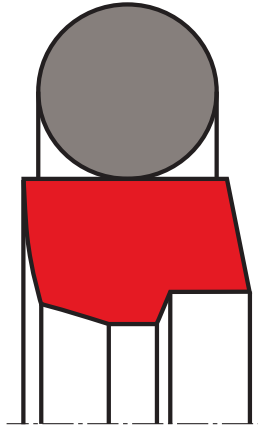


rod seal S09-SF

seal spec



application



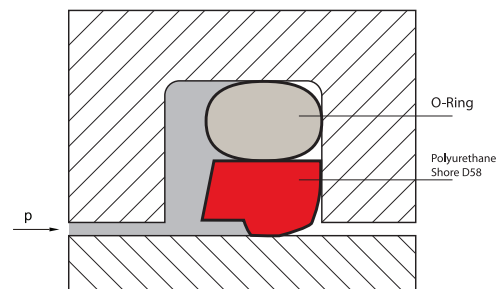
description

when the field of application and system requirements make high demands on leakage control and operational reliability, a redundant sealing system is necessary to ensure reliable sealing of hydraulic cylinders at the piston rod. sealing systems with elastomer energized polymer seals are a proven answer to widely varying demands for standardised grooves, simple installation, resistance to media, high and low temperatures and pressures. the system offers enormous flexibility in the choice and matching of materials.

the piston rod sealing system for hydraulic cylinders subject to heavy loads should consist of three elements:

- the S09-SG used as primary seal. this seal element offers the back pumping property necessary for redundant rod seal systems as well as good resistance to high and low temperatures and high media resistance.
- the S09-SF was developed as the secondary seal in this system to ensure reliable sealing of thin oil films at low secondary pressures. polyurethane Shore D 58 material is used combined with a new seal profile.
- the contact pressure curve is automatically optimised under dynamic conditions. the final outer element of the redundant sealing system is a double-acting scraper seal (e.g. A11-SL, A11-A, A11-SC, A27-SC, A27-SD).

the optimum sealing system thus consists of three independent lip seals installed in line, whereby the hardness of the material decreases from the pressure side to the atmospheric side.



category of profile

machined or molded/standard/trade product.

double acting

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

area of application: hydraulics

- mobile hydraulics
- standard cylinders
- machine tools
- injection moulding machines
- presses

method of operation

the S09-SF is an elastomer energised seal element. the changes in seal position in the groove necessary for an optimum sealing function are guaranteed by the combination of the two component parts (O-Ring and seal ring).

in order to achieve a contact pressure curve which enhances the sealing effect, the seal has a chamfer on the low pressure side. when under pressure and exposed to friction against the piston rod, this chamfer causes the seal to tilt slightly so that the seal ring is forced against the side of the groove. this creates an area of maximum pressure at the edge of the seal.

when the S09-SF is used in a system with a double-acting scraper A11-SL (A11-A, A11-SC, A27-SD), the sealing function of the system must be assured even if pressure build-up occurs between the S09-SF and the double-acting wiper seal.

for this reason, the high-pressure side of the seal ring also has a chamfer which, in the event of a build-up of pressure behind the S09-SF, comes into contact with the flank of the groove. the S09-SF moves in the groove so that a contact pressure distribution is obtained on the piston rod which enhances the back pumping effect.

**advantages**

- high static and dynamic leak tightness
- low friction for reduced power loss
- high wear resistance for long service life
- small groove
- easy installation
- optimum system element
- ISO/DIN grooves optional
- available for any diameter from 8 to 2200 mm

redundant sealing system

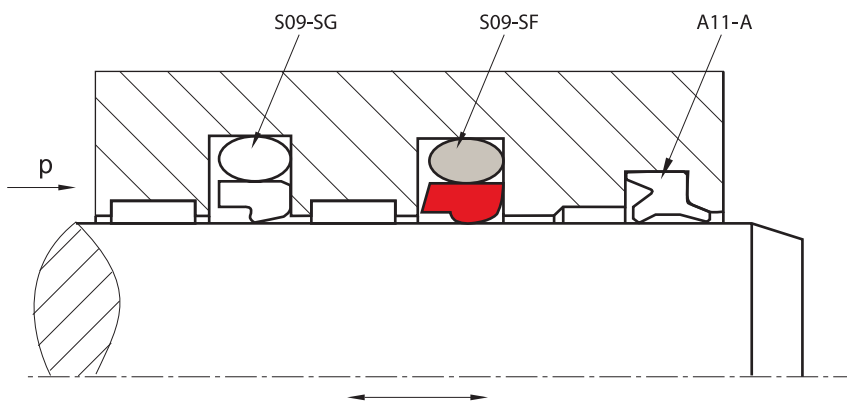
redundant sealing systems are used where the application conditions no longer permit reliable sealing over the demanded service life with a single seal.

the property of the tandem sealing system is particularly important during cold starts when, due to the very high viscosity of the oil, the primary seal allows oil to pass as the piston rod is extended. in the tandem system the oil is heated as a result of the friction at the primary seal and is then reliably wiped off at a now lower viscosity by the secondary seal, the S09-SF.

as the piston rod is retracted, the oil is stored in the reservoir between the seals, and is then pumped back against the system pressure by the hydrodynamics in the seal clearance of the S09-SG.

particularly with strokes of more than 1 metre, constructional measures have to be taken to provide a storage chamber between the seals. the S09-SF is designed so that it also has the back pumping properties necessary when using a double-acting scraper in the rod sealing system due to the controlled sealing behaviour of the individual elements in the sealing system and the appropriate combination of the seal materials, a rod seal system is obtained with a low overall friction.

the figure below shows a redundant rod seal system consisting of S09-SG, S09-SF and A11-A with corresponding wear ring arrangement.

**operating parameters & material**

material		temperature	max. surface speed	max. pressure ¹
sealing element	energizer			
s-mart PU (58 Shore D)	s-mart NBR (70 Shore A)	-45°C ... + 100°C	5 m/s	600 bar (60 MPa) as an individual element: 250 bar (25 MPa)

important note:

the above data are maximum values and cannot 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.

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



installation dimensions

rod diameter - d (f8/h9)			D (H9)	L + 0,2	r	max. permissible gap dimension - s ¹		O-Ring cross section
standard application	light application	heavy duty application				10 MPa	20 MPa	
8 ~ 18,9	19 ~ 37,9	~	d + 7,3	3,2	0,6	0,40	0,25	2,62
19 ~ 37,9	38 ~ 199,9	8 ~ 18,9	d + 10,7	4,2	1,0	0,40	0,25	3,53
38 ~ 199,9	200 ~ 255,9	19 ~ 37,9	d + 15,1	6,3	1,3	0,50	0,30	5,33
200 ~ 255,9	256 ~ 649,9	38 ~ 199,9	d + 20,5	8,1	1,8	0,60	0,35	6,99
256 ~ 649,9	650 ~ 999,9	200 ~ 255,9	d + 24,0	8,1	1,8	0,60	0,35	7,00
650 ~ 999,9	1000 ~ 2200	256 ~ 649,9	d + 27,3	9,5	2,5	0,70	0,50	8,40
1000 ~ 2200	~	650 ~ 999,9	d + 38,0	13,8	3,0	1,00	0,70	12,00

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.

¹ at pressures > 40 MPa use diameter tolerance H8/f8 (bore/piston) in area of the seal. the radial clearance is valid for material PTFE + Bronze at +60°C.

surface quality

surface roughness	material	Rtmax [μm]	Rz DIN [μm]	Ra [μm]
mating surface	PTFE +	0.63 - 2.50	0.40 - 1.60	0.05 - 0.20
	PU & Rubber	1.00 - 4.00	0.63 - 2.50	0.10 - 0.40
groove surface		< 16	< 10.0	< 1.6

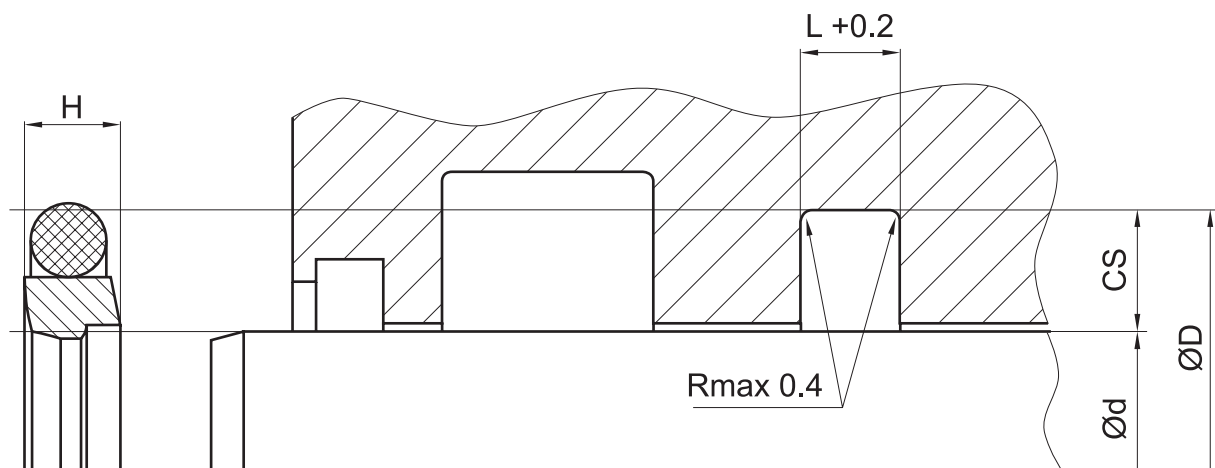
tolerance recommendation

seal housing tolerances

Ød	f8/h9
ØD	H9

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...



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.