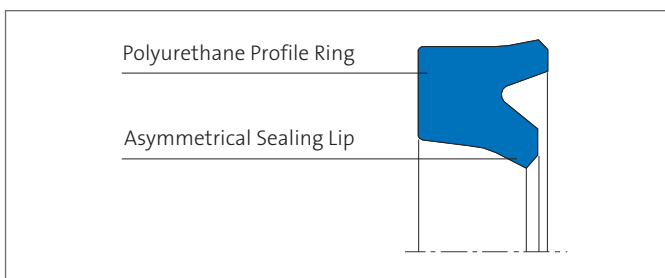




MERKEL U-RING TM20

Merkel U-ring TM20 is a U-ring made of polyurethane with asymmetrical profile for sealing piston rods.



Applications

Merkel TM20 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	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 GLAND DESIGN

Operating Condition

Material	95 AU V142	93 AU V167
Hydraulic oils, HL, HLP	-30 ... +110 °C	-20 ... +110 °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 ... +110 °C
Pressure	40 MPa	40 MPa
Sliding speed	0,5 m/s*	0,5 m/s*

* When the Merkel TM20 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

Parameter	Tolerance [μm]		
	Sliding Surface	Groove	Groove Sides
R_a	0,05 ... 0,3 μm	$\leq 1,6 \mu\text{m}$	$\leq 3,0 \mu\text{m}$
$Rz1_{\text{max}}$	$\leq 3,0 \mu\text{m}$	$\leq 6,3 \mu\text{m}$	$\leq 15,0 \mu\text{m}$

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

The long-time behavior of a sealing element and its dependability against early failures are crucially influenced by the quality of the counter surface. A precise description and assessment of the surface is thus indispensable.

Based on current findings, we recommend supplementing the above definition of the surface finish of the sliding surface with the parameters shown in the following table. These new parameters based on the material content significantly improve the previously only general description of the material content, particularly with regard to the abrasiveness of the surface. Further information in our Technical Manual.

Surface Finish of the Sliding Surfaces

Parameter	Tolerance [μm]			
	HP-HVOF*	Plasma**	Hardchrome	Thermo-chem.***
R_a	0,05 ... 0,15	0,15 ... 0,3	0,1 ... 0,25	0,05 ... 0,3
R_{pk}	$\leq 0,1$	$\leq 0,1$	$\leq 0,3$	$\leq 0,5$
R_{vk}	0,1 ... 0,6	0,2 ... 1,5	0,2 ... 0,5	0,2 ... 0,65
$Rz1_{\text{max}}$./.	./.	./.	$\leq 2,5$
R_k	./.	./.	./.	0,25 ... 0,7
R_{pkx}	./.	./.	./.	$\leq 0,5$
R_{vkx}	./.	./.	./.	0,2 ... 2,0

* High Pressure - High Velocity Oxygen Fuel Flame-sprayed Surfaces

Carbides: WC/Ni, $\text{Cr}_2\text{C}_3/\text{NiCr}$
 \emptyset -Porosity: $\leq 0,5\%$
 Typical layer thickness: 125 μm

** Ceramic Counter Surfaces

Ceramic: Al_2O_3 , TiO_2 , Cr_2O_3
 \emptyset -Porosity: $\leq 3\%$
 Typical layer thickness: 150 μm

*** Hardened Counter Surfaces

Nitro-carburized; induction hardened

Tolerance Recommendation And Dimension D_2

The D_2 "System" relates to the use of the Merkel U-ring TM20 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 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.



INSTALLATION AND GLAND DESIGN

Recommended Extrusion Gap Inclusive Tube Expansion

Profile Dimension [mm]	Max. Permissible Gap Dimension [mm]			
	16 MPa	26 MPa	32 MPa	40 MPa
Profile				
>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

TM20 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 + 50	40	16

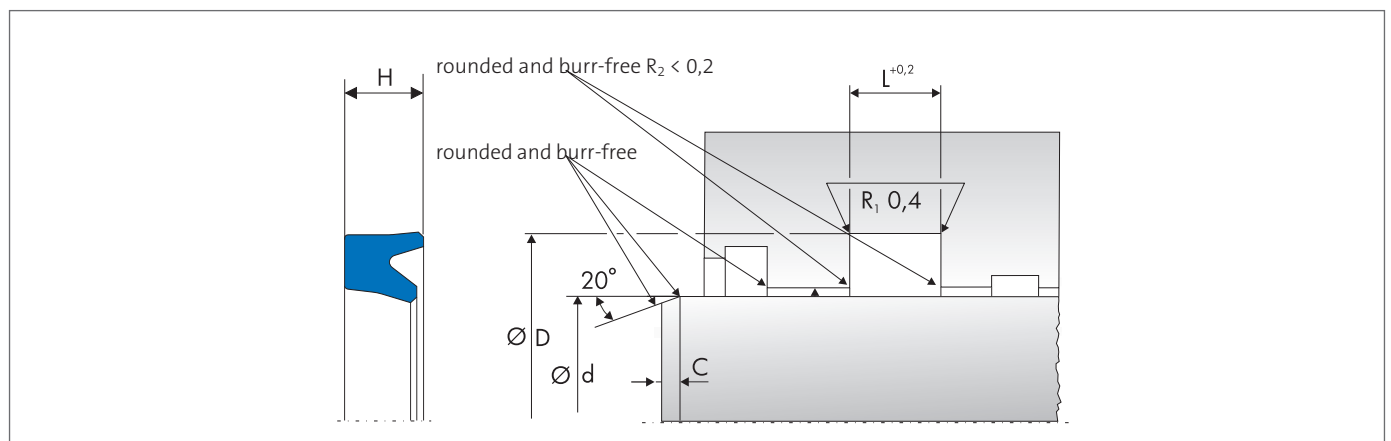
TM20 used as a secondary seal in a sealing system

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



The information contained herein is believed to be reliable, but no representation, guarantees or warranties of any kind are made to its accuracy or suitability for any purpose. The information presented herein is based on laboratory testing and does not necessarily indicate end product performance. Full scale testing and end product performance are the responsibility of the user.

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