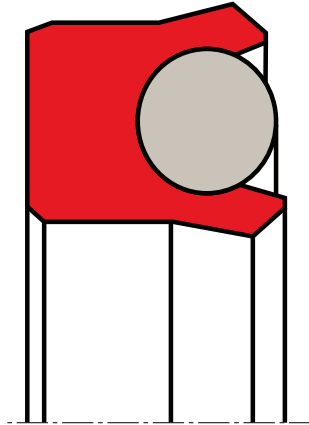


# piston seal K03-F

## seal spec



### application



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

### category of profile

machined product only.

### single acting

the K03-F 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:

reciprocating and swiveling pistons in cylinders, push rods, fittings in the chemical industry.

### note

- considering the limited long-time rupture strength of the PTFE materials, the ratio of  $cs/H$  should not fall below a value of 1/1.5. using back up rings can widen the application range.
- cross-sections limited with 15 mm.
- varying the angle of the chamfer on the dynamic sealing lip allows adaptation to media (steeper angle for high viscosity media) respectively a pressure relief (flat angle).

### function

K03-F profiles are compact 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 aggressive media or with high thermal demands. 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.

### description

PTFE-Piston seal. O-Ring activated, asymmetrical PTFE piston seal, low friction and no stick-slip effect. good adaptation possibilities for diverse temperatures and media by selection of suitable O-Ring material, almost no dead spots as required for applications in food and pharma industry.

- asymmetric single acting piston compact seal, with the dynamic sealing lip being shorter than the static one. in addition, an o-ring inserted into the groove increases the preload.
- interference fit on the inside diameter.
- various materials are available for different purposes.
- good sealing effect across a wide temperature range.
- sealing effect enhanced by high recovery rate.
- for pressures up to 200 bar as a seal between pressurised space and atmosphere (in certain cases even above, see "gap dimensions").
- good sealing in all pressure ranges.
- excellent static and dynamic sealing after short run-in time.
- suitable for short and long travel.
- small break-away load.
- no reverse leakage (i.e. minor relative motion of the sealing edges when the direction is changed).
- little friction when dry running or when used in media with poor lubrication (conditionally suitable for use in aqueous media).

**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	energizer (O-Ring)						
s-mart PTFE virgin	s-mart FKM	-30 °C ... +200 °C	1 m/s	100 bar (10 MPa)	-	++	O
s-mart PTFE glass	s-mart FKM	-30 °C ... +200 °C	1 m/s	160 bar (16 MPa)	-	++	+
s-mart PTFE virgin	s-mart HNBR	-25 °C ... +150 °C	1 m/s	100 bar (10 MPa)	+	++	O
s-mart PTFE glass	s-mart HNBR	-25 °C ... +150 °C	1 m/s	160 bar (16 MPa)	+	++	+
s-mart PTFE virgin	s-mart MVQ	-60 °C ... +80 °C	1 m/s	200 bar (20 MPa)	++	++	O
s-mart PTFE glass	s-mart MVQ	-60 °C ... +200 °C	1 m/s	100 bar (10 MPa)	++	++	+
s-mart UHMWPE	s-mart MVQ	-60 °C ... +200 °C	0,5 m/s	160 bar (16 MPa)	++	+	+

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.

++ ... particularly suitable

o ... conditional suitable

+ ... suitable

- ... not suitable

for detailed information regarding chemical resistance please refer to our "list of resistance". for decreased leakage rates elastomer materials (polyurethane or rubber) in other sealing systems are to be preferred.

note on special material:

other materials such as Viton, Silicone, EPDM, H-NBR, etc., can be used for the preload element, but they are only useful in specific cases (temperature or chemical influences).

**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)	0,30	0,35	0,55	0,67	0,67	0,67
100 bar (10 MPa)	0,22	0,25	0,40	0,50	0,50	0,50
150 bar (15 MPa)	0,20	0,23	0,35	0,45	0,45	0,45
200 bar (20 MPa)	0,17	0,20	0,33	0,40	0,40	0,40

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 refers to a operating temperature of 80°C. temperatures below may increase the safe extrusion gap slightly, at temperatures above 80 °C, the gap dimensions has to be reduced or a stronger profile selected.

in exceptional cases, a pressure above the limit of 200 bar is possible, the safe extrusion gap is the result of the tolerance pair H8/f8, influences due to thermal expansion have to be considered. we also recommend contacting our application engineering department.

**surface quality**

surface roughness	Rtmax (µm)	Ra (µm)
sliding surface	≤2,0	≤0,05-0,3
bottom of groove	≤10	≤1,6
groove face	≤10	≤1,6

**tolerance recommendation**

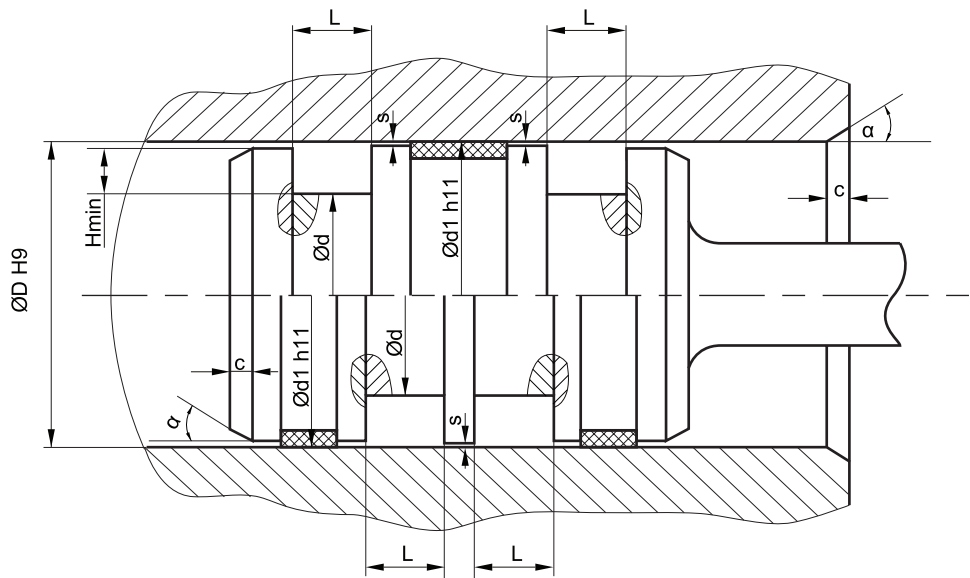
seal housing tolerances	
Ød	h10
ØD	H9

**mode of installation**

open housings are required.



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. 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:

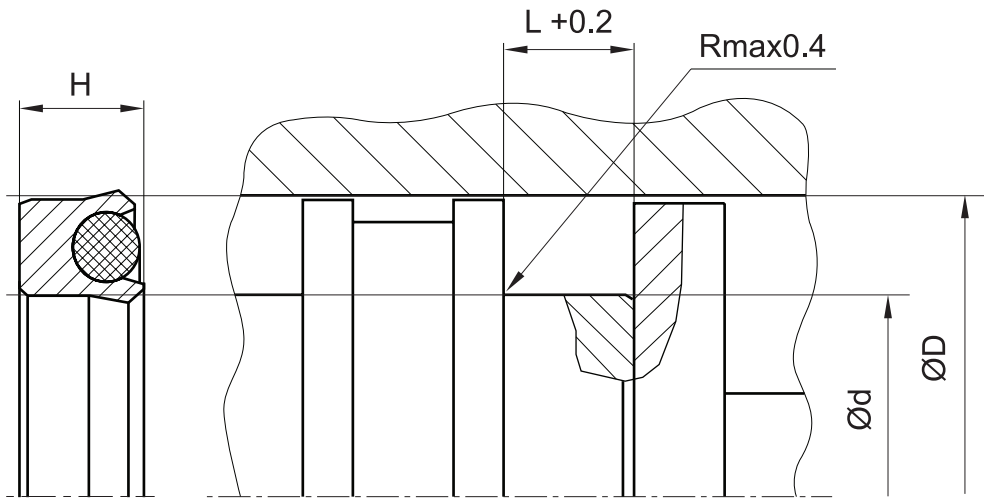
in order to avoid damage to the piston seal during installation, the piston and the housing is to be chamfered and rounded as shown in the "recommended mounting space" drawing. the size of chamfer depends on the seal type and profile width.

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

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**

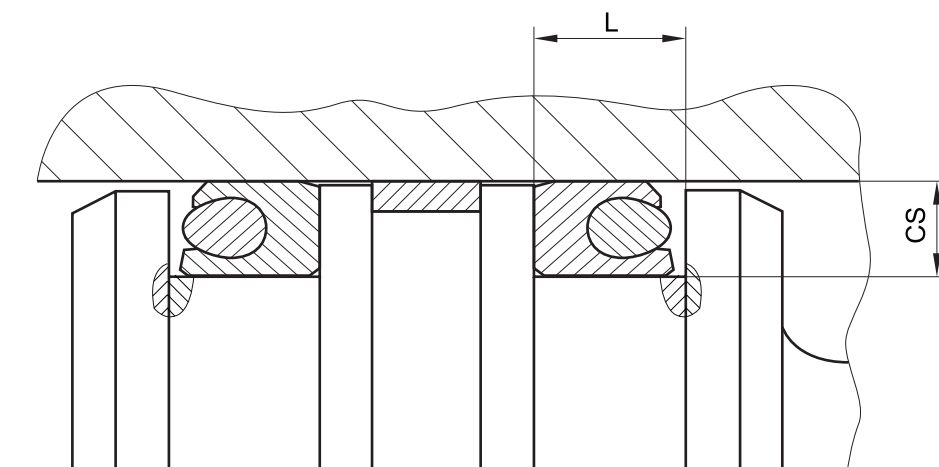
*please note that we are able to produce those profiles to your specific need or any non standard housing. for detail measurements, please see seal-mart catalog...*



with PTFE materials, the profile size does not depend so much on the seal diameter but rather on pressure and extrusion gap. this relationship is described under "gap dimensions". nominal widths not shown in the diagram can be interpolated.

the ratio between nominal width and seal height  $cs/H$  should not drop below 1/1.5. therefore we recommend the following housing heights.

$\text{ØD [mm]}$	$\text{Ød [mm]}$	$L \text{ [mm]}$	$cs = (\text{ØD} - \text{Ød})/2 \text{ [mm]}$
5 ~ 24,9	$\text{ØD} - 8$	6,4	4
25 ~ 49,9	$\text{ØD} - 10$	8,5	5
50 ~ 74,9	$\text{ØD} - 12$	10	6
75 ~ 149,9	$\text{ØD} - 16$	12,3	7,5
150 ~ 299,9	$\text{ØD} - 20$	16	10
300 ~ 500	$\text{ØD} - 24$	19,8	12,5
500 ~ 750	$\text{ØD} - 30$	24,5	15

**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.*