



SEAL DATA SHEET

K04-P



For symbols that are not bold, please consult our technical for application limitations.



3D Seals > Hydraulics & Pneumatics >

PISTON SEALS

Description

Asymmetric piston seal for standard applications as K03-P, but due to design with active back-up ring suitable for larger extrusion gaps or higher pressure. K04-P for standard housing design

- Asymmetric single-acting compact piston seals, 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.
- 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.
- For pressures up to 700 bar as a seal between pressurised spaces.
- Good sealing in the low pressure range.
- Excellent static and dynamic sealing.
- Suitable for long travel.
- Recommended when holding or positioning under pressure.
- Low break-away load after prolonged periods of standstill.
- No reverse leakage (i.e. minor relative motion of the sealing edges when the direction is changed).
- Shorter seal lengths require design K04-PD.

Single Acting

The K04-P 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.

As piston seals for switching functions (e.g. clutch operation).

As piston seals for clamping functions.

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 CS/H should not drop below a value of 1/1.25 (essentially according to ISO 5597 housings for piston and rod seals).

- High degree of friction.
- High break-away moment.
- The recovery volume is smaller than with simple lip seals.
- Cross-section limited to 20 mm.
- Design K04-PD with triangular backupring can lead to installation difficulties.

Function

K04-P and K04-PD profiles are compact 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

Seal	Material		Temperature	Max. Surface Speed	Max. Pressure ¹	Hydrolysis	Dry Running	Wear Resistance
	Energizer	B/U Ring						
PU	NBR 70	POM / PA2	-30 °C ... +100 °C	0.5 m/s	700 bar (70 MPa)	-	+	+
HPU	NBR 70	POM / PA2	-20 °C ... +100 °C	0.5 m/s	700 bar (70 MPa)	-	+	+
TPU	NBR 70	POM / PA2	-30 °C ... +100 °C	0.5 m/s	700 bar (70 MPa)	-	+	+
SPU	NBR 70	POM / PA2	-20 °C ... +100 °C	0.7 m/s	700 bar (70 MPa)	-	+	+
GPU	NBR 70	POM / PA2	-30 °C ... +100 °C	0.5 m/s	700 bar (70 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.

1. Pressure ratings are dependent on the size of the extrusion gap.

2. POM up to $\varnothing 260$ mm, PA above $\varnothing 260$ mm

++ ... particularly suitable

O ... conditional suitable

+ ... suitable

- ... not suitable

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 = $(\varnothing D - \varnothing d)/2$ mm					
	4	5	7.5	10	12.5	15
	Safe Extrusion Gap (mm)					
200 bar (20 MPa)	0.62	0.75	0.90	1.15	1.35	1.60
400 bar (40 MPa)	0.27	0.36	0.45	0.55	0.65	0.75
600 bar (60 MPa)	0.17	0.19	0.21	0.23	0.25	0.26
700 bar (70 MPa)	0.05	0.07	0.10	0.13	0.15	0.17

Important Note

The above data are maximum value and can't be used at the same time. e.g. the maximum operating speed depends 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. If the permissible extrusion gap cannot be achieved, K02-P is to be used.

Surface Quality

Surface Roughness	R _{tmax} (µm)	R _a (µm)
Sliding	≤2.5	≤0.1-0.5
Bottom of Groove	≤6.3	≤1.6
Groove	≤15	≤3

Tolerance Recommendation

Seal Housing Tolerances	
∅d	h10
∅D	H9

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