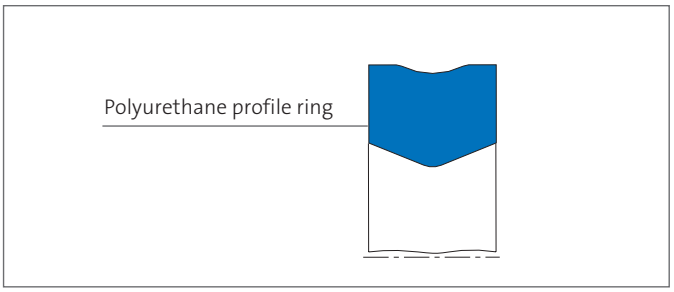
MERKEL COVERSEAL PU 82

Merkel CoverSeal PU 82 is a single-piece, double-acting compact seal made of polyurethane for static sealing, internal sealing.



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 2,000 mm

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.

VALUE TO THE CUSTOMER

- 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

FEATURES AND BENEFITS

Operating conditions

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.

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 [mm]				
L [mm]	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

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

Tolerance recommendation

Diameter d [mm]	Tolerance
<800	H7/f7
>800	+0,1/–0,05/–0,15 [mm]

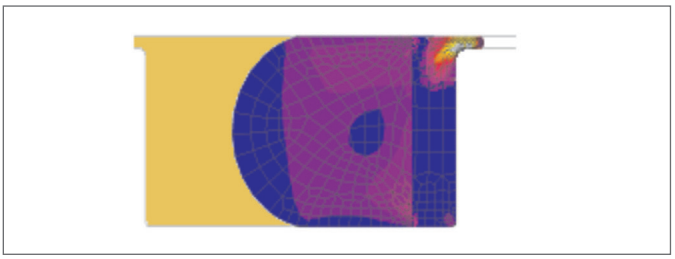
Installation & assembly

Please note our general remarks on the installation of hydraulic seals in our technical manual.

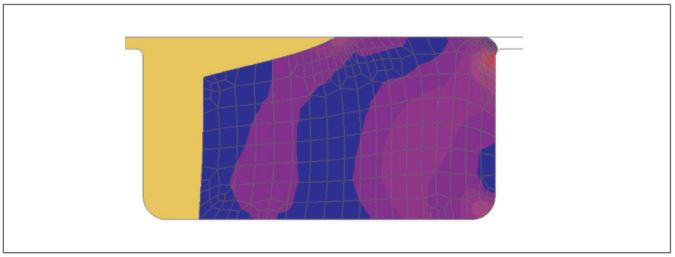
Design notes

Please note our general remarks in our technical manual.

Operating principle



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



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

ADDITIONAL PRODUCT DESCRIPTION

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).
Merkel CoverSeal 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.

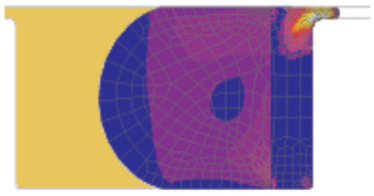


Figure 01: PTFE back-up ring at 40 MPa

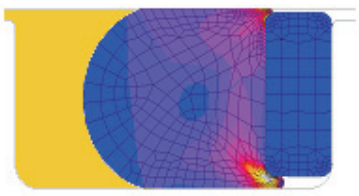


Figure 02: PA back-up ring at 20 MPa

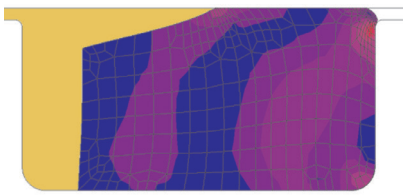


Figure 03: Merkel CoverSeal at 40 MPa

ADDITIONAL PRODUCT DESCRIPTION

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 Merkel CoverSeal 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.

Merkel CoverSeal 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.

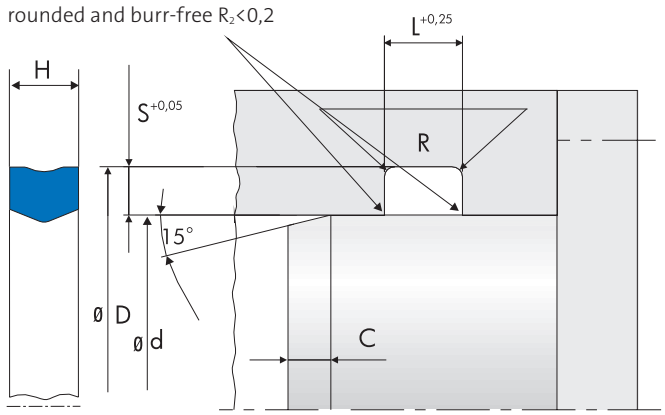
The profile ring of the cover seal is clearly preferred due to the stable support provided in the groove bottom. Any squeezing and rotary movements occurring inside the sealing ring under changing pressure as well as a helical distortion of the sealing ring during assembly are precluded, thus providing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

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

TABLE OF DIMENSIONS



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