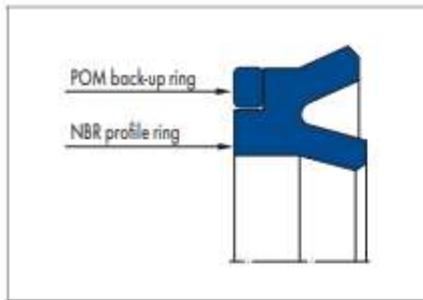


U-RING NA 250



PRODUCT DESCRIPTION

Merkel U-ring with asymmetrical profile of the sealing lips and back-up ring as a gap sealing component.

PRODUCT ADVANTAGES

Single-acting piston seal for medium load, preferably for spare parts requirement.

APPLICATION

- Excavators
- Earth moving equipment
- Forestry equipment
- Standard cylinders

MATERIAL

Sealing component

Material	Code	Hardness
Nitrile rubber NBR	80 NBR 878	80 Shore A

Back-up ring

Material	Code	Hardness
Polyacetal	POM 992020	-

OPERATING CONDITIONS

Pressure p	25 MPa
------------	--------

Running speed v	0,5 m/s
-----------------	---------

Medium/ Temperature	80 NBR 878/POM
Hydraulic oils HL, HLP	-30 °C ... +100 °C
HFA fluids	+5 °C ... +60 °C
HFB fluids	+5 °C ... +60 °C
HFC fluids	-30 °C ... +60 °C
HFD fluids	-
Water	+5 °C ... +90 °C
HETG (rapeseed oil)	-30 °C ... +80 °C

Medium/ Temperature	80 NBR 878/POM
HEES (synthetic ester)	-
HEPG (glycol)	-30 °C ... +60 °C
Mineral greases	-30 °C ... +100 °C

DESIGN NOTES

Please observe our general design notes in → Technical Manual.

Surface quality

Peak-to-valley heights	R_a	R_{max}
Sliding surface	0,05 ... 0,3 μm	$\leq 2,5 \mu\text{m}$
Groove base	$\leq 1,6 \mu\text{m}$	$\leq 6,3 \mu\text{m}$
Groove flanks	$\leq 3,0 \mu\text{m}$	$\leq 15,0 \mu\text{m}$

Percentage contact area $M_v > 50\%$ to max. 90% at cutting depth $c = Rz/2$ and reference line $C_{ref} = 0\%$.

Admissible gap dimension

The largest gap dimension occurring on the non-pressurised side of the seal in operation is of vital importance for the function of the seal. → Technical Manual.

d (D)	7,5 MPa	10,0 MPa	25,0 MPa
$\leq 80 \text{ mm}$	0,95 mm	0,80 mm	0,60 mm
$> 80 \text{ mm}$	1,00 mm	0,85 mm	0,65 mm

Tolerances

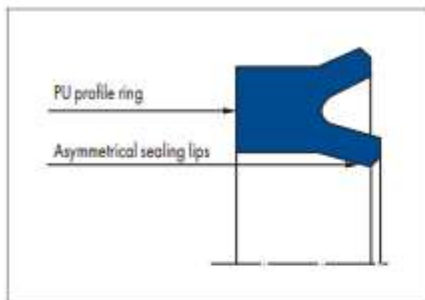
The admissible gap width, tolerances, guide play and deflection of the guide under load are to be taken into account when designing d2. → Technical Manual.

Nominal $\varnothing D$	D	d
$\leq 180 \text{ mm}$	H11	h11

FITTING & INSTALLATION

Careful fitting is a prerequisite for the correct function of the seal. → Technical Manual.

U-RING NA 300



PRODUCT DESCRIPTION

Merkel U-ring with asymmetrical profile, outer lip set back and press fit at the inside diameter.

PRODUCT ADVANTAGES

Single-acting piston seal for standardised housings, amongst others, according to ISO 5597.

- Very good static and dynamic tightness

APPLICATION

- Earth moving equipment
- Presses
- Support cylinders

MATERIAL

Material	Code	Hardness
Polyurethane	94 AU 925	94 Shore A

OPERATING CONDITIONS

Pressure p	40 MPa
Running speed v	0,5 m/s

Medium/ Temperature	94 AU 925
Hydraulic oils HL, HLP	-30 °C ... +110 °C
HFA fluids	+5 °C ... +50 °C
HFB fluids	+5 °C ... +50 °C
HFC fluids	-30 °C ... +40 °C
HFD fluids	-
Water	+5 °C ... +40 °C
HETG (rapeseed oil)	-30 °C ... +60 °C
HEES (synthetic ester)	-30 °C ... +60 °C
HEPG (glycol)	-30 °C ... +40 °C
Mineral greases	-30 °C ... +110 °C

DESIGN NOTES

Please observe our general design notes in → Technical Manual.

Surface quality

Peak-to-valley heights	R_a	R_{max}
Sliding surface	0,05 ... 0,3 μm	$\leq 2,5 \mu\text{m}$
Groove base	$\leq 1,6 \mu\text{m}$	$\leq 6,3 \mu\text{m}$
Groove flanks	$\leq 3,0 \mu\text{m}$	$\leq 15,0 \mu\text{m}$

Percentage contact area M_c , >50% to max. 90% of cutting depth $c = R_z/2$ and reference line $C_{ref} = 0\%$.

Admissible gap dimension

The largest gap dimension occurring on the non-pressurised side of the seal in operation is of vital importance for the function of the seal. → Technical Manual.

Profile dimension	16 MPa	26 MPa	32 MPa	40 MPa
>4,0 mm ... ≤5,0 mm	0,50 mm	0,40 mm	0,35 mm	0,30 mm
>5,0 mm ... ≤7,5 mm	0,55 mm	0,45 mm	0,40 mm	0,35 mm
>7,5 mm ... ≤11,0 mm	0,66 mm	0,50 mm	0,45 mm	0,40 mm

Tolerances

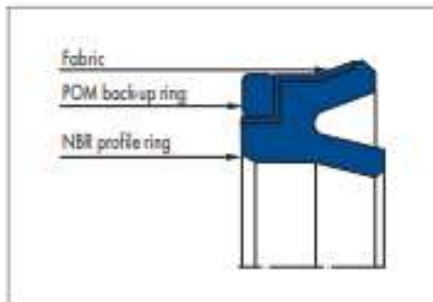
The admissible gap width, tolerances, guide play and deflection of the guide under load are to be taken into account when designing d2. → Technical Manual.

Nominal $\varnothing D$	D	d
$\leq 400 \text{ mm}$	H9	h11

FITTING & INSTALLATION

Careful fitting is a prerequisite for the correct function of the seal. → Technical Manual.

U-RING NA 400



PRODUCT DESCRIPTION

Merkel U-ring with asymmetrical profile of the sealing lips, fabric reinforcement on the dynamic sealing side and back-up ring as a gap sealing component.

PRODUCT ADVANTAGES

Single-acting piston seal for medium load, preferably for spare parts requirement.

APPLICATION

- Earth moving equipment
- Industrial vehicles
- Mobile hydraulics
- Presses

MATERIAL

Sealing component

Material	Code	Hardness
Nitrile rubber NBR	80 NBR 878	80 Shore A

Back-up ring

Material	Code	Hardness
Polyacetal	POM 992020	-

OPERATING CONDITIONS

Pressure p	40 MPa
------------	--------

Running speed v	0,5 m/s
-----------------	---------

Medium/ Temperature	80 NBR 878/POM
Hydraulic oils HL, HLP	-30 °C ... +100 °C
HFA fluids	+5 °C ... +60 °C
HFB fluids	+5 °C ... +60 °C
HFC fluids	-30 °C ... +60 °C
HFD fluids	-

Medium/ Temperature	80 NBR 878/POM
Water	+5 °C ... +90 °C
HEYG (rapeseed oil)	-30 °C ... +80 °C
HEES (synthetic ester)	-
HEPG (glycol)	-30 °C ... +60 °C
Mineral greases	-30 °C ... +100 °C

DESIGN NOTES

Please observe our general design notes in → Technical Manual.

Surface quality

Peak-to-valley heights	R_a	R_{max}
Sliding surface	0,05 ... 0,3 μ m	$\leq 2,5 \mu$ m
Groove base	$\leq 1,6 \mu$ m	$\leq 6,3 \mu$ m
Groove flanks	$\leq 3,0 \mu$ m	$\leq 15,0 \mu$ m

Percentage contact area M_v >50% to max. 90% at cutting depth $c = R_z/2$ and reference line $C_{rel} = 0\%$.

Admissible gap dimension

d (D)	16 MPa	26 MPa	32 MPa	40 MPa
\leq	0,60 mm	0,50 mm	0,40 mm	0,35 mm
$>$	0,65 mm	0,55 mm	0,45 mm	0,40 mm

Tolerances

The admissible gap width, tolerances, guide play and deflection of the guide under load are to be taken into account when designing d2. → Technical Manual.

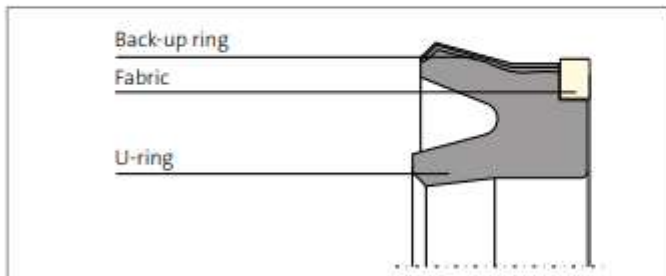
Nominal \varnothing D	D	d
≤ 320 mm	H11	h11

FITTING & INSTALLATION

Careful fitting is a prerequisite for the correct function of the seal. → Technical Manual.

U-RING SEAL SET 0215

Merkel U-ring Seal Set 0215 is a two-piece seal set comprising an elastomer U-ring with a fabric reinforcement on the running surface and an active back-up ring.



VALUE TO THE CUSTOMER

- Low friction due to fabric reinforcement
- Large dimension range
- Resistant to extrusion owing to activated back-up ring

Applications

Single-acting piston seal for use in hydraulics or pneumatics.

Material

Profile ring

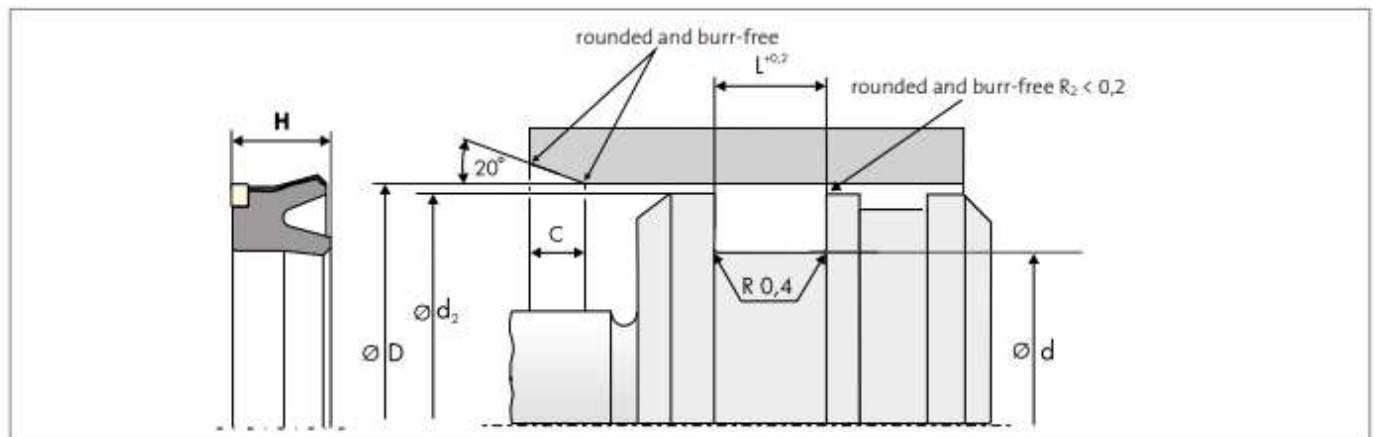
Material	Designation	Color
Nitrile rubber	NBR	black
Cotton fabric	BI-NBR	black

Back-up ring

Material	Designation	Color
D<300 mm Polyacetal	POM	white
D>300 mm Polyamide	PA	white

Other materials like PTFE/bronze back-up ring on request.

Installation diagram



FEATURES AND BENEFITS

Operating conditions

Material	NBR/BI-NBR/POM or PA
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 Hydraulic	25 or 40* MPa
Pressure Pneumatic	5 MPa
Sliding speed	1,5 m/s

* max. pressure depends on the profile
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	$\leq 2,5 \mu\text{m}$
Groove base	$\leq 1,6 \mu\text{m}$	$\leq 6,3 \mu\text{m}$
Groove sides	$\leq 3,0 \mu\text{m}$	$\leq 15,0 \mu\text{m}$

Material content M_r >50% to max. 90%, with cut depth $c = R_z/2$ and reference line $C_{ref} = 0\%$

Gap dimension

The dimension d_2 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. Please consult our 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			
	16 MPa	26 MPa	32 MPa	40 MPa
<15	1,2	1,0	0,65	0,5
>15	1,8	1,4	0,9	0,7

The largest gap width occurring in operation on the non-pressurised side of the seal is crucial for the functioning of the seal. Please consult our Technical Manual.

Tolerances

Diameter	Tolerance
D	H8
d_2	h10

The tolerance for the diameters d_2 and D 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 or H7 and H8 are usually chosen.

Design notes

Please note the general design remarks in our Technical Manual.

Installation & assembly

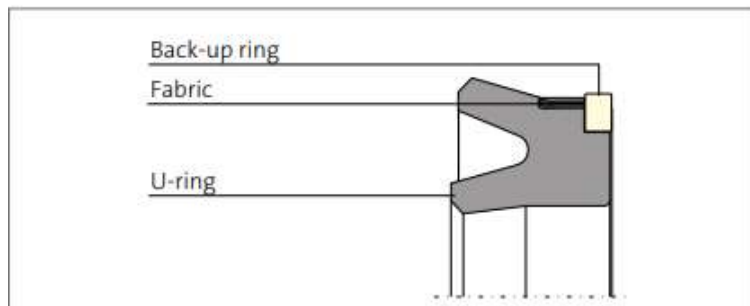
Reliable seal function is dependent on correct installation. Please also consult our Technical Manual.

U-RING SEAL SET 0217

Merkel U-ring Seal Set 0217 is a two-piece seal set comprising an elastomer U-ring with a fabric reinforcement on the running surface to right over the sealing edge and an active back-up ring.

VALUE TO THE CUSTOMER

- Low friction due to fabric reinforcement
- Large dimension range
- Resistant to extrusion owing to activated back-up ring



Applications

Single-acting piston seal for use in hydraulics or pneumatics.

Material

Profile ring

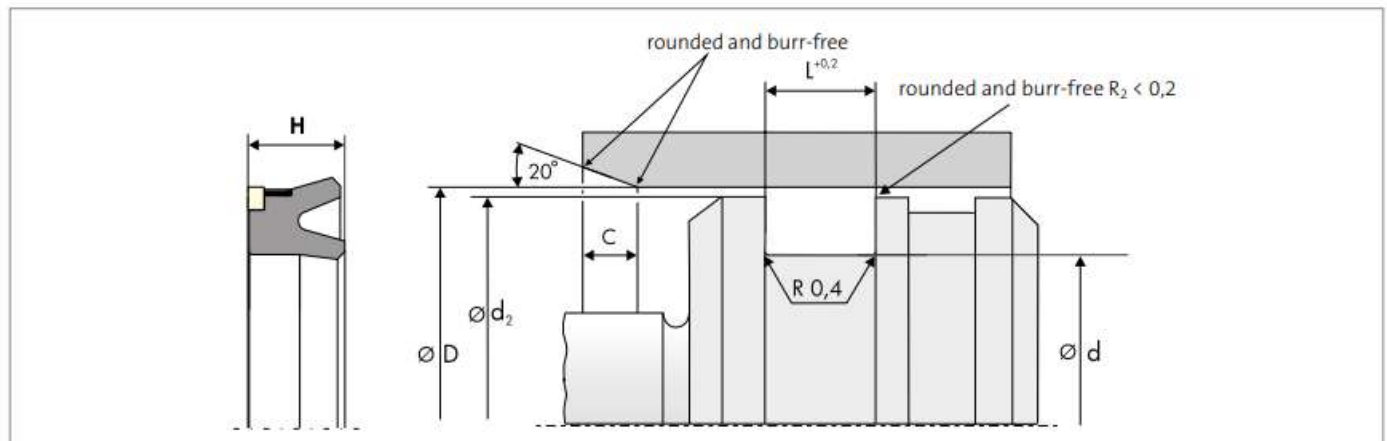
Material	Description	Color
Nitrile rubber	NBR	black
Cotton fabric	BI-NBR	black

Back-up ring

Material	Description	Color
D < 300 mm Polyacetal	POM	white
D > 300 mm Polyamide	PA	white

Other materials like PTFE/bronze back-up ring on request.

Installation diagram



FEATURES AND BENEFITS

Operating conditions

Material	NBR/BI-NBR/POM or PA
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 Hydraulic	25 or 40* MPa
Pressure Pneumatic	5 MPa
Sliding speed	1,5 m/s

*max. pressure depends on the profile

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	$\leq 2,5 \mu\text{m}$
Groove base	$\leq 1,6 \mu\text{m}$	$\leq 6,3 \mu\text{m}$
Groove sides	$\leq 3,0 \mu\text{m}$	$\leq 15,0 \mu\text{m}$

Material content $M_v > 50\%$ to max. 90%, with cut depth $c = R_z/2$ and reference line $C_{ref} = 0\%$

Design notes

Please note the general design remarks in our Technical Manual.

Gap dimension

The dimension d_2 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. Please consult our 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 [mm]	Max. permissible gap dimension [mm]			
	16 MPa	26 MPa	32 MPa	40 MPa
<15	1,2	1	0,65	0,5
>15	1,8	1,4	0,9	0,7

The largest gap width occurring in operation on the non-pressurised side of the seal is crucial for the functioning of the seal. Please consult our Technical Manual.

Tolerances

Diameter	Tolerance
D	H8
d_2	h10

The tolerance for the diameters d_2 and D 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 or H7 and H8 are usually chosen.

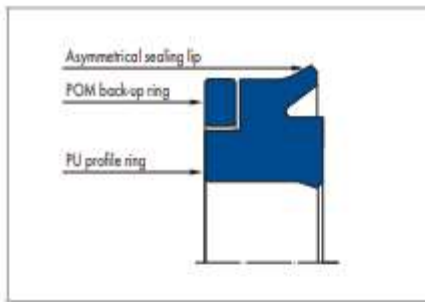
Design notes

Please note the general design remarks in our Technical Manual.

Installation & assembly

Reliable seal function is dependent on correct installation. Please also consult our Technical Manual.

U-RING T18



PRODUCT DESCRIPTION

Merkel U-ring with integrated back-up ring, asymmetrical profile with pressure-relieving grooves, outer lip set back and press fit at the inside diameter.

PRODUCT ADVANTAGES

Single-acting piston seal also for standardised housings according to ISO 5597.

- Very good static and dynamic tightness
- High extrusion resistance (back-up ring)
- "back-to-back" arrangement for pistons with pressure on both sides
- High reliability
- Relief grooves against dynamic drag pressure

APPLICATION

- Earth moving equipment
- Scrap presses
- Heavy duty earth moving equipment

MATERIAL

Profile ring

Material	Code	Hardness
Polyurethane	95 AU V142	95 Shore A

Back-up ring

Material	Code	Hardness
Polyacetal	POM PO202	-

Other materials are available on request.

OPERATING CONDITIONS

Pressure p	40 MPa
Running speed v	0,5 m/s

Medium/ Temperature	95 AU V142/POM PO202
Hydraulic oils HL, HLP	-30 °C ... +110 °C
HFA fluids	+5 °C ... +50 °C
HFB fluids	+5 °C ... +50 °C
HFC fluids	-30 °C ... +40 °C
HFD fluids	-
Water	+5 °C ... +50 °C
HETG (rapeseed oil)	-30 °C ... +60 °C
HEES (synthetic ester)	-30 °C ... +80 °C
HEPG (glycol)	-30 °C ... +50 °C
Mineral greases	-30 °C ... +110 °C

DESIGN NOTES

Please observe our general design notes in → Technical Manual.

Surface quality

Peak-to-valley heights	R_a	R_{max}
Sliding surface	0,05 ... 0,3 μm	$\leq 2,5 \mu\text{m}$
Groove base	$\leq 1,6 \mu\text{m}$	$\leq 6,3 \mu\text{m}$
Groove flanks	$\leq 3,0 \mu\text{m}$	$\leq 15,0 \mu\text{m}$

Percentage contact area M, >50% to max. 90% at cutting depth $c = R_z/2$ and reference line $C_{ref} = 0\%$.

Admissible gap dimension

The largest gap dimension occurring on the non-pressurised side of the seal in operation is of vital importance for the function of the seal. → Technical Manual. Regard must be paid to the dimensions d1 and df in relation with the guide element used.

Profile dimension	16 MPa	26 MPa	32 MPa	40 MPa
7,5 mm	0,80 mm	0,70 mm	0,50 mm	0,40 mm
>7,5 mm	1,05 mm	0,90 mm	0,85 mm	0,80 mm

Tolerances

The admissible gap width, tolerances, guide play and deflection of the guide under load are to be taken into account when designing d2. → Technical Manual.

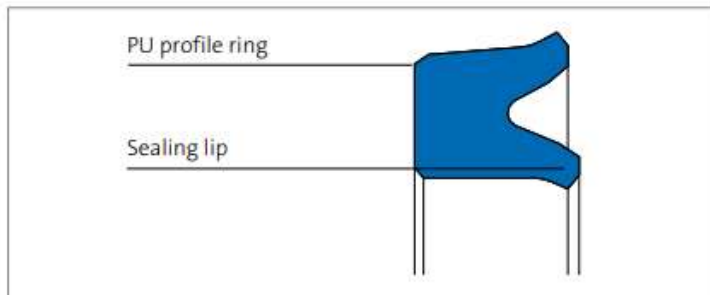
Nominal $\varnothing D$	D	d
$\leq 400 \text{ mm}$	H8	h11

FITTING & INSTALLATION

We recommend the use of a fitting tool for the fitting. Careful fitting is a prerequisite for the correct function of the seal. → Technical Manual.

U-RING TM21

Merkel U-ring TM 21 is a single-acting U-ring made of polyurethane with an asymmetrical profile, retracted outer sealing lip and press fit at the inner diameter.



Applications

Piston seal for demanding requirements in heavy duty hydraulics, like Injection molding machines, presses, heavy machinery manufacture, large size cylinders.

Operating conditions

Material	95 AU V142	93 AU V167
Hydraulic oils, HL, HLP	-30 ... +110 °C	-25 ... +100 °C
HFA fluids	+5 ... +50 °C	+5 ... +60 °C
HFB fluids	+5 ... +50 °C	+5 ... +60 °C
HFC fluids	-30 ... +40 °C	-25 ... +40 °C
HFD fluids	-	-
Water	+5 ... +40 °C	+5 ... +60 °C
HETG (rape-seed oil)	-30 ... +60 °C	-25 ... +60 °C
HEES (synth. ester)	-30 ... +60 °C	-25 ... +60 °C
HEPG (glycol)	-30 ... +40 °C	-25 ... +50 °C
Mineral greases	-30 ... +110 °C	-25 ... +100 °C
Pressure	40 MPa	40 MPa
Sliding speed	0,5 m/s	0,5 m/s

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

VALUES FOR THE CUSTOMER

- Very good static and dynamic tightness
- Highly wear resistant
- Broad temperature range
- Good media resistance
- Large range of dimensions

FEATURES AND BENEFITS

Material

For diameter <500 mm

Material	Designation	Color
Polyurethane	95 AU V142	dark blue

For diameter >500 mm

Material	Designation	Color
Polyurethane	93 AU V167	red

Surface finish

Peak-to-valley heights	R_a	R_{max}
Sliding surface	0,05 ... 0,3 μm	$\leq 2,5 \mu\text{m}$
Groove base	$\leq 1,6 \mu\text{m}$	$\leq 6,3 \mu\text{m}$
Groove sides	$\leq 3,0 \mu\text{m}$	$\leq 15,0 \mu\text{m}$

Material content M_r >50% to max. 90%, with cut depth $c = R_z/2$ and reference line $C_{ref} = 0\%$

The long term behavior of a sealing element and its dependability against early failures are significantly influenced by the quality of the counter face. Therefore a precise description and assessment of the surface is indispensable.

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. Please also consult our technical manual.

Housing recommendation and dimension d2

The admissible gap width, tolerances, guide play and deflection of the guide under load are to be taken into account when designing d2. Please also consult our technical manual.

Surface finish of the sliding surfaces

Characteristic value	Limit	
R_a	>0,05 μm	<0,30 μm
R_{max}	<2,5 μm	
R_{pkx}	<0,5 μm	
R_{pk}	<0,5 μm	
R_k	>0,25 μm	<0,7 μm
R_{vk}	>0,2 μm	<0,65 μm
R_{vkx}	>0,2 μm	<2,0 μm

The limit values listed in the table do not currently apply for ceramic or semi-ceramic counterfaces. Please also consult our technical manual.

Housing recommendations for new design

D [mm]	d [mm]	L [mm]	C [mm]
>200 ... 630	D-30	25	9
>630 ... 800	D-40	32	11
>800 ... 2.000	D-50	40	13

Design notes

Please read our general design notes in our technical manual.

FEATURES AND BENEFITS

Recommended tolerances* in combination with Merkel guide rings KB

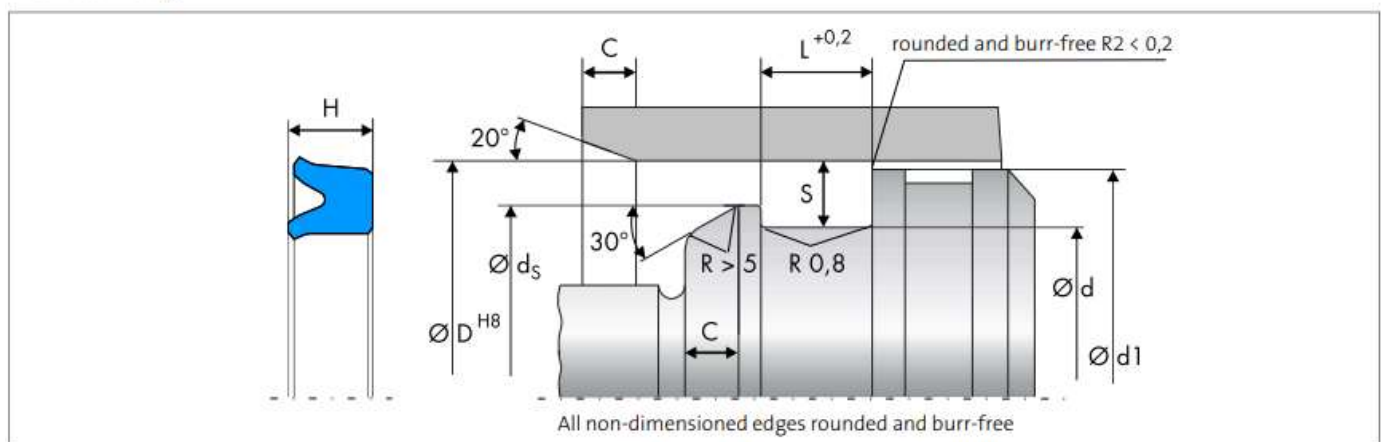
D	16 MPa				26 MPa				32 MPa				40 MPa			
	S	D	d	X2	S	D	d	X2	S	D	d	X2	S	D	d	X2
... 250	15	H8	h11	0,65	15	H8	h11	0,55	15	H8	h11	0,45	15	H8	h11	0,40
... 500	15	H8	h11	0,65	15	H8	h11	0,55	15	H8	h11	0,45	15	H8	h11	0,40
... 560	15	H8	h11	0,65	15	H8	h11	0,55	15	H7	h11	0,45	15	H8	h11	0,40
... 450	20	H8	h11	0,67	20	H8	h11	0,57	20	H8	h11	0,47	20	H8	h11	0,42
... 600	20	H8	h11	0,67	20	H8	h11	0,57	20	H7	h11	0,47	20	H8	h11	0,42
... 750	20	H8	h11	0,67	20	H8	h11	0,57	20	H7	h11	0,47	20	H8	h11	0,42
... 1000	25	H8	h11	0,70	25	H8	h11	0,60	25	H7	h11	0,47	25	H8	h11	0,42
... 1400	25	H7	h11	0,70	25	H7	h11	0,60	25	H7	h11	0,47	25	H7	h11	0,42

* Profiles according to "Housing recommendation for new designs"

Installation & assembly

Please contact our application consultants about different housings, e.g. in old plants. To achieve optimum running-in and operation behaviour, the U-rings should be oiled or greased slightly prior to use (initial lubrication).

Installation diagram



مجموعه چرخش صنعت

تامین کننده انواع کاسه نمد، اورینگ، کوپلینگ، دیافراگم و پکینگ

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