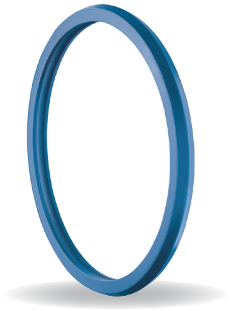
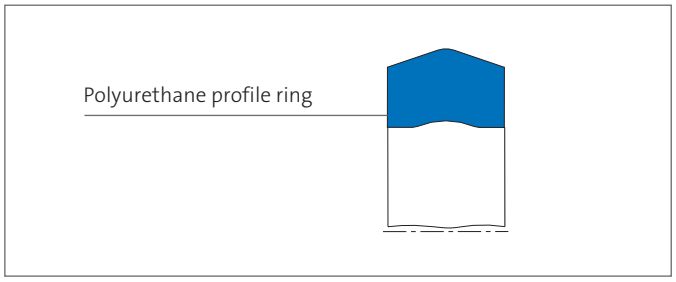
MERKEL COVER SEAL PU 83



Merkel Cover Seal PU 83 is a single-piece, double-acting compact seal made of polyurethane for static sealing, external 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
- Gas tight

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]

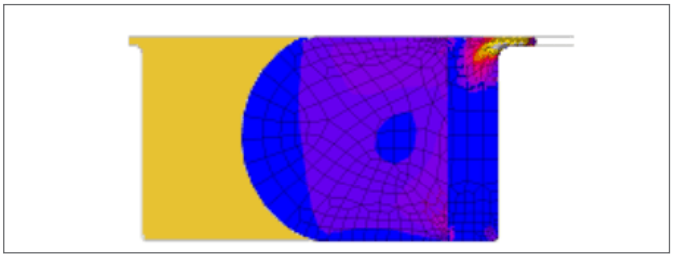
Installation & assembly

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

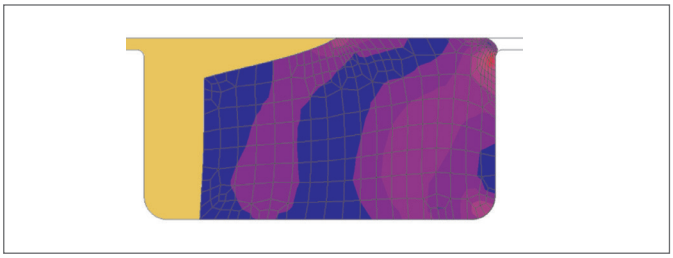
Design notes

Please note our general remarks in our technical manual.

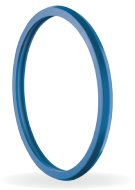
Operating principle



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



Merkel Cover Seal PU 83 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 one-sided pressurization. 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).
The cover seal 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.

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 Cover Seal 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.

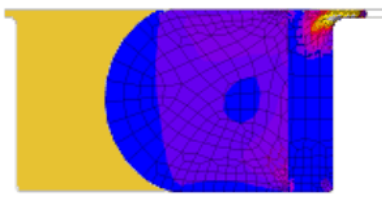


Figure 01: PTFE back-up ring at 40 MPa

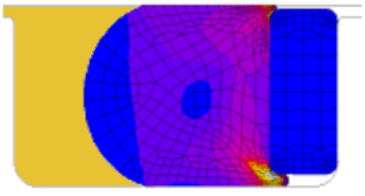


Figure 02: PA back-up ring at 20 MPa

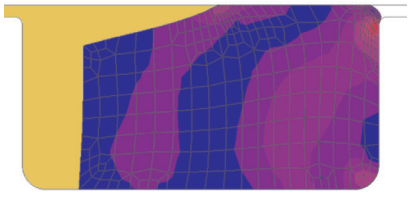
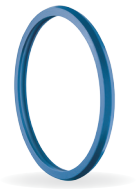


Figure 03: Merkel Cover Seal at 40 MPa



ADDITIONAL PRODUCT DESCRIPTION

The Merkel Cover Seal is designed individually in line with the metallic housing used. A continuously 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 Merkel CoverS eal is clearly preferred due to the stable support provided at the bottom of the groove. 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 cover seal.

The use of Merkel Cover Seal makes a vital contribution to the functional reliability and dependability of hydraulic cylinders.

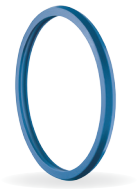
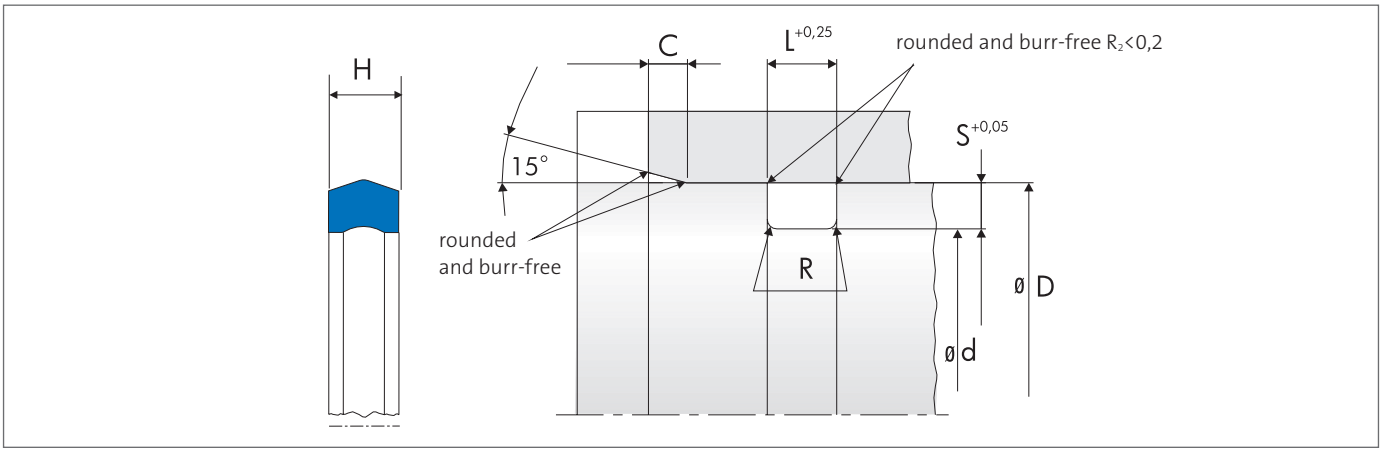


TABLE OF DIMENSIONS

Installation diagram



D	d	H	L	Profile S	C	ISC O-Ring	Material	Article No.
40	32,8	2,8	3,4	3,6	3,5		95 AU V142	24367566
40	35,2	5,4	6,3	2,4	3		95 AU V142	49065681
45	40,2	5,4	6,3	2,4	3		95 AU V142	49065618
50	42,2	5	5,8	3,9	3,5		95 AU V142	24334142
50	42,2	5	5,8	3,9	3,5		95 AU V142	40422462
50	44,4	5,3	6,2	2,8	3,5	3,53	95 AU V142	532203
50	44,6	5,2	6,2	2,7	3,5		95 AU V142	49055450
60	52,2	5	5,8	3,9	3,5		95 AU V142	24327617
60	52,2	5	5,8	3,9	3,5		95 AU V142	40422459
60	54	5,3	6,2	3	3,5		95 AU V142	49001027
60	54,6	5,5	6,5	2,7	3,5		95 AU V142	24380802
65	57,2	5	5,8	3,9	3,5		95 AU V142	24327636
65	57,2	5	5,8	3,9	3,5		95 AU V142	40422460
70	64,4	5,2	6,2	2,8	3,5	3,53	95 AU V142	532201
75	69,6	5,5	6,5	2,7	3,5		95 AU V142	24380803
75	69,6	5,5	6,5	2,7	3,5		95 AU V142	40422519
80	70	6,9	8	5	4,5		95 AU V142	532538
81	73,2	5	5,8	3,9	3,5		95 AU V142	24295885
81	73,2	5	5,8	3,9	3,5		95 AU V142	40422408
90	80,1	6,7	7,8	5	4		95 AU V142	24362668
90	80,1	6,7	7,8	5	4		95 AU V142	40422495
85	80,8	4,2	5	2,1	2,5	2,62	95 AU V142	24269861

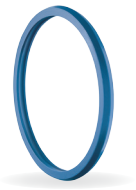


TABLE OF DIMENSIONS

D	d	H	L	Profile S	C	ISC O-Ring	Material	Article No.
95	86,4	7,8	9	4,3	4	5,33	95 AU V142	49018330
95,5	87,7	5	5,8	3,9	3,5		95 AU V142	24293063
100	90	7,3	7,8	5	4		95 AU V142	40422493
100	90,1	6,7	7,8	5	4		95 AU V142	24362292
100	91,4	7,8	9	4,3	4	5,33	95 AU V142	24379356
100	94,4	5,2	6,2	2,8	3,5	3,53	95 AU V142	532202
105	95,1	6,7	7,8	5	4		95 AU V142	24359847
105	95,1	6,7	7,8	5	4		95 AU V142	40422492
110	101,4	7,8	9	4,3	4	5,33	95 AU V142	24380871
115	105,1	6,7	7,8	5	4		95 AU V142	24355287
115	105,1	6,7	7,8	5	4		95 AU V142	40422490
120	110,6	7,9	9,1	4,7	4		95 AU V142	530765
125	115,1	6,7	7,8	5	4		95 AU V142	24355288
125	115,1	6,7	7,8	5	4		95 AU V142	40422491
122	115,6	5,7	6,8	3,2	4	4	95 AU V142	49001025
125	116,4	7,8	9	4,3	4	5,33	95 AU V142	24379551
130	120,8	4,2	5	4,6	4		95 AU V142	24311962
130	121,4	7,8	9	4,3	4	5,33	95 AU V142	528353
140	130,4	6,6	7,7	4,8	4		95 AU V142	24362518
140	131,4	7,8	9	4,3	4		95 AU V142	49036033
140	134,1	4,9	5,9	3	3,5		95 AU V142	24245392
140	134,1	4,9	5,9	2,95	3,5		95 AU V142	40422341
145	135	7,3	8,4	5	4,5	5,7	95 AU V142	24359031
150	140,4	6,6	7,7	4,8	4		95 AU V142	24367348
150	140,4	6,6	7,7	4,8	4		95 AU V142	40422496
150	141,9	8	9,2	4,1	3,5		95 AU V142	24348854
160	151,4	7,8	9	4,3	4		95 AU V142	49036034
165	159,2	4,9	5,9	2,9	3,5		95 AU V142	24250883
180	170	7,3	8,4	5	4,5	5,7	95 AU V142	24378895
190	170	7,8	9	10	8		95 AU V142	24361640
180	174,4	5,2	6,2	2,8	3,5	3,53	95 AU V142	49001429
192	185,9	4,9	5,9	3,1	4		95 AU V142	24250878

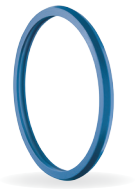


TABLE OF DIMENSIONS

D	d	H	L	Profile S	C	ISC O-Ring	Material	Article No.
200	191,4	7,8	9	4,3	4	5,33	95 AU V142	49004492
200	193,9	4,9	5,9	3,1	4		95 AU V142	24250880
225	216,4	7,8	9	4,3	4	5,33	95 AU V142	531563
240	228,4	10,7	12,3	5,8	5,5	6,99	95 AU V142	24375294
240	231,4	7,8	9	4,3	4	5,33	95 AU V142	24360083
242	236	4,9	5,9	3	3,5		95 AU V142	24245390
250	241,4	7,8	9	4,3	4		95 AU V142	49022154
265	253,4	10,7	12,3	5,8	5,5	6,99	95 AU V142	49000175
280	268,4	10,9	12,3	5,8	5,5		95 AU V142	49033375
290	281,4	7,5	8,8	4,3	4		95 AU V142	525514
288	282	4,9	5,9	3	4		95 AU V142	24250877
300	290,3	8,1	9,3	4,8	4		95 AU V142	49016225
320	308,4	10,4	12	5,8	5,5		95 AU V142	529772
340	331,4	7,7	9	4,3	4		95 AU V142	525487
360	348,4	10,4	12	5,8	5,5		94 AU 925	49004019
380	368,4	10,9	12,3	5,8	5,5		95 AU V142	49033376
390	378,4	10,4	12	5,8	5,5		95 AU V142	49002712
400	388,4	10,7	12,3	5,8	5,5		95 AU V142	532306
410	398,4	10,7	12,3	5,8	5,5		95 AU V142	49001342
420	408,4	10,7	12,3	5,8	5,5		95 AU V142	24379139
450	438,4	10,7	12,3	5,8	5,5		95 AU V142	529212
480	463	14,4	16,3	8,5	7		94 AU 925	49004706
480	468,4	10,9	12,3	5,8	5,5		94 AU 925	49025771
490	478,4	10,9	12,3	5,8	5,5		95 AU V142	49033377
520	508,4	10,6	12,3	5,8	5,5		95 AU V142	532963
560	548,4	10,9	12,3	5,8	5,5		94 AU 925	49027156
570	556,6	11,8	13,6	6,7	6		94 AU 925	49007603
660	643	14,4	16,3	8,5	7	10	94 AU 925	49012006
810	793	14,4	16,3	8,5	7	10	94 AU 925	49015798
813	830	15,6	16,3	8,5	7	10	94 AU 925	24361263
860	843	14,4	16,3	8,5	7	10	94 AU 925	49015799