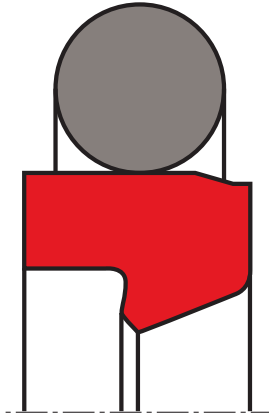


rod seal S09-SG

seal spec



description

rod seals must exhibit no dynamic leakage to the atmosphere side under all operating conditions and must be statically completely leak tight when the machine is at a standstill. furthermore, they should achieve a high degree of mechanical efficiency through low friction and be easy to install in small grooves. costs and service life must meet the high expectations of the operator.

application



category of profile

machined or molded/standard/trade product.

single acting

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

area of application: hydraulics

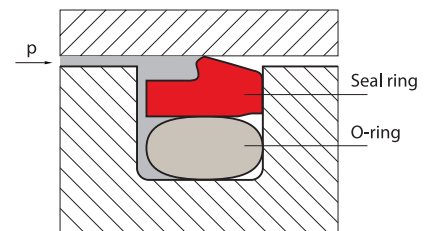
- mobile hydraulic
- standard cylinders
- machine tools
- injection moulding machines
- presses
- automobile industry
- hydraulic hammers
- servo hydraulics

area of application: hydraulics

the sealing performance of S09-SG (figure beside) results from the hydro dynamic properties of the seal. the classic Stepseal® seal edge creates a steep contact pressure gradient on the high pressure side and a shallow contact pressure gradient on the low pressure side. the controlled pressure gradients minimizes fluid adherence to the piston rod during the extending stroke, and enables residual fluid film on the rod to be returned into the system on the return stroke. this is united with new patented and patent applied design features which further improve the performance of S09-SG under severe service conditions.

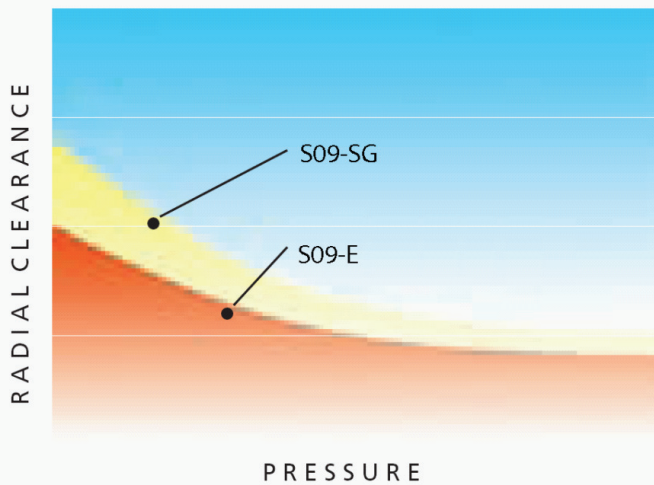
the O—Ring relief chamfer reduces pressure loading on the seal, whereby contact with the rod is optimised and sealing performance is improved at high service pressures. the special high-lift rear chamfer combines a smooth downstream sealing face with the ability to meet large radial clearances and hardware tolerances.

Stepseal® 2K gives high static and dynamic sealing performance, and the build-up of intermediate pressure often found with tandem seal configurations (see figure in redundant sealing system) is efficiently suppressed.





Increased Clearance

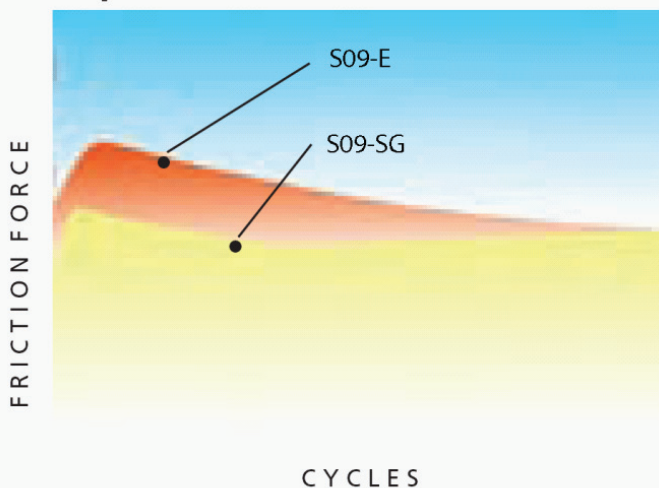


S09-SG possesses superior extrusion resistance under all service conditions and allows hardware clearance to be significantly increased.

advantages

- high static and dynamic sealing effect.
- high extrusion resistance, meets high hardware clearances.
- low friction, high efficiency.
- stick-slip free starting, no sticking.
- high abrasion resistance, high operational reliability.
- wide range of application temperatures and high resistance to chemicals, depending on the choice of O-Ring material.
- simple installation without seal edge deformation.
- available for all diameters up to 2.600 mm rod dia.

Improved Friction Performance



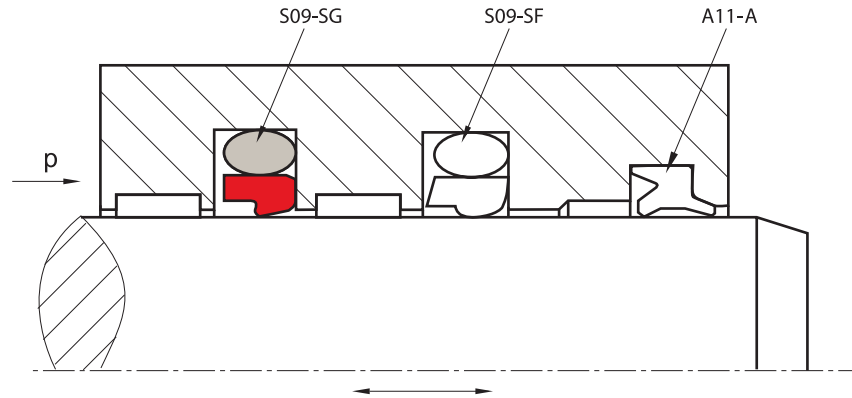
S09-SG offers a uniform, low friction characteristic, throughout its life, including the run in period.

redundant sealing system

in many applications, secondary seal systems are demanded. figure below shows such a tandem configuration with the S09-SG. in this configuration it must be noted that a sufficiently large space is formed between the seals to take the hydraulic fluid, as shown in the figure.

depending on the application and the operating conditions, the combination of different materials offers a further improvement in the sealing efficiency and the service life of the system, e.g. in hydraulic cylinders subject to high loads and under rough operating conditions, the primary seal should be made of PTFE series and the secondary seal of PU.

S09-SG elements should always be used in combination with a double-acting scraper to provide an optimum sealing effect. the A27-SC, A27-SD, A11-A, A11-SC, A11-SL are well suited to such applications.



standard material

operating parameters & material for standard application:

material		temperature	max. surface speed	max. pressure ¹
sealing element	energizer			
s-mart PTFE bronze	s-mart NBR (70 Shore A)	-30°C ... +100°C	15 m/s	700 bar (70 MPa)
	s-mart NBR (70 Shore A for low temp.)	-45°C ... +80°C	15 m/s	700 bar (70 MPa)
	s-mart FKM (70 Shore A)	-10°C ... +200°C	15 m/s	700 bar (70 MPa)

for hydraulic high compressive strength, good sliding and wear properties, good extrusion resistance, BAM tested.

mating surface material: steel tubes, steel hardened cast iron.

colour: greyish to dark brown

operating parameters & material for special application:

material		temperature	max. surface speed	max. pressure ¹
sealing element	energizer			
PTFE + carbon fibre (high carbon fibre filled)	s-mart NBR (70 Shore A)	-30°C ... +100°C	15 m/s	700 bar (70 MPa)
	s-mart NBR (70 Shore A for low temp.)	-45°C ... +80°C	15 m/s	700 bar (70 MPa)
	s-mart FKM (70 Shore A)	-10°C ... +200°C	15 m/s	700 bar (70 MPa)
	s-mart EPDM ² (70 Shore A)	-45°C ... +145°C	15 m/s	700 bar (70 MPa)

for all lubricating and non-lubricating hydraulic fluids, hydraulic oils without zinc, water hydraulic, soft mating surfaces, good extrusion resistance. surface texture not suitable for gases.

mating surface material: steel, cast iron, stainless steel, aluminium, bronze.

colour: grey

operating parameters & material for special application:

material		temperature	max. surface speed	max. pressure ¹
sealing element	energizer			
s-mart PU (cast polyurethane)	s-mart NBR (70 Shore A)	-30°C ... +100°C	15 m/s	800 bar (80 MPa)
	s-mart NBR (70 Shore A for low temp.)	-45°C ... +80°C	15 m/s	800 bar (80 MPa)

for lubricating hydraulic fluids, high abrasion resistance, high extrusion resistance, limited chemical resistance.

mating surface material: steel, steel, hardened, cast iron, ceramic coating, stainless steel.

colour: yellow to light-brown

non-standard material

operating parameters & material

material		temperature	max. surface speed	max. pressure ¹
sealing element	energizer			
PTFE + high bronze (high bronze filled)	s-mart NBR (70 Shore A)	-30°C ... +100°C	15 m/s	800 bar (80 MPa)
	s-mart NBR (70 Shore A for low temp.)	-45°C ... +80°C	15 m/s	800 bar (80 MPa)
	s-mart FKM (70 Shore A)	-10°C ... +200°C	15 m/s	800 bar (80 MPa)

very high compressive strength, very good extrusion resistance.

mating surface material: steel tubes, steel hardened cast iron.

colour: light to dark brown.



material		temperature	max. surface speed	max. pressure ¹
sealing element	energizer			
PTFE + carbon-fibre (carbon fibre filled)	s-mart NBR (70 Shore A)	-30°C ... + 100°C	15 m/s	300 bar (30 MPa)
	s-mart NBR (70 Shore A for low temp.)	-45°C ... + 80°C	15 m/s	300 bar (30 MPa)
	s-mart FKM (70 Shore A)	-10°C ... + 200°C	15 m/s	300 bar (30 MPa)
	s-mart EPDM ² (70 Shore A)	-45°C ... + 145°C	15 m/s	300 bar (30 MPa)

for all lubricating and non-lubricating hydraulic fluids, water hydraulic, soft mating surfaces. surface texture not suitable for gases.

mating surface material: steel tubes, cast iron, stainless steel, aluminium, bronze, alloys.

colour: grey.

material		temperature	max. surface speed	max. pressure ¹
sealing element	energizer			
s-mart PTFE glass (glass fibre filled + MoS ₂)	s-mart NBR (70 Shore A)	-30°C ... + 100°C	15 m/s	400 bar (40 MPa)
	s-mart NBR (70 Shore A for low temp.)	-45°C ... + 80°C	15 m/s	400 bar (40 MPa)
	s-mart FKM (70 Shore A)	-10°C ... + 200°C	15 m/s	400 bar (40 MPa)

for all lubricating and non-lubricating hydraulic fluids, good chemical resistance, good dielectric properties.

mating surface material: steel tubes, steel hardened, chromeplated cast iron.

colour: grey to blue.

material		temperature	max. surface speed	max. pressure ¹
sealing element	energizer			
PTFE + carbon-graphite (carbon, graphite filled)	s-mart NBR (70 Shore A)	-30°C ... + 100°C	15 m/s	700 bar (70 MPa)
	s-mart NBR (70 Shore A for low temp.)	-45°C ... + 80°C	15 m/s	700 bar (70 MPa)
	s-mart FKM (70 Shore A)	-10°C ... + 200°C	15 m/s	700 bar (70 MPa)
	s-mart EPDM ² (70 Shore A)	-45°C ... + 145°C	15 m/s	700 bar (70 MPa)

for oil hydraulic and pneumatic, for all lubricating and non-lubricating fluids, high extrusion resistance, good chemical resistance, BAM tested.

mating surface material: steel, chromeplated stainless steel.

colour: black.

material		temperature	max. surface speed	max. pressure ¹
sealing element	energizer			
s-mart UHMWPE (polyethylen)	s-mart NBR (70 Shore A)	-30°C ... + 80°C	15 m/s	400 bar (40 MPa)
	s-mart NBR (70 Shore A for low temp.)	-45°C ... + 80°C	15 m/s	400 bar (40 MPa)

for lubricating and non-lubricating hydraulic fluids, high abrasion resistance, very good chemical resistance, limited temp. resistance. ultra high molecular weight polyethylen.

mating surface material: steel, stainless steel, aluminium, bronze, ceramic coating.

colour: white to off-white.

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.

² attention: not suitable for mineral oils!



gap dimension

bore diameter - D (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	40 MPa	
8 ~ 16,9	17 ~ 26,9	~	D - 4,9	2,2	0,4	0,30	0,20	0,15	1,78
17 ~ 26,9	27 ~ 59,9	~	D - 7,3	3,2	0,6	0,40	0,25	0,15	2,62
27 ~ 59,9	60 ~ 199,9	17 ~ 26,9	D - 10,7	4,2	1,0	0,50	0,30	0,20	3,53
60 ~ 199,9	200 ~ 255,9	27 ~ 59,9	D - 15,1	6,3	1,3	0,70	0,40	0,24	5,33
200 ~ 255,9	256 ~ 669,9	60 ~ 199,9	D - 20,5	8,1	1,8	0,80	0,60	0,35	6,99
256 ~ 669,9	670 ~ 999,9	200 ~ 255,9	D - 24,0	8,1	1,8	0,90	0,70	0,40	7,00
670 ~ 999,9	≥ 1000	256 ~ 669,9	D - 27,3	9,5	2,5	1,00	0,80	0,50	8,40
≥ 1000 ²		670 ~ 999,9	D - 38,0	13,8	3,0	1,20	0,90	0,60	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.

² energiser has a special shape.

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

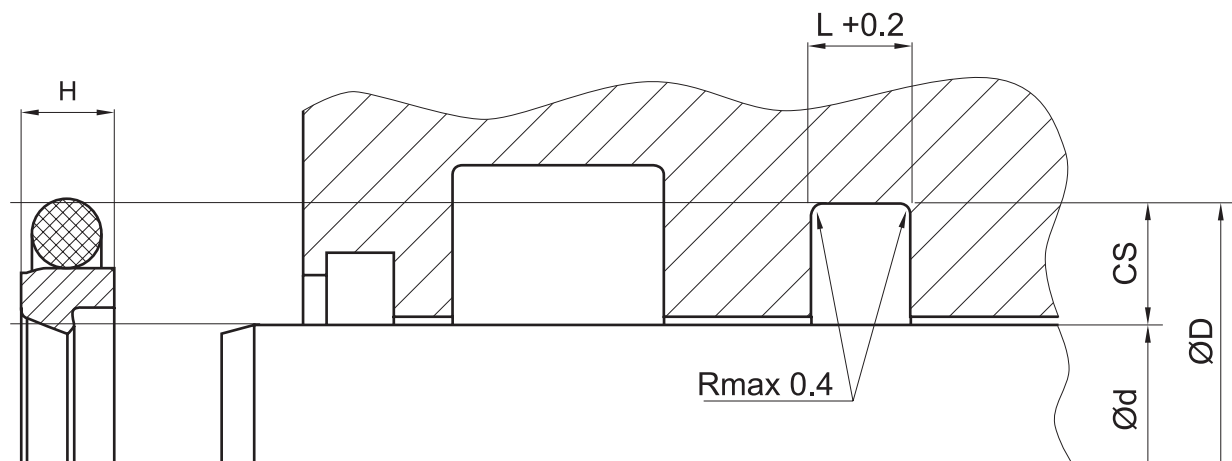
tolerance recommendation

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.