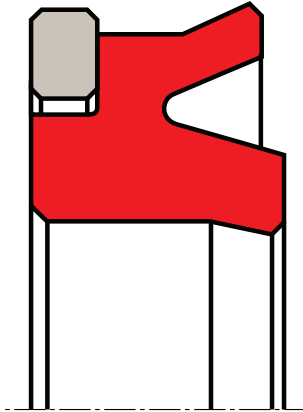


## piston seal K02-R

## seal spec



### description

as profile K02-P, but more adaptation possibilities for diverse temperatures and media by selection of suitable seal material. K02-R for standard housing design.

- asymmetric single acting piston lipseal, with the dynamic sealing lip being shorter and thinner than the static one in order to avoid drag pressure built up.
- interference fit on the inside diameter.
- various materials are available for different purposes.
- snaps into simple grooves (see notes on installation).
- best sealing effect across a wide temperature range.
- the active back up ring on the trailing side of the seal reduces extrusion wear and allows larger gap dimensions respectively higher system pressure.
- sealing effect enhanced by high recovery rate.
- for pressures up to 250 bar as a seal between pressurised spaces.
- good sealing in the low pressure range.
- excellent static and dynamic sealing.
- suitable for long travel.
- little inclination to "stick-slip".
- low break-away load after prolonged periods of standstill.
- shorter seal heights require design K02-RD.

### application



*not bolded symbols; please consult our technical for application limitations*

### category of profile

machined or molded/standard/trade product

### single acting

the K02-R 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 cylinders.
- piston seal for applications with large extrusion gap and without special impact load.

### note

- this seal has the correct functioning dimensions only when mounted. in unmounted condition, the seal may appear too small.
- the ratio between nominal width and sealing height  $c_s/H$  should not drop below a value of 1/1.25 (essentially according to ISO 5597 housings for piston and rod seals).
- recovery volume is limited
- design K02-RD with triangular back up ring can lead to installation difficulties.

### function

K02-R and K02-RD profiles are lip seals designed to seal pressurised space against the atmosphere or - in case of back to back arrangement with intermediate guiding - to seal between two pressurised spaces, mainly for reciprocating movements. the design is based on application in standard hydraulic systems with conventional hydraulic oils. 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.

**operating parameters & material**

diameter range: up to 600 mm

material		temperature	max. surface speed	max. pressure <sup>1</sup>	hydrolysis	dry running	wear resistance
sealing element	back-up ring						
s-mart NBR	s-mart POM / s-mart PA <sup>2</sup>	-30 °C ... +100 °C	0,5 m/s	250 bar (25 MPa)	-	-	O
s-mart FKM	s-mart PTFE glass	-20 °C ... +200 °C	0,5 m/s	250 bar (25 MPa)	-	-	O
s-mart EPDM <sup>3</sup>	s-mart POM <sup>2</sup>	-50 °C ... +100 °C	0,5 m/s	250 bar (25 MPa)	++	-	O
s-mart EPDM <sup>3</sup>	s-mart PA <sup>2</sup>	-50 °C ... +100 °C	0,5 m/s	250 bar (25 MPa)	+	-	O
s-mart EPDM <sup>3</sup>	s-mart PTFE glass	-50 °C ... +150 °C	0,5 m/s	250 bar (25 MPa)	++	-	O
s-mart HNBR	s-mart POM / s-mart PA <sup>2</sup>	-25 °C ... +100 °C	0,5 m/s	250 bar (25 MPa)	+	O	+
s-mart HNBR	s-mart PTFE glass	-25 °C ... +150 °C	0,5 m/s	250 bar (25 MPa)	+	O	+

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.

<sup>1</sup> pressure ratings are dependent on the size of the extrusion gap.

<sup>2</sup> POM up to ø260 mm, PA above ø260 mm.

<sup>3</sup> attention: not suitable for mineral oils!

++ ... particularly suitable

o ... conditional suitable

+ ... suitable

- ... not suitable

for detailed information regarding chemical resistance please refer to our „list of resistance“. for increased wear resistance and higher pressure range polyurethane materials are to be preferred, attention should be paid to restrictions in chemical and thermal resistance. for higher gliding speeds another sealing system should be used (e.g. PTFE materials).

note on special material:

as the temperature limits are determined by POM, using special materials for the back up ring can expand the temperature limits.

**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)	0,80	1,00	1,50	2,00	2,50	3,00
100 bar (10 MPa)	0,80	1,00	1,40	1,65	1,85	2,20
200 bar (20 MPa)	0,60	0,75	0,85	1,12	1,25	1,35
250 bar (25 MPa)	0,50	0,65	0,75	0,85	1,00	1,25

important note:

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. use larger cross sections to increase maximum allowed gap dimension.

**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**

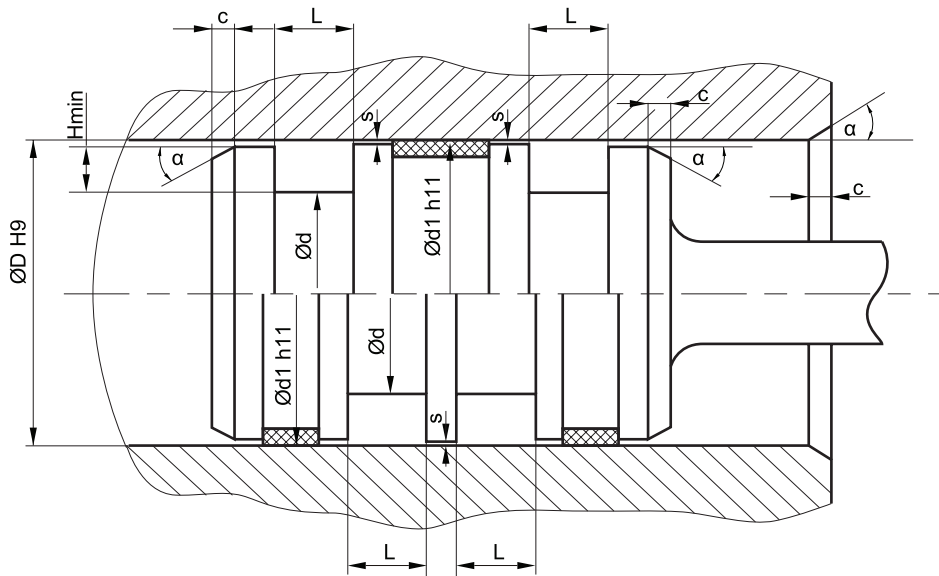
seal housing tolerances	
Ød	h10
ØD	H9

**mode of installation**

for inside diameters of 25 mm and more, the seal can generally be slipped over the piston and snapped into closed grooves. due to occurring deformation force at installation, assembly aid tools are to be used for large cross-sections. the material deformation should not exceed the value of 30%, otherwise the permanent deformation would be too large.



**recommended mounting space:**



plastic guide rings (wear bands) have to feature a adequate cutting gap (recommendation: 2-5% of D). if metallic guides are used, spiral grooves shall be provided. smaller values for Hmin will ease the installation (reduced elongation and mounting force) but the height of the retaining collar has to be sufficient to assure a stable fit in the housing ( larger than  $cs/2$ , smaller retaining collars will increase the danger of eversion of the profile in case of occuring drag pressure).

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.

**insertion chamfer:**

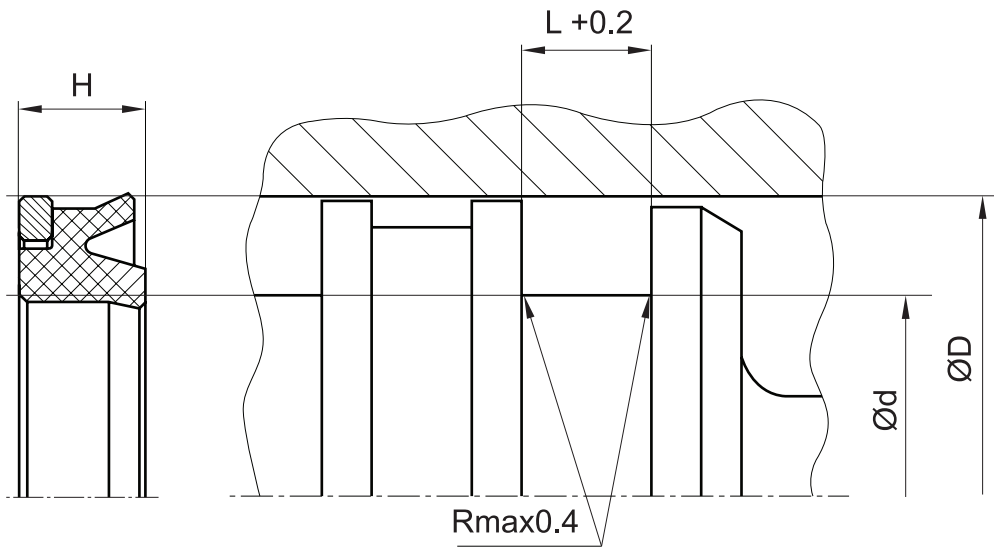
in order to avoid damage to the piston seal during installation, the piston and the housing is to be chamfered and rounded as shown in the "recommended mounting space" drawing. the size of chamfer depends on the seal type and profile width.

cs (mm)	c (mm)	
	$\alpha = 15^\circ \dots 20^\circ$	$\alpha = 20^\circ \dots 30^\circ$
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 ( $R=c$ ).

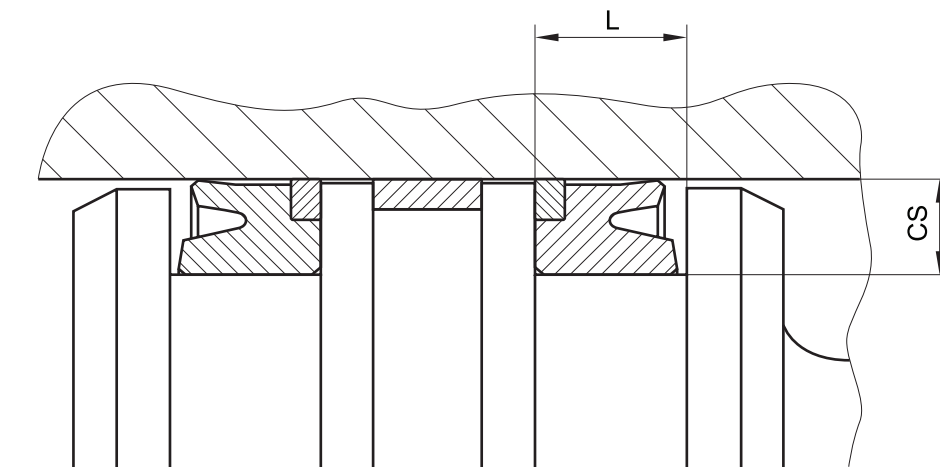
**seal & housing recommendations**

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...



the ratio between nominal width and seal height  $cs/H$  should not drop below 1/1.25. therefore we recommend the following housing heights.

$\text{ØD}$ [mm]	$\text{Ød}$ [mm]	L [mm]	$cs = (\text{ØD} - \text{Ød})/2$ [mm]
5 ~ 24,9	$\text{ØD} - 8$	6	4
25 ~ 49,9	$\text{ØD} - 10$	7	5
50 ~ 74,9	$\text{ØD} - 12$	8	6
75 ~ 149,9	$\text{ØD} - 16$	10	7,5
150 ~ 299,9	$\text{ØD} - 20$	12	10
300 ~ 500	$\text{ØD} - 24$	18	12,5
500 ~ 750	$\text{ØD} - 30$	20	15
> 750	$\text{ØD} - 40$	26	20

**fitted:**

don't hesitate to contact our technical department for further information or for special requirements (temperature, speed etc.), so that suitable materials and/or designs can be recommended.