

MERKEL U-RING TM 20

Merkel U-ring TM 20 is a U-ring made of polyurethane with asymmetrical profile for sealing piston rods.



Applications

Merkel TM 20 is mainly used as a secondary seal in a sealing system, or as a single seal in the pressure range of up to 26 MPa. As a single seal in subordinate applications, the pressure range is up to 40 MPa. Nominal diameters are available up to 2.000 mm.

Material

Material	Designation	Color
Polyurethane	95 AU V142	dark blue
Polyurethane	94 AU 925	light blue
Polyurethane	94 AU 30000	dark blue
Polyurethane	93 AU V167	red
Polyurethane	93 AU V167	red

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

VALUE TO THE CUSTOMER

- Low breakaway force
- Good media resistance
- Wide operating temperature range
- Very good static and dynamic tightness
- Dynamic return capability
- Use as an individual seal or as a secondary seal in sealing systems possible
- Large range of dimensions
- No moulding tools





FEATURES AND BENEFITS

Operating condition

Material	95 AU V142/ 94 AU 925	93 AU V167/ 93 AU V168	94 AU 30000
Hydraulic oils, HL, HLP	−30 +110 °C	−20 +100 °C	
HFA fluids	+5 +50 °C	+5 +60 °C	
HFB fluids	+5 +50 °C	+5 +60 °C	
HFC fluids	−30 +40 °C	−20 +40 °C	
HFD fluids	-	-	
Water	+5 +40 °C	+5 +60 °C	
HETG (rape-seed oil)	−30 +60 °C	−20 +60 °C	
HEES (synth. ester)	−30 +60 °C	−20 +60 °C	
HEPG (glycol)	−30 +40 °C	−20 +50 °C	
Mineral greases	−30 +110 °C	−20 +100 °C	
Pressure	40 MPa	40 MPa	
Sliding speed	0,5 m/s*	0,5 m/s*	

* When the Merkel TM 20 is used as a secondary seal, sliding 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 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 surface. 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.

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.

Tolerance recommendation and dimension D₂

The D_2 "System" relates to the use of the Merkel U-ring TM 20 as a secondary seal within a sealing system. The D_2 tolerance zones are based on the use of Merkel laminated fabric guide rings SB, or alternatively metallic guides. They offer high security against gap extrusion as well as protection against metallic contact. If the







FEATURES AND BENEFITS

operating conditions are not – respectively short-term – utilised to their maximum, larger D_2 tolerance zones can be chosen. In case of high side loads respectively large shaft misalignment, we recommend metallic guides.

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. 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. Please also consult our Technical Manual.

Profile dimension [mm]	Max. permissible gap dimension [mm]			
Profile	16 MPa	26 MPa	32 MPa	40 MPa
≥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

Housing recommendations for new equipment

TM 20 used as a primary seal

d [mm]	D [mm]	L [mm]	C [mm]
>320 600	d + 30	25	11
>320 720	d + 40	32	12
>720 2.000	d + 40	40	16

TM 20 used as a secondary seal in a sealing system

d [mm]	D [mm]	L [mm]	C [mm]
>320 650	d + 20	16	8
>650 950	d + 25	20	10
>950 2.000	d + 30	25	11

Fitting & installation

Rod seals can be installed into grooves by hand or with a fitting tool. For different housings, e. g. in old plants, please consult our advisory service.

Installation diagram



www.fst.com



