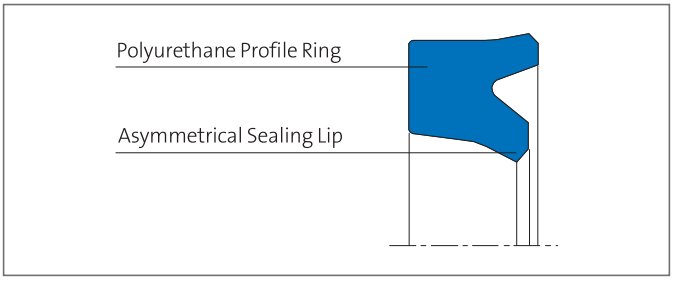


MERKEL® U-RING T20

Merkel® U-ring T20 is a sealing element made of polyurethane with asymmetrical profile for the sealing of piston rods.



Applications
Ideally suited as a secondary seal in a sealing system. Preferred use as a single seal in the pressure range up to 26 MPa. For less critical applications, it can also be used as a single seal in the pressure range up to 45 MPa. Available nominal diameters up to 2,000 mm.

Material

Material	Designation	Color
Polyurethane	95 AU V142	dark blue
Polyurethane	94 AU 30000	dark blue

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

VALUE TO THE CUSTOMER

- 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)



TECHNICAL PROPERTIES

Operating Conditions

Material	95 AU V142	94 AU 30000
Hydraulic oils, HL, HLP	−30 ... +110 °C	−35 ... +120 °C
HFA Fluids	+5 ... +50 °C	+5 ... +60 °C
HFB Fluids	+5 ... +50 °C	+5 ... +60 °C
HFC Fluids	−30 ... +40 °C	−35 ... +60 °C
HFD Fluids	–	Must be tested
Water	+5 ... +40 °C	+5 ... +80 °C
HETG (rape-seed oil)	−30 ... +60 °C	−35 ... +70 °C
HEES (synth. ester)	−30 ... +60 °C	−35 ... +90 °C
HEPG (glycol)	−30 ... +40 °C	−35 ... +60 °C
Mineral Greases	−30 ... +110 °C	−35 ... +120 °C
Pressure	40 MPa	45 MPa
Sliding Speed	0,5 m/s*	0,5 m/s*

* When the Merkel® T20 is used as a secondary seal, sliding speed of up to 1,5 m/s can be permitted.

Notes: The limit values for the temperature application range are general indications related to the media group. Since the unspecified additives of the oil manufacturers have a significant impact on the resistance of the sealing materials, their resistance must be explicitly checked in the actual medium used.

The specified figures for pressure, temperature, and sliding speed 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	≤1,6 µm	≤3,0 µm
$Rz1_{max}$	≤3,0 µm	≤6,3 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-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}	≤0,1	≤0,1	≤0,3	≤0,5
R_{vk}	0,1 ... 0,6	0,2 ... 1,5	0,2 ... 0,5	0,2 ... 0,65
$Rz1_{max}$	./.	./.	./.	≤2,5
R_k	./.	./.	./.	0,25 ... 0,7
R_{pkx}	./.	./.	./.	≤0,5
R_{vkx}	./.	./.	./.	0,2 ... 2,0

* **High Pressure - High Velocity Oxygen Fuel Flame-sprayed Surfaces**
Carbides: WC/Ni, Cr_2C_3/NiCr
Ø-Porosity: ≤0,5 %
Typical layer thickness: 125 µm

** **Ceramic Counter Surfaces**
Ceramic: $Al2O_3$, TiO_3, Cr_2O_3
Ø-Porosity: ≤3 %
Typical layer thickness: 150 µm

*** **Hardened Counter Surfaces**
Nitro-carburized; induction hardened

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
≤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



TECHNICAL PROPERTIES AND INSTALLATION

Tolerances
If the Merkel® U-ring T20 is used as a secondary seal in a sealing system, a larger gap dimension can be set. The general rule applying here is $D_2 = d + 1$ mm with a tolerance of H11 for $D_2 \leq 400$ mm or +0,4 mm for $D_2 > 400$ mm.

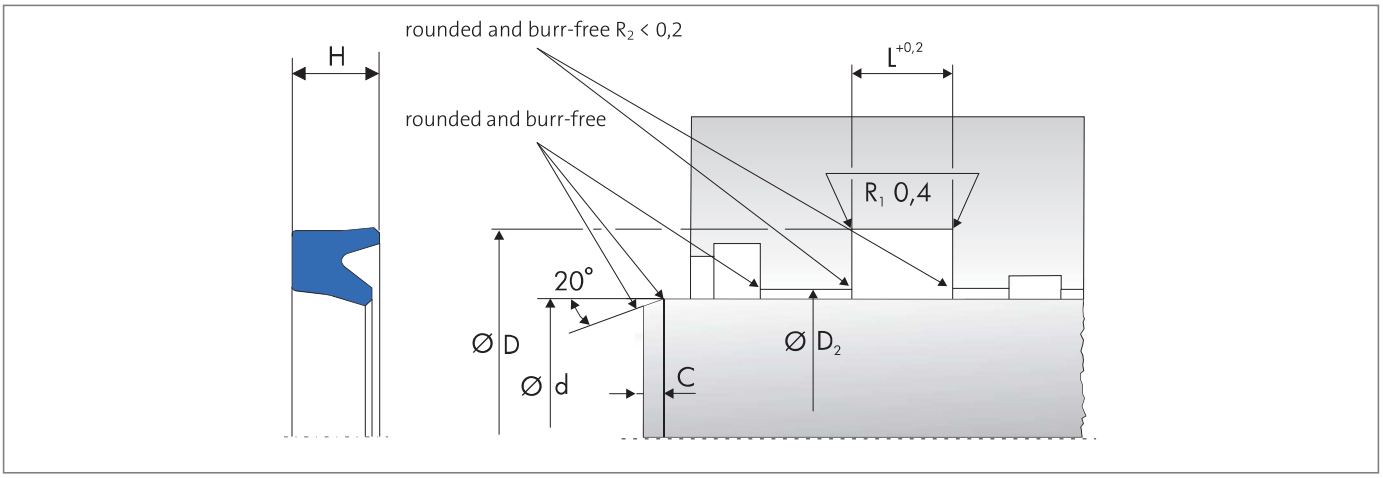
Diameter D [mm]	Tolerance
<400	H11

The tolerance for the diameters d and D_2 is specified in connection with the gap dimension calculation. In typical hydraulic applications up to a nominal dimension of 1000 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 mm 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. Please note the general design remarks in our Technical Manual.

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

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.