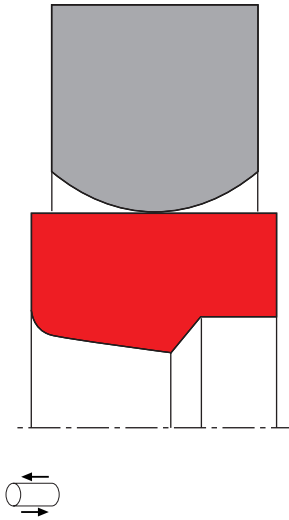


SEAL SPEC S09-ES



description

profile ring-activated asymmetric PTFE rod seal, similar to S09-E, but special heavy duty design for heavy industry hydraulics or for special housing dimensions.

- + asymmetric single-acting composite rod seals, with a gliding part made of low friction material and an elastic preload element.
- + interference fit on the outside diameter.
- + various materials are available for different purposes.
- + mostly used in a sealing system, either in tandem arrangement with double wiper (A11-A/I) or in combination with a secondary sealing element (S01-P/R).
- + best sealing effect across a wide temperature range.
- + for pressures up to 400 bar (in special cases up to 800 bar) as a seal between pressurised spaces.
- + good sealing in all pressure ranges.
- + good static and dynamic sealing.
- + suitable for short and long travel with extremely slow or quick movements.
- + no stick-slip. exact positioning due to little friction.
- + small break-away load after prolonged periods of standstill.
- + high mechanical efficiency. high distortion stability.
- + insensitive to thermal damage caused by air in the oil.
- + high pressing force due to rubber profile ring.

category of profile

machined only

single acting

the S09-ES seal is designed for use as a rod seal.

area of application; hydraulics

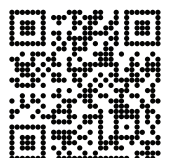
- reciprocating rods on hydraulic cylinders, small swivelling motion permissible.
- especially for larger diameter and heavy-duty hydraulic applications.
- as rod seal in tandem arrangement for positioning tasks for machine tools and robots.
- as rod seal in combination with lip seals as secondary seal for rough operations (e.g. construction machines, heavy machinery).
- for heavy-duty operating conditions.

note

- the ratio between nominal width and sealing height c_s/H should range between 1/0.75 and 1/1.5.
- there should be enough space for trailing oil between the seals.
- the recovery capacity depends on the sealing system.

function

S09-ES profiles are composite rod seals designed to seal between pressurized 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 parameter & material

sealing element	material energizer	back-up ring	temperature	max surface speed	max pressure ¹	hydrolysis	dry running	wear resistance
PTFE glass	NBR (70 shore A)	-	-30 °C ... +100 °C	10 m/s	400 bar (40 MPa)	-	++	+
PTFE bronze	NBR (70 shore A)	-	-30 °C ... +100 °C	10 m/s	400 bar (40 MPa)	-	++	+
PTFE carbon	NBR (70 shore A)	-	-30 °C ... +100 °C	10 m/s	400 bar (40 MPa)	-	++	+
PTFE glass	FKM (75 shore A)	-	-20 °C ... +200 °C	10 m/s	400 bar (40 MPa)	-	++	+
PTFE bronze	FKM (75 shore A)	-	-20 °C ... +200 °C	10 m/s	400 bar (40 MPa)	-	++	+
PTFE carbon	FKM (75 shore A)	-	-20 °C ... +200 °C	10 m/s	400 bar (40 MPa)	-	++	+
PTFE glass	EPDM ² (70 shore A)	-	-50 °C ... +150 °C	10 m/s	800 bar (80 MPa) ³	++	++	+
PTFE bronze	EPDM ² (70 shore A)	-	-50 °C ... +150 °C	10 m/s	400 bar (40 MPa)	++	++	+
PTFE carbon	EPDM ² (70 shore A)	-	-50 °C ... +150 °C	10 m/s	400 bar (40 MPa)	++	++	+
PTFE glass	MVQ (70 shore A)	-	-60 °C ... +200 °C	10 m/s	400 bar (40 MPa)	++	++	+
PTFE bronze	MVQ (70 shore A)	-	-60 °C ... +200 °C	10 m/s	400 bar (40 MPa)	++	++	+
PTFE carbon	MVQ (70 shore A)	-	-60 °C ... +200 °C	10 m/s	400 bar (40 MPa)	++	++	+
UHMWPE	MVQ (70 shore A)	-	-60 °C ... +80 °C	10 m/s	400 bar (40 MPa)	++	+	+
XPU	MVQ (70 shore A)	-	-30 °C ... +110 °C	5 m/s	600 bar (60 MPa)			

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

++ particularly suitable

+ suitable

o conditional suitable

- not suitable

² attention: not suitable for mineral oils!

³ only in special cases (small extrusion gap, low surface speed)

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 decreased leakage rates elastomer materials (polyurethane or rubber) in other sealing systems are to be preferred.

gap dimension

operating pressure	cs = (ØD - Ød)/2 mm					
	5	7,5	10	12,5	15	20
	safe extrusion gap (mm)					
100 bar (10 MPa)	0,33	0,43	0,49	0,55	0,65	0,81
200 bar (20 MPa)	0,28	0,32	0,36	0,42	0,50	0,65
300 bar (30 MPa)	0,22	0,24	0,30	0,34	0,41	0,55
400 bar (40 MPa)	0,18	0,20	0,24	0,29	0,36	0,49

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. for extrusion gap sizes resulting from tolerance pair H8/f8 pressure ranges above 400 bar can be reached in special cases, influences due to thermal expansion have to be considered. we recommend to contact our technical department.

surface quality

surface roughness	Rtmax (µm)	Ra (µm)	tolerance recommendation	
sliding surface	≤2	≤0,05-0,3	seal housing tolerance	
bottom of groove	≤6,3	≤1,6	Ød	f8
groove face	≤15	≤3	ØD	H10

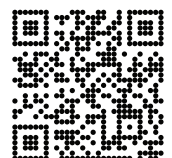
mode of installation

Ød	type of installation
≤ 6·cs	open mounting space required
> 6·cs ≤ 10·cs	snap mounting with tool
> 10·cs	snap mounting by hand

for inside diameters of 25mm or more, and dependant on radial cross section (cs), seals may be snapped into closed housings.

insertion chamfer

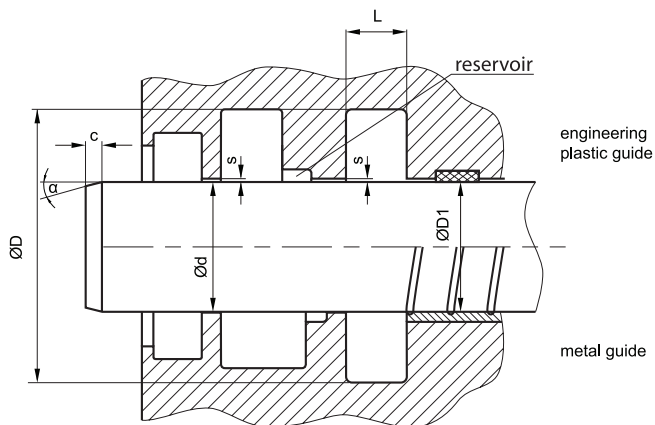
cs (mm)	c (mm)	
	α = 15° ... 20°	α = 20° ... 30°
5	5	2,5
7,5	5	4
10	6	5
12,5	8,5	6,5
15	10	7,5
17,5	11,5	9
20	13	10



SEAL SPEC S09-ES



recommended mounting space

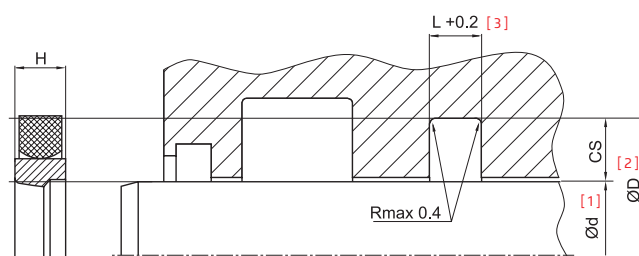


	secondary seal	wiper
version 1	S09-E	A11-A
	S09-P	A11-I
		A26-F
		A27-F
version 2	S01-P	all type possible
	S09-R	

two types of mounting space are recommended depending on application: the choice of the sealing system does not depend on the guide elements.

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...



Ød [mm] [1]	L [mm] [3]	cs = (ØD - Ød)/2 [mm]
5 - 49.9	5	5
50 - 59.9	7,5	7,5
60 - 199.9	10	10
200 - 299.9	12,5	12,5
300 - 529.9	15	15
530 - 679.9	17,5	17,5
680 - 999.9	20	20

the ratio between nominal width and seal height should be in accordance to ISO 7425 part 2. we recommend the following values

recommended guide tolerance D1

d f8 [mm]	p ≤ 100 [bar]	100 < p ≤ 200 [bar]	p > 200 [bar]
≤ 100	H10	H8	H8
> 100 ≤ 200	H10	H8	H7
> 200	H9	H8	H7

fitted

