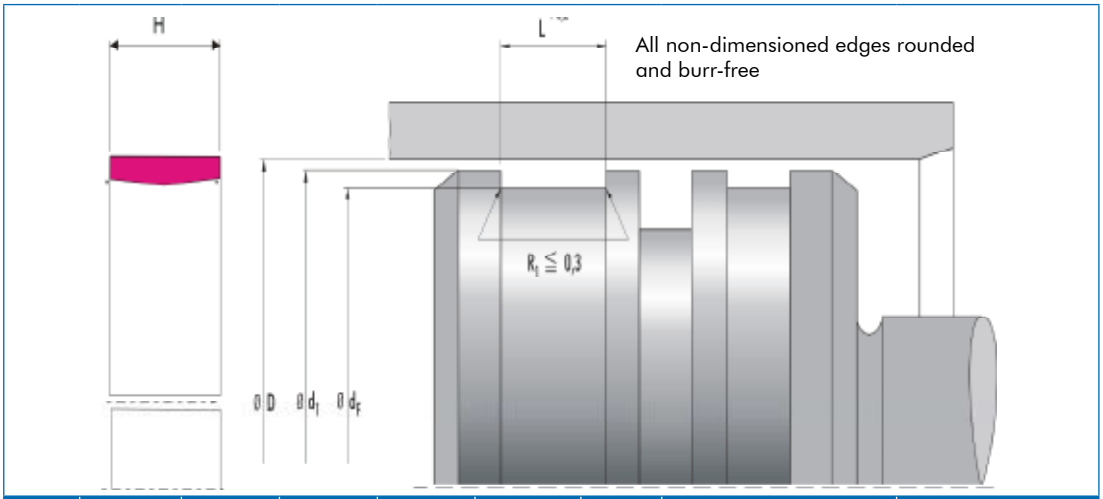


ISO	D	d_F	d_1	L	H	Profile	Material	Article No.
	40	35	38,4	9,7	9,5	2,5	HGW HG650	49005755
	40	35	38,4	15,0	14,8	2,5	HGW HG650	49005756
	45	40	43,4	9,7	9,5	2,5	HGW HG650	49005758
	45	40	43,4	15,0	14,8	2,5	HGW HG650	49005759
	50	45	48,4	9,7	9,5	2,5	HGW HG650	49005771
	50	45	48,4	15,0	14,8	2,5	HGW HG650	49005772
	55	50	53,4	9,7	9,5	2,5	HGW HG650	49005773
	55	50	53,4	15,0	14,8	2,5	HGW HG650	49005774
	60	55	58,4	9,7	9,5	2,5	HGW HG650	49005777
	60	55	58,4	15,0	14,8	2,5	HGW HG650	49005778
	65	60	63,4	9,7	9,5	2,5	HGW HG650	49005792
	65	60	63,4	15,0	14,8	2,5	HGW HG650	49005793
	70	65	68,4	9,7	9,5	2,5	HGW HG650	49005794
	70	65	68,4	15,0	14,8	2,5	HGW HG650	49005795
	75	70	73,4	9,7	9,5	2,5	HGW HG650	49005796
	75	70	73,4	15,0	14,8	2,5	HGW HG650	49005797
ISO	80	75	78,4	9,7	9,5	2,5	HGW HG650	49002931
	80	75	78,4	15,0	14,8	2,5	HGW HG650	49005798
	80	75	78,4	20,0	19,8	2,5	HGW HG650	49018501
	85	80	83,4	9,7	9,5	2,5	HGW HG650	49005812
	85	80	83,4	15,0	14,8	2,5	HGW HG650	49005828
	90	85	88,4	9,7	9,5	2,5	HGW HG650	49005829
	90	85	88,4	15,0	14,8	2,5	HGW HG650	49005830
	95	90	93,4	9,7	9,5	2,5	HGW HG650	49005832
	95	90	93,4	15,0	14,8	2,5	HGW HG650	49005833
ISO	100	95	98,4	9,7	9,5	2,5	HGW HG650	49005835

Further dimensions on request.

ISO	D	d_F	d_1	L	H	Profile	Material	Article No.
	100	95	98,4	15,0	14,8	2,5	HGW HG650	49005581
	105	100	103,4	9,7	9,5	2,5	HGW HG650	49005836
	105	100	103,4	20,0	19,8	2,5	HGW HG650	49018503
	110	105	108,4	9,7	9,5	2,5	HGW HG650	49005838
	110	105	108,4	15,0	14,8	2,5	HGW HG650	49003729
	110	105	108,4	25,0	24,5	2,5	HGW HG650	49026578
	115	110	113,4	15,0	14,8	2,5	HGW HG650	49005839
	120	115	118,4	9,7	9,5	2,5	HGW HG650	49038027
ISO	125	120	123,4	9,7	9,5	2,5	HGW HG650	49005841
	125	120	123,4	15,0	14,8	2,5	HGW HG650	49003232
	125	120	123,4	25,0	24,5	2,5	HGW HG650	49005842
	130	125	128,4	9,7	9,5	2,5	HGW HG650	49005843
	130	125	128,4	15,0	14,8	2,5	HGW HG650	49005844
	130	125	128,4	25,0	24,5	2,5	HGW HG650	49005845
	135	130	133,4	9,7	9,5	2,5	HGW HG650	49005846
	135	130	133,4	15,0	14,8	2,5	HGW HG650	49005847
ISO	140	135	138,4	9,7	9,5	2,5	HGW HG650	49005899
ISO	140	135	138,4	15,0	14,8	2,5	HGW HG650	49005900
	140	135	138,4	25,0	24,5	2,5	HGW HG650	49005898
	145	140	143,4	25,0	24,5	2,5	HGW HG650	49020659
	150	145	148,4	9,7	9,5	2,5	HGW HG650	49005911
	155	150	153,4	9,7	9,5	2,5	HGW HG650	49015382
ISO	160	155	158,4	9,7	9,5	2,5	HGW HG650	49005912
ISO	160	155	158,4	15,0	14,8	2,5	HGW HG650	49005913
	160	155	158,4	25,0	24,5	2,5	HGW HG650	49005914
	170	165	168,4	15,0	14,8	2,5	HGW HG650	49005915
	170	165	168,4	25,0	24,5	2,5	HGW HG650	49005916
	175	170	173,4	9,7	9,5	2,5	HGW HG650	49012836
	175	170	173,4	25,0	24,5	2,5	HGW HG650	49018109
ISO	180	175	178,4	9,7	9,5	2,5	HGW HG650	49005917
ISO	180	175	178,4	15,0	14,8	2,5	HGW HG650	49005918
	185	180	183,4	9,7	9,5	2,5	HGW HG650	49015383
	190	185	188,4	25,0	24,5	2,5	HGW HG650	49006011
ISO	200	195	198,4	9,7	9,5	2,5	HGW HG650	49006013
ISO	200	195	198,4	15,0	14,8	2,5	HGW HG650	49006012
	200	195	198,4	20,0	19,8	2,5	HGW HG650	49019433
	210	205	208,4	15,0	14,8	2,5	HGW HG650	49037027
	215	210	213,4	15,0	14,8	2,5	HGW HG650	49006014

Further dimensions on request.



ISO	D	d_F	d_1	L	H	Profile	Material	Article No.
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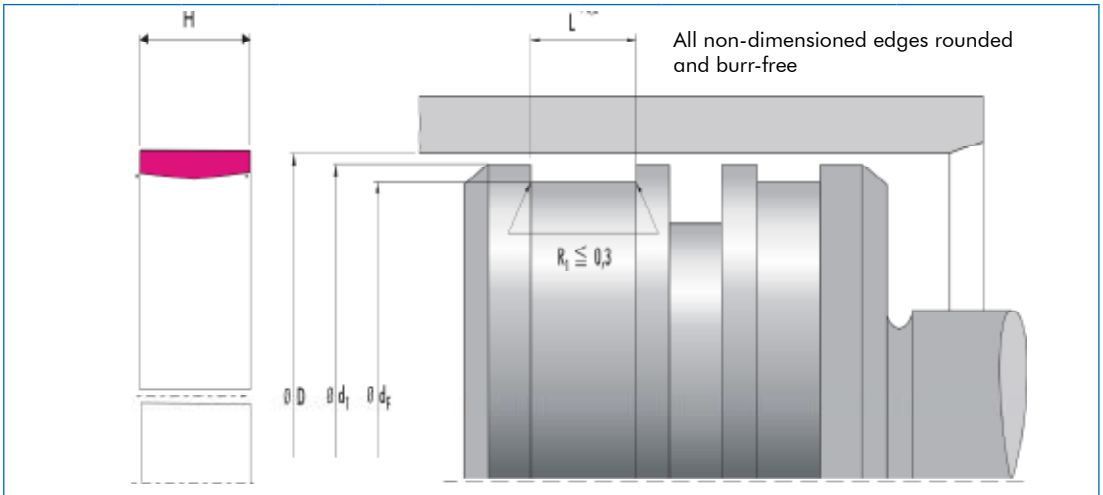
	175	170	173,4	9,7	9,5	2,5	HGW HG650	49012836
	175	170	173,4	25,0	24,5	2,5	HGW HG650	49018109
ISO	180	175	178,4	9,7	9,5	2,5	HGW HG650	49005917
ISO	180	175	178,4	15,0	14,8	2,5	HGW HG650	49005918
	185	180	183,4	9,7	9,5	2,5	HGW HG650	49015383
	190	185	188,4	25,0	24,5	2,5	HGW HG650	49006011
ISO	200	195	198,4	9,7	9,5	2,5	HGW HG650	49006013
ISO	200	195	198,4	15,0	14,8	2,5	HGW HG650	49006012
	200	195	198,4	20,0	19,8	2,5	HGW HG650	49019433
	210	205	208,4	15,0	14,8	2,5	HGW HG650	49037027
	215	210	213,4	15,0	14,8	2,5	HGW HG650	49006014
ISO	220	215	218,4	9,7	9,5	2,5	HGW HG650	49006015
ISO	220	215	218,4	15,0	14,8	2,5	HGW HG650	49006016
	225	220	223,4	15,0	14,8	2,5	HGW HG650	49037028
	225	220	223,4	25,0	24,5	2,5	HGW HG650	49006017
	230	225	228,4	9,7	9,5	2,5	HGW HG650	49006018
	230	225	228,4	15,0	14,8	2,5	HGW HG650	49006019
	240	235	238,4	15,0	14,8	2,5	HGW HG650	49006021
	240	235	238,4	25,0	24,5	2,5	HGW HG650	49006020
ISO	250	245	248,4	9,7	9,5	2,5	HGW HG650	49006022
ISO	250	245	248,4	15,0	14,8	2,5	HGW HG650	49006023
	255	250	253,4	15,0	14,8	2,5	HGW HG650	49030447
	260	255	258,4	25,0	24,5	2,5	HGW HG650	49006024
ISO	280	275	278,4	15,0	14,8	2,5	HGW HG650	49006025
ISO	280	275	278,4	25,0	24,5	2,5	HGW HG650	49006026

Further dimensions on request.

ISO	D	d_F	d_1	L	H	Profile	Material	Article No.
	300	295	298,4	15,0	14,8	2,5	HGW HG600	49008915
	300	295	298,4	25,0	24,5	2,5	HGW HG600	24378787
	310	305	308,4	15,0	14,8	2,5	HGW HG600	24380701
	310	302	307,5	40,0	39,6	4	HGW HG600	24378053
ISO	320	312	317,5	25,0	24,5	4	HGW HG600	24379044
	320	315	318,4	30,0	29,5	2,5	HGW HG600	49037777
	320	312	317,5	40,0	39,6	4	HGW HG600	24378054
	330	325	328,4	15,0	14,8	2,5	HGW HG600	49013266
	330	325	328,4	25,0	24,5	2,5	HGW HG600	24379256
	330	322	327,5	25,0	24,5	4	HGW HG600	49026460
	330	322	327,5	30,0	29,5	4	HGW HG600	49004578
	340	332	337,5	25,0	24,5	4	HGW HG600	24379045
	340	332	337,5	30,0	29,5	4	HGW HG600	528485
	350	345	348,4	15,0	14,8	2,5	HGW HG600	49023908
	350	342	347,5	25,0	24,5	4	HGW HG600	530277
	350	342	347,5	40,0	39,5	4	HGW HG600	533359
ISO	360	355	358,4	25,0	24,5	2,5	HGW HG600	49038865
ISO	360	352	357,5	25,0	24,5	4	HGW HG600	531639
	360	352	357,5	30,0	29,5	4	HGW HG600	24379154
	360	352	357,5	40,0	39,6	4	HGW HG600	24378056
	365	357	362,5	25,0	24,5	4	HGW HG600	49006184
	375	370	373,4	25,0	24,5	2,5	HGW HG600	24378788
	375	367	372,5	25,0	24,5	4	HGW HG600	24379080
	380	372	377,5	25,0	24,5	4	HGW HG600	49028909
	380	372	377,5	40,0	39,5	4	HGW HG600	24378057
	385	380	383,4	25,0	24,5	2,5	HGW HG600	49026710
	390	385	388,4	15,0	14,8	2,5	HGW HG600	49023299
	395	390	393,4	15,0	14,8	2,5	HGW HG600	49023907
	400	392	397,5	40,0	39,5	4	HGW HG600	24378058
	410	402	407,5	40,0	39,5	4	HGW HG600	531871
	420	415	418,4	25,0	24,5	2,5	HGW HG600	49027578
	420	412	417,5	25,0	24,5	4	HGW HG600	24379046
	420	412	417,5	40,0	39,5	4	HGW HG600	24378059
	430	422	427,5	40,0	39,5	4	HGW HG600	49003308
	435	430	433,4	15,0	14,8	2,5	HGW HG600	49023909
	440	432	437,5	25,0	24,5	4	HGW HG600	49002762
	440	432	437,5	40,0	39,5	4	HGW HG600	49015384
	450	442	447,5	40,0	39,5	4	HGW HG600	49027733

Further dimensions on request.



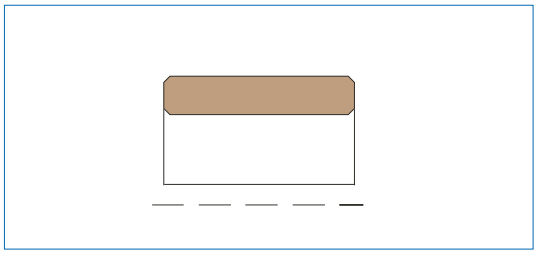
ISO	D	d_F	d_1	L	H	Profile	Material	Article No.
	455	447	452,5	25,0	24,5	4	HGW HG600	49026663
	460	455	458,4	15,0	14,8	2,5	HGW HG600	49033429
	460	455	458,4	25,0	24,5	2,5	HGW HG600	49038866
	460	452	457,5	25,0	24,5	4	HGW HG600	24379348
	460	452	457,5	40,0	39,6	4	HGW HG600	24379244
	465	460	463,4	40,0	39,5	2,5	HGW HG600	49016011
	470	465	468,4	25,0	24,5	2,5	HGW HG600	49018190
	475	470	473,4	25,0	24,5	2,5	HGW HG600	49015956
	480	475	478,4	25,0	24,5	2,5	HGW HG600	24378805
	480	472	477,5	40,0	39,6	4	HGW HG600	24378060
ISO	500	492	497,5	25,0	24,5	4	HGW HG600	49002908
	500	492	497,5	40,0	39,5	4	HGW HG600	531874
	510	505	508,4	25,0	24,5	2,5	HGW HG600	49027823
	510	502	507,5	25,0	24,5	4	HGW HG600	49022889
	520	515	518,4	40,0	39,5	2,5	HGW HG600	49037275
	530	522	527,5	25,0	24,5	4	HGW HG600	530276
	530	522	527,5	40,0	39,5	4	HGW HG600	49012255
	540	535	538,4	25,0	24,5	2,5	HGW HG600	24378806
	540	532	537,5	25,0	24,5	4	HGW HG600	24379047
	540	532	537,5	40,0	39,5	4	HGW HG600	49010048
	550	545	548,4	25,0	24,5	2,5	HGW HG600	49006853
	560	552	557,5	40,0	39,5	4	HGW HG600	49002673
	565	557	562,5	40,0	39,5	4	HGW HG600	49027672
	580	572	577,5	20,0	19,8	4	HGW HG600	49016127
	580	572	577,5	40,0	39,5	4	HGW HG600	49015385
	590	585	588,4	25,0	24,5	2,5	HGW HG600	49022694

Further dimensions on request.

ISO	D	d_F	d_1	L	H	Profile	Material	Article No.
	600	595	598,4	25,0	24,5	2,5	HGW HG600	24378808
	600	592	597,5	25,0	24,5	4	HGW HG600	24377999
	600	592	597,5	40,0	39,5	4	HGW HG600	24379323
	610	602	607,5	40,0	39,5	4	HGW HG600	49033425
	620	612	617,5	25,0	24,5	4	HGW HG600	49004662
	630	625	628,4	25,0	24,5	2,5	HGW HG600	49032298
	630	622	627,5	40,0	39,5	4	HGW HG600	49002675
	640	632	637,5	25,0	24,5	4	HGW HG600	531869
	650	642	647,5	40,0	39,5	4	HGW HG600	49007593
	660	655	658,4	25,0	24,5	2,5	HGW HG600	49012009
	660	652	657,5	25,0	24,5	4	HGW HG600	49024947
	680	675	678,4	25,0	24,5	2,5	HGW HG600	526191
	680	672	677,5	25,0	24,5	4	HGW HG600	527133
	680	672	677,5	40,0	39,5	4	HGW HG600	49004923
	690	685	688,4	15,0	14,8	2,5	HGW HG600	49006972
	700	692	697,5	35,0	34,5	4	HGW HG600	49003965
	700	695	698,4	40,0	39,5	2,5	HGW HG600	49023373
	710	702	707,5	40,0	39,5	4	HGW HG600	49002676
	730	722	727,5	40,0	39,5	4	HGW HG600	49015648
	740	732	737,5	25,0	24,5	4	HGW HG600	49023910
	740	732	737,5	35,0	34,5	4	HGW HG600	24378498
	750	742	747,5	25,0	24,5	4	HGW HG600	49019714
	760	752	757,5	40,0	39,5	4	HGW HG600	24379321
	800	792	797,5	20,0	19,8	4	HGW HG600	49000238
	800	792	797,5	25,0	24,5	4	HGW HG600	24378000
	830	822	827,5	25,0	24,5	4	HGW HG600	49023911
	840	832	837,5	25,0	24,5	4	HGW HG600	49005727
	850	842	847,5	25,0	24,5	4	HGW HG600	531637
	865	857	862,5	20,0	19,8	4	HGW HG600	531678
	865	857	862,5	40,0	39,5	4	HGW HG600	49003031
	900	892	897,5	40,0	39,5	4	HGW HG600	49013810
	950	942	947,5	25,0	24,5	4	HGW HG600	24379050
	950	942	947,5	40,0	39,5	4	HGW HG600	49028807
	965	957	962,5	25,0	24,5	4	HGW HG600	49003044
	1000	992	997,5	40,0	39,5	4	HGW HG600	49013809

Further dimensions on request.

Merkel KF Guide Ring



Product description

Non-metallic guide ring, either cut to size and ready for installation, or supplied as rolls.

Product advantages

Non-metallic guide element for pistons, for standardized housings as per ISO 10766, too
- low friction, stick-slip-free

Material

Material	Designation	Color
PTFE-bronze compound	PTFE B500	brown

Applications

Injection molding machines, control and regulating instruments, hand-held equipment

Field of application

Merkel KF Guide Rings can be used in all hydraulic fluids normally found in hydraulic systems such as oils and greases based on mineral oils, fire-resistant hydraulic fluids (HFD) and biodegradable hydraulic fluids (HETG, HEES, HEPG). We do not recommend to used Guide Rings SF in water or water based fluids (HFA, HFB, HFC).
The maximum permissible operating temperature is 120 °C

Surface finish

Peak-to-valley heights	R_a	R_{max}
Sliding surface	0,05 ... 0,3 µm	<2,5 µm
Groove base	<1,6 µm	<6,3 µm
Groove sides	<3,0 µm	<15,0 µm

Material content Mr >50% to max. 90% with cut depth c = Rz/2 and reference line Cref = 0%

Design notes

Please note our general remarks on design in the *Merkel Technical Manual*.

Manufacturing tolerance

L2	Manufacturing tolerances
>20 ... 80	... 0,5
>80 ... 250	... 1,0
>250 ... 500	... 1,5
>500 ... 1000	... 2,0
>1000 ... 2000	... 3,0
>2000 ... 4000	... 4,0

Recommended tolerances

d_1
h8

The tolerance for dimensions D and d_F must be viewed in connection with the seal used. Diameter d1 stated in the table of dimensions must be considered exclusively in conjunction with theguide ring. The corresponding diameter of the connected seal housing has to be adapted to the sealing element invol ved.

Profile thickness

Profile thickness S
–0,05

Surface load

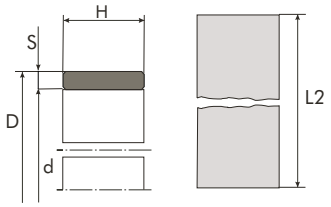
p <15 N/mm² ... 20 °C
p <7,5 N/mm² ... 80 °C
p <5 N/mm² ... 120 °C

Sliding speed, see sealing system.

Cutting rolls to size

The dimensions indicated below are available as rolls from stock. Stretched length L2 of sections cut to size must be determined in line with the formula of calculation. Gap k arising after assembly is required for thermal expansion purposes. We recommend therefore that the strips be cut straight. Butt joint tips may be damaged by fissures. Our cutter (article N. 507228) makes it possible to cut sections to size in a time-saving and accurate manner.

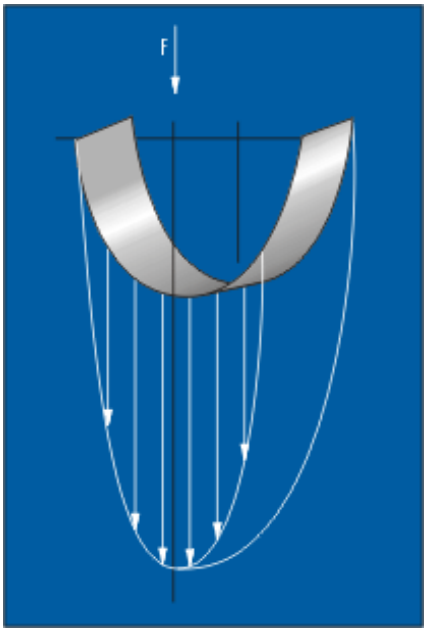
Calculating stretched length L2 for pistons: L2 = (D – S) x 3,11 – 0,5

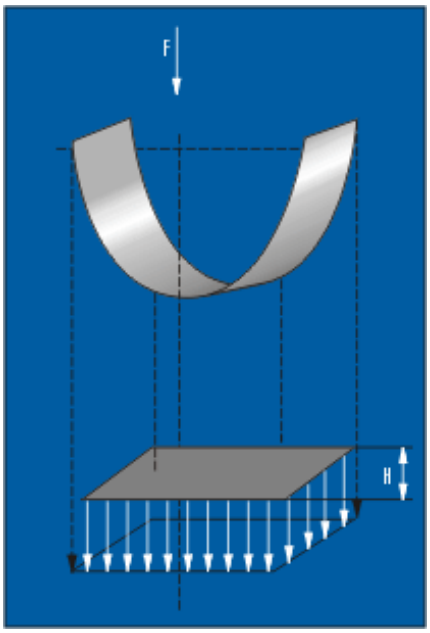


Groove length L	Strip thickness S	Article No.
8	2,5	24226174
9,7	2,5	24102775
10	2,5	24102563
12	2,5	24099191
15	2,5	24102564
20	2,5	24076217
25	2,5	24107955
15	4	24160019
20	4	24238052
25	4	24148093

Surface force

Pressure within the contact area between the guide and the counter surfaceis not linear. The guiding width required can be calculated by applying the formulas mentioned below on the basis of the projected area. The non-linear progression of the contact pressure process is taken into account in the surface pressure value.
It may be advisable to reduce the loads by selecting a broader guide in individual cases to obtain an extended service life.

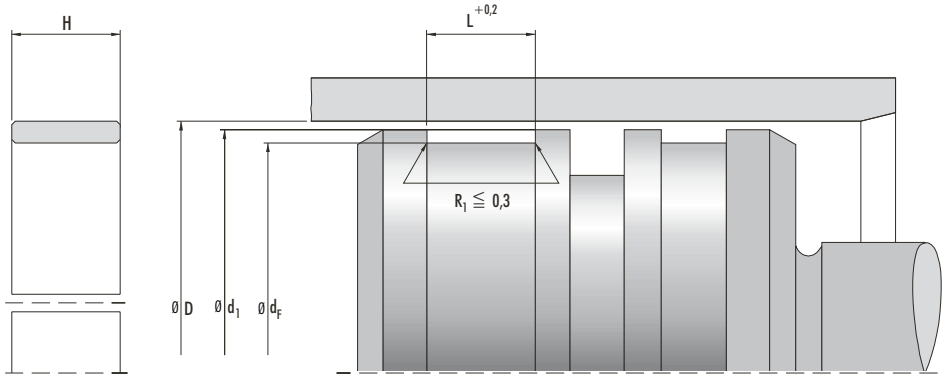




F = P x A
A = d x H
H = F / (d x P)

H = Guide bandwidth [mm]
F = Radial loads [N]
A = Projected area [mm²]

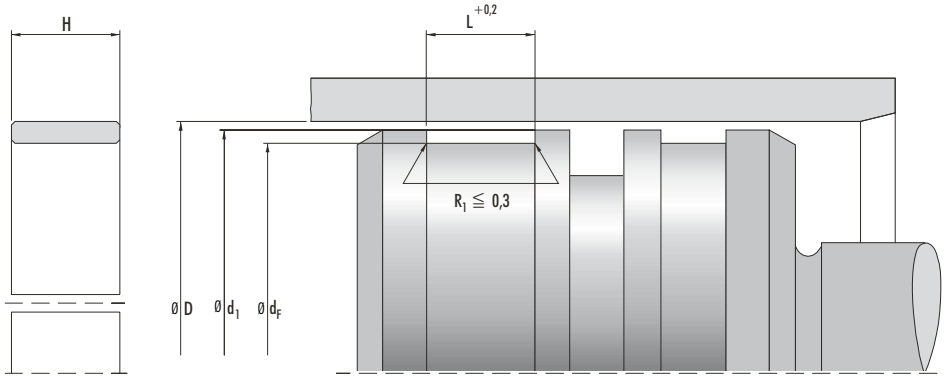
P = perm. surface pressure [N/mm²]
d = Rod diameter with rod guide; Piston diameter with piston guide [mm]



All non-dimensioned edges rounded and burr-free

ISO	D	d_F	d_1	L	H	Profile	Material	Article No.
	55	50	53,8	5,6	5,5	2,5	PTFE B500	24300190
	56	51	54,8	5,6	5,5	2,5	PTFE B500	24260615
	60	55	58,8	5,6	5,5	2,5	PTFE B500	24210205
	60	55	58,8	9,7	9,6	2,5	PTFE B500	24163238
ISO	63	58	61,8	9,7	9,6	2,5	PTFE B500	24169847
	65	60	63,8	9,7	9,6	2,5	PTFE B500	24300192
	70	65	68,8	9,7	9,6	2,5	PTFE B500	24165146
	70	65	68,8	15	14,8	2,5	PTFE B500	24338058
	75	70	73,8	9,7	9,6	2,5	PTFE B500	24300193
ISO	80	75	78,8	9,7	9,6	2,5	PTFE B500	24217207
	85	80	83,8	9,7	9,6	2,5	PTFE B500	24169641
	85	80	83,8	15	14,8	2,5	PTFE B500	24258738
	90	85	88,8	9,7	9,6	2,5	PTFE B500	24165145
	90	85	88,8	15	14,8	2,5	PTFE B500	24164295
	90	85	88,8	20	19,5	2,5	PTFE B500	24229424
	95	90	93,8	9,7	9,6	2,5	PTFE B500	24300197
	95	90	93,8	15	14,8	2,5	PTFE B500	24343224
ISO	100	95	98,8	9,7	9,6	2,5	PTFE B500	24153611
	100	95	98,8	15	14,8	2,5	PTFE B500	24165294
	100	95	98,8	25	24,5	2,5	PTFE B500	24311931
	105	100	103,8	9,7	9,6	2,5	PTFE B500	24216699
	105	100	103,8	25	24,5	2,5	PTFE B500	24333282
	110	105	108,8	9,7	9,6	2,5	PTFE B500	24165147
	110	105	108,8	15	14,8	2,5	PTFE B500	24291125
	110	105	108,8	20	19,5	2,5	PTFE B500	24243431
	115	110	113,8	9,7	9,6	2,5	PTFE B500	24153613

Further dimensions on request.



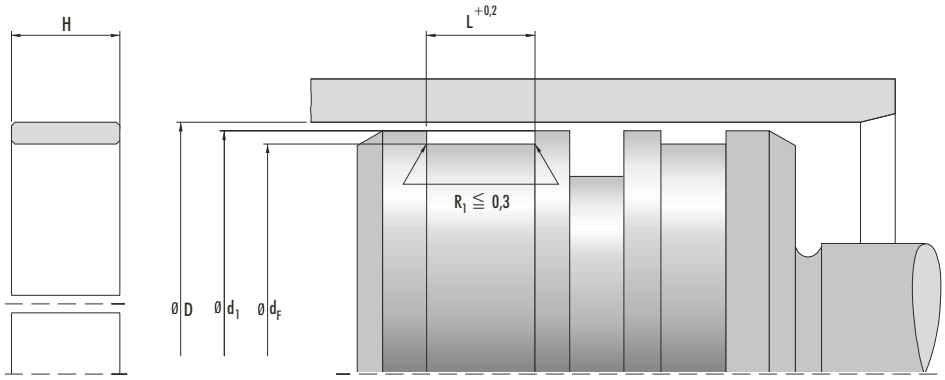
All non-dimensioned edges rounded and burr-free

ISO	D	d_F	d_1	L	H	Profile	Material	Article No.
	120	115	118,8	9,7	9,6	2,5	PTFE B500	24166736
	120	115	118,4	15	14,8	2,5	PTFE B500	24300203
ISO	125	120	123,4	9,7	9,6	2,5	PTFE B500	24204056
	125	120	123,8	15	14,8	2,5	PTFE B500	24165043
	130	125	128,8	9,7	9,6	2,5	PTFE B500	24153612
	130	125	128,4	15	14,8	2,5	PTFE B500	24300206
	130	125	128,8	20	19,5	2,5	PTFE B500	24166634
	135	130	133,8	9,7	9,6	2,5	PTFE B500	24203611
	135	130	133,8	15	14,8	2,5	PTFE B500	24340099
ISO	140	135	138,8	9,7	9,6	2,5	PTFE B500	24102436
ISO	140	135	138,8	15	14,8	2,5	PTFE B500	24236467
	140	135	138,8	20	19,5	2,5	PTFE B500	24339882
	140	135	138,8	25	24,5	2,5	PTFE B500	24338745
	150	145	148,8	9,7	9,6	2,5	PTFE B500	24300208
	150	145	148,8	15	14,8	2,5	PTFE B500	24169689
	150	145	148,8	20	19,5	2,5	PTFE B500	24336312
	150	145	148,8	25	24,5	2,5	PTFE B500	24243485
	155	150	153,8	9,7	9,6	2,5	PTFE B500	24169405
ISO	160	155	158,8	9,7	9,6	2,5	PTFE B500	24168887
ISO	160	155	158,8	15	14,8	2,5	PTFE B500	24300209
	160	155	158,8	20	19,5	2,5	PTFE B500	24217554
	170	165	168,8	9,7	9,6	2,5	PTFE B500	24300210
	170	165	168,4	15	14,8	2,5	PTFE B500	24300211
	170	165	168,8	20	19,5	2,5	PTFE B500	24336310
ISO	180	175	178,8	9,7	9,6	2,5	PTFE B500	24203474
ISO	180	175	178,4	15	14,8	2,5	PTFE B500	24219351

Further dimensions on request.

ISO	D	d_F	d_1	L	H	Profile	Material	Article No.
	220	215	218,4	25	24,5	2,5	PTFE B500	24290417
	225	220	223,4	9,7	9,6	2,5	PTFE B500	24259939
	225	220	223,4	15	14,8	2,5	PTFE B500	24169846
	225	220	223,4	20	19,5	2,5	PTFE B500	24260604
	225	220	223,4	25	24,5	2,5	PTFE B500	24298509
	230	225	228,4	20	19,5	2,5	PTFE B500	24233567
	240	235	238,4	15	14,8	2,5	PTFE B500	24167876
ISO	250	245	248,4	9,7	9,6	2,5	PTFE B500	24344263
ISO	250	245	248,4	15	14,8	2,5	PTFE B500	24300217
	250	245	248,4	20	19,5	2,5	PTFE B500	24338719
	260	255	258,4	15	14,8	2,5	PTFE B500	24300218
	260	255	258,4	25	24,5	2,5	PTFE B500	24293567
	270	265	268,4	15	14,8	2,5	PTFE B500	24238840
	270	265	268,4	25	24,5	2,5	PTFE B500	24332002
ISO	280	275	278,4	15	14,8	2,5	PTFE B500	24300219
	280	275	278,4	20	19,5	2,5	PTFE B500	24153362
ISO	280	275	278,4	25	24,5	2,5	PTFE B500	24203990
	300	295	298,4	20	19,5	2,5	PTFE B500	24328393
	300	295	298,4	15	14,8	2,5	PTFE B500	24137238
	300	295	298,4	25	24,5	2,5	PTFE B500	24134951
	305	300	303,4	15	14,8	2,5	PTFE B500	24350592
	310	305	308,4	25	24,5	2,5	PTFE B500	24237194
	320	312	317,5	20	19,5	4	PTFE B500	24245663
ISO	320	315	318,4	15	14,8	2,5	PTFE B500	24300220
	320	315	318,4	20	19,5	2,5	PTFE B500	24231223
ISO	320	315	318,4	25	24,5	2,5	PTFE B500	24300221
	330	325	328,4	15	14,8	2,5	PTFE B500	24296714
	330	325	328,4	25	24,5	2,5	PTFE B500	24314011
	340	335	338,4	15	14,8	2,5	PTFE B500	24300222
	340	335	338,4	25	24,5	2,5	PTFE B500	24300223
	350	345	348,4	9,7	9,6	2,5	PTFE B500	24316713
	350	345	348,4	15	14,8	2,5	PTFE B500	24234725
	355	350	353,4	25	24,5	2,5	PTFE B500	24336608
	360	352	357,5	15	14,8	4	PTFE B500	24266168
x	360	352	357,5	25	24,5	4	PTFE B500	24298511
x	360	355	358,4	15	14,8	2,5	PTFE B500	24300224
x	360	355	358,4	25	24,5	2,5	PTFE B500	24164558
	380	375	378,4	20	19,5	2,5	PTFE B500	24257157

Further dimensions on request.



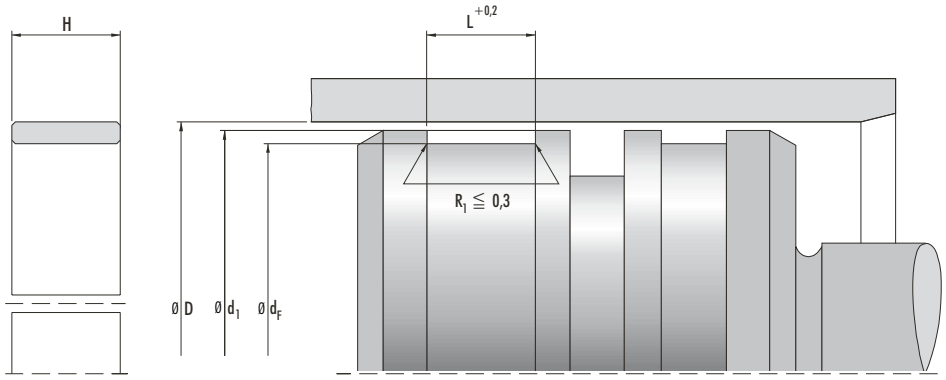
All non-dimensioned edges rounded and burr-free

ISO	D	d_F	d_1	L	H	Profile	Material	Article No.
	330	325	328,4	15	14,8	2,5	PTFE B500	24296714
	330	325	328,4	25	24,5	2,5	PTFE B500	24314011
	340	335	338,4	15	14,8	2,5	PTFE B500	24300222
	340	335	338,4	25	24,5	2,5	PTFE B500	24300223
	350	345	348,4	9,7	9,6	2,5	PTFE B500	24316713
	350	345	348,4	15	14,8	2,5	PTFE B500	24234725
	355	350	353,4	25	24,5	2,5	PTFE B500	24336608
	360	352	357,5	15	14,8	4	PTFE B500	24266168
ISO	360	352	357,5	25	24,5	4	PTFE B500	24298511
ISO	360	355	358,4	15	14,8	2,5	PTFE B500	24300224
ISO	360	355	358,4	25	24,5	2,5	PTFE B500	24164558
	380	375	378,4	20	19,5	2,5	PTFE B500	24257157
	380	375	378,4	25	24,5	2,5	PTFE B500	24299555
	390	382	387,5	25	24,5	4	PTFE B500	24344184
	390	385	388,4	20	19,5	2,5	PTFE B500	24248042
	390	385	388,4	25	24,5	2,5	PTFE B500	24215936
ISO	400	392	397,5	25	24,5	4	PTFE B500	24353170
ISO	400	395	398,4	15	14,8	2,5	PTFE B500	24300225
	400	395	398,4	20	19,5	2,5	PTFE B500	24241924
ISO	400	395	398,4	25	24,5	2,5	PTFE B500	24237477
	410	405	408,4	25	24,5	2,5	PTFE B500	24292267
	420	415	418,4	20	19,5	2,5	PTFE B500	24246829
	420	415	418,4	25	24,5	2,5	PTFE B500	24298563
	430	425	428,4	15	14,8	2,5	PTFE B500	24274579
	430	425	428,4	25	24,5	2,5	PTFE B500	24356343
	440	435	438,4	15	14,8	2,5	PTFE B500	24362293

Further dimensions on request.

ISO	D	d_F	d_1	L	H	Profile	Material	Article No.
ISO	500	492	497,5	25	24,5	4	PTFE B500	24261230
ISO	500	495	498,4	15	14,8	2,5	PTFE B500	24274580
ISO	500	495	498,4	25	24,5	2,5	PTFE B500	24263977
	510	505	508,4	15	14,8	2,5	PTFE B500	24291161
	510	505	508,4	25	24,5	2,5	PTFE B500	24360396
	520	515	518,4	20	19,5	2,5	PTFE B500	24230163
	530	525	528,4	15	14,8	2,5	PTFE B500	24258834
	540	535	538,4	25	24,5	2,5	PTFE B500	24339008
	545	540	543,4	25	24,5	2,5	PTFE B500	24250579
	550	545	548,4	25	24,5	2,5	PTFE B500	24257339
	560	552	557,5	25	24,5	4	PTFE B500	24359710
	560	555	558,4	15	14,8	2,5	PTFE B500	24351466
	560	555	558,4	25	24,5	2,5	PTFE B500	24269185
	570	562	567,5	15	14,8	4	PTFE B500	24352095
	570	562	567,5	25	24,5	4	PTFE B500	24351060
	580	572	577,5	15	14,8	4	PTFE B500	24344267
	580	575	578,4	25	24,5	2,5	PTFE B500	24339500
	600	592	597,5	25	24,5	4	PTFE B500	24275000
	600	595	598,4	15	14,8	2,5	PTFE B500	24234910
	600	595	598,4	20	19,5	2,5	PTFE B500	24329803
	600	595	598,4	25	24,5	2,5	PTFE B500	24234912
	625	620	623,4	15	14,8	2,5	PTFE B500	24352637
	630	625	628,4	15	14,8	2,5	PTFE B500	24161640
	630	625	628,4	25	24,5	2,5	PTFE B500	24263466
	640	632	637,5	25	24,5	4	PTFE B500	24275167
	650	642	647,5	25	24,5	4	PTFE B500	24358984
	650	645	648,4	25	24,5	2,5	PTFE B500	24239182
	655	650	653,4	25	24,5	2,5	PTFE B500	24231930
	665	660	663,4	25	24,5	2,5	PTFE B500	24336379
	680	672	677,5	15	14,8	4	PTFE B500	24344269
	680	672	677,5	25	24,5	4	PTFE B500	24298430
	680	675	678,4	25	24,5	2,5	PTFE B500	24357190
	690	682	687,5	25	24,5	4	PTFE B500	24361405
	700	692	697,5	25	24,5	4	PTFE B500	24349705
	700	695	698,4	15	14,8	2,5	PTFE B500	24275183
	700	695	698,4	25	24,5	2,5	PTFE B500	24338859
	710	705	708,4	20	19,5	2,5	PTFE B500	24162128
	720	712	717,5	20	19,5	4	PTFE B500	24226253

Further dimensions on request.



All non-dimensioned edges rounded and burr-free

ISO	D	d_F	d_1	L	H	Profile	Material	Article No.
	720	712	717,5	25	24,5	4	PTFE B500	24355876
	720	715	718,4	15	14,8	2,5	PTFE B500	24348252
	720	715	718,4	20	19,5	2,5	PTFE B500	24291417
	720	715	718,4	25	24,5	2,5	PTFE B500	24240256
	725	720	723,4	25	24,5	2,5	PTFE B500	24340198
	750	742	747,5	25	24,5	4	PTFE B500	24293964
	760	752	757,5	15	14,8	4	PTFE B500	24216171
	760	752	757,5	20	19,5	4	PTFE B500	24216170
	760	755	758,4	25	24,5	2,5	PTFE B500	24162992
	770	762	767,5	15	14,8	4	PTFE B500	24344270
	775	770	773,4	25	24,5	2,5	PTFE B500	24245794
	780	775	778,4	15	14,8	2,5	PTFE B500	24358668
	800	792	797,5	15	14,8	4	PTFE B500	24348279
	800	792	797,5	25	24,5	4	PTFE B500	24243176
	820	812	817,5	25	24,5	4	PTFE B500	24341042
	830	822	827,5	25	24,5	4	PTFE B500	24354856
	830	825	828,4	25	24,5	2,5	PTFE B500	24353637
	850	842	847,5	25	24,5	4	PTFE B500	24300402
	850	845	848,4	20	19,5	2,5	PTFE B500	24265124
	850	845	848,4	25	24,5	2,5	PTFE B500	24163721
	900	892	897,5	20	19,5	4	PTFE B500	24238053
	900	892	897,5	25	24,5	4	PTFE B500	24344380
	900	895	898,4	25	24,5	2,5	PTFE B500	24162990
	920	915	918,4	25	24,5	2,5	PTFE B500	24258318
	940	932	937,5	25	24,5	4	PTFE B500	24352164
	940	935	938,4	25	24,5	2,5	PTFE B500	24163720

Further dimensions on request.

ISO	D	d_F	d_1	L	H	Profile	Material	Article No.
	965	957	962,5	15	14,8	4	PTFE B500	24263608
	965	957	962,5	25	24,5	4	PTFE B500	24295215
	1000	995	998,4	25	24,5	2,5	PTFE B500	24162989

Further dimensions on request.

Simmerring BAUMSL X7

Material

Fluoroelastomer

Designation	Color	Hardness	Spring	Reinforcing plate
75 FKM 585	dark-brown	Shore A 75	Spring steel DIN EN 10270-1	unalloyed steel DIN EN 10027-1

Product description

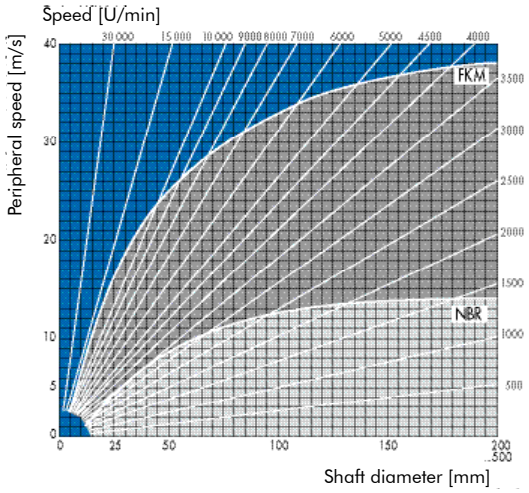
Outer sleeve: elastomer, grooved, spring-loaded sealing lip, additional dust lip, frictionally optimized sealing lip profile.

Product advantages

- broad application spectrum in all branches of industry
- greater thermal stability and chemical resistance
- Secure OD sealing, even in the event of higher bore roughness, thermal expansion and spilt housings, so that fluid and gaseous media can be sealed, too.
- advantages for sealing against fluid and gaseous media
- additional dust lip protecting against reasonable and average volumes of dust and dirt from outside (note: may lead to higher temperatures as a result of frictional heat)

Applications

- Agricultural and construction machinery
- Industrial gears
- Axles (exposed to moderate dirt influences)
- Electric tools

Media	Mineral oils, synthetic oils, aromatic and chlorinated hydrocarbons, motor fuels, heating oils
Temperature	–25 … +160 ° C
Peripheral speed	 Permissible peripheral speed for Simmerrings made of materials NBR (72 NBR 902) and FKM (75 FKM 585) for sealing motor oil SAE 20. Use of a Simmerring with a DL (dirt lip): v = max. 8 m/s
Pressure	up to 0.05 MPa/0.5 bar a Simmerring provided with a back-up ring can be used at >0.05 MPa/0.5 bar. See also Simrit Technical Manual.

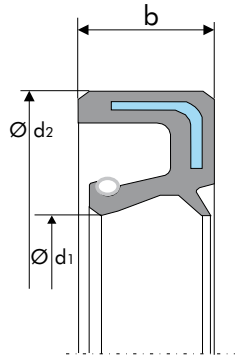
Shaft

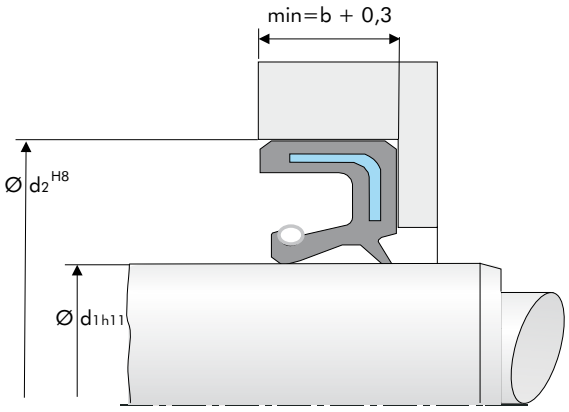
Tolerance	Concentricity	Roughness	Hardness	Finish
ISO h 11	IT 8	R_a = 0,2 … 0,8 µm; R_z = 1,0 … 5,0 µm; R_{max} = <6,3 µm	45 … 60 HRC	non oriented, preferably by plunge grinding

Housing bore

Tolerance	Roughness
ISO H8	R_z = 10 … 25 µm

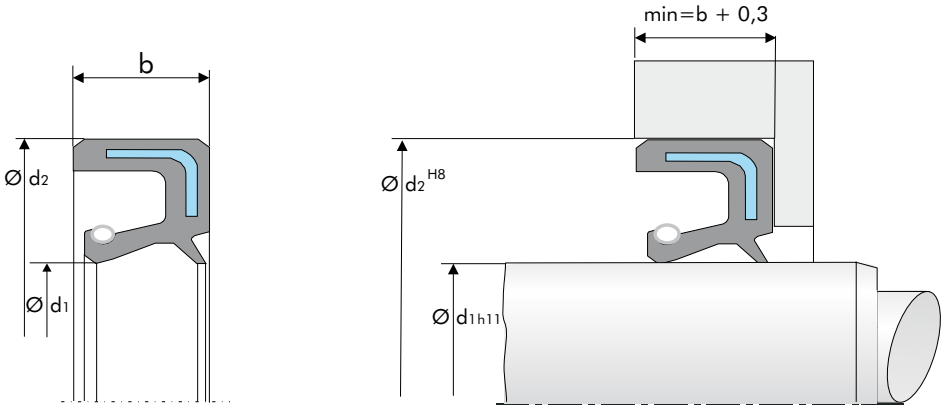
For optimum seal performance correct handling and installation is critical as per DIN3760.
See also Simrit Technical Manual.





d_1	d_2	b	DIN 3761	Article No.
50	60	4,5	AS	521194
50	65	8	AS	410188
50	68	8	AS	433708
50	72	8	AS	410430
50	75	8	AS	468760
50	80	8	AS	477663
50	80	10	AS	405447
50	80	10	AS	526239
52	68	8	AS	409244
52	72	8	AS	410422
52	80	10	AS	532940
52	85	10	AS	465368
54	70	8	AS	532939
55	68	8	AS	520864
55	70	8	AS	476381
55	72	8	AS	407140
55	75	8	AS	410784
55	78	10	AS	474111
55	80	8	AS	521008
55	90	8	AS	477662
55	110	10	AS	465367
56	70	8	AS	407296
56	72	8	AS	410420
58	72	8	AS	49009508
58	80	8	AS	478514
60	75	8	AS	404321
60	80	8	AS	407294
60	90	8	AS	407448
60	95	8	AS	468761

Further dimensions on request.



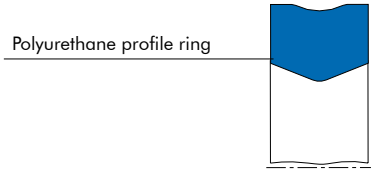
d_1	d_2	b	DIN 3761	Article No.
62	90	10	AS	520029
63	90	10	AS	410417
64	90	10	AS	532938
65	80	8	AS	474109
65	85	10	AS	389999
65	90	10	AS	416246
65	100	10	AS	410408
67	90	10	AS	531790
68	90	10	AS	407291
70	85	8	AS	532958
70	90	10	AS	520226
70	95	12	AS	405449
70	100	10	AS	524105
72	100	10	AS	407289
75	90	10	AS	468762
75	95	10	AS	521009
75	100	10	AS	407279
75	115	12	AS	477664
80	100	10	AS	468978
80	110	10	AS	427699
80	140	13	AS	477666
85	100	8	AS	520227
85	105	7	AS	522850
85	105	12	AS	404329
85	130	10	AS	477667
85	150	12	AS	520105
88	160	13	AS	477611
90	110	12	AS	521010
90	115	12	AS	428612

Further dimensions on request.

d_1	d_2	b	DIN 3761	Article No.
110	140	12	AS	521013
115	140	12	AS	522388
115	150	12	AS	411270
120	140	13	AS	405832
120	150	12	AS	474123
120	160	12	AS	411290
122	200	15	AS	477613
125	150	12	AS	407276
130	160	12	AS	474122
130	170	12	AS	411238
130	200	15	AS	477612
140	170	13	AS	434702
150	180	15	AS	521014
150	225	15	AS	477610
155	180	15	AS	474107
160	190	15	AS	521015
160	240	14	AS	477614
162	190	12	AS	520229
170	200	15	AS	521016
180	210	15	AS	521017
190	220	15	AS	454176
200	230	15	AS	520230
210	240	15	AS	474108
220	250	15	AS	468763
230	260	15	AS	520231
240	270	15	AS	520694
250	280	15	AS	520695
260	300	20	AS	520696
280	320	20	AS	520697
300	340	20	AS	520698
320	360	20	AS	520699
340	380	20	AS	523042

Further dimensions on request.

Merkel Pinmatic



Product description

Single-piece, double-acting compact seal made of Polyurethane for link-pin sealing purposes, internal sealing.

Product advantages

- loss-free lubricant supply to link-pin bearings requiring restricted maintenance
- great functional reliability
- minimum wear
- stable long-term behavior
- extended service intervals
- insensitive to pressure peaks

The newly developed Merkel Pinmatic seal is ideally suited for meeting the demands made on a link-pin seal. The excellent functional reliability based on a given circulation and/or pulse lubrication is achieved on the basis of the appropriate extrusion resistance of the material Polyurethane as well as the high line force along the sealing edge.

Material

Material	Designation	Color
Polyurethane	95 AU V142	dark-blue

Application

Swiveling movement, pressure peaks, injection molding machines, toggles, bearing and link pins

Field of application

Medium	Material 95 AU V142
Hydraulic oils HL, HLP	–30 … +100 °C
HETG (rape-seed oil)	–30 … +60 °C
HEES (synth. ester)	–30 … +60 °C
Mineral greases	–30 … +100 °C
Pressure	2 MPa
Speed (swiveling movement)	0,2 m/s

Surface finish

Peak-to-valley heights	R_a	R_{max}
Sliding surface	<0,8 µm	<3,2 µm
Groove base	<1,6 µm	<6,3 µm
Groove sides	<6,3 µm	<20 µm
Lead-in chamfer*	<0,8 µm	<3,2 µm

* burr-free transition

The long term behavior of a sealing element and its dependability against early failures are crucially influenced by the quality of the counterface. Therefore a precise description and assessment of the surface is critical.

Based on recent findings, we recommend supplementing the above definition of surface finish for the dynamic surface by the characteristics detailed in the table below. With these new characteristics derived from the material content, previous more general descriptions of the material content are significantly improved, especially in regard to surface roughness. *See also Merkel Technical Manual.*

Surface finish of the sliding surfaces

Characteristic value	Limit	
Ra	> 0,05µm	< 0,30µm
Rmax	< 2,5µm	
Rpkx	< 0,5µm	
Rpk	< 0,5µm	
Rk	>0,25µm	<0,7µm
Rvk	>0,2µm	<0,65µm
Rvkx	>0,2µm	<2,0µm

Gap dimension

Section	Max. permissible gap dimension at 2 MPa
3,5 - 8,5	0,55

Recommended tolerances

Diameter	Tolerance
< 200	H7/f7

Design notes
Please note our general design-related remarks in the *Merkel Technical Manual*.

Installation & assembly
Please note our general remarks on the installation of hydraulic seals in the Merkel Technical Manual, Assembling hydraulic seals.

Additional product description – Pinmatic

Application

A sealing system integrated into the bearing shells and preventing lubricant leakage in a reliable way has been specially developed for toggle-lever systems on injection molding machines.
Toggle-lever machines provide special benefits in certain applications. Toggle-lever bearings being exposed to heavy loads must, however, be reliably lubricated. Leaking lubricant has frequently been leading to considerable soiling so far. There is hardly any production environment nowadays where this is acceptable. The new bearing system integrates single-piece, double-acting Pinmatic compact seals made of polyurethane into two bearing-shell grooves. This prevents lubricants from leaking between the link pin and the toggle-lever bearing. As a result, the machine will remain clean and maintenance operations will be reduced due to leak-free lubricant supply.

Pressing and friction

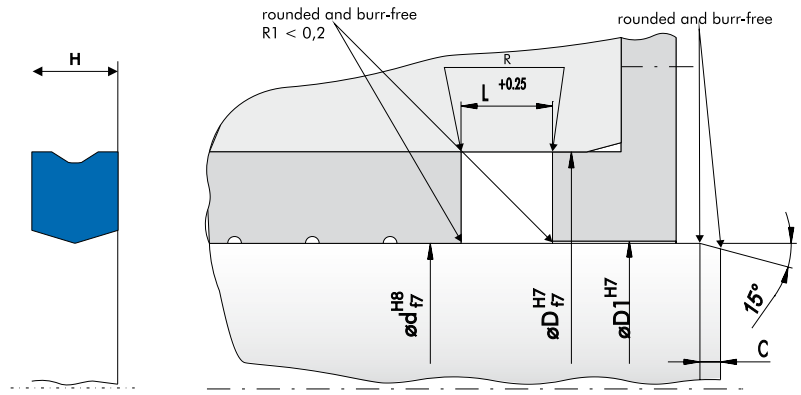
Sealing elements made of polyurethane make it possible to achieve an efficient sealing effect, due to the material properties provided. The sealing material is interlinked to different degrees with the counterface, depending on the contact force and the size of the contact face involved. The closer the contact, the higher the coefficient of friction will be. Link-pin seals made from polyurethane 95AUV142 exhibit restricted friction only, no stick-slip effect and minimum wear. The strong line force also exerted on the sealing edge in the relaxed state ensures reliable sealing properties at standstill and, therefore, clean conditions.
The Pinmatic profile is designed on the basis of FEM calculations while considering the pressure applied to the housing.

Pinmatic is designed individually in line with the metallic housing involved. A constantly high degree of functional reliability is set regardless of the tolerances of the metallic components. It is possible to apply application experiences gathered with one scope of diameters directly to another scope of diameters, when designing series.

The line force defined within the sealing edge area makes it possible to achieve a high degree of functional reliability under any operating conditions.

The Pinmatic profile ring is clearly preferred due to the stable support provided in the groove bottom. Any squeezing movements occurring inside the sealing ring in the event of rotational direction changes as well as a helical distortion of the sealing ring during assembly are precluded, thus providing enhanced functional reliability.

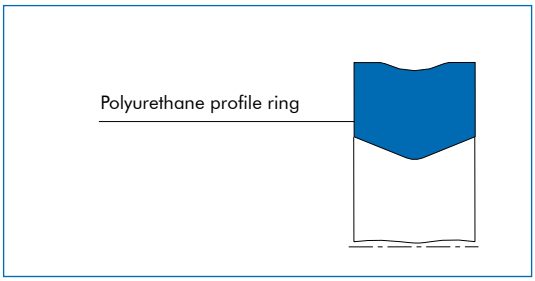
The use of Pinmatic makes a vital contribution to the dependable sealing of plain bearings in toggle levers and, therefore, to a clean exterior of the machine as a whole.



d	D	S	H	L	C	R	Material	Article No.
35	42	3,5	2,9	3,5	3,5	0,4	95 AU V142	49032618
40	47	3,5	2,9	3,5	3,5	0,4	95 AU V142	49042897
70	77	3,5	2,9	3,5	3,5	0,4	95 AU V142	49032619
80	87	3,5	2,9	3,5	3,5	0,4	95 AU V142	49042898
55	65	5	4,2	5	4,5	0,6	95 AU V142	49059668
65	75	5	4,2	5	4,5	0,6	95 AU V142	49027581
75	85	5	4,2	5	4,5	0,6	95 AU V142	49058095
80	90	5	4,2	5	4,5	0,6	95 AU V142	49040864
80	91	5,5	4,3	5	5	0,6	95 AU V142	49026063
95	110	7,5	5,1	6	6	0,6	95 AU V142	49030381
110	125	7,5	5,1	6	6	0,6	95 AU V142	49027446
130	145	7,5	5,1	6	6	0,6	95 AU V142	49055945

Further dimensions on request.

Merkel Cover Seal PU 82



Product description

Single-piece, double-acting compact seal made of Polyurethane for static sealing, internal sealing.

Product advantages

- interchangeable with housings for O-ring and O-ring with back-up ring
- high degree of functional reliability provided by the sturdy profile ring made of Polyurethane
- great resistance to extrusion (dimensional stability)
- simple and safe assembly (single-piece element)
- simplified inventory
- gastight

Material

Material	Designation	Color
Polyurethane	95 AU V142	dark-blue
Polyurethane	94 AU 925	light-blue

Der Material wird durch den NennDiameter und das Fertigungsverfahren bestimmt.

Applications

- High operating pressure (up to 60 MPa)
- Breathing gap (cylinder expansion)
- Short pressure build-up time (end-of-travel damping)
- Reciprocal operating pressure
- Nominal diameter up to 2,000mm

Field of application

Material	95 AU V142/94 AU 925
Hydraulic oils, HL, HLP	-30 ... +110 °C
HFA fluids	+5 ... +50 °C
HFB fluids	+5 ... +50 °C
HFC fluids	-30 ... +40 °C
HFD fluids	-
Water	+5 ... +40 °C
HETG (rape-seed oil)	–30 ... +60 °C
HEES (synth. ester)	–30 ... +60 °C
HEPG (glycol)	–30 ... +40 °C
Mineral greases	–30 ... +110 °C
Pressure	60 MPa

The figures given are maximum values and must not be applied simultaneously.

Surface finish

Peak-to-valley heights	R_a	R_{max}
Sliding surface	<0,8 µm	<3,2 µm
Groove base	<1,6 µm	<6,3 µm
Groove sides	<6,3 µm	<20 µm
Lead-in chamfer*	<0,8 µm	<3,2 µm

* burr-free transition

Gap dimension

The maximum permissible extrusion gap with a piston rod arranged on one side, while taking cylinder expansion into account, is determined, to a large extent, by the maximum operating pressure and the dimensional stability of the sealing material, depending on the temperature involved.

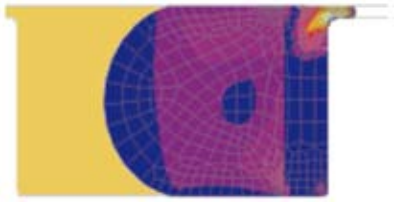
Section*	Max. perm. gap dimension				
	16 MPa	26 MPa	32 MPa	40 MPa	60 MPa
1,78	0,2	0,2	0,15	0,1	0,1
2,62	0,35	0,3	0,25	0,15	0,1
3,5/3,53	0,5	0,4	0,35	0,25	0,2
5,33	0,5	0,4	0,35	0,25	0,2
6,99/7	0,55	0,45	0,35	0,35	0,25
8	0,55	0,45	0,4	0,35	0,25
8,4	0,55	0,45	0,4	0,35	0,25
10	0,6	0,5	0,45	0,4	0,3
12	0,6	0,5	0,45	0,4	0,3

* Cord thickness for housing recommendation O-ring with a back-up ring

Tolerances

Diameter d	Tolerance
≤ 800	H7/f7
> 800	+0,1 / -0,05 / -0,15

Operating principle



O-ring with a PTFE back-up ring at an operating pressure of 40 MPa

Design notes

Please note our general remarks in the *Merkel Technical Manual*.

Installation & assembly

Please note our general remarks on the installation of hydraulic seals in the *Merkel Technical Manual*.

Additional product description – Cover Seal PU 82

O-ring and back-up ring

Static sealing is usually achieved by combining an O-ring and a back-up ring for operation at a pressure exceeding 15 MPa and for pressurization on one side. At higher operating pressures, the back-up ring function is restricted by the resulting tube expansion. This causes damage to the O-ring as well as the back-up ring, as a result of gap extrusion.
Two back-up rings are required in the event of alternate pressurization. Under such operating conditions, O-rings are frequently twisted inside the groove until the sealing element fails. A series of possible defects likely to jeopardize the lasting functionality of the sealing element also arise during installation and operation of the combined O-ring and back-up ring.

Cylinder expansion

A conventional back-up ring fills the gap to the main functional surface in pressureless condition. Back-up rings are made either of virgin PTFE or more dimensionally stable materials like PA, for example. Pure PTFE tends to creep under the effects of lengthy stresses. The back-up ring adapts itself to the housing, while filling the gap. At high pressure, the surfaces to be sealed are moved as a result of cylinder expansion. The PTFE back-up ring penetrates into the sealing gap and is squeezed when relieved (Figure 01). Dimensionally stable PA back-up rings are only slightly distorted under pressure and fail, therefore, to adapt their shape to the housing. The O-ring may penetrate into the sealing gap arising under pressure. If the pressure drops suddenly, the extrusion lug may be sheared off as a result. In this case, the elastic deformation of the metal (cylinder expansion) is reduced within a shorter period of time than that required by the O-ring to get out of the gap.
The gap resulting from the manufacturing tolerances of the back-up ring on the side facing the groove bottom represents a further source of defects in terms of damage caused by extrusion to the O-ring (Figure 02).
The cover seal is subject to comparatively moderate deformations only at high operating pressures (Figure 03). The element bridges the extrusion gap, but does not penetrate into it. The deformation is entirely reversible.

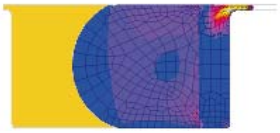


Figure 01: PTFE back-up ring at 40 MPa

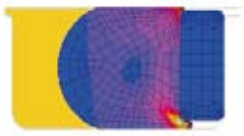


Figure 02: PA back-up ring at 20 MPa

Figure 03: Cover seal at 40 Ma

Pressure

The radial deformation of the sealing element inside the housing is an indicator for the sealing effect. Whereas insufficient pressure reduces both the initial sealing effect in pressureless condition and the suitability for short pressure build-up periods, excessive pressure may lead to a shorter service life as a result of material fatigue.

The tolerances for metallic components and the seal exert a profound influence on profile overlapping. Whereas tolerance dimensions for metallic components are selected according to the nominal diameter involved, the cord thickness for an O-ring is given a constant tolerance regardless of the O-ring diameter. The larger the nominal diameter with the same cord thickness, the larger possible deviations from ideal pressure conditions will be. The sealing effect and/or the functional reliability of an O-ring will decline in proportion to nominal diameter increases.

The cover seal profile is adapted to the housing respectively involved, i.e. by taking the nominal diameter into consideration, too, on the basis of a design program and in view of the pressing conditions. Consequently, the diameter has no impact on the sealing effect and functional reliability.

The cover seal is designed individually in line with the metallic housing used. A continously high degree of functional reliability is set regardless of the tolerances of the metallic components and of the nominal diameter involved. It is possible to apply application experiences gathered with one scope of diameters directly to another scope of diameters, when designing series.

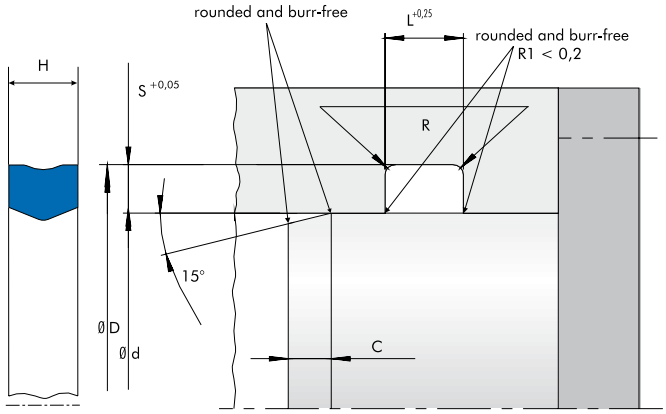
A high degree of functional reliability is attained under any operating conditions due to a great resistance to extrusion and a favorable mold release behavior, on the one hand, and to the high line force around the sealing edge even in pressureless condition, on the other.

The profile ring of the cover seal is clearly preferred due to the stable support provided in the groove bottom. Any squeezing and rotary movements occurring inside the sealing ring under changing pressure as well as a helical distortion of the sealing ring during assembly are precluded, thus providing enhanced functional reliability.

The single-piece symmetrical cover seal design precludes any faulty installation due to twisting or confusion.

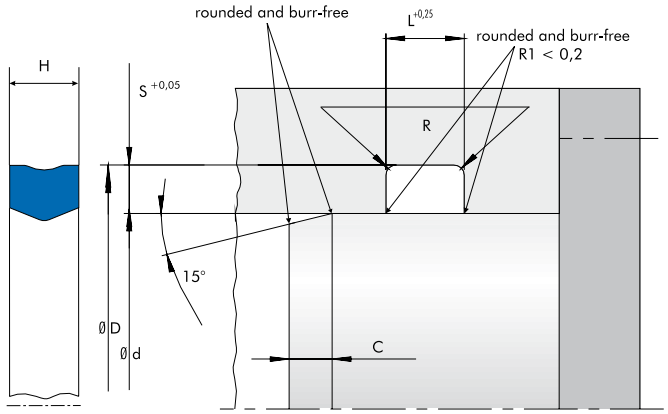
Procurement and storing are simplified by the use of the single-piece cover seal.

The use of the cover seal makes a vital contribution to the functional reliability and dependability of hydraulic cylinders.



d	D	S	H	L	C	R	Material	Article No.
50	58	4	5,6	6,4	3,5	0,4	95 AU V142	24362417
50	60	5	9,2	10,5	4,5	0,4	95 AU V142	49000499
60	65,6	2,75	4,4	5,2	3,0	0,4	95 AU V142	24368756
70	75,6	2,8	5,3	6,2	3,0	0,4	95 AU V142	49004012
80	85	2,5	2,6	3,2	3,0	0,4	95 AU V142	49022415
80	90	5	9,2	10,5	4,5	0,4	95 AU V142	49000500
90	110	10	10,8	12,3	8,0	0,4	95 AU V142	49018307
110	117	3,5	4	4,7	3,0	0,4	95 AU V142	24367583
120	140	10	10,8	12,3	8,0	0,6	95 AU V142	49018308
140	145,9	2,95	4,9	5,8	3,5	0,6	95 AU V142	49009024
160	168,6	4,3	7,8	9	4,0	0,6	95 AU V142	24370625
170	176,3	3,15	4,9	5,8	3,5	0,6	95 AU V142	24250879
180	188,6	4,3	7,8	9	4,0	0,4	95 AU V142	49002910
190	201,6	5,8	10,7	12,3	5,0	0,6	94 AU 925	49003461
200	208,6	4,3	7,8	9	4,0	0,6	95 AU V142	533208
210	221,6	5,8	10,7	12,3	5,0	0,6	94 AU 925	24379224
230	239,1	4,55	5,2	6,1	4,5	0,6	95 AU V142	49039425
240	249,4	4,7	6,1	7,1	4,0	0,6	95 AU V142	49002429
250	258,6	4,3	7,8	9	4,0	0,6	95 AU V142	49004491
250	261,6	5,8	10,9	12,3	4,5	0,6	94 AU 925	49022890
270	278,2	4,1	7,4	8,5	3,5	0,6	95 AU V142	24360461
270	278,6	4,3	7,8	9	4,0	0,6	94 AU 925	49016834
270	281,6	5,8	10,4	12	5,0	0,6	95 AU V142	49004133
280	320	20	17,9	20	15,0	0,4	94 AU 925	49009097
285	296,6	5,8	10,7	12,3	5,0	0,6	94 AU 925	49000401
300	309,8	4,9	7,1	8,2	4,0	0,4	95 AU V142	49028621

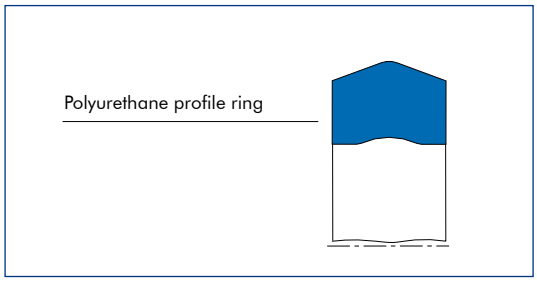
Further dimensions on request.



d	D	S	H	L	C	R	Material	Article No.
300	311,6	5,8	10,4	12	5,0	0,6	95 AU V142	49002713
300	311,6	5,8	10,7	12,3	5,0	0,6	95 AU V142	49006854
310	321,6	5,8	10,9	12,3	4,5	0,4	94 AU 925	49023886
320	333,4	6,7	8,6	10	6,0	0,6	95 AU V142	24369684
330	341,6	5,8	10,7	12,3	5,0	0,6	94 AU 925	532554
360	371,6	5,8	10,7	12,3	5,0	0,6	94 AU 925	49005757
370	381,6	5,8	10,9	12,3	4,5	0,6	94 AU 925	49023888
400	411,6	5,8	10,7	12,3	5,0	0,6	94 AU 925	49014554
410	421,6	5,8	10,9	12,3	4,5	0,6	94 AU 925	49023889
440	451,6	5,8	10,7	12,3	5,0	0,6	94 AU 925	531798
510	523,4	6,7	11,8	13,6	6,0	0,6	95 AU 925	49035523
540	553,4	6,7	9,3	10,8	6,0	0,6	94 AU 925	49001311
600	614,2	7,1	11,2	12,8	6,0	0,6	94 AU 925	49026666
790	803,6	6,8	9,2	10,7	6,0	0,6	94 AU 925	527748
840	853,6	6,8	9,2	10,7	6,0	0,6	94 AU 925	527749

Further dimensions on request.

Merkel Cover Seal PU 83



Product description

Single-piece, double-acting compact seal made of polyurethane for static sealing, external sealing.

Product advantages

- interchangeable with housings for O-ring and O-ring with back-up ring
- high degree of functional reliability provided by the sturdy profile ring made of polyurethane
- great resistance to extrusion (dimensional stability)
- simple and safe assembly (single-piece element)
- simplified inventory
- gastight

Material

Material	Designation	Color
Polyurethane	95 AU V142	dark-blue
Polyurethane	94 AU 925	light-blue

The material is determined on the basis of the nominal diameter and the manufacturing process.

Applications

- High operating pressure (up to 60 MPa)
- Breathing gap (cylinder expansion)
- Short pressure build-up time (end-of-travel damping)
- Reciprocal operating pressure
- Nominal diameter up to 2,000mm

Field of application

Material	95 AU V142/94 AU 925
Hydraulic oils, HL, HLP	-30 ... +110 °C
HFA fluids	+5 ... +50 °C
HFB fluids	+5 ... +50 °C
HFC fluids	-30 ... +40 °C
HFD fluids	-
Water	+5 ... +40 °C
HETG (rape-seed oil)	–30 ... +60 °C
HEES (synth. ester)	–30 ... +60 °C
HEPG (glycol)	–30 ... +40 °C
Mineral greases	–30 ... +110 °C
Pressure	60 MPa

The figures given are maximum values and must not be applied simultaneously.

Surface finish

Peak-to-valley heights	R_a	R_{max}
Sliding surface	<0,8 µm	<3,2 µm
Groove base	<1,6 µm	<6,3 µm
Groove sides	<6,3 µm	<20 µm

* burr-free transition

Gap dimension

The maximum permissible extrusion gap for a piston rod arranged on one side, while taking tube expansion into account, is determined, to a large extent, by the maximum operating pressure and the dimensional stability of the sealing material, depending on the temperature involved.

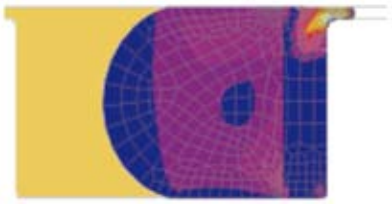
Section*	Max. perm. gap dimension				
	16 MPa	26 MPa	32 MPa	40 MPa	60 MPa
1,78	0,2	0,2	0,15	0,1	0,1
2,62	0,35	0,3	0,25	0,15	0,1
3,5/3,53	0,5	0,4	0,35	0,25	0,2
5,33	0,5	0,4	0,35	0,25	0,2
6,99/7,0	0,55	0,45	0,35	0,35	0,25
8,0	0,55	0,45	0,4	0,35	0,25
8,4	0,55	0,45	0,4	0,35	0,25
10,0	0,6	0,5	0,45	0,4	0,3
12,0	0,6	0,5	0,45	0,4	0,3

* Cord thickness for housing recommendation O-ring with a back-up ring

Tolerances

Diameter D	Tolerance
≤ 800	H7/f7
> 800	+0,1 / -0,05 / -0,15

Operating principle



O-ring with a PTFE back-up ring at an operating pressure of 40 MPa

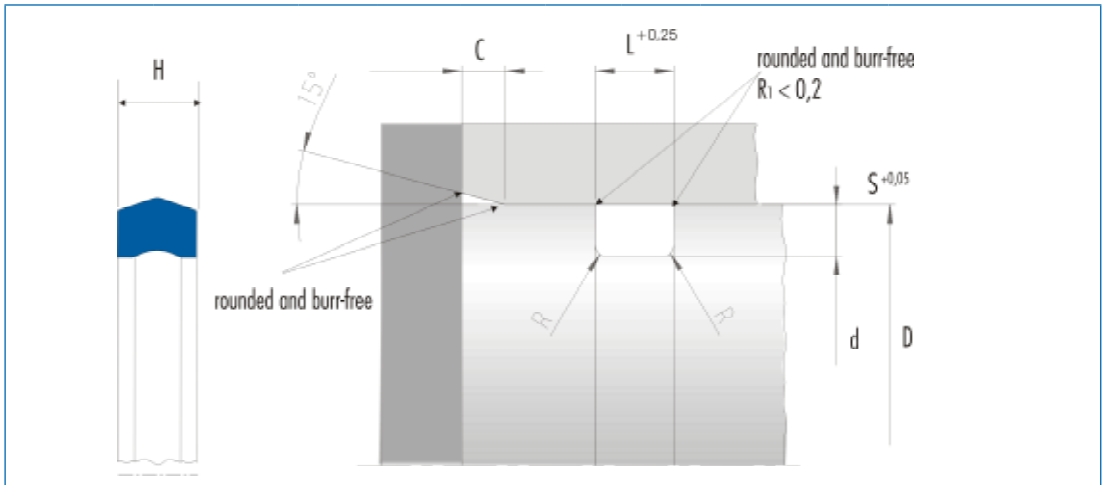
Cover Seal PU 83 at an operating pressure of 40 MPa

Design notes

Please note our general remarks on design in the *Merkel Technical Manual*.

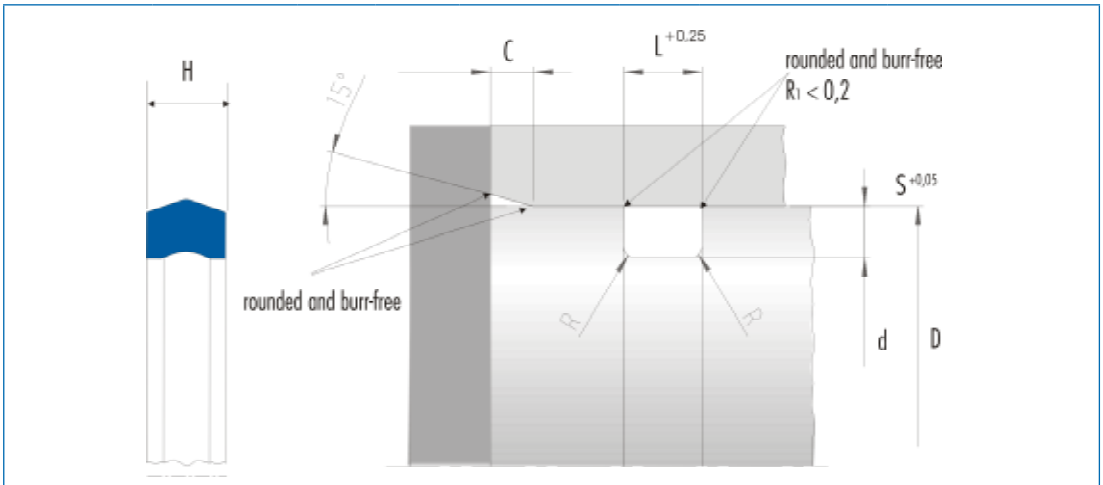
Installation & assembly

Please note our general remarks on the installation of hydraulic seals in the *Merkel Technical Manual*.



D	d	S	H	L	C	R	Material	Article No.
50	42,2	3,9	5	5,8	3,5	0,4	95 AU V142	24334142
50	44,4	2,8	5,3	6,2	3,5	0,4	95 AU V142	532203
60	52,2	3,9	5	5,8	3,5	0,4	95 AU V142	24327617
60	54	3	5,3	6,2	3,5	0,4	95 AU V142	49001027
60	54,6	2,7	5,5	6,5	3,5	0,4	95 AU V142	24380802
65	57,2	3,9	5	5,8	3,5	0,4	95 AU V142	24327636
70	64,4	2,8	5,2	6,2	3,5	0,4	95 AU V142	532201
75	69,6	2,7	5,5	6,5	3,5	0,4	95 AU V142	24380803
80	70	5	6,9	8,0	4,5	0,6	95 AU V142	532538
90	80,1	4,95	6,7	7,8	4	0,6	95 AU V142	24362668
100	90,1	4,95	6,7	7,8	4	0,6	95 AU V142	24362292
100	91,4	4,3	7,8	9,0	4	0,6	95 AU V142	24379356
100	94,4	2,8	5,2	6,2	3,5	0,4	95 AU V142	532202
105	95,1	4,95	6,7	7,8	4	0,6	95 AU V142	24359847
110	101,4	4,3	7,8	9,0	4	0,6	95 AU V142	24380871
115	105,1	4,95	6,7	7,8	4	0,6	95 AU V142	24355287
120	110,6	4,7	7,9	9,1	4	0,6	95 AU V142	530765
125	115	4,95	6,7	7,8	4	0,6	95 AU V142	24355288
125	116,4	4,3	7,8	9,0	4	0,6	95 AU V142	24379551
130	120,8	4,6	4,2	5,0	4	0,6	95 AU V142	24311962
130	121,4	4,3	7,8	9,0	4	0,6	95 AU V142	528353
140	130,4	4,8	6,6	7,7	4	0,6	95 AU V142	24362518
140	131,4	4,3	7,8	9,0	4	0,6	95 AU V142	49036033
140	134,1	2,95	4,9	5,9	3,5	0,4	95 AU V142	24245392
150	140,4	4,8	6,6	7,7	4	0,6	95 AU V142	24367348
150	141,9	4,05	8	9,2	3,5	0,4	95 AU V142	24348854

Further dimensions on request.



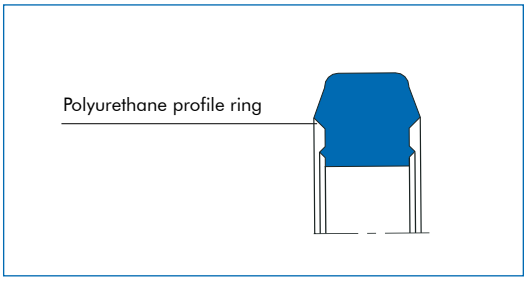
D	d	S	H	L	C	R	Material	Article No.
160	151,4	4,3	7,8	9,0	4	0,6	95 AU V142	49036034
180	170	5	7,3	8,4	4,5	0,6	95 AU V142	24378895
180	174,4	2,8	5,2	6,2	3,5	0,4	95 AU V142	49001429
190	170	10	7,8	9,0	8	0,6	95 AU V142	24361640
200	191,4	4,3	7,8	9,0	4	0,6	95 AU V142	49004492
210	201,4	4,3	7,8	9,0	4	0,6	94 AU 925	49035972
225	216,4	4,3	7,8	9,0	4	0,6	95 AU V142	531563
240	228,4	5,8	10,7	12,3	5	0,6	95 AU V142	24375294
240	231,4	4,3	7,8	9,0	4	0,6	95 AU V142	24360083
250	241,4	4,3	7,8	9,0	4	0,6	95 AU V142	49022154
270	261,4	4,3	7,7	9,0	4	0,6	94 AU 925	49017087
280	268,4	5,8	10,9	12,3	5	0,6	95 AU V142	49033375
290	281,4	4,3	8,1	8,8	4	0,6	95 AU V142	525514
300	290,4	4,8	8,1	9,3	4	0,6	95 AU V142	49016225
310	298,4	5,8	10,7	12,3	5	0,6	94 AU 925	49038888
320	308,4	5,8	10,4	12,0	5,5	0,6	95 AU V142	529772
330	318,4	5,8	10,9	12,3	5	0,6	95 AU V142	49027154
340	331,4	4,3	7,7	9,0	4	0,6	95 AU V142	525487
350	338,4	5,8	10,7	12,3	5	0,6	94 AU 925	49038889
360	348,4	5,8	10,4	12,0	5,5	0,6	94 AU 925	49004019
380	368,4	5,8	10,9	12,3	5	0,6	95 AU V142	49033376
390	378,4	5,8	10,4	12,0	5,5	0,6	95 AU V142	49002712
400	388,4	5,8	10,7	12,3	5	0,6	95 AU V142	532306
410	398,4	5,8	10,7	12,3	5	0,6	95 AU V142	49001342
420	408,4	5,8	10,7	12,3	5	0,6	95 AU V142	24379139
430	418,4	5,8	10,9	12,3	5	0,6	95 AU V142	49027155

Further dimensions on request.

D	d	S	H	L	C	R	Material	Article No.
440	428,4	5,8	10,9	12,3	5	0,6	94 AU 925	49030619
450	438,4	5,8	10,7	12,3	5	0,6	95 AU V142	529212
460	448,4	5,8	10,9	12,3	5	0,6	94 AU 925	49023288
470	458,4	5,8	10,7	12,3	5	0,6	94 AU 925	49021561
480	468,4	5,8	10,9	12,3	5	0,6	94 AU 925	49025771
490	478,4	5,8	10,9	12,3	5	0,6	95 AU V142	49033377
500	488,4	5,8	10,7	12,3	5	0,6	95 AU V142	530849
520	508,4	5,8	10,6	12,3	5,5	0,6	95 AU V142	532963
530	518,4	5,8	10,6	12,3	5,5	0,6	95 AU V142	529838
550	536,6	6,7	11,8	13,6	6	0,6	94 AU 925	49000360
560	548,4	5,8	10,9	12,3	5,5	0,6	94 AU 925	49027156
570	556,6	6,7	11,8	13,6	6	0,6	94 AU 925	49007603
580	566,6	6,7	11,8	13,6	6	0,6	94 AU 925	531187
600	586,6	6,7	11,8	13,6	6	0,6	93 AU V168	49001757
680	668,4	5,8	10,6	12,3	4,5	0,6	94 AU 925	49038887
690	673	8,5	14,4	16,3	7	0,6	94 AU 925	49026186
700	683	8,5	14,4	16,3	7	0,6	94 AU 925	49035978
740	723	8,5	14,4	16,3	7	0,6	94 AU 925	49026187
810	793	8,5	14,4	16,3	7	0,6	94 AU 925	49015798
830	813	8,5	15,6	16,3	7	0,6	94 AU 925	24361263
860	843	8,5	14,4	16,3	7	0,6	94 AU 925	49015799
960	943	8,5	14,4	16,3	7	0,6	94 AU 925	49012180

Further dimensions on request.

Merkel Stircomatic SRC



Product description

Single-piece compact seal made of polyurethane for static sealing, axially sealing component.

Product advantages

- interchangeable with housings for O-ring and O-ring with back-up ring
- firm seat inside the housing provided by optimally designed sealing edges (stress distribution)
- high degree of functional reliability provided by the sturdy profile ring made of polyurethane
- functional reliability resulting from a great resistance to extrusion (dimensional stability)
- simple and safe assembly
- gastight

Material

Material	Designation	Color
Polyurethane	95 AU V142	dark-blue
Polyurethane	94 AU 925	light-blue

The material is determined on the basis of the nominal diameter and the manufacturing process.

Applications

- Negative pressure (flowing medium)
- Pulsating pressure
- High operating pressure (up to 80 MPa)
- Nominal diameter up to 2,000mm

Field of application

Material	95 AU V142/94 AU 925
Hydraulic oils, HL, HLP	-30 ... +110 °C
HFA fluids	+5 ... +50 °C
HFB fluids	+5 ... +50 °C
HFC fluids	-30 ... +40 °C
HFD fluids	-
Water	+5 ... +40 °C
HETG (rape-seed oil)	–30 ... +60 °C
HEES (synth. ester)	–30 ... +60 °C
HEPG (glycol)	–30 ... +40 °C
Mineral greases	–30 ... +110 °C
Pressure	80 MPa

The figures given are maximum values and must not be applied simultaneously.

Surface finish

Peak-to-valley heights	R_a	R_{max}
Sealing surfaces	<1,6 µm	<6,3 µm
Groove sides	<6,3 µm	<20 µm

More accurate values for Ra and Rmax should be set within the sealing surfaces for applications requiring gastight operation.

Tolerances

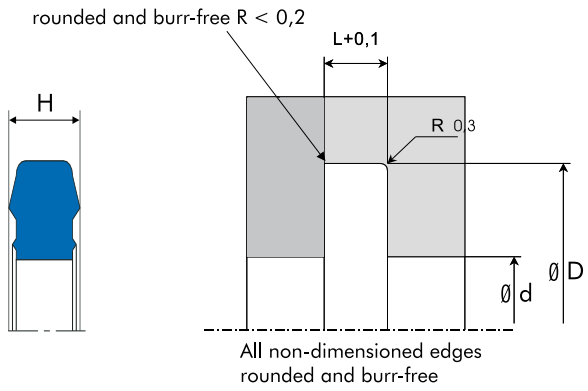
Diameter	Tolerance
d	h10
D	H9

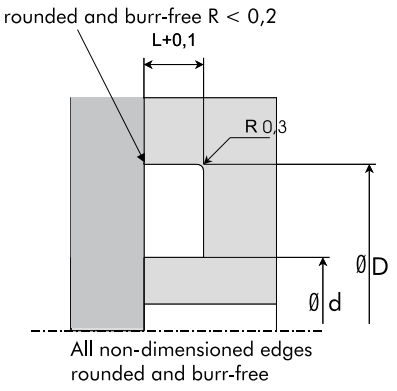
Design notes

The housing for the Stircomatic SRC may be designed with an aperture in inner diameter direction or in the form of an axial recess. Pressure is applied from the interior.
Please note our general remarks on design in the *Merkel Technical Manual*.

Installation & assembly

Please note our general remarks on the installation of hydraulic seals in the *Merkel Technical Manual*.





d	D	H	L	Profile	Material	Article No.
40,0	48,0	3,00	2,4	4,0	95 AU V142	24343125
45,0	53,0	3,00	2,4	4,0	95 AU V142	49003451
50,0	58,0	3,10	2,5	4,0	95 AU V142	24350857
60,0	68,0	3,10	2,5	4,0	95 AU V142	24367175
60,0	70,0	5,00	4,0	5,0	95 AU V142	24374887
75,0	83,0	3,10	2,5	4,0	95 AU V142	24367176
90,0	100,0	3,80	3,0	5,0	95 AU V142	532063
102,0	110,0	3,10	2,5	4,0	95 AU V142	49031644
122,0	130,0	3,10	2,5	4,0	95 AU V142	49031645
132,0	140,0	3,10	2,5	4,0	95 AU V142	49031646
235,4	260,0	7,25	5,8	12,3	95 AU V142	49043603
295,4	320,0	7,25	5,8	12,3	95 AU V142	49017430
335,4	360,0	7,25	5,8	12,3	95 AU 925	49017431
349,4	370,0	7,25	5,8	10,3	94 AU 925	49031386
415,4	440,0	7,25	5,8	12,3	95 AU V142	49017432
460,4	485,0	7,25	5,8	12,3	95 AU V142	49016295
469,4	490,0	7,25	5,8	10,3	94 AU 925	49045102
512,8	540,0	8,35	6,7	13,6	94 AU 925	49017433
542,8	570,0	8,35	6,7	13,6	94 AU 925	49026033
587,8	615,0	8,35	6,7	13,6	94 AU 925	49017434
725,0	750,0	8,95	7,2	12,5	94 AU 925	49017436
795,0	820,0	8,95	7,2	12,5	94 AU 925	49032358
815,0	840,0	8,95	7,2	12,5	94 AU 925	49028615
995,0	1.020,0	8,95	7,2	12,5	94 AU 925	49031377
1.015,0	1.040,0	8,95	7,2	12,5	94 AU 925	49017437
1.065,0	1.090,0	8,95	7,2	12,5	94 AU 925	49045105

Further dimensions on request.

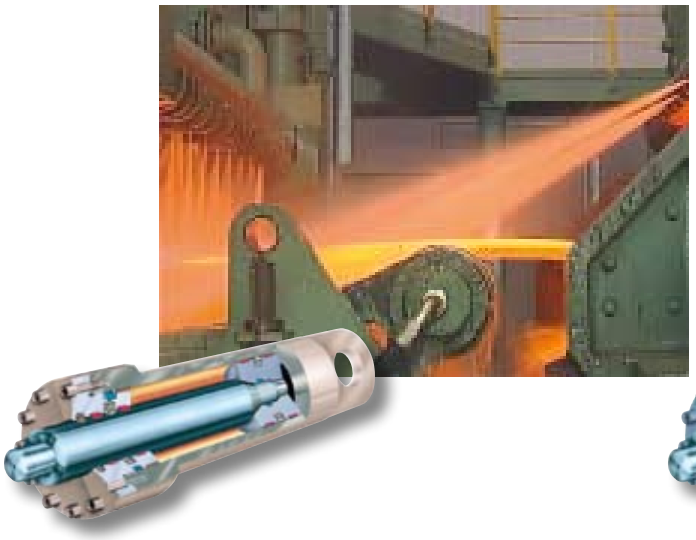
Sectoral solutions

Merkel Freudenberg Fluidtechnic is committed to developing and producing seals, as well as to offering them with a comprehensive range of services in order to meet its customers' current requirements to optimum effect.

In order to meet this challenge, Merkel has specialized in seals and sealing systems for the heavy industry. The individual elements are optimally attuned in terms of material and functionality, as all individual seals are also developed as package solutions.
A special selection of materials and profiles geared to each branch respectively involved ensures an extended service life and great resistance to agents.

Merkel seals and sealing systems in the steel and nonferrous industries:

optimum service life even under exacting environmental conditions



Merkel seals and sealing systems in the press industries:

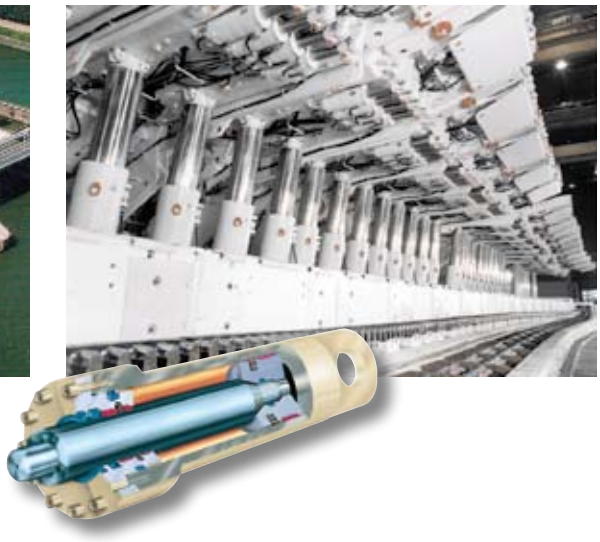
high pressure resistance with relatively large diameters

Merkel seals and sealing systems in the hydraulic steelwork or shipbuilding industry:

high degree of reliability even over extremely long maintenance intervals

Merkel seals and sealing systems in the special mechanical engineering industries (e.g. mining):

high degree of reliability in conjunction with extremely stringent requirements



Sectoral solutions

Merkel seals and sealing systems in the paper-manufacturing industry:

high degree of reliability at high speeds and with abrasive media

Merkel Technical Manual

The Merkel Technical Manual includes data and descriptions regarding technical fundamental principles, sealing mechanisms and factors of influence, materials and resistance values as well as the installation of hydraulic seals. Please order under No.: 15 GB MHI.

The figures indicated in the catalog are based on experiences gathered within the Freudenberg Group in the field of research over several decades for the development and manufacture of seals and they are in line with today's state-of-the-art expertise. However, the sealing effect provided by numerous products mentioned in the catalog is not only generated by the component proper. It is rather based to a very large extent – depending on the specific application involved – on other parameters such as the place of installation and counter rotation, the pressure applied, the operating temperature, the media to be sealed, the lubrication, vibration-related influences and possible dirt from outside. These and further unknown factors are likely to exert a tangible influence on the function of seals in practical applications. Against this background, no standard statements can be made about the function of the products mentioned in the catalog. The data stated in the latter merely represent general, non-binding reference values which cannot be applied to every case of application. As a result, we recommend that you discuss concrete cases of application with our consulting services.

In the event of higher and special stresses, e.g. exerted by aggressive media, the seal should be selected in cooperation with us, as functional reliability tests are frequently indispensable.

Merkel - by your side around the globe

Merkel Quality & Value

Boost your success with our sealing expertise:

- Perfect sealing technology for top productivity
- Leading material know-how
- Extrusion-proof products with a long service life and extended service intervals
- Absolute functional reliability of the seals under the most diversified and extremely stringent conditions
- Experience gathered in sealing technology since 1899

Merkel Service

Take advantage of our excellent services worldwide:

- 120,000 widely diversified products
- Very high degree of availability, prompt worldwide supplies
- Built-to-order; rapid, tailor-made, economical
- Optimum solutions for challenging special applications
- Individual test series under genuine conditions
- Immediate assistance in the event of repairs

Please contact our product management for injection molding technology:

Phone.: +49 (0)40/75306-0
injectionmoulding@freudenberg-ds.com
www.merkel-heavy-industry.com

America
Freudenberg-NOK
Merkel Heavy Industry
11617 State Route 13
Milan, OH 44846/USA
E-Mail: merkel.americas@freudenberg-ds.com

Asia
Merkel Freudenberg Fluidtechnic GmbH
c/o EKK Eagle Industry Asia Pacific Pte. Ltd.
52 Serangoon North Avenue 4
03-02, Ever Tech Building
Singapore 555853
E-Mail: merkel.asia@freudenberg-ds.com

Headquarter Europa
Merkel Freudenberg Fluidtechnic GmbH
Industriestraße 64
D-21107 Hamburg
E-Mail: merkel@freudenberg-ds.com

www.merkel-heavy-industry.com

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