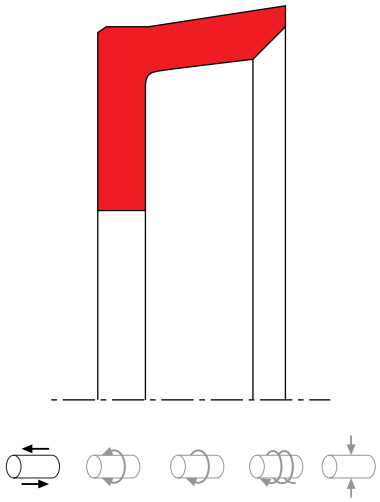
SEAL SPEC
K16-A



description

simple cup seal, usually fixed on the piston by means of a clamping plate. mainly used for replacement in old hydraulic and pneumatic cylinders or for low-grade secondary applications. also used for food filling / portioning equipment.

+ asymmetric single-acting piston lip seals.
+ the profile is clamped at the flange, thereby ensuring stability and static sealing effect.
+ various materials are available for different purposes.
+ sealing effect across a wide temperature range.
+ radial inaccuracy or excentricity can be compensated by varying the length of the lip.
+ for pressures up to 160 bar as a seal between pressurised space and atmosphere, pivoting and rotary movement and also long seal lips allow only lower values.
+ design A with chamfer, design B with radius (depending on housing).
+ suitable for long travel.
+ seal lip length affects to "stick-slip" behavior
+ low break-away load after prolonged periods of standstill.
+ mainly used as a replacement in older pneumatic or hydraulic cylinders.

category of profile

machined or molded/standard/trade product

double acting

the K16-A seal is designed for use as a piston seal - either single or double acting where two seals are used 'back to back'

area of application; hydraulics

- reciprocating pistons in hydraulic and pneumatic cylinders, push rods and fittings.
- piston seal for applications with small extrusion gap and without special impact load.
- replacement for old leather seals.
- can also be used in rotating and pivoting applications at low loads (see also materials).

note

- special designed mounting space is required.
- complicated installation. do not use for new designs.
- housings with integrated radius on the non pressurised side (common for old leather seals) do not allow design A.

function

K16-A resp. K16-B profiles are lip seals with clamp flange (also referred to as "cup seals"), designed to seal pressurised space against the atmosphere or in case of back-to-back arrangement - to seal between two pressurised spaces. mainly for reciprocating movements, but also for minor rotating and pivoting movements. the design is based on application in standard hydraulic systems with conventional hydraulic oils, the use in pneumatic systems is quite common as well. the operating parameters are as defined in the sealing data sheet and material data. requirements deviating from these parameters can be met to a certain degree by changing the geometry in the software program.

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operating parameter & material

material	temperature	max surface speed	max pressure[1]	hydrolysis	dry running	wear resistance
PU	-30 °C ... +110 °C	0,5 m/s	160 bar (16 MPa)	+	+	++
HPU	-20 °C ... +110 °C	0,5 m/s	160 bar (16 MPa)	++	+	++
GPU	-30 °C ... +110 °C	0,5 m/s	160 bar (16 MPa)			
LTPU	-50 °C ... +110 °C	0,5 m/s	160 bar (16 MPa)	-	++	++
SPU	-20 °C ... +110 °C	0,7 m/s	160 bar (16 MPa)	++	++	++
NBR	-30 °C ... +100 °C	0,5 m/s	160 bar (16 MPa)	-	-	o
FKM	-20 °C ... +200 °C	0,5 m/s	160 bar (16 MPa)	-	-	o
EPDM	-50 °C ... +150 °C	0,5 m/s	160 bar (16 MPa)	++	-	o
HNBR	-25 °C ... +150 °C	0,5 m/s	160 bar (16 MPa)	+	o	+

[1] pressure ratings are dependent on the size of the extrusion gap.
[2] attention: not suitable for mineral oils!.

++ particularly suitable + suitable o conditional suitable - not suitable

the stated operation conditions represent general indications. it is recommended not to use all maximum values simultaneously.
surface speed limits apply only to the presence of adequate lubrication film.
for detailed information regarding chemical resistance please refer to our „list of resistance". for increased chemical and thermal resistance rubber materials are to be preferred, attention should be paid to restrictions for pressure range and wear resistance. for higher gliding speeds another system should be used (e.g. PTFE materials).

gap dimension

operating pressure	cs = (ØD - Ød)/2 mm					
	4	5	7,5	10	12,5	15
	safe extrusion gap (mm)					
50 bar (5 MPa)	0,18	0,22	0,26	0,30	0,33	0,36
100 bar (10 MPa)	0,16	0,18	0,24	0,27	0,31	0,35
160 bar 16 MPa)	0,14	0,17	0,22	0,25	0,27	0,33

the above data are maximum value and can't be used at the same time. e.g. the maximum operating speed depend on material type, pressure, temperature and gap value. temperature range also dependent on medium.
the table applies to an operating temperature of 70 °C.

surface quality

surface roughness	Rtmax (µm)	Ra (µm)
sliding surface	≤2,5	≤0,1-0,5
bottom of groove	≤6,3	≤1,6
groove face	≤15	≤3

tolerance recommendation

seal housing tolerance	
Ød	h10
Ød1	h11
ØD	H9

mode of installation

special shaped, open housings are required. the axial compression of the flange should not exceed 5 to 10% of the height , a clamping torque limitation should be arranged. to avoid twisting in the sealing lip, the compression should occur only at the clamp flange.

insertion chamfer

in order to avoid damage to the piston seal during installation, the piston and the housing is to be chamfered and rounded as shown in the "recommended mounting space" drawing. the size of chamfer depends on the seal type and profile width.

cs (mm)	c (mm)	
	α = 15° ... 20°	α = 20° ... 30°
4	3,5	2
5	4	2,5
6	4,5	3
7,5	5	4
10	6	5
12,5	8,5	6,5
15	10	7,5
20	13	10

instead of a chamfer, the piston can also be designed with a radius. recommended size of the radius is equal to size of chamfer (R=c).

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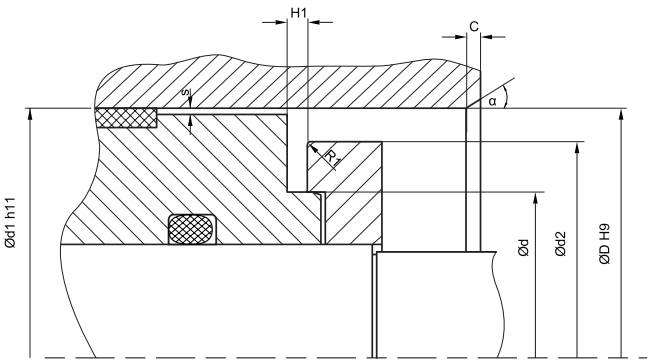
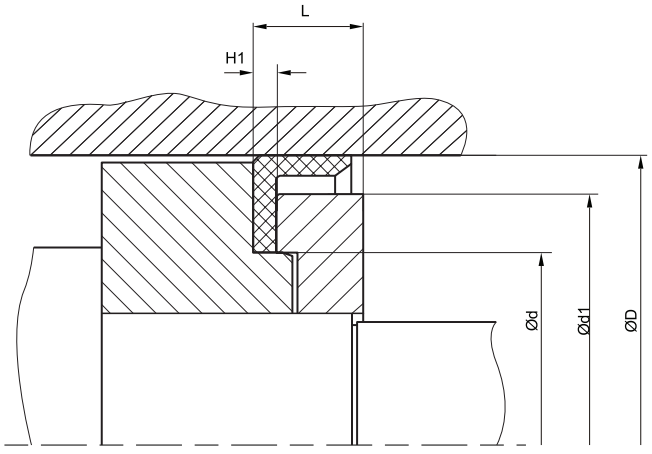
recommended mounting space



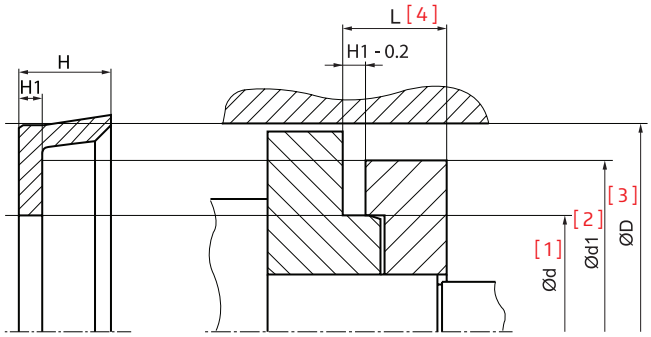
plastic guiderings (wearbands) have to feature a adequate cutting gap (recommendation: 2-5% of D). if metalic guides are used, spiral grooves shall be provided. in order to avoid drag pressure built up in case of back-to-back arrangement, the distance between the seals should be as small as possible. radius R1 should be at least equal to the radius at the seal.

fitted



seal & housing recommendations

please note that we are able to produce those profiles to your specific need or any non standard housing. for detail measurements, please see seal-mart catalog...



this profile should only used as a replacement in already existing mounting spaces.
use modern sealing systems for new designs.