seal-mart

ecoseal

Flow and Sealing Technology

seal application limit

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introduction

at seal-mart, we offer :

- sealing solutions tailored to your specifications
- partnership from the design phase to serial production
- just-in-time manufacturing of seals and components up to 4.000 mm diameter
- production of in miscellaneous materials
- production of Advanced Engineering Plastics Products (AEPP)

superior manufacturing concept

at seal-mart we know that only state-of-the-art technology can provide us with an edge on our competitors. a rapidly changing environment demands new production concepts that surpass our customers' requirements, such as:

- delivery on demand with short cycle times
- no mould or tooling limitations
- no stock requirements for our customers
- seal engineering to customer specification

to face this challenge, we developed special CNC technologies for seals and gaskets to satisfy the very specific needs of every customer, in every industry.

material availability restrictions

- thermoplastic elastomers (PU) up to ø 4.000 mm
- rubber materials or elastomers up to ø 1.500 mm
- plastomers & PTFE materials up to ø 2.000 mm

notes for large diameter seals

polyurethane materials:
please note, that seals with a diameter of more than 600 mm are made of casted TPU (as a substitute for PU or HPU).
rubber materials:
the whole elastomer material range (NBR, FKM, EPDM, HNBR, MVQ) can be offered now with outer diameters up to 1500 mm.

important guideline for application limits

the stated operating parameters represent general conditions. it is recommended NOT to use all maximum values simultaneously. the specified pressure limits apply for use in mineral oil with a maximum temperature of 60°C and a maximum metal extrusion gap of 0,25 mm. the speed limits apply for adequate lubrication and running surface finish as recommended.
for severe applications we recommend that material / media compatibility and sealing function will be tested under actual field conditions. depending on application details, higher pressures and speed limits can be attained in most cases. if any of the indicated limits do not meet specific requirements please contact the next seal-mart branch or subsidiary.
this brochure is for information purposes only and cannot substitute individual consultation. the information is based on many years of experience, on FEA-calculations and test results. as far as we can assess this information is the most updated and according to the highest technical standard currently available. however, seal-mart can not guarantee and/or take any responsibility, obligation or liability whatsoever in connection with this information. In particular, seal-mart is not liable for damages or losses that occur in connection with the use or implementation of this information. warranties for special features, certain aim and utility are subject to a separate agreement.

legends

linear moving oscillating oscillating spiral moving static

not bolded symbols: please consult our technical dpmt. for application limitations

* POM up to ø260 mm, PA above ø260 mm
** attention: not suitable for mineral oils !

• machined or molded
•• molded or machined with minor design change
••• molded only
no mark - only machined

our product range

seals

- hydraulics & pneumatics
  - piston seals
  - rod seals
  - wiper
  - guide rings
  - back-up rings
  - others
- static seals
  - d-rings
  - o-rings
  - x-rings
  - others
- rotary seals
  - oil seals
  - roto slide seals
  - v-rings
  - others

complete in product range and services

at seal-mart we offer you:

- sealing solutions tailored to your specifications
- partnership from the design phase to serial production
- just-in-time manufacturing of seals and components up to 4.000 mm diameter
- production of industrial gaskets of any kind
- production of advanced engineering plastics products (AEPP)

quality makes the difference

quality is at the core of everything we do. production breakdowns due to sealing problems can cause huge losses. therefore, we make every effort to deliver high quality sealing products that meet our customers' needs. at seal-mart, we are constantly striving to enforce and improve our quality standards, since customers demand the highest quality sealing solutions to compete in their highly competitive markets.

superior manufacturing concept

at seal-mart we know that only state-of-the-art technology can provide us with an edge on our competitors. a rapidly changing environment demanded for a new production concept that surpasses our customers' requirements, such as:

- delivery on demand with short cycle times
- no mould or tooling limitations
- no stock requirements for our customers
- seal engineering to customer specification

to face this challenge, we manufacture seals with cutting edge CNC turning technology to satisfy the very specific needs of every customer, in every industry.

material data / properties	DIN-standard	unit	polyurethanes						
			PU thermoplastic polyurethane elastomer	HPU hydrolisys-resistant polyurethane	GPU casted polyurethane elastomer	TPU low-temperature polyurethane	SPU self-lubricated polyurethane	XHPU thermoplastic polyurethane elastomer	XSPU thermoplastic polyurethane elastomer
colour			green	red	red	blue	grey	dark red	grey/ black
hardness	53505	Shore A	95±2	95±2	95±2	95±2	95±2		
hardness	53505	Shore D	48±3	48±3	47±3	48±3	48±3	60±3	57±3
density	53479	g/cm³	1,20	1,20	1,20	1,17	1,24	1,22	1,26
100% modulus	53504	N/mm²	≥12	≥13	≥11	≥12	17	≥20	24
tensile strength / yield stress	53504/53455	N/mm²	≥40	≥50	≥45	≥50	50	≥50	45
elongation at break	53504/53455	%	≥430	≥330	≥280	≥450	380	≥350	350
modulus of elasticity - tensile strength	53457	N/mm²							
compression set 70°C/24h 20% Def		%	≤30	≤27	≤30	≤27	25	26	24
100°C/24h 20% Def		%	≤35	≤33	≤40	≤33	30	30	30
100°C /22h	53517	%							
175°C /22h	53517	%							
rebound resilience	52512	%	42	29	43	50			
tear strength	53515	N/mm	≥100	≥100	≥40	≥80	120	170	160
abrasion	53516	mm³	18	17	25	15	17	20	20
minimum service temperature		°C	-30	-20	-30	-50	-20	-20	-20
maximum service temperature		°C	+110	+110	+110	+110	+110	+110	+110

due to our innovative manufacturing system, we are able to provide you any special seal profile in any diameter

classification of sealing materials

in sealing technology, mainly representatives of two groups of macromolecular (polymeric) substances are used, i.e. substances of the groups of elastomers and thermoplastics.

macromolecular substances are organic compounds whose molecules exist of several thousands, often even millions, of atoms which are known as macro, giant, string or chain molecules. they can be created either by modification of highly molecular natural materials (e.g. natural rubber) or by depositing low-molecular elements (so called monomers) through various chemical reactions (synthetic materials, plastics).

we serve the following industries

- agricultural industry
- automotive industry
- cement, lime, ceramic & refractory industry
- chemical industry
- construction industry
- electronic industry
- food and pharmaceutical industry
- general mechanical engineering
- mining industry
- non-ferrous industry
- oil & gas industry
- plastic & rubber processing industry
- power supply industry
- pulp & paper industry
- shipbuilding industry
- steel industry
- textile industry
- water supply & water treatment industry
- wood & wood processing industry

rubber elastomers						thermoplastics						
hydrogenated acrylonitrile-butadiene	NBR acrylonitrile-butadiene-rubber	FKM VITON® / fluoro-rubber	EPDM ethylene propylene rubber	TFE/P - ALFAS tetrafluorethylene propylene rubber	MVQ silicone rubber	POM polyacetal	PTFE polytetrafluorethylene - virgin PTFE	PTFE + 15% Glass Fibre + 5% MoS_2	PTFE + 40% Bronze	PTFE + 25% Carbon	PA polyamide	PEEK polyaryletherketone
black	black	brown	black	black	reddish brown	black	white	grey	brown	black	black	cream
85±2	85±2	83±2	85±2	85±2	85±2							
						82	57	60	64	65	77	86
1,22	1,31	2,30	1,22	1,60	1,52	1,41	2,17	2,25	3,00	2,10	1,15	1,32
≥10	≥11	≥5	≥9	8	≥5							
≥18	≥16	≥8	≥12	13	≥7	62	27	18	22	15	65	97
≥180	≥130	≥200	≥110	200	≥130	40	300	200	280	180	120	≥50
						2600					1800	3600
≤22	≤22		≤15									
		≤20		29	≤15							
29	28	7	38		44							
20	21	15	21	19	8							
90	90	150	120	110								
-25	-30	-20	-50	-10	-60	-50	-200	-200	-200	-200	-40	
+150	+100	+200	+150	+200	+200	+100	+260	+260	+260	+260	+100	260

(up to 4.000 mm). do not hesitate to contact our technical department for further informations

- seals
  - static seals
    - d-rings
    - o-rings
    - x-rings
    - others

D-RINGS

R35-A

O-RINGS

R13 *

X-RINGS

R16-R *

STATIC OTHERS

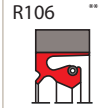
R12-F	R12-SA *	R12-SB *	R14	R15-P	R20-P
R30-A	**ST61 ***	**ST62 ***	**ST63 ***	**ST64 ***	

* machined or molded
** molded or machined with minor design change
*** molded only
no mark - only machined

seals

- rotary seals
  - oil seals
  - roto slide seals
  - v-rings
  - others

OIL SEALS

R103-A **	R103-B **	R103-V **	R104-A **	R104-V **	R105-A **
R105-B **	R105-V **	R106 ** 	R107 **	R108 **	R109 **
R110 **	R111 ***	R112 ***	R113 ***	R114-A ***	R114-B ***
R114-V ***	R115 ***	R116 ***	R117 ***		

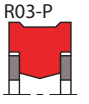
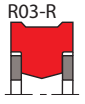
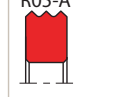
ROTO SLIDE SEALS

R09-F *	R09-FS	R10-F *	R10-FS

V-RINGS

R06-P *	R06-R	R06-SA *	R06-SB *	R06-SC *	R06-SD *
R06-SE *	R06-SF *	R07-P *	R07-R		

ROTARY OTHERS

R03-P 	R03-R 	R04-A	R05-A 	R08-A	R11-F
R19-F *	R94-A ***	R94-V ***	R95-A ***	R95-V ***	R96 ***
R97 ***	R118 ***	R119 ***	R120 ***	R121 ***	

OIL SEALS

R61-R **	R61-Y **	R61-V **	R62-A **	R62-B **	R62-C **
R62-D **	R62-E **	R63-A **	R63-B **	R63-C **	R63-D **
R64 **	R65 **	R66 ***	R67 ***	R68 ***	R69 ***
R70 ***	R71 ***	R72 **	R73-A **	R73-B **	R73-C **
R74-A ***	R74-B ***	R75 **	R76 **	R77-A **	R77-B **
R78 **	R79 **	R80-A **	R80-B **	R80-C **	R81 **
R82-A **	R82-B **	R83 **	R84 ***	R85 ***	R86 ***
R87 ***	R88 ***	R89 ***	R90 ***	R91 ***	R92 ***
R93 ***	R98 *	R99 ***	R100 ***	R101 ***	R102 ***

* machined or molded

** molded or machined with minor design change

*** molded only

no mark - only machined

- seals
  - hydraulics & pneumatics
    - piston seals
    - rod seals
    - wiper
    - guide rings
    - back-up rings
    - others

PISTON SEALS

K01-P *	K01-R *	K02-P *	K02-PD	K02-R *	K02-RD
K02-SA **	K03-P	K03-F	K03-S	K04-P	K04-PD
K05-P *	K05-R	K05-SA *	K05-SB *	K05-SC *	K05-SD
K05-SE *	K05-SF *	K05-SG *	K05-SH *	K05-SI *	K06-P
K06-R *	K06-SA *	K07-P *	K08-E *	K08-D *	K08-P
K08-ES *	K08-DS *	K08-SA *	K08-SB *	K08-SC *	K08-SD
K08-SE *	K08-SF *	K08-SG *	K09-N	K09-D	K09-H
K09-F	K09-SA *	K09-SB *	K09-SC **	K09-SD *	K09-SE *
K09-SF **	K09-SG **	K09-SH *	K09-SI **	K09-SJ *	K09-SK
K09-SL *	K09-SM *	K1012-T	K1012-M*	K1012-SA*	K1315-T
K16-A *	K16-B	K16-SA ***	K17-P *	K17-R	K17-SA
K17-SB *	K19-F *	K20-R	K21-P	K22-P	K22-R
K23-N	K23-D	K23-H	K23-F *	K23-SA *	K23-SB *
K23-SC **	K23-SD **	K23-SE *	K23-SF *	K24-P	K32-P
K35-P *	K60 *	K61 *	K62 **	K63 ***	K64 **

* machined or mol

** molded or machined with minor design cha

*** molded

no mark - only machi

PISTON SEALS

K65 **	K66 *	K67 ***	K68 ***	K69 ***	K70 ***
K71 ***	K72 ***	K73 ***	K74 ***	K75 *	K76 *
K77 *	K78 **	K79 **	K80 **	K81 **	K82 **
K83 **	K84 **	K85 **	K86 *	K88 *	

ROD SEALS

S01-P *	S01-R *	S01-SA *	S01-SB *	S01-SC *	S02-P *
S02-PD	S02-R	S02-RD	S02-S *	S02-SA **	S03-P
S03-F	S03-S	S03-SA *	S04-P	S04-PD	S05-P
S05-R	S05-SA *	S05-SG *	S05-SH *	S06-P *	S06-R *
S06-SA *	S07-P	S07-SA *	S08-P	S08-PE	S08-R
S08-SA *	S08-SB *	S09-E *	S09-D *	S09-P	S09-ES
S09-DS *	S09-SA *	S09-SB *	S09-SC *	S09-SD *	S09-SE *
S09-SF *	S09-SG *	S1012-M*	S1012-T	S1012-SA*	S1315-T
S16-A	S16-B	S16-SA *	S16-SB **	S17-P *	S17-R
S17-SA *	S17-SB *	S17-SC *	S18-P *	S18-R	S19-F *

ROD SEALS

S20-R	S21-P	S22-P	S22-R	S24-P	S24-SA *
S2527-F	S2931-F *	S32-P	S35-P	S60 *	S61 *
S62 **	S63 **	S64 *	S65 **	S66 *	S67 **
S68 **	S69 **	S70 **	S73 *	S74 **	S75 **
S76 *	S78 ***				

WIPER

A01-A	A01-B	A01-SA **	A01-SB *	A01-SC *	A01-SD *
A02-A *	A02-B *	A02-I	A02-SA *	A02-SB *	A02-SC **
A02-SD **	A02-SE **	A03-A	A03-SA **	A03-SB **	A03-SC **
A03-SD **	A04-A	A04-B	A05-A	A05-B *	A05-I
A06-A	A07-A	A07-SA *	A08-A	A08-B	A09-A
A10-A	A11-A *	A11-I	A11-SA *	A11-SB *	A11-SC *
A11-SD *	A11-SE *	A11-SF **	A11-SG **	A11-SH **	A11-SI **
A11-SJ **	A11-SK **	A11-SL **	A11-SM *	A11-SN *	A12-A
A12-B	A13-A	A25-F *	A26-F *	A27-F	A27-SA *

* machined or molded

** molded or machined with minor design change

*** molded only

no mark - only machined

- seals
  - hydraulics & pneumatics
    - piston seals
    - rod seals
    - wiper
    - guide rings
    - back-up rings
    - others

WIPER

A27-SB *	A27-SC *	A27-SD *	A60 *	A61 *	A62-A **
A62-B **	**	A63 **	A64 ***	A65 **	A66 *
A67 **	A68 *	A69 **	A70 **	A71 **	A72 **
A73 **	A74 *				

GUIDE RINGS

F01 *	F02 *	F03	F04	F05 *	F06
F07	F08				

BACK UP RINGS

ST08 *	ST09 *	ST10	ST11	ST12	ST13
ST60 ***					

* machined or molded

** molded or machined with minor design change

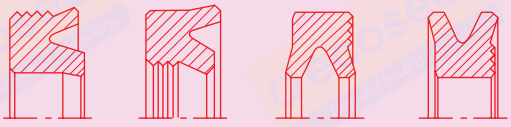
*** molded only

no mark - only machined

application	profile	description	temperature	max speed	max pressure	material		
	R12-SB	**hydraulics, single acting** R12-SB is a PTFE u-ring seal which is provided with a steel v spring.	-200 °C ... +260 °C -200 °C ... +260 °C -200 °C ... +260 °C -200 °C ... +260 °C		800 bar (11603 psi) 800 bar (11603 psi) 800 bar (11603 psi) 800 bar (11603 psi)	**seal part** smart PTFE glass smart PTFE bronze smart PTFE carbon PTFE modified, special material with superior extrusion resistance	**spring** 1.4310 1.4310 1.4310 1.4310	
	ST63	**back-up ring** this is the standard seal for axial (face) applications. the seal has the same high sealing load and is available for internal pressure. the use of the heavy helical spring makes it the best choice for vacuum, gas, and low temperature flange and cover applications.	-200°C ... +260°C		800 bar (11603 psi)	s-mart PTFE	helicoil spring	
	ST64	**back-up ring** this is the standard seal for axial (face) applications. the seal has the same high sealing load and is available for internal pressure. the use of the heavy helical spring makes it the best choice for vacuum, gas, and low temperature flange and cover applications.	-200°C ... +260°C		800 bar (11603 psi)	s-mart PTFE	helicoil spring	
	R14	**square ring** well known, simple square ring, mainly used for static applications or as gaskets. excellent adaptation possibilities for diverse temperatures and media by selection of suitable seal material.	upon application	upon application	upon application	all material possible		
	R15-P	**double acting** for static applications as an o-ring replacement to avoid drilling in the housing, simple installation and higher extrusion resistance.	-30 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -20 °C ... +110 °C -30 °C ... +110 °C		400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi)	s-mart PU s-mart HPU s-mart LTPU s-mart SPU s-mart GPU		
	R20-P	**single acting flange seal** flange seal for static applications, suitable for high pressure range. direction of pressurization (from inside or outside) must be indicated when ordering the seal.	-30 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -20 °C ... +110 °C -30 °C ... +110 °C		800 bar (11600 psi) 800 bar (11600 psi) 800 bar (11600 psi) 800 bar (11600 psi) 800 bar (11600 psi)	s-mart PU s-mart HPU s-mart LTPU s-mart SPU s-mart GPU		
	R30-A	**valve stem seal with PTFE jacket** for low friction, rubber energizer automatically increases preload as it senses leakage. mainly used as valve seal in oil industry/offshore applications.	-20 °C ... +100 °C -25 °C ... +100 °C -20 °C ... +200 °C -25 °C ... +200 °C	0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s	500 bar (7200 psi) 500 bar (7200 psi) 1000 bar (14500 psi) 1000 bar (14500 psi)	**seal** s-mart FKM s-mart HNBR s-mart FKM s-mart HNBR	**cover** s-mart PTFE s-mart PTFE s-mart PTFE s-mart PTFE	**back-up** s-mart POM s-mart POM s-mart PAEK s-mart PAEK
	ST61	**back-up ring** good abrasion resistance - usable for rough surface finish - the sealing edge offers a very good sealing function - very high resistance to extrusion - low compression set	-30 °C ... +80 °C		400 bar (5801 psi)	s-mart PU		
	ST62	**back-up ring** this elastomeric seal is used as an axial static seal for threaded ports and stud ends in hydraulic fluid power applications in accordance with DIN 3869, ISO 11926, ISO 9974 and ISO 1179. The cross-section remains practically constant even under high pressure.	-25 °C ... +100 °C -18 °C ... +200 °C		630 bar (61370 psi) 630 bar (61370 psi)	s-mart NBR s-mart FKM		

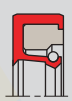
beside the conventional o-rings and square-rings seal-mart offers special seals for static applications. most of below listed profiles fit in standard o-ring-grooves (housings) and can be substituted easily without any rework of housing dimensions.

application	static	profile			
universal		R13 •	R14 •	R16-R •	**universal type** most common and simple seal profiles with proven reliability in multiple applications in every sector of industry.
inside sealing		S20-R	S35-P	R15-P	**inside sealing type** interference fit on outside diameter assures stable fit in the housing and reliable performance at all pressures.
outside sealing		K20-R	K35-P •	R15-P	**outside sealing type** interference fit on inside diameter assures stable fit in the housing and reliable performance at all pressures.
axial sealing		R35-A	R20-P	R12-F	**axial sealing type** robust profiles mainly used as flange seals, inside or outside pressurizsation possible. direction of pressurization (from inside or outside) must be indicated when ordering the seal.

application	static	profile	
tailor made solutions			examples for tailor-made solutions

product range seal

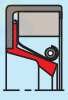
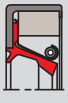
rotary seals : oil seal

application	profile	description	temperature	max speed	max pressure	material	
	R01-P	**single acting rotary shaft seal**				**seal part**	**energizer**
		spring loaded lip seal with retainer ring for press-fit installation into axially open housings. wide range of applications in every sector of industry, mainly as protecting element for bearings.	-30 °C ... +80 °C	5,0 m/s	0,5 bar (7 psi)	s-mart PU	s-mart POM / PA*
			-20 °C ... +80 °C	5,0 m/s	0,5 bar (7 psi)	s-mart HPU	s-mart POM / PA*
			-40 °C ... +80 °C	5,0 m/s	0,5 bar (7 psi)	s-mart LTPU	s-mart POM / PA*
			-20 °C ... +80 °C	6,0 m/s	0,5 bar (7 psi)	s-mart SPU	s-mart POM / PA*
			-30 °C ... +80 °C	5,0 m/s	0,5 bar (7 psi)	s-mart GPU	s-mart POM / PA*
	R01-R	**single acting rotary shaft seal**				**seal part**	**energizer**
		spring loaded lip seal with retainer ring for press-fit installation into axially open housings. good adaptation possibilities for diverse temperatures and media by selection of suitable seal material. wide range of applications in every sector of industry, mainly as protecting element for bearings.	-30 °C ... + 80 °C	10,0 m/s	0,5 bar (7 psi)	s-mart NBR	s-mart POM / PA*
			-25 °C ... + 80 °C	10,0 m/s	0,5 bar (7 psi)	s-mart HNBR	s-mart POM / PA*
			-20 °C ... +200 °C	15,0 m/s	0,5 bar (7 psi)	s-mart FKM	metal
			-50 °C ... + 80 °C	10,0 m/s	0,5 bar (7 psi)	s-mart EPDM**	s-mart POM
			-50 °C ... +150 °C	10,0 m/s	0,5 bar (7 psi)	s-mart EPDM**	metal
			-50 °C ... + 80 °C	5,0 m/s	0,2 bar (3 psi)	s-mart MVQ	s-mart POM
			-60 °C ... +200 °C	5,0 m/s	0,2 bar (3 psi)	s-mart MVQ	metal
	R01-AF	**single acting rotary shaft seal**					
		spring loaded lip seal with solid outer section for axially open housings with clamping plate fixation. mainly used for rolling mills, large gear mechanisms in heavy duty machinery, for shipbuilding industry and civil engineering.	-30 °C ... +110 °C	5,0 m/s	0,5 bar (7 psi)	s-mart PU	
			-20 °C ... +110 °C	5,0 m/s	0,5 bar (7 psi)	s-mart HPU	
			-50 °C ... +110 °C	5,0 m/s	0,5 bar (7 psi)	s-mart LTPU	
			-20 °C ... +110 °C	6,0 m/s	0,5 bar (7 psi)	s-mart SPU	
			-30 °C ... +100 °C	5,0 m/s	0,5 bar (7 psi)	s-mart GPU	
			-30 °C ... +100 °C	10,0 m/s	0,5 bar (7 psi)	s-mart NBR	
			-25 °C ... +150 °C	10,0 m/s	0,5 bar (7 psi)	s-mart HNBR	
			-20 °C ... +200 °C	15,0 m/s	0,5 bar (7 psi)	s-mart FKM	
			-50 °C ... +150 °C	10,0 m/s	0,2 bar (3 psi)	s-mart EPDM**	
			-60 °C ... +200 °C	5,0 m/s	0,2 bar (3 psi)	s-mart MVQ	
	R01-AS	**single acting rotary shaft seal**					
		split version of a spring loaded lip seal with solid outer section for axially open housings with clamping plate fixation. mainly used for repair purpose on rolling mills, large gear machanisms in heavy duty machinery, for shipbuilding industry and civil engineering.	-30 °C ... +110 °C	5,0 m/s	0,5 bar (7 psi)	s-mart PU	
			-20 °C ... +110 °C	5,0 m/s	0,5 bar (7 psi)	s-mart HPU	
			-50 °C ... +110 °C	5,0 m/s	0,5 bar (7 psi)	s-mart LTPU	
			-20 °C ... +110 °C	6,0 m/s	0,5 bar (7 psi)	s-mart SPU	
			-30 °C ... +100 °C	5,0 m/s	0,5 bar (7 psi)	s-mart GPU	
			-30 °C ... +100 °C	10,0 m/s	0,5 bar (7 psi)	s-mart NBR	
			-25 °C ... +150 °C	10,0 m/s	0,5 bar (7 psi)	s-mart HNBR	
			-20 °C ... +200 °C	15,0 m/s	0,5 bar (7 psi)	s-mart FKM	
			-50 °C ... +150 °C	10,0 m/s	0,2 bar (3 psi)	s-mart EPDM**	
			-60 °C ... +200 °C	5,0 m/s	0,2 bar (3 psi)	s-mart MVQ	
	R01-F	**single acting**				**glide ring**	**energizer**
		spring loaded PTFE-lip seal for axially open housings with clamping plate fixation, elastic secondary seal or integrated o-ring necessary for static sealing in the housing. excellent chemical and thermal resistance, allowable pressure and speed depend on each other, it is not recommended to use all maximum values simultaneously	-30 °C ... +100 °C	10,0 m/s	15 bar (210 psi)	s-mart PTFE glass	s-mart NBR
			-30 °C ... +100 °C	10,0 m/s	15 bar (210 psi)	s-mart PTFE bronze	s-mart NBR
			-30 °C ... +100 °C	10,0 m/s	15 bar (210 psi)	s-mart PTFE carbon	s-mart NBR
			-20 °C ... +200 °C	10,0 m/s	15 bar (210 psi)	s-mart PTFE glass	s-mart FKM
			-20 °C ... +200 °C	10,0 m/s	15 bar (210 psi)	s-mart PTFE bronze	s-mart FKM
			-20 °C ... +200 °C	10,0 m/s	15 bar (210 psi)	s-mart PTFE carbon	s-mart FKM
	R02-P	**single acting rotary shaft seal**				**seal part**	**energizer**
		as profile R01-P, but with additional dust lip to avoid ingress of dust and dirt.	-30 °C ... +80 °C	5,0 m/s	0,5 bar (7 psi)	s-mart PU	s-mart POM / PA*
			-20 °C ... +80 °C	5,0 m/s	0,5 bar (7 psi)	s-mart HPU	s-mart POM / PA*
			-40 °C ... +80 °C	5,0 m/s	0,5 bar (7 psi)	s-mart LTPU	s-mart POM / PA*
			-20 °C ... +80 °C	6,0 m/s	0,5 bar (7 psi)	s-mart SPU	s-mart POM / PA*
			-30 °C ... +80 °C	5,0 m/s	0,5 bar (7 psi)	s-mart GPU	s-mart POM / PA*
	R02-R	**single acting rotary shaft seal**				**seal part**	**energizer**
		as profile R01-P, but with additional dust lip to avoid ingress of dust and dirt.	-30 °C ... + 80 °C	10,0 m/s	0,5 bar (7 psi)	s-mart NBR	s-mart POM / PA*
			-25 °C ... + 80 °C	10,0 m/s	0,5 bar (7 psi)	s-mart HNBR	s-mart POM / PA*
			-20 °C ... +200 °C	15,0 m/s	0,5 bar (7 psi)	s-mart FKM	metal
			-50 °C ... + 80 °C	10,0 m/s	0,5 bar (7 psi)	s-mart EPDM**	s-mart POM
			-50 °C ... +150 °C	10,0 m/s	0,5 bar (7 psi)	s-mart EPDM**	metal
			-50 °C ... + 80 °C	5,0 m/s	0,2 bar (3 psi)	s-mart MVQ	s-mart POM
			-60 °C ... +200 °C	5,0 m/s	0,2 bar (3 psi)	s-mart MVQ	metal

application	profile	description	temperature	max speed	max pressure	material		
	R60-A ••	**single acting rotary shaft seal** R60-A & R60-V are seals with completely rubber covered outer diameter.	-40 °C ... +100 °C	30,0 m/s	0,5 bar (7 psi)	**seal part** s-mart NBR	**metal insert** metal	**spring** spring
	R60-B ••	**single acting rotary shaft seal** R60-B is seals with completely rubber covered outer diameter.	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	1 bar (14,5 psi) 1 bar (14,5 psi)	**seal part** s-mart NBR s-mart FKM	**metal insert** metal metal	**spring** spring spring
	R60-C ••	**single acting rotary shaft seal** R60-C is seals with completely rubber covered outer diameter. sealing lip with spring	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	10 bar (145 psi) 10 bar (145 psi)	**seal part** s-mart NBR s-mart FKM	**metal insert** metal metal	**spring** spring spring
	R60-D ••	**single acting rotary shaft seal** R60-D is seals with completely rubber covered outer diameter sealing up with sping.	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	10 bar (145 psi) 10 bar (145 psi)	**seal part** s-mart NBR s-mart FKM	**metal insert** metal metal	**spring** spring spring
	R60-E ••	**single acting rotary shaft seal** R60-E is seals with completely rubber covered outer diameter sealing up with sping.	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	0,4 bar (5,8 psi) 0,4 bar (5,8 psi)	**seal part** s-mart NBR s-mart FKM	**metal insert** metal metal	**spring** spring spring
	R60-F ••	**single acting rotary shaft seal** R60-F is seals with completely rubber covered outer diameter sealing up with sping.	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	4 bar (58 psi) 4 bar (58 psi)	**seal part** s-mart NBR s-mart FKM	**metal insert** metal metal	**spring** spring spring
	R60-G ••	**single acting rotary shaft seal** R60-G is seals with completely rubber covered outer diameter. sealing lip with sping + axial and radial lubricaton grooves.	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	4 bar (58 psi) 4 bar (58 psi)	**seal part** s-mart NBR s-mart FKM	**metal insert** metal metal	**spring** spring spring
	R60-R ••	**single acting rotary shaft seal** R60-R is seals with completely rubber covered outer diameter.	-30 °C ... +170 °C	up to 35,0 m/s	10 bar (145 psi)	**seal part** s-mart NBR	**metal insert** metal	**spring** spring
	R60-Y ••	**single acting rotary shaft seal** R60-Y is seals with completely rubber covered outer diameter.	-40 °C ... +100 °C	up to 10,0 m/s	10 bar (145 psi)	**seal part** s-mart NBR	**metal insert** metal	**spring** spring

application	profile	description	temperature	max speed	max pressure	material		
	R60-V ••	**single acting rotary shaft seal** R60-A & R60-V are seals with completely rubber covered outer diameter	-30 °C ... +170 °C	30,0 m/s	0,5 bar (7,25 psi)	**seal part** s-mart FKM	**metal insert** metal	**spring** spring
	R61-A ••	**single acting rotary shaft seal** R61-A & R61-V is seals with completely rubber covered outer diameter. the additional dust lip protects the main sealing lip against dust and other fine solid contaminants and therefore this type is recommended for use in polluted environments. to achieve a long lifetime a suitable lubricant between the two sealing lips should be applied.	-30 °C ... +100 °C	up to 10,0 m/s	0,5 bar (7,25 psi)	**seal part** s-mart NBR	**metal insert** metal	**spring** spring
	R61-B ••	**single acting rotary shaft seal** R61-B is seals with completely rubber covered outer diameter. the additional dust lip protects the main sealing lip against dust and other fine solid contaminants and therefore this type is recommended for use in polluted environments. to achieve a long lifetime a suitable lubricant between the two sealing lips should be applied.	-40 °C ... +100 °C -25 °C ... +160 °C	40,0 m/s 40,0 m/s	110 bar (145 psi) 10 bar (145 psi)	**seal part** s-mart NBR s-mart FKM	**metal insert** metal metal	**spring** spring spring
	R61-C ••	**single acting rotary shaft seal** R61-C is seals with completely rubber covered outer diameter. the additional dust lip protects the main sealing lip against dust and other fine solid contaminants and therefore this type is recommended for use in polluted environments. to achieve a long lifetime a suitable lubricant between the two sealing lips should be applied. sealing lip with spring, left helix sealing lip with spring, left helix + dust lip sealing lip with spring, bidirectional helix + dust lip	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	1 bar (14,5 psi) 1 bar (14,5 psi)	**seal part** s-mart NBR s-mart FKM	**metal insert** metal metal	**spring** spring spring
	R61-D ••	**single acting rotary shaft seal** R61-D is seals with completely rubber covered outer diameter. the additional dust lip protects the main sealing lip against dust and other fine solid contaminants and therefore this type is recommended for use in polluted environments. to achieve a long lifetime a suitable lubricant between the two sealing lips should be applied. sealing lip with spring + dust lip	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	10 bar (145 psi) 10 bar (145 psi)	**seal part** s-mart NBR s-mart FKM	**metal insert** metal metal	**spring** spring spring
	R61-F ••	**single acting rotary shaft seal** R61-F seals with completely rubber covered outer diameter. this type of seal is designed for pressures up to 0.5 MPa. In order to avoid a "pop-out" of the seal, we suggest to fit an axial retainer (e.g. circlip, shoulder, etc.) the additional dust lip protects the main sealing lip against dust and other fine solid contaminants and therefore this type is recommended for use in polluted environments. to achieve a long lifetime a suitable lubricant between the two sealing lips should be applied.	-30 °C ... +100 °C -30 °C ... +140 °C	up to 5,0 m/s up to 5,0 m/s	10 bar (145 psi) 10 bar (145 psi)	**seal part** s-mart NBR s-mart HNBR	**metal insert** metal metal	**spring** spring spring
	R61-G ••	**single acting rotary shaft seal** R61-G is seals with completely rubber covered outer diameter. the additional dust lip protects the main sealing lip against dust and other fine solid contaminants and therefore this type is recommended for use in polluted environments. to achieve a long lifetime a suitable lubricant between the two sealing lips should be applied. sealing lip with spring + dust lip	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	1 bar (14,5 psi) 1 bar (14,5 psi)	**seal part** s-mart NBR s-mart FKM	**metal insert** metal metal	**spring** spring spring
	R61-R ••	**single acting rotary shaft seal** R61-R is seals with completely rubber covered outer diameter. the additional dust lip protects the main sealing lip against dust and other fine solid contaminants and therefore this type is recommended for use in polluted environments. to achieve a long lifetime a suitable lubricant between the two sealing lips should be applied. sealing lip with spring + dust lip	-30 °C ... +170 °C	up to 35,0 m/s	10 bar (145 psi)	**seal part** s-mart FKM	**metal insert** metal	**spring** spring

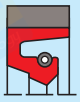
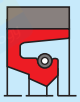
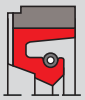
application	profile	description	temperature	max speed	max pressure	material		
	R61-Y ••	**single acting rotary shaft seal** R61-Y is seals with completely rubber covered outer diameter. the additional dust lip protects the main sealing lip against dust and other fine solid contaminants and therefore this type is recommended for use in polluted environments. to achieve a long lifetime a suitable lubricant between the two sealing lips should be applied.	-40 °C ... +100 °C	up to 10,0 m/s	10 bar (145 psi)	**seal part** s-mart NBR	**metal insert** metal	**spring** spring
	R61-V ••	**single acting rotary shaft seal** R61-A & R61-V is seals with completely rubber covered outer diameter. the additional dust lip protects the main sealing lip against dust and other fine solid contaminants and therefore this type is recommended for use in polluted environments. to achieve a long lifetime a suitable lubricant between the two sealing lips should be applied.	-20 °C ... +100 °C	up to 30,0 m/s	0,5 bar (7,25 psi)	**seal part** s-mart FKM	**metal insert** metal	**spring** spring
	R62-A ••	**single acting rotary shaft seal** the R62-A metal cased radial lip seals. this type is not recommended for use in heavy polluted environments. as the static sealing between housing and metallic shell is limited, low viscosity media can "creep". better performance can be achieved with epoxy-based resin O.D. coating. this special treatment is on request.	-30 °C ... +100 °C -20 °C ... +200 °C	30,0 m/s 30,0 m/s	0,5 bar (7,25 psi) 0,5 bar (7,25 psi)	**seal part** s-mart NBR s-mart FKM	**metal insert** metal metal	**spring** spring spring
	R62-C ••	**single acting rotary shaft seal** the R62-B metal cased radial lip seals. this type is not recommended for use in heavy polluted environments. as the static sealing between housing and metallic shell is limited, low viscosity media can "creep". better performance can be achieved with epoxy-based resin O.D. coating. this special treatment is on request. sealing lip with spring, right helix sealing lip with spring, left helix sealing lip with spring, bidirectional helix	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	1 bar (14,5 psi) 1 bar (14,5 psi)	**seal part** s-mart NBR s-mart FKM	**metal insert** metal metal	**spring** spring spring
	R62-D ••	**single acting rotary shaft seal** the R62-D metal cased radial lip seals. this type is not recommended for use in heavy polluted environments. as the static sealing between housing and metallic shell is limited, low viscosity media can "creep". better performance can be achieved with epoxy-based resin O.D. coating. this special treatment is on request. sealing lip with spring	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	1 bar (14,5 psi) 1 bar (14,5 psi)	**seal part** s-mart NBR s-mart FKM	**metal insert** metal metal	**spring** spring spring
	R62-E ••	**single acting rotary shaft seal** the R62-E metal cased radial lip seals. this type is not recommended for use in heavy polluted environments. as the static sealing between housing and metallic shell is limited, low viscosity media can "creep". better performance can be achieved with epoxy-based resin O.D. coating. this special treatment is on request. sealing lip with spring	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	1 bar (14,5 psi) 1 bar (14,5 psi)	**seal part** s-mart NBR s-mart FKM	**metal insert** metal metal	**spring** spring spring
	R63-A ••	**single acting rotary shaft seal** the R63-A is metal cased radial lip seals. the additional dust lip protects the main sealing lip against dust and other fine solid contaminants and therefore this type is recommended for use in polluted environments. to achieve a long lifetime a suitable lubricant between the two sealing lips should be applied. as the static sealing between housing and metallic shell is somewhat limited, low viscosity media can "creep". better performance can be achieved with epoxy based resin O.D. coating. this special treatment is on request.	-30 °C ... +100 °C -30 °C ... +140 °C -20 °C ... +200 °C	up to 30,0 m/s up to 30,0 m/s up to 30,0 m/s	0,5 bar (7,25 psi) 0,5 bar (7,25 psi) 0,5 bar (7,25 psi)	**seal part** s-mart NBR s-mart HNBR s-mart FKM	**metal insert** metal metal metal	**spring** spring spring spring
	R63-B ••	**single acting rotary shaft seal** the R63-B is metal cased radial lip seals. the additional dust lip protects the main sealing lip against dust and other fine solid contaminants and therefore this type is recommended for use in polluted environments. to achieve a long lifetime a suitable lubricant between the two sealing lips should be applied. as the static sealing between housing and metallic shell is somewhat limited, low viscosity media can "creep". better performance can be achieved with epoxy based resin O.D. coating. this special treatment is on request. sealing lip with spring + dust lip	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	1 bar (14,5 psi) 1 bar (14,5 psi)	**seal part** s-mart NBR s-mart FKM	**metal insert** metal metal	**spring** spring spring

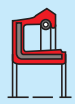
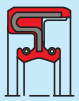
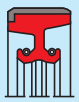
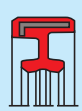
application	profile	description	temperature	max speed	max pressure	material		
	R63-C ••	**single acting rotary shaft seal**				**seal part**	**metal insert**	**spring**
		the R63-C is metal cased radial lip seals. the additional dust lip protects the main sealing lip against dust and other fine solid contaminants and therefore this type is recommended for use in polluted environments. to achieve a long lifetime a suitable lubricant between the two sealing lips should be applied. as the static sealing between housing and metallic shell is somewhat limited, low viscosity media can "creep". better performance can be achieved with epoxy based resin O.D. coating. this special treatment is on request. sealing lip with spring + dust lip	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	1 bar (14,5 psi) 1 bar (14,5 psi)	s-mart NBR s-mart FKM	metal metal	spring spring
	R63-D ••	**single acting rotary shaft seal**				**seal part**	**metal insert**	**spring**
		the R63-D is metal cased radial lip seals. the additional dust lip protects the main sealing lip against dust and other fine solid contaminants and therefore this type is recommended for use in polluted environments. to achieve a long lifetime a suitable lubricant between the two sealing lips should be applied. as the static sealing between housing and metallic shell is somewhat limited, low viscosity media can "creep". better performance can be achieved with epoxy based resin O.D. coating. this special treatment is on request. sealing lip with spring, left helix + dust lip sealing lip with spring, bidirectional helix + dust lip sealing lip with spring, right helix + dust lip	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	1 bar (14,5 psi) 1 bar (14,5 psi)	s-mart NBR s-mart FKM	metal metal	spring spring
	R64 ••	**single acting rotary shaft seal**				**seal part**	**metal insert**	**spring**
		R64 is reinforced metal cased radial lip seals. the supplementary metal inner ring provides a superior stiffness. this type is not recommended for use in heavy polluted environments. as the static sealing between housing and metallic shell is limited, low viscosity media can "creep". better performance can be achieved with epoxy based resin O.D. coating. this special treatment is on request.	-30 °C ... +100 °C -30 °C ... +140 °C -20 °C ... +200 °C	up to 30,0 m/s up to 30,0 m/s up to 30,0 m/s	0,5 bar (7,25 psi) 0,5 bar (7,25 psi) 0,5 bar (7,25 psi)	s-mart NBR s-mart HNBR s-mart FKM	metal metal metal	spring spring spring
	R65 ••	**single acting rotary shaft seal**				**seal part**	**metal insert**	**spring**
		R65 is reinforced metal cased radial lip seals with dust lip. the supplementary metal inner ring provides a superior stiffness. this type is recommended for use in heavy polluted environments. to achieve a long lifetime a suitable lubricant between the two sealing lips should be applied. as the static sealing between housing and metallic shell is limited, low viscosity media can "creep". better performance can be achieved with epoxy based resin O.D. coating. this special treatment is on request.	-30 °C ... +100 °C -30 °C ... +140 °C -20 °C ... +200 °C	up to 30,0 m/s up to 30,0 m/s up to 30,0 m/s	0,5 bar (7,25 psi) 0,5 bar (7,25 psi) 0,5 bar (7,25 psi)	s-mart NBR s-mart HNBR s-mart FKM	metal metal metal	spring spring spring
	R66 •••	**single acting rotary shaft seal**				**seal part**	**metal insert**	**spring**
		special oil seals. strong construction shaft oil seal presenting a stiffening ring in Fe37 with ground external diameter according to DIN 3760. this seal is usable on large diameter rolls. metal with metal inner case sealing lip with spring	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	1 bar (14,5 psi) 1 bar (14,5 psi)	s-mart NBR s-mart FKM	metal metal	spring spring
	R67 •••	**single acting rotary shaft seal**				**seal part**	**metal insert**	**spring**
		metal with metal inner ring. sealing lip with finger spring and garter spring (sealing lip/finger + garter not to be used in paper industry). sealing lip with finger spring and garter spring/vulcanized. PTFE lip tip sealing lip with finger spring and garter spring/vulcanized. PTFE lip tip	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	1 bar (14,5 psi) 1 bar (14,5 psi)	s-mart NBR s-mart FKM	metal metal	spring spring
	R68 •••	**single acting rotary shaft seal**				**seal part**	**metal insert**	**spring**
		metal with metal inner ring and dust lip. sealing lip with finger spring and garter spring and dust lip (sealing lip/finger + garter and dust lip not to be used in paper industry).	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	1 bar (14,5 psi) 1 bar (14,5 psi)	s-mart NBR s-mart FKM	metal metal	spring spring
	R69 •••	**single acting rotary shaft seal**				**seal part**	**metal insert**	**spring**
		metal with metal inner ring for small band. sealing lip with finger spring and garter spring (sealing lip/finger + garter not to be used in paper industry).	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	1 bar (14,5 psi) 1 bar (14,5 psi)	s-mart NBR s-mart FKM	metal metal	spring spring

application	profile	description	temperature	max speed	max pressure	material		
	R70 •••	**single acting rotary shaft seal** metal with grooved rubber sealing lip with spring, left helix + dust lip. sealing lip with spring, right helix + dust lip	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	0,5 bar (7,25 psi) 0,5 bar (7,25 psi)	**seal part** s-mart NBR s-mart FKM	**metal insert** metal metal	**spring** spring spring
	R71 •••	**single acting rotary shaft seal** the R71 are seals with partially rubber covered outer diameter. these seals are designed to assure a high assembly stiffness and a good static sealing together with a good heat transfer. the additional dust lip protects the main sealing lip against dust and other fine solid contaminants, therefore these types are recommended for use in polluted environments. to achieve a long lifetime a suitable lubricant between the two sealing lips should be applied.	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	0,5 bar (7,25 psi) 0,5 bar (7,25 psi)	**seal part** s-mart NBR s-mart FKM	**metal insert** metal metal	**spring** spring spring
	R72 ••	**single acting rotary shaft seal** outer casing: elastomer spring-loaded sealing lip with additional dust lip. sealing lip profile, sealing lip machined on the front face. sealing lip profile, finished sealing lip.	-40 °C ... +100 °C	up to 30,0 m/s	0,5 bar (7,25 psi)	**seal part** s-mart NBR	**metal insert** metal	**spring** spring
	R73-A ••	**single acting rotary shaft seal** outer casing: elastomer, spring-loaded sealing lip with additional dust lip. sealing lip profile, sealing lip machined on the front face. sealing lip profile, finished sealing lip.	-40 °C ... +100 °C	up to 30,0 m/s	0,5 bar (7,25 psi)	**seal part** s-mart NBR	**metal insert** metal	**spring** spring
	R73-B ••	**single acting rotary shaft seal** outer casing: elastomer, spring-loaded sealing lip with additional dust lip. sealing lip profile, sealing lip machined on the front face. sealing lip profile, finished sealing lip. rubber covered with grooved o.d. sealing lip with spring, right helix + dust lip.	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	0,5 bar (7,25 psi) 0,5 bar (7,25 psi)	**seal part** s-mart NBR s-mart FKM	**metal insert** metal metal	**spring** spring spring
	R73-C ••	**single acting rotary shaft seal** The R73-C seals with completely rubber covered outer diameter and the additional dust lip protects the main sealing lip against dust and other fine solid contaminants and therefore this type is recommended for use in polluted environments. this type of seal is designed for pressures up to 0.5 MPa. in order to avoid a "pop-out" of the seal, we suggest to fit an axial retainer (e.g. circlip, shoulder, etc.) to achieve a long lifetime a suitable lubricant between the two sealing lips should be applied. sealing lip with spring, right helix + dust lip	-30 °C ... +100 °C -20 °C ... +200 °C	10,0 m/s 10,0 m/s	0,5 bar (7,25 psi) 0,5 bar (7,25 psi)	**seal part** s-mart NBR s-mart FKM	**metal insert** metal metal	**spring** spring spring
	R74-A ••	**single acting rotary shaft seal** rubber covered, sealing lip with spring + flange.	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	1 bar (14,5 psi) 1 bar (14,5 psi)	**seal part** s-mart NBR s-mart FKM	**metal insert** metal metal	**spring** spring spring
	R74-B ••	**single acting rotary shaft seal** rubber covered, sealing lip with spring + flange + dust lip	-20 °C ... +120 °C	up to 12,0 m/s	1 bar (14,5 psi)	**seal part** s-mart NBR	**metal insert** metal	**spring** spring
	R75 ••	**single acting rotary shaft seal** R75 is seals with completely rubber covered outer diameter. the additional dust lip protects the main sealing lip against dust and other fine solid contaminants and therefore this type is recommended for use in polluted environments. sealing lip with spring + double dust lip	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	1 bar (14,5 psi) 1 bar (14,5 psi)	**seal part** s-mart NBR s-mart FKM	**metal insert** metal metal	**spring** spring spring
	R80-A ••	**single acting rotary shaft seal** rotary shaft seal in standard design with a grooved elastomer outer sheath covering a metal insert without an energised spring on the sealing lip.	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	without pressure without pressure	**seal part** s-mart NBR s-mart FKM	**metal insert** metal metal	

application	profile	description	temperature	max speed	max pressure	material		
	R81 ••	**single acting rotary shaft seal** rotary shaft seal in standard design with a grooved elastomer outer sheath covering a metal insert without an energised spring on the sealing lip. the additional dust lip protects the main sealing lip against dust and other fine solid contaminants and therefore this type is recommended for use in polluted environments. rubber covered, sealing lip + dust lip	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	without pressure without pressure	**seal part** s-mart NBR s-mart FKM	**metal insert** metal metal	
	R82-A ••	**single acting rotary shaft seal** the R82-A are special metal cased radial oil seals without spring energised sealing lip. these types are not recommended for use in heavy polluted environments. as the static sealing between housing and metallic shell is limited, low viscosity media can "creep". better performance can be achieved with epoxy based resin O.D. coating. this special treatment is on request.	-30 °C ... +100 °C -20 °C ... +200 °C	10,0 m/s 10,0 m/s	without pressure without pressure	**seal part** s-mart NBR s-mart FKM	**metal insert** metal metal	
	R83 ••	**single acting rotary shaft seal** rotary shaft seal made od elastomer which has an outer casing reinforced with impregnated fabric. the fabric reinforcement is bonded firmly to the elastomer component. rubber/fabric oil seal with sealing lip and spring and dust lip.	-40 °C ... +100 °C		0,5 bar (7,25 psi)	s-mart NBR	NBR (fabric)	
	R84 •••	**single acting rotary shaft seal** external diameter rubber, radial sealing, sealing lip with finger spring.	-40 °C ... +100 °C			s-mart NBR	spring	
	R85 •••	**single acting rotary shaft seal** R85 is a special grease retainer for severe working conditions : moulded-in stainless steel finger spring to avoid spring dumping and corrosion endless and machined outer metal ring for a perfect contact with housing bore inner metal ring vulcanised for a perfect concentricity outside diameter from 140 to 1640 mm. sealing lip with finger spring and metal outside, radial sealing.	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	1 bar (14,5 psi) 1 bar (14,5 psi)	**seal part** s-mart NBR s-mart FKM	**metal insert** metal metal	**spring** spring spring
	R86 •••	**single acting rotary shaft seal** these special shaft oil seals are similar to the R86 shaft oil seals and have been developed especially for small diameters rolls starting from 70 mm. the construction of the R86 is made by: steel outer case, machine finished to DIN 3760 standard, onto which is bonded the sealing element. steel filler ring to provide the required rigidity to the seal. stainless steel finger spring to ensure the correct sealing performance even when shock loads arise. metal with metal inner case. sealing lip with finger spring.	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	1 bar (14,5 psi) 1 bar (14,5 psi)	**seal part** s-mart NBR s-mart FKM	**metal insert** metal metal	**spring** spring spring
	R87 •••	**single acting rotary shaft seal** radial sealing. metal with metal inner case for small band. sealing lip with finger spring.	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	1 bar (14,5 psi) 1 bar (14,5 psi)	**seal part** s-mart NBR s-mart FKM	**metal insert** metal metal	**spring** spring spring
	R88 •••	**single acting rotary shaft seal** similar to the R86 shaft oil seals, developed especially for small diameters rolls starting from 70 mm. the construction made of : steel outer case, machine finished to DIN 3760 standard, onto which is bonded the sealing element. steel filler ring to provide the required rigidity to the seal. stainless steel finger spring to ensure the correct sealing performance even when shock loads arise.	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	1 bar (14,5 psi) 1 bar (14,5 psi)	**seal part** s-mart NBR s-mart FKM	**metal insert** metal metal	**spring** spring spring
	R89 •••	**single acting rotary shaft seal** the combined rotary shaft lip seal is an assembly which includes a supplementary protection of the radial sealing members with an axial rotary sealing lip integrated into a wear sleeve. the rubberised wear sleeve and radial seal are designed to satisfy either customer's and DIN 3760 (3761) specifications.	-30 °C ... +100 °C -20 °C ... +200 °C	10,0 m/s 10,0 m/s	0,5 bar (7,25 psi) 0,5 bar (7,25 psi)	**seal part** s-mart NBR s-mart FKM	**metal insert** carbon metal stainless metal	**spring** spring spring

application	profile	description	temperature	max speed	max pressure	material		
	R90 •••	**single acting rotary shaft seal** R90, the original unitized wheel hub seal for heavy-duty vehicles, is designed for rotating hubs. the inner section of the R90 is secured against the shaft. the outer section, press fitted into the wheel hub, rotates together with the hub around the inner section, creating a completely enclosed seal. dirt and water, the major enemies of hub seals, are effectively kept at distance, whilst the lubrication of the rubber lip remains intact. this decreases friction and increases seal life accordingly.	-40 °C ... + 80 °C -30 °C ... +120 °C -30 °C ... +150 °C	10,0 m/s 10,0 m/s 10,0 m/s	0,5 bar (7,25 psi) 0,5 bar (7,25 psi) 0,5 bar (7,25 psi)	seal part s-mart NBR s-mart HNBR s-mart FKM	**metal insert** carbon metal carbon metal carbon metal	**spring** spring spring spring
	R91 •••	**single acting rotary shaft seal** R91 is specifically designed for rotating hubs on off-road machines in heavy duty applications, i.e. wet rice fields. the design offers significant improvements in providing improved ability to exclude water, dirt and dust for much longer time. its ability to sustain eccentricities, over-pressure and shaft misalignments are equal to radial seals. the R91, while based on R90, features two sealing lips, equipped with compression springs, to provide excellent sealing performance and an additional dust lip. mudbox-tests are showing more than doubled lifetime performance compared with the other system seals.	-40 °C ... + 80 °C -30 °C ... +120 °C -30 °C ... +150 °C	4,0 m/s 4,0 m/s 4,0 m/s	0,5 bar (7,25 psi) 0,5 bar (7,25 psi) 0,5 bar (7,25 psi)	**seal part** s-mart NBR s-mart HNBR s-mart FKM	**metal insert** carbon metal carbon metal carbon metal	**spring** spring spring spring
	R92 •••	**single acting rotary shaft seal** the R92 is, like R90 and R91, a fully enclosed seal however designed for rotating shafts. the R92 has the same features but the design has been inverted, i.e. the sealing element is fixed in the stationary housing and the casing components rotates with the shaft. the R92 is used to prevent oil from leaking out of a bearing housing, i.e. a differential pinion housing for rear axles on trucks, and at the same time preventing road dirt, salt and water splash to enter. the design is compact and integrates the necessary shaft counterface as well as the dirt exclusion. the dirt exclusion function consists of two rubber lips, one axial and one radial, the space between these filled with grease, and the rotating seal case, which acts as an effective deflector due to the centrifugal force.	-40 °C ... + 80 °C -30 °C ... +120 °C -30 °C ... +150 °C	15,0 m/s 15,0 m/s 15,0 m/s	0,5 bar (7,25 psi) 0,5 bar (7,25 psi) 0,5 bar (7,25 psi)	**seal part** s-mart NBR s-mart HNBR s-mart FKM	**metal insert** carbon metal carbon metal carbon metal	**spring** spring spring spring
	R93 •••	**single acting rotary shaft seal** outer casing: elastomer (smooth). spring-loaded sealing lip and sealing lip with helix edge without spring. additional dust lip. modern sealing lip profile. friction-optimised primary seal lip 1 made from fluoro rubber 75 FKM 585. secondary seal lip with additional dust lip 2.	-25 °C ... +100 °C -25 °C ... +160 °C	up to 6,0 m/s up to 6,0 m/s	0,5 bar (7,25 psi) 0,5 bar (7,25 psi)	**seal part** s-mart NBR s-mart FKM	**metal insert** metal metal	**spring** spring spring
	R99 •••	**single acting rotary shaft seal** rotary shaft seal with a PTFE sealing lip and an elastomer pre-tension ring which is clamped between two metal cages. non mould production.	-90 °C ... +250 °C	40,0 m/s	25 bar (352 psi)	**seal part** s-mart PTFE glass	**elastomer ring** s-mart FKM	**metal housing** metal
	R100 •••	**single acting rotary shaft seal** rotary shaft seal with a spring energized elastomer sealing lip clamped between two metal cages. non mould production.	-40 °C ... +100 °C -30 °C ... +200 °C	12,0 m/s 15,0 m/s	10 bar (145 psi) 10 bar (145 psi)	**seal part** s-mart NBR s-mart FKM	**spring** spring spring	**metal housing** metal metal
	R101 •••	**single acting rotary shaft seal**	-40 °C ... +100 °C -30 °C ... +200 °C	12,0 m/s 15,0 m/s	10 bar (145 psi) 10 bar (145 psi)	**seal part** s-mart NBR s-mart FKM	**spring** spring spring	**metal housing** metal metal
	R102 •••	**single acting rotary shaft seal** outer casing: metal housing & sealing lip made of PTFE.	-80 °C ... +200 °C	30,0 m/s	10 bar (145 psi)	**seal part** s-mart PTFE carbon	**o-ring** s-mart FKM	**metal housing** metal

application	profile	description	temperature	max speed	max pressure	material
	R103-A •• 	**single acting rotary shaft seal** rotary shaft seal made od elastomer which has an outer casing reinforced with impregnated fabric. the fabric reinforcement is bonded firmly to the elastomer component. the sealing ring is energized by a spring.	-30 °C ... +100 °C	up to 20,0 m/s	0,5 bar (7,25 psi)	**seal part** s-mart NBR + NBR (fabric) **spring** spring
	R103-B ••	**single acting rotary shaft seal** rotary shaft seal made od elastomer which has an outer casing reinforced with impregnated fabric. the fabric reinforcement is bonded firmly to the elastomer component. the sealing ring is energized by a spring. rubber/fabric oil seal with lip + spring with radial + axial lubrication grooves.	-30 °C ... +100 °C	up to 20,0 m/s	0,5 bar (7,25 psi)	**seal part** s-mart NBR + NBR (fabric) **spring** spring
	R103-V •• 	**single acting rotary shaft seal** rotary shaft seal made od elastomer which has an outer casing reinforced with impregnated fabric. the fabric reinforcement is bonded firmly to the elastomer component. the sealing ring is energized by a spring.	-20 °C ... +180 °C	up to 25,0 m/s	0,5 bar (7,25 psi)	**seal part** s-mart FKM + FKM (fabric) **spring** spring
	R104-A ••	**single acting rotary shaft seal** rotary shaft seal made od elastomer which has an outer casing reinforced with impregnated fabric. the fabric reinforcement is bonded firmly to the elastomer component. the sealing ring is energized by a spring.	-30 °C ... +100 °C	up to 20,0 m/s	0,5 bar (7,25 psi)	**seal part** s-mart NBR + NBR (fabric) **spring** spring
	R104-V ••	**single acting rotary shaft seal** rotary shaft seal made od elastomer which has an outer casing reinforced with impregnated fabric. the fabric reinforcement is bonded firmly to the elastomer component. the sealing ring is energized by a spring.	-20 °C ... +180 °C	up to 25,0 m/s	0,5 bar (7,25 psi)	**seal part** s-mart FKM + FKM (fabric) **spring** spring
	R105-A •• 	**single acting rotary shaft seal** rotary shaft seal made od elastomer which has an outer casing reinforced with impregnated fabric. the fabric reinforcement is bonded firmly to the elastomer component. the sealing ring is energized by a spring.	-30 °C ... +100 °C	up to 20,0 m/s	0,5 bar (7,25 psi)	**seal part** s-mart NBR + NBR (fabric) **spring** spring
	R105-B ••	**single acting rotary shaft seal** rotary shaft seal made od elastomer which has an outer casing reinforced with impregnated fabric. the fabric reinforcement is bonded firmly to the elastomer component. the sealing ring is energized by a spring. rubber/fabric oil seal with lip + spring with radial + axial lubrication grooves.	-30 °C ... +100 °C	up to 20,0 m/s	0,5 bar (7,25 psi)	**seal part** s-mart NBR + NBR (fabric) **spring** spring
	R105-V ••	**single acting rotary shaft seal** rotary shaft seal made od elastomer which has an outer casing reinforced with impregnated fabric. the fabric reinforcement is bonded firmly to the elastomer component. the sealing ring is energized by a spring.	-20 °C ... +180 °C	up to 25,0 m/s	0,5 bar (7,25 psi)	**seal part** s-mart FKM + FKM (fabric) **spring** spring
	R106 ••	**single acting rotary shaft seal** rotary shaft seal made od elastomer which has an outer casing reinforced with impregnated fabric. the fabric reinforcement is bonded firmly to the elastomer component. the sealing ring is energized by a spring. rubber/fabric oil seal with lip + spring + dust lip	-30 °C ... +100 °C	up to 20,0 m/s	0,5 bar (7,25 psi)	**seal part** s-mart NBR + NBR (fabric) **spring** spring
	R107 ••	**single acting rotary shaft seal** rotary shaft seal made od elastomer which has an outer casing reinforced with impregnated fabric. the fabric reinforcement is bonded firmly to the elastomer component. the sealing ring is energized by a spring. rubber/fabric oil seal with lip + spring	-30 °C ... +100 °C	up to 20,0 m/s	0,5 bar (7,25 psi)	**seal part** s-mart NBR + NBR (fabric) **spring** spring
	R108 ••	**single acting rotary shaft seal** alternative movement an d radial sealing, rubber covered with grooved od, sealing lip with spring + dust lip.	-40 °C ... +100 °C		without pressure	**seal part** s-mart NBR **spring** spring **metal housing** metal

application	profile	description	temperature	max speed	max pressure	material
	R109 ••	**single acting rotary shaft seal** the R109 rotary shaft seal is a special type with the sealing lip on the outside (exterior sealing). rotary shaft seal made od elastomer which has an inner casing reinforced with impregnated fabric. rubber/fabric oil seal with lip and spring and dust lip	-40 °C ... +100 °C		0,2 bar (2,90 psi)	s-mart NBR + NBR (fabric)
	R110 •• 	**single acting rotary shaft seal** the R110 rotary shaft seal is a special type with the sealing lip on the outside (exterior sealing). it consists of a metal insert with an elastomer inner sheath as well as a spring-energized sealing lip facing outwards. sealing lip with spring	-40 °C ... +100 °C	up to 10,0 m/s	0,5 bar (7,25 psi)	**seal part** / **spring** / **metal housing** s-mart NBR / spring / metal
	R111 •••	**single acting rotary shaft seal** sealing lip with finger spring and garter spring, metal with metal inner ring	-20 °C ... +120 °C		0,5 bar (7,25 psi)	**seal part** / **spring** / **metal housing** s-mart NBR / spring / metal
	R112 •••	**single acting rotary shaft seal** sealing lip with finger spring and garter spring + dust lip, metal with metal inner ring and dust lip	-20 °C ... +120 °C		0,5 bar (7,25 psi)	**seal part** / **spring** / **metal housing** s-mart NBR / spring / metal
	R113 ••	**single acting rotary shaft seal** external radial sealing, metal with metal inner case, sealing lip with finger spring	-20 °C ... +120 °C		0,5 bar (7,25 psi)	**seal part** / **metal housing** s-mart NBR / NBR fabric / metal
	R114-A ••• 	**single acting rotary shaft seal** outer casing: elastomer, two spring-loaded sealing lips.	-20 °C ... +120 °C	up to 5,0 m/s	0,5 bar (7,25 psi)	**seal part** / **spring** / **metal housing** s-mart NBR / spring / metal
	R114-V •••	**single acting rotary shaft seal** outer casing: elastomer, two spring-loaded sealing lips.	-20 °C ... +120 °C	up to 5,0 m/s	0,5 bar (7,25 psi)	**seal part** / **spring** / **metal housing** s-mart FKM / spring / metal
	R115 ••• 	**single acting rotary shaft seal** outer casing: elastomer, two spring-loaded sealing lips. double lipped oil seal (with two garter springs) which ensures a compact sealing system from two different media. radial sealing, metal, double sealing lip with spring	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	1 bar (14,5 psi) 1 bar (14,5 psi)	**seal part** / **spring** / **metal housing** s-mart NBR / spring / metal s-mart FKM / spring / metal
	R116 •••	**single acting rotary shaft seal** outer casing: elastomer, two spring-loaded sealing lips. double lipped oil seal (with two garter springs) which ensures a compact sealing system from two different media. grease sealing, metal, double sealing lip.	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	1 bar (14,5 psi) 1 bar (14,5 psi)	**seal part** / **metal housing** s-mart NBR / metal s-mart FKM / metal
	R117 ••• 	**single acting rotary shaft seal** R117 is seals with completely rubber covered outer diameter. two sealing lips.	-20 °C ... +120 °C -18 °C ... +220 °C	up to 12,0 m/s up to 40,0 m/s	1 bar (14,5 psi) 1 bar (14,5 psi)	**seal part** / **metal housing** s-mart NBR / metal s-mart FKM / metal

rotary seals : roto slide seal

application	profile	description	temperature	max speed	max pressure	material	
	R03-P	**double acting rotary shaft seal**				**seal part**	**back-up ring**
		rotary seal with integrated backup rings for pivoting motion in hydraulic systems. interference fit on outside diameter maintains stable fit in the housing, backup rings permit larger extrusion gap / higher pressure. mainly used for rotary pivots on excavators, grabs	-30 °C ... +100 °C	0,2 m/s	400 bar (5800 psi)	s-mart PU	s-mart POM / PA*
			-20 °C ... +100 °C	0,2 m/s	400 bar (5800 psi)	s-mart HPU	s-mart POM / PA*
			-40 °C ... +100 °C	0,2 m/s	400 bar (5800 psi)	s-mart LTPU	s-mart POM / PA*
			-20 °C ... +100 °C	0,3 m/s	400 bar (5800 psi)	s-mart SPU	s-mart POM / PA*
			-30 °C ... +100 °C	0,2 m/s	400 bar (5800 psi)	s-mart GPU	s-mart POM / PA*
	R03-R	**double acting rotary shaft seal**				**seal part**	**back-up ring**
		as profile R03-P but more adaptation possibilities for diverse temperatures and media by selection of suitable seal material.	-30 °C ... +100 °C	0,2 m/s	250 bar (3600 psi)	s-mart NBR	s-mart POM
			-30 °C ... +100 °C	0,2 m/s	250 bar (3600 psi)	s-mart NBR	s-mart PA
			-25 °C ... +100 °C	0,2 m/s	250 bar (3600 psi)	s-mart HNBR	s-mart POM
			-25 °C ... +100 °C	0,2 m/s	250 bar (3600 psi)	s-mart HNBR	s-mart PA*
			-20 °C ... +200 °C	0,2 m/s	250 bar (3600 psi)	s-mart FKM	s-mart PTFE
	R04-A	**double acting rotary shaft seal**					
		space saving rotary seal for pivoting motion in hydraulic systems. interference fit on outside diameter maintains stable fit in the housing, dynamic sealing lips on inside diameter.	-30 °C ... +110 °C	0,2 m/s	160 bar (2300 psi)	s-mart PU	
			-20 °C ... +110 °C	0,2 m/s	160 bar (2300 psi)	s-mart HPU	
			-50 °C ... +110 °C	0,2 m/s	160 bar (2300 psi)	s-mart LTPU	
			-20 °C ... +110 °C	0,3 m/s	160 bar (2300 psi)	s-mart SPU	
			-30 °C ... +110 °C	0,2 m/s	160 bar (2300 psi)	s-mart GPU	
			-30 °C ... +100 °C	0,2 m/s	100 bar (1450 psi)	s-mart NBR	
			-25 °C ... +150 °C	0,2 m/s	100 bar (1450 psi)	s-mart HNBR	
			-20 °C ... +200 °C	0,2 m/s	100 bar (1450 psi)	s-mart FKM	
			-50 °C ... +150 °C	0,2 m/s	100 bar (1450 psi)	s-mart EPDM**	
	R05-A	**double acting rotary shaft seal**					
		space saving rotary seal for pivoting motion in hydraulic systems. interference fit on inside diameter maintains stable fit in the housing, dynamic sealing lips on outside diameter.	-30 °C ... +110 °C	0,2 m/s	160 bar (2300 psi)	s-mart PU	
			-20 °C ... +110 °C	0,2 m/s	160 bar (2300 psi)	s-mart HPU	
			-50 °C ... +110 °C	0,2 m/s	160 bar (2300 psi)	s-mart LTPU	
			-20 °C ... +110 °C	0,3 m/s	160 bar (2300 psi)	s-mart SPU	
			-30 °C ... +110 °C	0,2 m/s	160 bar (2300 psi)	s-mart GPU	
			-30 °C ... +100 °C	0,2 m/s	100 bar (1450 psi)	s-mart NBR	
			-25 °C ... +150 °C	0,2 m/s	100 bar (1450 psi)	s-mart HNBR	
			-20 °C ... +200 °C	0,2 m/s	100 bar (1450 psi)	s-mart FKM	
			-50 °C ... +150 °C	0,2 m/s	100 bar (1450 psi)	s-mart EPDM**	
	R09-F •	**double acting rotary shaft seal**				**glide ring**	**energizer**
		o-ring activated, low friction PTFE rotary seal. mainly used in applications with alternating pressure from one side of the seal to the other, such as hose reels, swivel joints, rotating track rings and machine tool hydraulics. good chemical and thermal resistance achievable by selection of suitable o-ring material.	-30 °C ... +100 °C	0,4 m/s	350 bar (5000 psi)	s-mart PTFE glass	s-mart NBR
			-30 °C ... +100 °C	0,4 m/s	350 bar (5000 psi)	s-mart PTFE bronze	s-mart NBR
			-30 °C ... +100 °C	0,4 m/s	350 bar (5000 psi)	s-mart PTFE carbon	s-mart NBR
			-30 °C ... + 80 °C	0,4 m/s	350 bar (5000 psi)	s-mart UHMWPE	s-mart NBR
	R09-FS	**double acting rotary shaft seal**				**glide ring**	**energizer**
		as profile R09-F, but with a profile ring energizer instead of the o-ring. for heavy duty applications and non standard housings.	-30 °C ... +100 °C	0,4 m/s	350 bar (5000 psi)	s-mart PTFE glass	s-mart NBR
			-30 °C ... +100 °C	0,4 m/s	350 bar (5000 psi)	s-mart PTFE bronze	s-mart NBR
			-30 °C ... +100 °C	0,4 m/s	350 bar (5000 psi)	s-mart PTFE carbon	s-mart NBR
			-30 °C ... + 80 °C	0,4 m/s	350 bar (5000 psi)	s-mart UHMWPE	s-mart NBR
	R10-F •	**double acting rotary shaft seal**				**glide ring**	**energizer**
		o-ring activated, low friction PTFE rotary seal. mainly used in applications with alternating pressure from one side of the seal to the other, such as hose reels, swivel joints, rotating track rings and machine tool hydraulics. good chemical and thermal resistance achievable by selection of suitable o-ring material.	-30 °C ... +100 °C	0,4 m/s	350 bar (5000 psi)	s-mart PTFE glass	s-mart NBR
			-30 °C ... +100 °C	0,4 m/s	350 bar (5000 psi)	s-mart PTFE bronze	s-mart NBR
			-30 °C ... +100 °C	0,4 m/s	350 bar (5000 psi)	s-mart PTFE carbon	s-mart NBR
			-30 °C ... + 80 °C	0,4 m/s	350 bar (5000 psi)	s-mart UHMWPE	s-mart NBR
	R10-FS •	**double acting rotary shaft seal**				**glide ring**	**energizer**
		as profile R10-F, but with a profile ring energizer instead of the o-ring. for heavy duty applications and non standard housings.	-30 °C ... +100 °C	0,4 m/s	350 bar (5000 psi)	s-mart PTFE glass	s-mart NBR
			-30 °C ... +100 °C	0,4 m/s	350 bar (5000 psi)	s-mart PTFE bronze	s-mart NBR
			-30 °C ... +100 °C	0,4 m/s	350 bar (5000 psi)	s-mart PTFE carbon	s-mart NBR
			-30 °C ... + 80 °C	0,4 m/s	350 bar (5000 psi)	s-mart UHMWPE	s-mart NBR
	R19-F	**single acting PTFE rotary seal**				**seal part**	**spring**
		fingerspring activated PTFE seal with integrated clamping flange on the back of seal for clamping fixation, acting as anti-twist device. excellent chemical and thermal resistance. suitable for relatively high pressure and high speed, however, allowable pressure and speed depend on each other, not recommended to use all maximum values simultaneously.	-200°C ... +260°C	15,0 m/s	150 bar (2100 psi)	s-mart PTFE glass	1.4310
			-200°C ... +260°C	15,0 m/s	150 bar (2100 psi)	s-mart PTFE bronze	1.4310
			-200°C ... +260°C	15,0 m/s	150 bar (2100 psi)	s-mart PTFE carbon	1.4310
			upon application	upon application	upon application	all material possible	1.4310

rotary seals : v-ring

R06-P •	**axially acting rotary seal** elastic, excellent wear resistant v-ring with interference fit on the shaft, rotates with the shaft, sealing axially against shaft collars, thrust blocks or the outer race of roller bearings, protecting the bearing against dust, dirt, oil splash, water splash and similar media. acting as a seal and slinger ring.	-30 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -20 °C ... +110 °C -30 °C ... +110 °C	25,0 m/s 25,0 m/s 25,0 m/s 25,0 m/s 25,0 m/s		s-mart PU s-mart HPU s-mart LTPU s-mart SPU s-mart GPU
R06-R	**axially acting rotary seal** elastic, good wear resistant v-ring as profile R06-P, but more adaptation possibilities for diverse temperatures and media by selection of suitable seal material.	-30 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +150 °C -25 °C ... +150 °C	25,0 m/s 25,0 m/s 25,0 m/s 25,0 m/s		s-mart NBR s-mart FKM s-mart EPDM** s-mart HNBR
R06-SA	**axially acting rotary seal** v-rings are available in seven standard cross-sections to meet various space and application requirements. R06-SA have narrow axial cross sections making them suitable for compact arrangements and are often used in combination with labyrinth seals. available for shaft diameters from 105 to 2025 mm.	-30 °C ... +100 °C -30 °C ... +140 °C -20 °C ... +200 °C -30 °C ... +110 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C -50 °C ... +150 °C -25 °C ... +150 °C	up to 30,0 m/s up to 30,0 m/s up to 30,0 m/s - - - - - - -		s-mart NBR s-mart HNBR s-mart FKM s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU s-mart EPDM** s-mart HNBR
R06-SB	**axially acting rotary seal** v-rings are available in seven standard cross-sections to meet various space and application requirements. R06-SB have narrow axial cross sections making them suitable for compact arrangements and are often used in combination with labyrinth seals. available for shaft diameters from 105 to 2025 mm.	-30 °C ... +100 °C -30 °C ... +140 °C -20 °C ... +200 °C -30 °C ... +110 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C -50 °C ... +150 °C -25 °C ... +150 °C	up to 30,0 m/s up to 30,0 m/s up to 30,0 m/s - - - - - - -		s-mart NBR s-mart HNBR s-mart FKM s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU s-mart EPDM** s-mart HNBR
R06-SC	**axially acting rotary seal** v-ring is axial seals with an elastomer sealing element vulcanised in the mould. the typical design of a v-ring is comprised of the body, the flexibe joint and the sealing lip. R06-SC with thin profile for reduced housing e.g in labyrinth seals.	-30 °C ... +100 °C -30 °C ... +140 °C -20 °C ... +200 °C -30 °C ... +110 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C -50 °C ... +150 °C -25 °C ... +150 °C	up to 30,0 m/s up to 30,0 m/s up to 30,0 m/s - - - - - - -		s-mart NBR s-mart HNBR s-mart FKM s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU s-mart EPDM** s-mart HNBR
R06-SD	**axially acting rotary seal** profiles R06-SD are heavy duty v-rings that are designed primarily for large high speed bearing arrangements, i.e. rolling mill and paper making machine applications. additionally they can be used as secondary seals for heavy duty applications where the primary seal has to be protected against water and or particulate contamination. the R06-SD types can be axially and radially located on the shaft with the especially designed clamping bands. available for shaft diameters from 300 mm and up.	-30 °C ... +100 °C -30 °C ... +140 °C -20 °C ... +200 °C -30 °C ... +110 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C -50 °C ... +150 °C -25 °C ... +150 °C	up to 30,0 m/s up to 30,0 m/s up to 30,0 m/s - - - - - - -		s-mart NBR s-mart HNBR s-mart FKM s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU s-mart EPDM** s-mart HNBR
R06-SE	**axially acting rotary seal** profiles R06-SE are heavy duty v-rings that are designed primarily for large high speed bearing arrangements, i.e. rolling mill and paper making machine applications. additionally they can be used as secondary seals for heavy duty applications where the primary seal has to be protected against water and or particulate contamination. the R06-SE types can be axially and radially located on the shaft with the especially designed clamping bands. available for shaft diameters from 300 mm and up.	-30 °C ... +100 °C -30 °C ... +140 °C -20 °C ... +200 °C -30 °C ... +110 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C -50 °C ... +150 °C -25 °C ... +150 °C	up to 30,0 m/s up to 30,0 m/s up to 30,0 m/s - - - - - - -		s-mart NBR s-mart HNBR s-mart FKM s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU s-mart EPDM** s-mart HNBR

application	profile	description	temperature	max speed	max pressure	material
	R06-SF	**axially acting rotary seal** profiles R06-SF are heavy duty v-rings that are designed primarily for large high speed bearing arrangements, i.e. rolling mill and paper making machine applications. additionally they can be used as secondary seals for heavy duty applications where the primary seal has to be protected against water and or particulate contamination. the R06-SF types can be axially and radially located on the shaft with the especially designed clamping bands. available for shaft diameters from 300 mm and up.	-30 °C ... +100 °C -30 °C ... +140 °C -20 °C ... +200 °C -30 °C ... +110 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C -50 °C ... +150 °C -25 °C ... +150 °C	up to 30,0 m/s up to 30,0 m/s up to 30,0 m/s - - - - - - -		s-mart NBR s-mart HNBR s-mart FKM s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU s-mart EPDM** s-mart HNBR
	R07-P •	**axially acting rotary seal** elastic, excellent wear resistant v-ring with interference fit on the shaft, rotates with the shaft, sealing axially against shaft collars, thrust blocks or the outer race of roller bearings, protecting the bearing against dust, dirt, oils plash, water splash and similar media. acting as a seal and slinger ring.	-30 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -20 °C ... +110 °C -30 °C ... +110 °C	25,0 m/s 25,0 m/s 25,0 m/s 25,0 m/s 25,0 m/s		s-mart PU s-mart HPU s-mart LTPU s-mart SPU s-mart GPU
	R07-R	**axially acting rotary seal** elastic, good wear resistant v-ring as profile R07-P, but more adaptation possibilities for diverse temperatures and media by selection of suitable seal material.	-30 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +150 °C -25 °C ... +150 °C	25,0 m/s 25,0 m/s 25,0 m/s 25,0 m/s		s-mart NBR s-mart FKM s-mart EPDM** s-mart HNBR

rotary seals : others

	R08-A	**single acting rotary seal** springless rotary lip seal with arbitrary preload on inside and outside diameter in order to design the seal to different specific needs.	upon application	upon application	upon application	all material possible	
	R11-F	**double acting rotary seal** space saving rotary seal, deformed sealing lip acts selfadjusting on increasing temperature. for axially openhousings with clamping plate fixation, elastic secondary seal or integrated o-ring necessary for static sealing in the housing. excellent chemical and thermal resistance, suitable for high speed applications.	-200°C ... +260°C -200°C ... +260°C -200°C ... +260°C	20,0 m/s 20,0 m/s 20,0 m/s	5 bar (70 psi) 5 bar (70 psi) 5 bar (70 psi)	s-mart PTFE glass s-mart PTFE bronze s-mart PTFE carbon	
	R94-A	**single acting rotary seal** outer casing: metal housing, dust lip without spring, this is consists of an elastic sealing member and a metal case. the case serves as a holder, support and protection for the sealing member and constitutes a very effective deflector. the components are not bonded to each other, the rubber sealing member is stretched and held in the case by its elasticity.	-30°C ... +100°C	up to 20,0 m/s		**seal part** s-mart NBR	**back-up ring** metal
	R94-V	**single acting rotary seal** outer casing: metal housing, dust lip without spring, this is consists of an elastic sealing member and a metal case. the case serves as a holder, support and protection for the sealing member and constitutes a very effective deflector. the components are not bonded toeach other, the rubber sealing member is stretched and held in the case by its elasticity.	-20°C ... +200°C	up to 20,0 m/s		**seal part** s-mart FKM	**back-up ring** metal
	R95-A	**single acting rotary seal** outer casing: metal housing, dust lip without spring, this is consists of an elastic sealing member and a metal case. the case serves as a holder, support and protection for the sealing member and constitutes a very effective deflector. the components are not bonded to each other, the rubber sealing member is stretched and held in the case by its elasticity.	-30°C ... +100°C	up to 20,0 m/s		**seal part** s-mart NBR	**back-up ring** metal

application	profile	description	temperature	max speed	max pressure	material	
	R95-V	**single acting rotary seal** outer casing: metal housing, dust lip without spring, this is consists of an elastic sealing member and a metal case. the case serves as a holder, support and protection for the sealing member and constitutes a very effective deflector. the components are not bonded toeach other, the rubber sealing member is stretched and held in the case by its elasticity.	-20°C ... +200°C	up to 20,0 m/s		**seal part** s-mart FKM	**back-up ring** metal
	R96	R96 with internal sealing lip, primarily for sealing of fluids. the seal is generally pressfitted in the housing with the sealing lip against the rotating shaft. the seal should always be installed so that the sealing lip is flushed by the fluid. dry running must be avoided.	-30°C ... +120°C -25°C ... +250°C	up to 20,0 m/s up to 20,0 m/s	0,1 bar (14,5 psi) 0,1 bar (14,5 psi)	**seal part** s-mart NBR s-mart FKM	**back-up ring** metal + spring metal + spring
	R97	R97 with external sealing lip for sealing against grease. at low speeds and with a very good, preferably ground or lapped contact surface, it can also be used for sealing against fluids.	-30°C ... +120°C -25°C ... +250°C	up to 20,0 m/s up to 20,0 m/s	0,1 bar (14,5 psi) 0,1 bar (14,5 psi)	**seal part** s-mart NBR s-mart FKM	**back-up ring** metal + spring metal + spring
	R118	R118 are components to be fitted in the housing bores where no input/output shaft is located. moreover they are used to plug and seal service bores. standard end covers are manufactured in accordance with bore tolerances recommended by DIN 3760 and ISO 6194/1 for radial oil seals. fully rubber covered.	-30°C ... +100°C -30°C ... +100°C -20°C ... +200°C	up to 6,0 m/s up to 6,0 m/s up to 6,0 m/s	0,5 bar (7,25 psi) 0,5 bar (7,25 psi) 0,5 bar (7,25 psi)	**seal part** s-mart NBR s-mart NBR s-mart FKM	**back-up ring** metal metal metal
	R119	R119 are components to be fitted in the housing bores where no input/output shaft is located. moreover they are used to plug and seal service bores. standard end covers are manufactured in accordance with bore tolerances recommended by DIN 3760 and ISO 6194/1 for radial oil seals.	-30°C ... +100°C -30°C ... +100°C -20°C ... +200°C	up to 6,0 m/s up to 6,0 m/s up to 6,0 m/s	0,5 bar (7,25 psi) 0,5 bar (7,25 psi) 0,5 bar (7,25 psi)	**seal part** s-mart NBR s-mart NBR s-mart FKM	**back-up ring** metal metal metal
	R120	R120 are components to be fitted in the housing bores where no input/output shaft is located. moreover they are used to plug and seal service bores. standard end covers are manufactured in accordance with bore tolerances recommended by DIN 3760 and ISO 6194/1 for radial oil seals.	-20°C ... +120°C -18°C ... +220°C -50°C ... +170°C	up to 6,0 m/s up to 6,0 m/s up to 6,0 m/s	0,5 bar (7,25 psi) 0,5 bar (7,25 psi) 0,5 bar (7,25 psi)	**seal part** s-mart NBR s-mart FKM s-mart MVQ	**back-up ring** metal metal metal
	R120	it consists of a thin-walled cylindrical tube with a mounting flange. the flange has a design breaking point and can be removed. the shaft repair kit has a wall thickness of approx. 0.254 mm and a spiral free ground surface. it is ideally suited as a counter face for rotary shaft lip seals.				**seal part** stainless steel ANSI 304	

product range seal

hydraulics & pneumatics : piston seal

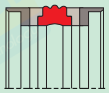
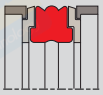
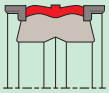
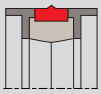
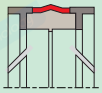
application	profile	description	temperature	max speed	max pressure	material	
	K01-P •	**hydraulic, single acting** asymmetric piston seal for standard applications. design provides stable fit in the housing,ultimate sealing effect over a wide temperature range. avoids extensive drag pressure. back-to-back arrangement with guide ring in between or for double acting pistons or to separate different fluids.	-30 °C ... +110 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C	0,5 m/s 0,5 m/s 0,7 m/s 0,5 m/s 0,5 m/s	400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi)	s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU	
	K01-R •	**hydraulic, single acting** as profile K01-P, but more adaptation possibilities for diverse temperatures and media by selection of suitable seal material.	-30 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +150 °C -25 °C ... +150 °C -60 °C ... +200 °C	0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s -	160 bar (2300 psi) 160 bar (2300 psi) 160 bar (2300 psi) 160 bar (2300 psi) -	s-mart NBR s-mart FKM s-mart EPDM s-mart HNBR s-mart MVQ	
	K02-P •	**hydraulic, single acting** asymmetric piston seal for standard applications as K01-P, but due to design with active back-up ring suitable for higher pressure range or larger extrusion gaps. K02-P for standard housing design.				**seal part** s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU	**back-up ring** s-mart POM/PA* s-mart POM/PA* s-mart POM/PA* s-mart POM/PA* s-mart POM/PA*
			-30 °C ... +100 °C -20 °C ... +100 °C -20 °C ... +100 °C -40 °C ... +100 °C -30 °C ... +100 °C	0,5 m/s 0,5 m/s 0,7 m/s 0,5 m/s 0,5 m/s	700 bar (10.000 psi) 700 bar (10.000 psi) 700 bar (10.000 psi) 700 bar (10.000 psi) 700 bar (10.000 psi)		
	K02-PD	**hydraulic, single acting** asymmetric piston seal for standard applications as K01-P, but due to design with active back-up ring suitable for higher pressure range or larger extrusion gaps. K02-P for short housings.				**seal part** s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU	**back-up ring** s-mart POM/PA* s-mart POM/PA* s-mart POM/PA* s-mart POM/PA* s-mart POM/PA*
			-30 °C ... +100 °C -20 °C ... +100 °C -20 °C ... +100 °C -40 °C ... +100 °C -30 °C ... +100 °C	0,5 m/s 0,5 m/s 0,7 m/s 0,5 m/s 0,5 m/s	700 bar (10.000 psi) 700 bar (10.000 psi) 700 bar (10.000 psi) 700 bar (10.000 psi) 700 bar (10.000 psi)		
	K02-R	**hydraulic, single acting** as profile K02-P, but more adaptation possibilities to diverse temperatures and media by selection of suitable seal material. K02-R for standard housing design.				**seal part** s-mart NBR s-mart NBR s-mart FKM s-mart EPDM** s-mart EPDM** s-mart EPDM** s-mart HNBR s-mart HNBR s-mart HNBR	**back-up ring** s-mart POM s-mart PA* s-mart PTFE glass s-mart POM s-mart PA s-mart PTFE glass s-mart POM s-mart PA* s-mart PTFE glass
			-30 °C ... +100 °C -30 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +100 °C -40 °C ... +100 °C -50 °C ... +150 °C -25 °C ... +100 °C -25 °C ... +100 °C -25 °C ... +150 °C	0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s	250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi)		
	K02-RD	**hydraulic, single acting** as profile K02-P, but more adaptation possibilities to diverse temperatures and media by selection of suitable seal material. K02-RD for short housings.				**seal part** s-mart NBR s-mart NBR s-mart FKM s-mart EPDM** s-mart EPDM** s-mart EPDM** s-mart HNBR s-mart HNBR s-mart HNBR	**back-up ring** s-mart POM s-mart PA* s-mart PTFE glass s-mart POM s-mart PA s-mart PTFE glass s-mart POM s-mart PA* s-mart PTFE glass
			-30 °C ... +100 °C -30 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +100 °C -40 °C ... +100 °C -50 °C ... +150 °C -25 °C ... +100 °C -25 °C ... +100 °C -25 °C ... +150 °C	0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s	250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi)		
	K02-SA •	**hydraulic, single acting** asymmetrical profile of the sealing lips, fabric reinforcement on the dynamic sealing side and back-up ring as a gap sealing component.				**seal part** s-mart NBR s-mart FKM s-mart EPDM** s-mart EPDM** s-mart HNBR s-mart HNBR	**back-up ring** s-mart POM/PA* s-mart PTFE+15% Glass-fibre+5% MoS2 s-mart POM/PA* s-mart PTFE+15% Glass-fibre+5% MoS2 s-mart POM/PA* s-mart PTFE+15% Glass-fibre+5% MoS2
			-30 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +100 °C -50 °C ... +150 °C -25 °C ... +100 °C -25 °C ... +150 °C	0,5 m/s	400 bar (5800 psi)		

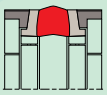
application	profile	description	temperature	max speed	max pressure	material		
	K03-P	**hydraulic, single acting**				**seal part**	**back-up ring**	
		o-ring activated, asymmetrical piston seal. interference fit on inside diameter maintains stable fit in the housing. design provides ultimate sealing effect. especially suitable for short stroke applications (e.g. spindle seals, coupling actuators…)	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU	s-mart NBR	
			-20 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart HPU	s-mart NBR	
			-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart LTPU	s-mart NBR	
			-20 °C ... +100 °C	0,7 m/s	400 bar (5800 psi)	s-mart SPU	s-mart NBR	
			-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart GPU	s-mart NBR	
			-50 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart LTPU	s-mart MVQ	
	K03-F	**PTFE-piston seal, single acting**				**seal part**	**o-ring**	
		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.	-20 °C ... +200 °C	1,0 m/s	100 bar (1450 psi)	s-mart PTFE virgin	s-mart FKM	
			-20 °C ... +200 °C	1,0 m/s	160 bar (2300 psi)	s-mart PTFE glass	s-mart FKM	
			-25 °C ... +150 °C	1,0 m/s	100 bar (1450 psi)	s-mart PTFE virgin	s-mart HNBR	
			-25 °C ... +150 °C	1,0 m/s	160 bar (2300 psi)	s-mart PTFE glass	s-mart HNBR	
			-60 °C ... + 80 °C	0,5 m/s	200 bar (2900 psi)	s-mart UHMWPE	s-mart MVQ	
			-60 °C ... +200 °C	1,0 m/s	100 bar (1450 psi)	s-mart PTFE virgin	s-mart MVQ	
			-60 °C ... +200 °C	1,0 m/s	160 bar (2300 psi)	s-mart PTFE glass	s-mart MVQ	
	K03-S	**PTFE-piston seal, single acting**				**seal part**	**spring**	
		helicoil spring activated, asymmetrical PTFE piston seal, low friction and no stickslip effect, excellent chemical and thermal resistance, mainly used in chemical, pharma and food industry or for valves.	-200 °C ...+260 °C	1,0 m/s	100 bar (1450 psi)	s-mart PTFE	1.4310	
			-200 °C ...+260 °C	1,0 m/s	160 bar (2300 psi)	s-mart PTFE glass	1.4310	
			-200 °C ...+ 80 °C	0,5 m/s	200 bar (2900 psi)	s-mart UHMWPE	1.4310	
	K04-P	**hydraulic, single acting**				**seal part**	**o-ring**	**back-up ring**
		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	-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart PU	s-mart NBR 70	s-mart POM/PA*
			-20 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart HPU	s-mart NBR 70	s-mart POM/PA*
			-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart LTPU	s-mart NBR 70	s-mart POM/PA*
			-20 °C ... +100 °C	0,7 m/s	700 bar (10.000 psi)	s-mart SPU	s-mart NBR 70	s-mart POM/PA*
			-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart GPU	s-mart NBR 70	s-mart POM/PA*
	K04-PD	**hydraulic, single acting**				**seal part**	**o-ring**	**back-up ring**
		asymmetric piston seal for standard applications as K03-P, but due to design with active back-up ring suitable for larger extrusion gaps. K04-PD for short housings.	-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart PU	s-mart NBR 70	s-mart POM/PA*
			-20 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart HPU	s-mart NBR 70	s-mart POM/PA*
			-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart LTPU	s-mart NBR 70	s-mart POM/PA*
			-20 °C ... +100 °C	0,7 m/s	700 bar (10.000 psi)	s-mart SPU	s-mart NBR 70	s-mart POM/PA*
			-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart GPU	s-mart NBR 70	s-mart POM/PA*
	K05-P •	**pneumatic, single acting**						
		asymmetric piston seal, extremely wear resistant, for use in lubricated or dry pneumatic applications. special design of sealing lip allows retention of initial lubricating film.	-30 °C ... +110 °C	1,0 m/s	25 bar (360 psi)	s-mart PU		
			-20 °C ... +110 °C	1,0 m/s	25 bar (360 psi)	s-mart HPU		
			-20 °C ... +110 °C	2,0 m/s	25 bar (360 psi)	s-mart SPU		
			-50 °C ... +110 °C	1,0 m/s	25 bar (360 psi)	s-mart LTPU		
			-30 °C ... +110 °C	1,0 m/s	25 bar (360 psi)	s-mart GPU		
	K05-R	**pneumatic, single acting**						
		asymmetric piston seal,good wear resistant,for use in lubricated or dry pneumatic applications. good adaptation possibilities for diverse temperatures and media by selection of suitable seal material. special design of sealing lip allows retention of initial lubricating film.	-30 °C ... + 80 °C	1,0 m/s	25 bar (360 psi)	s-mart NBR		
			-20 °C ... +200 °C	1,0 m/s	25 bar (360 psi)	s-mart FKM		
			-50 °C ... +150 °C	1,0 m/s	25 bar (360 psi)	s-mart EPDM**		
			-25 °C ... +150 °C	1,0 m/s	25 bar (360 psi)	s-mart HNBR		
	K05-SA •	**pneumatic, single acting**						
		a dynamic lip with no sharp edges which facilitates sliding. increased depth within the U profile to increase flexibility. the use of a urethane resin instead of rubber to increase seal life and facilitate the use of non-lubricated air.	-30 °C ... + 80 °C	1,0 m/s	16 bar (232 psi)	s-mart PU		
			-20 °C ... +110 °C	-	-	s-mart HPU		
			-20 °C ... +110 °C	-	-	s-mart SPU		
			-50 °C ... +110 °C	-	-	s-mart LTPU		
			-30 °C ... +110 °C	-	-	s-mart GPU		

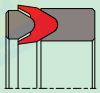
application	profile	description	temperature	max speed	max pressure	material
	K05-SB •	**pneumatic, single acting**				
		the seal type K05-SB has been specifically designed for use on single acting stroke cylinders with spring return, having a good guiding system. it has the same profile as the K05-SA type, but its difference, is in the lower pre-load on the external diameter which reduces both the friction and break-out pressure	-30 °C ... + 80 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C	1,0 m/s - - - -	16 bar (232 psi) - - - -	s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU
	K05-SC •	**pneumatic, single acting**				
		the profile K05-SC piston seal is a lip seal specially developed for use in pneumatics. the dimensions of the profile K05-SC standard series correspond to the cylinder diameters according to ISO 3320, CETOP RP 52 P, RP 43 P and RP 53 P. profile K05-SC is fully interchangeable with the profile K05-SD standard series formerly used in pneumatics. due to their special structural design, the profile K05-SC piston seals offer the following advantages when used in pneumatic equipment: sealing lip geometry designed to operate with lubricated air as well as dry and oil-free air. robust design based on favourable dimensions of seal cross-section. tight fit into the groove ensures reliable operation. optimal friction characteristics after careful initial lubrication obtained by sealing lip geometry retaining lubrication film. suitable for cylinders with cushioning. extended service life due to the use of proven elastomers. easy snap assembly in grooves of simple design.	-30 °C ... + 80 °C -30 °C ... + 80 °C -20 °C ... +200 °C -50 °C ... +150 °C -25 °C ... +150 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C	1,0 m/s 1,0 m/s - - - - - - -	16 bar (232 psi) 16 bar (232 psi) - - - - - - -	s-mart NBR s-mart PU s-mart FKM s-mart EPDM** s-mart HNBR s-mart HPU s-mart SPU s-mart LTPU s-mart GPU
	K05-SE •	**pneumatic, single acting**				
		u-ring with asymmetrical profile and special pneumatic sealing edge on the dynamic sealing lip. the asymmetrical profile with the longer and thicker static sealing lip ensure secure seating in the bottom of the groove. the special pneumatic sealing edge give very good tightness with low friction and maintains an effective lubricating film.	- 5 °C ... + 200 °C -25 °C ... + 100 °C -35 °C ... + 80 °C -50 °C ... +150 °C -25 °C ... +150 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C	up to 1,0 m/s up to 1,0 m/s up to 1,0 m/s - - - - - -	12 bar (174 psi) 12 bar (174 psi) 12 bar (174 psi) - - - - - -	s-mart FKM s-mart NBR s-mart PU s-mart EPDM** s-mart HNBR s-mart HPU s-mart SPU s-mart LTPU s-mart GPU
	K05-SF •	**pneumatic, single acting**				
		u-ring with asymmetrical profile and special pneumatic sealing edge on the dynamic sealing lip. the asymmetrical profile with the longer and thicker static sealing lip ensure secure seating in the bottom of the groove. the special pneumatic sealing edge give very good tightness with low friction and maintains an effective lubricating film. widely proven design. large supply range available. very good tribological properties wear, friction and long service life).	-20 °C ... + 100 °C -20 °C ... +200 °C -50 °C ... +150 °C -25 °C ... +150 °C	up to 1,0 m/s - - -	10 bar (145 psi) - - -	s-mart NBR s-mart FKM s-mart EPDM** s-mart HNBR
	K05-SI •	**pneumatic, single acting**				
		u-ring with asymmetrical profile and special pneumatic sealing edge on the dynamic sealing lip. the asymmetrical profile with the longer and thicker static sealing lip ensures secure seating in the bottom of the groove. the special pneumatic sealing edge gives very good tightness with low friction and maintains an effective lubricating film. material with high wear resistance and good low temperature properties.	-35 °C ... + 80 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C	1,0 m/s - - - -	12 bar (174 psi) - - - -	s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU
	K06-P •	**hydraulic, single acting**				
		symmetric piston seal for simple standard applications, not recommended for new designs (profile K01-P preferred). also for larger cross section, easier to install.	-30 °C ... +110 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C	0,5 m/s 0,5 m/s 0,7 m/s 0,5 m/s 0,5 m/s	400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi)	s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU
	K06-R •	**hydraulic, single acting**				
		as profile K06-P, but more adaptation possibilities for diverse temperatures and media by selection of suitable seal material. also for larger cross section, easier to install.	-30 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +150 °C -25 °C ... +150 °C -60 °C .. +200 °C	0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s -	160 bar (2300 psi) 160 bar (2300 psi) 160 bar (2300 psi) 160 bar (2300 psi) -	s-mart NBR s-mart FKM s-mart EPDM** s-mart HNBR s-mart MVQ

application	profile	description	temperature	max speed	max pressure	material	
	K06-SA •	**hydraulic & pneumatic, single acting** u-ring with symmetrical profile or pistons/rods.	-30 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +150 °C -25 °C ... +150 °C	0,5 m/s - - -	100 bar (1450 psi) - - -	s-mart NBR s-mart FKM s-mart EPDM** s-mart HNBR	
	K07-P •	**hydraulic, single acting** o-ring activated symmetric piston seal for simple standard applications, not recommended for new designs (profile K03-P preferred)	-30 °C ... +100 °C -20 °C ... +100 °C -20 °C ... +100 °C -30 °C ... +100 °C -30 °C ... +100 °C	0,5 m/s 0,5 m/s 0,7 m/s 0,5 m/s 0,5 m/s	400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi)	**seal part** s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU	**o-ring** s-mart NBR s-mart NBR s-mart NBR s-mart NBR s-mart NBR
	K08-E •	**hydraulic, single acting** o-ring activated asymmetric PTFE piston seal, low friction. for extreme low or high speed. suitable for positioning functions.	-30 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +150 °C -60 °C ... +200 °C -60 °C ... + 80 °C -30 °C ... +110 °C	10,0 m/s 10,0 m/s 10,0 m/s 10,0 m/s 10,0 m/s 5,0 m/s	400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 600 bar (8700 psi)	**glide ring** s-mart PTFE glass s-mart PTFE bronze s-mart PTFE carbon s-mart UHMWPE s-mart XPU	**o-ring** s-mart NBR s-mart FPM/FKM s-mart EPDM** s-mart MVQ s-mart MVQ s-mart NBR
	K08-D •	**hydraulic, double acting** o-ring activated symmetric PTFE piston seal, low friction. for extreme low or high speed, suitable for positioning functions. for mobile hydraulics, machine tools, injection moulding machines, heavy hydraulics.	-30 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +150 °C -60 °C ... +200 °C -60 °C ... + 80 °C -30 °C ... +110 °C	10,0 m/s 10,0 m/s 10,0 m/s 10,0 m/s 10,0 m/s 5,0 m/s	400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 600 bar (8700 psi)	**glide ring** s-mart PTFE glass s-mart PTFE bronze s-mart PTFE carbon s-mart UHMWPE s-mart XPU	**o-ring** s-mart NBR s-mart FPM/FKM s-mart EPDM** s-mart MVQ s-mart MVQ s-mart NBR
	K08-P •	**hydraulic, double acting** o-ring activated symmetric PU piston seal with excellent static and dynamic sealing capacity, extremely wear resistant.	-30 °C ... +100 °C -20 °C ... +100 °C -20 °C ... +100 °C -30 °C ... +100 °C	1,0 m/s 1,0 m/s 1,4 m/s 1,0 m/s	250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi)	**glide ring** s-mart PU s-mart HPU s-mart SPU s-mart LTPU	**o-ring** s-mart NBR s-mart NBR s-mart NBR s-mart NBR
	K08-ES •	**hydraulic, single acting** profile ring-activated asymmetric PTFE piston seal, similar to K08-E, but special heavy duty design. for heavy industry hydraulics or for special housing dimensions.	-30 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +150 °C -25 °C ... +150 °C -30 °C ... +110 °C	10,0 m/s 10,0 m/s 10,0 m/s 10,0 m/s 5,0 m/s	400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 600 bar (8700 psi)	**glide ring** s-mart PTFE glass s-mart PTFE bronze s-mart PTFE carbon s-mart XPU	**energizer** s-mart NBR s-mart FPM/FKM s-mart EPDM** s-mart HNBR s-mart NBR
	K08-DS •	**hydraulic, double acting** profile ring-activated symmetric PTFE piston seal, similar to S09-D, but special heavy duty design. for heavy industry hydraulics or for special housing dimensions.	-30 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +150 °C -25 °C ... +150 °C -30 °C ... +110 °C	10,0 m/s 10,0 m/s 10,0 m/s 10,0 m/s 5,0 m/s	400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 600 bar (8700 psi)	**glide ring** s-mart PTFE glass s-mart PTFE bronze s-mart PTFE carbon s-mart XPU	**energizer** s-mart NBR s-mart FPM/FKM s-mart EPDM** s-mart HNBR s-mart NBR
	K08-SA •	**hydraulic, double acting** K08-SA is a further technical development of the K08-D seal which has been successfully used for decades. it is fully interchangeable with the earlier K08 seals in all new applications. the benefits of the patented seal concept are provided by the innovative functional principle of the trapezoidal profile cross-section.	-30 °C ... +100 °C -10 °C ... +200 °C -30 °C ... +100 °C -10 °C ... +200 °C -45 °C ... +145 °C -30 °C ... +100 °C	15,0 m/s 15,0 m/s 15,0 m/s 15,0 m/s 15,0 m/s 15,0 m/s	600 bar (8702 psi) 600 bar (8702 psi) 250 bar (3626 psi) 250 bar (3626 psi) 250 bar (3626 psi) 800 bar (11603 psi)	**seal part** s-mart PTFE bronze s-mart PTFE bronze PTFE + high carbon fibre PTFE + high carbon fibre PTFE + high carbon fibre s-mart PU	**energizer** s-mart NBR s-mart FKM s-mart NBR s-mart FKM s-mart EPDM** s-mart NBR
	K08-SB •	**hydraulic, double acting** the K08-SB is a rubber energised plastic faced seal. the seal is designed to expand and improve the service parameters of o-rings and is installed in existing o-ring grooves. K08-SB combines the flexibility and response of o-rings with the wear and friction characteristics of the PTFE series materials in dynamic applications. the double acting performance of the seal follows from the symmetrical cross section which allow the seal to respond to pressure in both directions.	-30 °C ... +100 °C -10 °C ... +200 °C -30 °C ... +100 °C -10 °C ... +200 °C -45 °C ... +145 °C	15,0 m/s 15,0 m/s 15,0 m/s 15,0 m/s 15,0 m/s	350 bar (5076 psi) 350 bar (5076 psi) 250 bar (3626 psi) 250 bar (3626 psi) 250 bar (3626 psi)	**seal part** s-mart PTFE bronze s-mart PTFE bronze s-mart PTFE carbon s-mart PTFE carbon s-mart PTFE carbon	**energizer** s-mart NBR s-mart FKM s-mart NBR s-mart FKM s-mart EPDM**

application	profile	description	temperature	max speed	max pressure	material		
	K08-SC •	**hydraulic, double acting** the K08-SC is a double-acting seal consisting of a special polyurethane seal ring and an o-ring as energizing element. the particular characteristic of the seal is the special design of the seal edge profile. two external seal edges act as primary seal for pressures from both sides and prevent any build-up of hydrodynamic pressure over the seal profile and the risk of the blow-by effect. the central back-up and sealing bulge increases the sealing effect.	-35 °C ... +110 °C	0,5 m/s	250 bar (3626 psi)	**seal part** s-mart PU	**energizer** s-mart NBR	
	K08-SD •	**hydraulic, double acting** two-piece K08-SD comprising one profile ring with pronounced sealing edge and one contact pressure element for producing the pre-load.	-35 °C ... +110 °C	0,5 m/s	250 bar (3626 psi)	**seal part** s-mart PU	**energizer** s-mart NBR	
	K08-SE •	**hydraulic, double acting** the profile K08-SE piston sealing set is primarily designed for heavy hydraulic applications and is preferably fitted in double-acting pistons. the sealing set is suitable for working pressures up to 500 bar.	-30 °C ... +110 °C	1,0 m/s	500 bar (7251 psi)	**seal part** thermoplastic	**energizer** s-mart NBR	
	K08-SF •	**hydraulic, double acting** two-piece K08-SF comprising a profile ring and o-ring as a pre-load component. double-acting piston seal for the lower pressure range with the properties of low friction & low housing height.	-30 °C ... +100 °C -30 °C ... +100 °C	2,0 m/s 2,0 m/s	160 bar (2320 psi) 160 bar (2320 psi)	**seal part** s-mart PTFE carbon s-mart PTFE bronze	**energizer** s-mart NBR s-mart NBR	
	K08-SG •	**hydraulic, single acting** the K08-SG is a single-acting seal element consisting of a seal ring of high-grade PTFE series or PU materials and an o-ring as energizing element. due to its outstanding properties, however, it is equally well suited as a single-acting piston seal where high demands are made on positional accuracy and free movement	-30 °C ... +100 °C -10 °C ... +200 °C -30 °C ... +100 °C -10 °C ... +200 °C -30 °C ... +100 °C -10 °C ... +200 °C -45 °C ... +145 °C -30 °C ... +100 °C -10 °C ... +200 °C -45 °C ... +145 °C -30 °C ... +100 °C -10 °C ... +200 °C -30 °C ... +100 °C -10 °C ... +200 °C -45 °C ... +145 °C -30 °C ... +100 °C	15,0 m/s 15,0 m/s 15,0 m/s 15,0 m/s 15,0 m/s 15,0 m/s 15,0 m/s 15,0 m/s 15,0 m/s 15,0 m/s 15,0 m/s 15,0 m/s 15,0 m/s 15,0 m/s 15,0 m/s 15,0 m/s	700 bar (10152 psi) 700 bar (10152 psi) 800 bar (11603 psi) 800 bar (11603 psi) 300 bar (4351 psi) 300 bar (4351 psi) 300 bar (4351 psi) 700 bar (10152 psi) 700 bar (10152 psi) 700 bar (10152 psi) 400 bar (5800 psi) 400 bar (5800 psi) 700 bar (10152 psi) 700 bar (10152 psi) 700 bar (10152 psi) 800 bar (11603 psi)	**seal part** s-mart PTFE bronze s-mart PTFE bronze PTFE + high bronze PTFE + high bronze PTFE + carbon fibre PTFE + carbon fibre PTFE + carbon fibre PTFE + high carbon fibre PTFE + high carbon fibre PTFE + high carbon fibre s-mart PTFE glass s-mart PTFE glass PTFE + carbon graphite PTFE + carbon graphite PTFE + carbon graphite s-mart PU	**energizer** s-mart NBR s-mart FKM s-mart NBR s-mart FKM s-mart NBR s-mart FKM s-mart EPDM** s-mart NBR s-mart FKM s-mart EPDM** s-mart NBR s-mart FKM s-mart NBR s-mart FKM s-mart EPDM** s-mart NBR	
	K09-N	**hydraulic, double acting** profile ring-activated compact piston seal with integrated guiding elements. excellent static sealing capacity. commonly used in standard cylinders.	-30 °C ... +100 °C -20 °C ... +100 °C -30 °C ... +100 °C -20 °C ... +100 °C -30 °C ... +100 °C	0,5 m/s 0,5 m/s 0,5 m/s 0,7 m/s 0,5 m/s	400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi)	**seal part** s-mart PU s-mart HPU s-mart LTPU s-mart SPU s-mart GPU	**energizer** s-mart NBR s-mart NBR s-mart NBR s-mart NBR s-mart NBR	**back-up ring** s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart POM / PA*
	K09-D	**hydraulic, double acting** profile ring-activated compact piston seal with integrated guiding elements. excellent static and dynamic sealing capacity.	-30 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +150 °C -25 °C ... +150 °C -30 °C ... +110 °C	10,0 m/s 10,0 m/s 10,0 m/s 10,0 m/s 5,0 m/s	400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 600 bar (8700 psi)	**seal part** s-mart PU s-mart HPU s-mart LTPU s-mart SPU s-mart GPU	**energizer** s-mart NBR s-mart NBR s-mart NBR s-mart NBR s-mart NBR	**back-up ring** s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart POM / PA*
	K09-H	**hydraulic, double acting** profile ring-activated compact piston seal with integrated guiding elements. design for high pressure range, excellent static sealing capacity. mainly used in mining / tunneling industry.	-20 °C ... +100 °C -30 °C ... +100 °C	3 m/s 3 m/s	1500 bar (21700 psi) 1500 bar (21700 psi)	**seal part** s-mart HPU s-mart GPU	**energizer** s-mart NBR s-mart NBR	**back-up ring** s-mart POM / PA* s-mart POM / PA*
	K09-F	**hydraulic, double acting** profile ring-activated compact PTFE piston seal with integrated guiding elements. low friction, good chemical and thermal resistance.	-30 °C ... +100 °C -30 °C ... +100 °C -20 °C ... +200 °C -20 °C ... +200 °C	1,5 m/s 1,5 m/s 1,5 m/s 1,5 m/s	500 bar (7200 psi) 500 bar (7200 psi) 400 bar (5800 psi) 400 bar (5800 psi)	**seal part** s-mart PTFE glass s-mart PTFE glass s-mart PTFE glass s-mart PTFE glass	**energizer** s-mart NBR s-mart NBR s-mart FKM s-mart FKM	**back-up ring** s-mart POM s-mart PA s-mart PAEK s-mart PTFE carbon

application	profile	description	temperature	max speed	max pressure	material		
	K09-SA • 	**hydraulic, double acting** the K09-SA is a double-acting seal and guide element comprising an elastomeric profile seal ring, two back-up rings and two guide rings. the profile seal ring seals in both the static and dynamic range whilst the back-up rings prevent extrusion into the sealing gap. the function of the guide rings is to guide the piston in the cylinder tube and to absorb transverse forces. the design provides a compact seal and guide combination for a closed or split installation groove. this type is characterized by the straight, long-sided L-profiles of the guide rings. compared with type K09-SB, it exhibits a smaller groove depth with the same cylinder diameter.	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	**seal part** s-mart NBR	**back-up ring** polyester elastomer	**guide ring** s-mart POM
	K09-SB • 	**hydraulic, double acting** the K09-SB is a double-acting seal and guide element comprising an elastomeric profile seal ring, two back-up rings and two guide rings. the profile seal ring seals in both the static and dynamic range whilst the back-up rings prevent extrusion into the sealing gap. the function of the guide rings is to guide the piston in the cylinder tube and to absorb transverse forces. the design provides a compact seal and guide combination for a closed or split installation groove. this type is characterized by a Z-shaped back-up ring which forms a chamber with the elastomer seal ring on the inside and is centered on the outside by the guide ring. for many piston diameters, the width of the guide ring (dimension L2) can be selected due to sideloads. due to the larger groove depth, the profile of the seal ring is more rigid than that of K09-SA and requires higher installation forces.	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	**seal part** s-mart NBR	**back-up ring** polyester elastomer	**guide ring** s-mart POM
	K09-SC • 	**hydraulic, double acting** the K09-SC are double-acting piston seals with integrated guide rings. the combination of the elastomer energiser and the polyurethane special shaped sealing element provide excellent sealing effect and service life. the function of the guide rings is to guide the piston in the cylinder tube and to absorb transverse forces. for the K09-SC is designed without back-up rings. for easy installation in closed grooves, the combination into one stiff sealing element and one soft energizing element is required. back-up rings are unnecessary thanks to the high extrusion resistance of the polyurethane material.	-35 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	**seal part** s-mart PU	**energizer** s-mart NBR	**guide ring** s-mart POM
	K09-SD • 	**hydraulic, double acting** the K09-SD are double-acting piston seals with integrated guide rings. the combination of the elastomer energiser and the polyurethane special shaped sealing element provide excellent sealing effect and service life. the function of the guide rings is to guide the piston in the cylinder tube and to absorb transverse forces. the K09-SD design includes T-shaped back-up/guide rings and a combination of seal ring and energizer.	-35 °C ... +110 °C -20 °C ... +100 °C -30 °C ... +100 °C -20 °C ... +100 °C -30 °C ... +100 °C	0,5 m/s - - - -	400 bar (5800 psi) - - - -	**seal part** s-mart PU s-mart HPU s-mart LTPU s-mart SPU s-mart GPU	**energizer** s-mart NBR s-mart NBR s-mart NBR s-mart NBR s-mart NBR	**guide ring** s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart POM / PA*
	K09-SE •• 	**hydraulic, double acting** the K09-SE profile has been designed for its installation in closed grooves. the radial dimension of the profile has been reduced to the minimum to allow the necessary deformation during installation in closed grooves. consequently its use must be limited to pressures up to 35 MPa. the K09-SE & K09-SF types are double acting piston seals with integrated guide rings. It has been designed to optimize the advantages of the materials selection: fabric reinforcement with high mechanical strength, optimum thermal stability and lubricating properties is incorporated in the sealing element all over the dynamic contact area. for the K09-SF the reinforcement is extended on both sides to improve the extrusion resistance. acetal resin with improved form stability gives the guide/backup rings high distortion and extrusion resistance. nitrile based elastomer with optimum elasticity and low compression set provides the initial radial pre-load.	-30 °C ... +130 °C -20 °C ... +100 °C	0,5 m/s -	350 bar (5076 psi) -	**seal part** NBR fabric s-mart HPU	**energizer** NBR s-mart NBR	**guide ring** s-mart POM s-mart POM / PA*

application	profile	description	temperature	max speed	max pressure	material		
	K09-SF ••	**hydraulic, double acting**				**seal part**	**energizer**	**guide ring**
		the K09-SF profile is much more robust and can therefore be used for pressure level up to 70 MPa. the K09-SE & K09-SF types are double acting piston seals with integrated guide rings. it has been designed to optimize the advantages of the materials selection: fabric reinforcement with high mechanical strength, optimum thermal stability and lubricating properties is incorporated in the sealing element all over the dynamic contact area. for the K09-SF the reinforcement is extended on both sides to improve the extrusion resistance. nitrile based elastomer with optimum elasticity and low compression set provides the initial radial pre-load. acetal resin with improved form stability gives the guide/backup rings high distortion and extrusion resistance	-30 °C ... +130 °C -20 °C ... +100 °C	0,5 m/s -	700 bar (10152 psi) -	NBR fabric s-mart HPU	NBR s-mart HPU	s-mart POM s-mart POM / PA*
	K09-SJ •	**hydraulic, double acting**				**seal part & energizer**	**back-up ring**	**guide ring**
		five-piece K09-SJ comprising one profile ring, two back-up rings and two angled bushes. the K09-SJ is used for sealing pistons with pressure on both sides. the angled rings guide the piston on the cylinder bore. no extrusion into the radial sealing gap, suitable for rapid pressure change, sealing component protected against twisting.	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart NBR	polyester elastomer	thermoplast
	K09-SK •	**hydraulic, double acting**				**seal part & energizer**	**back-up ring**	**guide ring**
		injection moulding proses and also can be machined.	-30 °C ... +100 °C	0,5 m/s	700 bar (10152 psi)	s-mart NBR	NBR fabric	s-mart POM
	K09-SL •	**hydraulic, double acting**				**seal part & energizer**	**back-up ring**	**guide ring**
		injection moulding proses and also can be machined.	-30 °C ... +100 °C	0,5 m/s	500 bar (7251 psi)	s-mart NBR	NBR fabric	s-mart POM
	K1012-T	**hydraulic, single acting**				**K 10-A**	**K 11-T**	**K 12-T**
		chevron sealing set, machined surface design. in back-to-back arrangement with one intermediate chevron for double sided pressure activation, in single acting applications with more intermediate chevrons possible for heavy industry hydraulics.	-30 °C ... +100 °C -20 °C ... +100 °C -40 °C ... +100 °C -20 °C ... +100 °C -30 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +150 °C -25 °C ... +150 °C	0,5 m/s 0,5 m/s 0,5 m/s 0,7 m/s 0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s	500 bar (7200 psi) 500 bar (7200 psi) 500 bar (7200 psi) 500 bar (7200 psi) 250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi)	s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart PTFE glass s-mart PTFE glass s-mart PTFE glass s-mart PTFE glass	s-mart PU s-mart HPU s-mart LTPU s-mart SPU s-mart NBR s-mart FKM s-mart EPDM** s-mart HNBR	s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart PTFE glass s-mart PTFE glass s-mart PTFE glass s-mart PTFE glass
	K1012-M	**hydraulic, single acting**				**K 10-A**	**K 11-T**	**K 12-M**
		chevron sealing set, parted surface design. in back-to-back arrangement with one intermediate chevron for double sided pressure activation, in single acting applications with more intermediate chevrons possible for heavy industry hydraulics.	-30 °C ... +100 °C -20 °C ... +100 °C -40 °C ... +100 °C -20 °C ... +100 °C -30 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +150 °C -25 °C ... +150 °C	0,5 m/s 0,5 m/s 0,5 m/s 0,7 m/s 0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s	500 bar (7200 psi) 500 bar (7200 psi) 500 bar (7200 psi) 500 bar (7200 psi) 250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi)	s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart PTFE glass s-mart PTFE glass s-mart PTFE glass s-mart PTFE glass	s-mart PU s-mart HPU s-mart LTPU s-mart SPU s-mart NBR s-mart FKM s-mart EPDM** s-mart HNBR	s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart PTFE glass s-mart PTFE glass s-mart PTFE glass s-mart PTFE glass
	K1012-SA •	**hydraulic, single acting**				**seal part**	**back-up ring**	**guide ring**
		K1012-SA seals are sets of fabric reinforced chevron rings. they are composed by a support ring, "V" shaped sealing rings and a pressure energizing ring. the support ring or base ring guides and sustains the other "V" shaped rings for best performance. special versions provide incorporated anti-extrusion rings, either on the inner or outer side, for rod or piston applications. in standard version the support ring is manufactured in cotton fabric reinforced rubber, for a good anti-extrusion resistance. the intermediate "V" shaped rings (vee-rings) are the real sealing elements of K1012-SA seals. in standard version they are made in cotton fabric reinforced NBR and pure NBR. the energizer ring ensures uniform loading of pressure on the other rings.	-30 °C ... +130 °C -20 °C ... +150 °C -20 °C ... +200 °C -30 °C ... +100 °C -20 °C ... +100 °C -40 °C ... +100 °C -20 °C ... +100 °C -30 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +150 °C -25 °C ... +150 °C	0,5 m/s 0,5 m/s 0,5 m/s - - - - - - - -	400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) - - - - - - - -	NBR fabric FKM fabric FKM fabric s-mart PU s-mart HPU s-mart LTPU s-mart SPU s-mart NBR s-mart FKM s-mart EPDM s-mart HNBR	NBR fabric FKM fabric FKM aramid fibre s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart PTFE glass s-mart PTFE glass s-mart PTFE glass s-mart PTFE glass	s-mart POM s-mart POM s-mart PTFE s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart PTFE glass s-mart PTFE glass s-mart PTFE glass s-mart PTFE glass

application	profile	description	temperature	max speed	max pressure	material		
	K1315-T	**hydraulic, double acting**				**K13-T**	**K14-T**	**K15-T**
		chevron sealing set, design with flexible sealing lips, good sealing ability in higher pressure range. for heavy industry hydraulics, water hydraulic systems	-30 °C ... +100 °C	0,5 m/s	600 bar (8700 psi)	s-mart POM / PA*	s-mart PU	s-mart POM / PA*
			-20 °C ... +100 °C	0,5 m/s	600 bar (8700 psi)	s-mart POM / PA*	s-mart HPU	s-mart POM / PA*
			-40 °C ... +100 °C	0,5 m/s	600 bar (8700 psi)	s-mart POM / PA*	s-mart LTPU	s-mart POM / PA*
			-20 °C ... +100 °C	0,7 m/s	600 bar (8700 psi)	s-mart POM / PA*	s-mart SPU	s-mart POM / PA*
	K16-A •	**hydraulic/pneumatic, single acting**						
		simple cup seal, usually fixed on the piston by means of a clamping plate. mainly used for replacement in old hydraulic and pneumatic cylinders or for low-grade secondary applications. also used for food filling / portioning equipment.	-30 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart PU		
			-20 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart HPU		
			-50 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart LTPU		
			-20 °C ... +110 °C	0,7 m/s	160 bar (2300 psi)	s-mart SPU		
			-30 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart GPU		
			-30 °C ... +100 °C	0,5 m/s	160 bar (2300 psi)	s-mart NBR		
			-25 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart HNBR		
			-20 °C ... +200 °C	0,5 m/s	160 bar (2300 psi)	s-mart FKM		
			-50 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart EPDM**		
	K16-B	**hydraulic/pneumatic, single acting**						
		simple cup seal, usually fixed on the piston by means of a clamping plate. mainly used for replacement in old hydraulic and pneumatic cylinders or for low-grade secondary applications. also used for food filling / portioning equipment.	-30 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart PU		
			-20 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart HPU		
			-50 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart LTPU		
			-20 °C ... +110 °C	0,7 m/s	160 bar (2300 psi)	s-mart SPU		
			-30 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart GPU		
			-30 °C ... +100 °C	0,5 m/s	160 bar (2300 psi)	s-mart NBR		
			-25 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart HNBR		
			-20 °C ... +200 °C	0,5 m/s	160 bar (2300 psi)	s-mart FKM		
			-50 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart EPDM**		
	K16-SA •••	**hydraulic, single acting**				**seal part**	**energizer**	
		lips seal, spring-loaded in some cases, clamping flange for axial fixing in the housing	-30 °C ... +100 °C	0,5 m/s	10 bar (145 psi)	NBR fabric	spring	
	K17-P •	**hydraulic, double acting**				**seal part**	**back-up ring**	
		space saving, compact piston seal with integrated guiding elements. excellent static sealing capacity, suitable for small housings.	-30 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart PU	s-mart POM / PA*	
			-20 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart HPU	s-mart POM / PA*	
			-40 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart LTPU	s-mart POM / PA*	
			-20 °C ... +100 °C	0,7 m/s	250 bar (3600 psi)	s-mart SPU	s-mart POM / PA*	
	K17-R	**hydraulic, double acting**				**seal part**	**back-up ring**	
		space saving, compact piston seal with integrated guiding elements. excellent static sealing capacity, good adaptation possibilities for diverse temperatures and media by selection of suitable material. suitable for small housings.	-30 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart NBR	s-mart POM	
			-30 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart NBR	s-mart PA*	
			-20 °C ... +200 °C	0,5 m/s	250 bar (3600 psi)	s-mart FKM	s-mart PTFE glass	
			-20 °C ... +200 °C	0,5 m/s	250 bar (3600 psi)	s-mart FKM	s-mart PAEK	
	K17-SA •	**hydraulic, double acting**				**seal part & energizer**	**guide ring**	
		the profile K17-SA piston sealing set can be used as a double or single acting piston seal. It consists of a polyurethane sealing element and two integrated angular guide rings which simultaneously act as anti-extrusion rings.	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU	s-mart POM / PA*	
			-20 °C ... +100 °C	-	-	s-mart HPU	s-mart POM / PA*	
			-30 °C ... +100 °C	-	-	s-mart LTPU	s-mart POM / PA*	
			-20 °C ... +100 °C	-	-	s-mart SPU	s-mart POM / PA*	
			-30 °C ... +100 °C	-	-	s-mart GPU	s-mart POM / PA*	
	K17-SB •	**hydraulic, double acting**				**seal part & energizer**	**guide ring**	
			-30 °C ... +100 °C	0,5 m/s	150 bar (2175 psi)	s-mart PU	s-mart POM / PA*	
			-20 °C ... +100 °C	-	-	s-mart HPU	s-mart POM / PA*	
			-30 °C ... +100 °C	-	-	s-mart LTPU	s-mart POM / PA*	
			-20 °C ... +100 °C	-	-	s-mart SPU	s-mart POM / PA*	
			-30 °C ... +100 °C	-	-	s-mart GPU	s-mart POM / PA*	
	K19-F •	**PTFE-piston seal, single acting**				**seal part**	**spring**	
		finger-spring activated, asymmetrical PTFE piston seal, low friction and good dry running properties, excellent chemical and thermal resistance, mainly used in chemical, pharma and food industry.	-200 °C ... +260 °C	15 m/s	100 bar (1450 psi)	s-mart PTFE virgin	1.4310	
			-200 °C ... +260 °C	15 m/s	160 bar (2300 psi)	s-mart PTFE glass	1.4310	
			-200 °C ... +260 °C	15 m/s	160 bar (2300 psi)	s-mart PTFE bronze	1.4310	
			-200 °C ... +80 °C	15 m/s	200 bar (2900 psi)	s-mart UHMWPE	1.4310	

application	profile	description	temperature	max speed	max pressure	material		
	K20-R	**hydraulic, double acting**				**seal part**		**back-up ring**
		space saving, compact piston seal, suitable for standard o-ring housings. advantage compared to o-ring: integrated active back-up rings for high pressure, design with interference fit on outside diameter prevents twisting in dynamic applications.	-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart NBR		s-mart POM / PA*
			-25 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart HNBR		s-mart POM / PA*
			-20 °C ... +200 °C	0,5 m/s	700 bar (10.000 psi)	s-mart FKM		s-mart PAEK
			-25 °C ... +150 °C	0,5 m/s	700 bar (10.000 psi)	s-mart HNBR		s-mart PTFE
	K21-P	**hydraulic, single acting**				**seal part**		**o-ring**
		o-ring activated symmetric rod seal with sharp-edged sealing lips, good sealing effect for high viscosity fluids, not recommended for new designs (profile S03-P preferred).	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU		s-mart NBR
			-20 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart HPU		s-mart NBR
			-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart SPU		s-mart NBR
			-20 °C ... +100 °C	0,7 m/s	400 bar (5800 psi)	s-mart LTPU		s-mart NBR
			-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart GPU		s-mart NBR
	K22-R	**hydraulic, single acting**				**seal part**		**support ring**
		symmetric piston seal as K22-P, but more adaptation possibilities for diverse temperatures and media by selection of suitable seal material. retainer ring in angled design possible.	-30 °C ... +100 °C	0,5 m/s	160 bar (2300 psi)	s-mart NBR		s-mart POM
			-30 °C ... +100 °C	0,5 m/s	160 bar (2300 psi)	s-mart NBR		s-mart PA
			-20 °C ... +200 °C	0,5 m/s	160 bar (2300 psi)	s-mart FKM		s-mart PTFE glass
			-50 °C ... +100 °C	0,5 m/s	160 bar (2300 psi)	s-mart EPDM**		s-mart POM
			-40 °C ... +100 °C	0,5 m/s	160 bar (2300 psi)	s-mart EPDM**		s-mart PA
			-50 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart EPDM**		s-mart PTFE glass
			-25 °C ... +100 °C	0,5 m/s	160 bar (2300 psi)	s-mart HNBR		s-mart POM
			-25 °C ... +100 °C	0,5 m/s	160 bar (2300 psi)	s-mart HNBR		s-mart PA
			-25 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart HNBR		s-mart PTFE glass
	K22-P	**hydraulic, single acting**				**seal part**		**support ring**
		symmetric piston seal with support ring for simple applications to serve repair purpose, not recommended for new designs (profile K01-P preferred). retainer ring in angled design possible.	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU		s-mart POM / PA*
			-20 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart HPU		s-mart POM / PA*
			-40 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart SPU		s-mart POM / PA*
			-20 °C ... +100 °C	0,7 m/s	400 bar (5800 psi)	s-mart LTPU		s-mart POM / PA*
			-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart GPU		s-mart POM / PA*
	K23-N	**hydraulic, double acting**				**seal part**	**energizer**	**back-up ring**
		profile ring-activated compact piston seal with integrated back-up rings, excellent static sealing capacity. external guiding elements required.	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU	s-mart NBR	s-mart POM / PA*
			-20 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart HPU	s-mart NBR	s-mart POM / PA*
			-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart SPU	s-mart NBR	s-mart POM / PA*
			-20 °C ... +100 °C	0,7 m/s	400 bar (5800 psi)	s-mart LTPU	s-mart NBR	s-mart POM / PA*
			-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart GPU	s-mart NBR	s-mart POM / PA*
	K23-D	**hydraulic, double acting**				**seal part**	**energizer**	**back-up ring**
		profile ring-activated compact piston seal with integrated back-up rings. excellent static and dynamic sealing capacity. external guiding elements required.	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU	s-mart NBR	s-mart POM / PA*
			-20 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart HPU	s-mart NBR	s-mart POM / PA*
			-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart SPU	s-mart NBR	s-mart POM / PA*
			-20 °C ... +100 °C	0,7 m/s	400 bar (5800 psi)	s-mart LTPU	s-mart NBR	s-mart POM / PA*
			-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart GPU	s-mart NBR	s-mart POM / PA*
	K23-H	**hydraulic, double acting**				**seal part**	**energizer**	**back-up ring**
		profile ring-activated compact piston seal with integrated back-up rings. design for high pressure range, excellent static sealing capacity. mainly used in mining / tunneling industry. external guiding elements required.	-20 °C ... +100 °C	0,3 m/s	1500 bar (21000 psi)	s-mart HPU	s-mart NBR	s-mart POM / PA*
			-30 °C ... +100 °C	0,3 m/s	1500 bar (21000 psi)	s-mart GPU	s-mart NBR	s-mart POM / PA*
	K23-F •	**hydraulic, double acting**				**seal part**	**energizer**	**back-up ring**
		profile ring-activated compact PTFE piston seal with integrated back-up rings. low friction, good chemical and thermal resistance. external guiding elements required.	-30 °C ... +100 °C	1,5 m/s	500 bar (7200 psi)	s-mart PTFE glass	s-mart NBR	s-mart POM
			-30 °C ... +100 °C	1,5 m/s	500 bar (7200 psi)	s-mart PTFE glass	s-mart NBR	s-mart PA
			-20 °C ... +200 °C	1,5 m/s	400 bar (5800 psi)	s-mart PTFE glass	s-mart FKM	s-mart PEEK
			-20 °C ... +200 °C	1,5 m/s	400 bar (5800 psi)	s-mart PTFE glass	s-mart FKM	s-mart PTFE carbon
			-20 °C ... +200 °C	1,5 m/s	400 bar (5800 psi)	s-mart PTFE carbon	s-mart FKM	s-mart PTFE carbon
	K23-SA •	**hydraulic, double acting**				**seal part**	**back-up ring**	**guide ring**
		the K23-SA Seal is a high-pressure heavy-duty piston seal with excellent leakage control and superior extrusion and wear resistance. the K23-SA seal is a combination of a polyurethane slipper seal energised by an elastomer profile ring and completed with two Back-up rings (POM). it is manufactured with a predefined interference fit, which together with the squeeze of the elastomer part ensures a good sealing effect even at low system pressure. at higher pressures the elastomer part is energised by the system pressure and consequently activates the slipper seal in the radial direction. the back-up rings prevent the slipper seal from extrusion and ensure a long service life even under harsh conditions.	-35 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU	s-mart NBR	s-mart POM / PA*
			-20 °C ... +200 °C	-	-	s-mart HPU	s-mart NBR	s-mart POM / PA*
			-30 °C ... +100 °C	-	-	s-mart LTPU	s-mart NBR	s-mart POM / PA*
			-20 °C ... +100 °C	-	-	s-mart SPU	s-mart NBR	s-mart POM / PA*
			-30 °C ... +100 °C	-	-	s-mart GPU	s-mart NBR	s-mart POM / PA*

application	profile	description	temperature	max speed	max pressure	material		
	K23-SB ••	**hydraulic, double acting** three-piece K23-SB consisting of a fabric reinforced elastomeric sealing element and two guide back-up rings as gap sealing component.	-35 °C ... +110 °C	0,5 m/s	500 bar (7251 psi)	**seal part & energizing** NBR fabric & NBR	**guide-ring** s-mart POM	
	K23-SC ••	**hydraulic, double acting** injection moulding proses and also can be machined.	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	**seal part** s-mart NBR	**back-up ring** NBR fabric	
	K23-SD ••	**hydraulic, double acting** injection moulding proses and also can be machined.	-30 °C ... +100 °C	0,5 m/s	700 bar (10152 psi)	**seal part** s-mart NBR	**back-up ring** NBR fabric	**guide-ring** s-mart POM
	K23-SE •	**hydraulic, double acting** injection moulding proses and also can be machined.	-30 °C ... +100 °C -30 °C ... +100 °C	0,5 m/s -	500 bar (7251 psi) -	**seal part** s-mart NBR s-mart NBR	**back-up ring** Polyester elastomer s-mart HPU	**guide-ring** s-mart POM s-mart POM / PA*
	K23-SF •	**hydraulic, double acting** injection moulding proses and also can be machined.	-30 °C ... +100 °C -30 °C ... +100 °C	0,5 m/s -	500 bar (7251 psi) -	**seal part** s-mart NBR s-mart NBR	**back-up ring** Polyester elastomer s-mart HPU	**guide-ring** s-mart POM s-mart POM / PA*
	K24-P	**hydraulic, single acting** chevron ring with flexible lip design. replacement part for standard commercial housings (male and female adapter mainly made of metal).	-30 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -20 °C ... +110 °C -30 °C ... +110 °C -30 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +150 °C -25 °C ... +150 °C	0,5 m/s 0,5 m/s 0,5 m/s 0,7 m/s 0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s	500 bar (7200 psi) 500 bar (7200 psi) 500 bar (7200 psi) 500 bar (7200 psi) 500 bar (7200 psi) 250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi)	**seal part** s-mart PU s-mart HPU s-mart LTPU s-mart SPU s-mart GPU s-mart NBR s-mart FKM s-mart EPDM** s-mart HNBR		
	K32-P	**hydraulic, double acting** chevron sealing set,design with extremely flexible sealing lips for difficult operating conditions like bad guiding, large tolerance range.available as total chevron sealing set as well as intermediate chevrons only (in case of metal male and female adapters).	-30 °C ... +100 °C -20 °C ... +100 °C -40 °C ... +100 °C -20 °C ... +100 °C -30 °C ... +100 °C	0,5 m/s 0,5 m/s 0,5 m/s 0,7 m/s 0,5 m/s	500 bar (7200 psi) 500 bar (7200 psi) 500 bar (7200 psi) 500 bar (7200 psi) 500 bar (7200 psi)	**seal part** s-mart PU s-mart HPU s-mart LTPU s-mart SPU s-mart GPU	**collar** s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart POM / PA*	**guide-ring** s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart POM / PA*
	K35-P •	**hydraulic, double acting** compact piston seal with almost no dead spots as required for applications in food and pharma industry, also commonly used as o-ring replacement, because design with interference fit on outside diameter maintains non-twisting in dynamic applications.	-30 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -20 °C ... +110 °C -30 °C ... +110 °C	0,4 m/s 0,4 m/s 0,4 m/s 0,5 m/s 0,4 m/s	400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi)	**seal part** s-mart PU s-mart HPU s-mart LTPU s-mart SPU s-mart GPU		
	K60 •	**hydraulic, double acting** the seal profile of the K60 has been redesigned on both the dynamic and static sealing surface. two o-rings are used to energize the seal instead of one. the K60 combines the benefits of a low-friction PTFE filled slipper seal with the high sealing characteristics of an elastomeric seal by incorporating a limited foot print x-ring seal in the dynamic sealing face. this optimizes leakage control while minimizing friction. the particular characteristics of the K60 are the special seal profile with a defined seal edge and the use of two o-rings as energizing elements to optimize the pressure profile and to reduce the force of attack at gas permeability.	-30 °C ... +100 °C -10 °C ... +200 °C -30 °C ... +100 °C -10 °C ... +200 °C -45 °C ... +145 °C -30 °C ... +100 °C -10 °C ... +200 °C -45 °C ... +145 °C	3,0 m/s 3,0 m/s 3,0 m/s 3,0 m/s 3,0 m/s 3,0 m/s 3,0 m/s 3,0 m/s	600 bar (8700 psi) 600 bar (8700 psi) 250 bar (3620 psi) 250 ba (3620 psi) 250 ba (3620 psi) 600 bar (8700 psi) 600 bar (8700 psi) 600 bar (8700 psi)	**seal part** s-mart PTFE bronze s-mart PTFE bronze PTFE + carbon fibre PTFE + carbon fibre PTFE + carbon fibre PTFE + carbon graphite PTFE + carbon graphite PTFE + carbon graphite	**energizer** s-mart NBR s-mart FKM s-mart NBR s-mart FKM s-mart EPDM** s-mart NBR s-mart FKM s-mart EPDM**	

application	profile	description	temperature	max speed	max pressure	material	
	K61 •	**hydraulic, double acting** the K61 is a double-acting seal consisting of a seal ring of high-grade modified PTFE filled material, a x-ring seal and an o-ring as energizing element. the K61 seal ring and the x-ring seal together assume the dynamic sealing function whilst the o-ring performs the static sealing function.	-30 °C ... +100 °C -45 °C ... + 80 °C -10 °C ... +200 °C -30 °C ... +100 °C -45 °C ... + 80 °C -10 °C ... +200 °C -45 °C ... +145 °C -30 °C ... +100 °C -45 °C ... + 80 °C -10 °C ... +200 °C -45 °C ... +145 °C	2,0 m/s 2,0 m/s 2,0 m/s 2,0 m/s 2,0 m/s 2,0 m/s 2,0 m/s 2,0 m/s 2,0 m/s 2,0 m/s 2,0 m/s	400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 250 bar (3620 psi) 250 bar (3620 psi) 250 bar (3620 psi) 250 bar (3620 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi)	**seal part** s-mart PTFE bronze s-mart PTFE bronze s-mart PTFE bronze PTFE + carbon fibre PTFE + carbon fibre PTFE + carbon fibre PTFE + carbon fibre PTFE + carbon graphite PTFE + carbon graphite PTFE + carbon graphite PTFE + carbon graphite	**energizer** s-mart NBR s-mart NBR s-mart FKM s-mart NBR s-mart NBR s-mart FKM s-mart EPDM** s-mart NBR s-mart NBR s-mart FKM s-mart EPDM**
	K62 ••	**hydraulic, double acting** the piston seal K62 range has been designed to meet the needs of hydraulic equipments operating at high pressures and subjected to severe loading and vibration conditions. the main sealing element is manufactured in a highly compression set resistant nitrile. the most important quality of this element is the design of the multiple sealing lips for maximum sealing efficiency and end face configuration, which ensures that the K62 can tolerate vibrations and severe misalignment. the two support rings are made in cotton fabric reinforced nitrile elastomer; the "u" shape is energised when pressure is applied. the last elements are the two guide rings manufactured in acetal resin which have also the function of anti-extrusion rings.	-40 °C ... +130 °C -30 °C ... +100 °C	0,5 m/s -	700 bar (10152 psi) -	**seal part** s-mart NBR s-mart NBR	**support ring** NBR fabric s-mart HPU	**guide-ring** s-mart POM s-mart POM / PA*
	K63 •••	**pneumatic, single acting** this seal is suitable for pneumatic cylinders, principally "K09" short stroke single or double acting, or magnetic pistons. the guiding element for the piston is in the seal itself which is designed with the proper radial and axial gaps to ensure constant lubrication from the entropped grease. the magnet is housed in a groove between the two opposed seals.	-30 °C ... + 80 °C	1,0 m/s	16 bar (232 psi)	**seal part** s-mart PU	
	K64 •••	**pneumatic, single acting** this seal is suitable for pneumatic cylinders, principally "K09" short stroke single or double acting, or magnetic pistons. the guiding element for the piston is in the seal it self which is designed with the proper radial and axial gaps to ensure constant lubrication from the entropped grease. the magnet is housed in a groove between the two opposed seals.	-30 °C ... + 80 °C	1,0 m/s	16 bar (232 psi)	**seal part** s-mart PU	
	K65 ••	**hydraulic, single acting** the profile K65 cylinder sealing set is manufactured in two parts and consists of a fabric reinforced symmetrical lip ring and a back-up ring made of fabric reinforced hard rubber. the lip ring has an integral support thus obviating the necessity for a separate header rings as found in normal seal ring arrangements. the header ring prevents extrusion damage to the lip ring occuring in the clearance between the piston and the cylinder wall.	-40 °C ... +100 °C	1,0 m/s	500 bar (7251 psi)	**seal part** NBR fabric & NBR	
	K66 •	**hydraulic, single acting** the profile K66 piston sealing set is particularly suitable for double-acting pistons because of its low height.	-40 °C ... +100 °C	0,5 m/s	250 bar (3625 psi)	**seal part** s-mart NBR fabric	**back-up ring** s-mart NBR / POM
	K67 •••	**hydraulic, double acting** the Piston seal K67 with steel base plate and vulcanised, springloaded sealing lips.	-30 °C ... +100 °C	0,5 m/s	60 bar (870 psi)	**seal part** s-mart NBR	**back-up ring** spring steel wire

application	profile	description	temperature	max speed	max pressure	material	
	K68 •••	**pneumatic, double acting** the piston K68 with steel base plate and vulcanised sealing lips with special pneumatic sealing edges.	-30 °C ... +100 °C -30 °C ... + 80 °C	1,0 m/s 1,0 m/s	12 bar (174 psi) 12 bar (174 psi)	**seal part** s-mart NBR s-mart PU	**base plate** metal (mild steel) metal (mild steel)
	K69 •••	**pneumatic, single acting** the profile K69 is a complete pneumatic piston with a cup seal and a vulcanized metal disc support. it performs two functions: sealing and guiding.	-30 °C ... + 80 °C	1,0 m/s	16 bar (232 psi)	**seal part** s-mart NBR	**base plate** metal (mild steel)
	K70 •••	**pneumatic, single acting** the piston K70 with steel base plate, vulcanised buffers and sealing lips with special pneumatic sealing edges. ready to install this piston with integrated guide that can be pressurised on both sides.	-20 °C ... + 100 °C	1,0 m/s	10 bar (145 psi)	**seal part** s-mart NBR	**base plate** metal (mild steel)
	K71 •••	**pneumatic, single acting** the profile K71 is a complete pneumatic piston with a cup seal and a vulcanized metal disc support. it performs three functions: sealing, guiding and cushioning.	-30 °C ... + 100 °C	1,0 m/s	12 bar (174 psi)	**seal part** s-mart NBR	**base plate** metal (mild steel)
	K72 •••	**pneumatic, double acting** the piston K72 with light alloy/ polyamide body, snap-action seal and integrated guide.	-20 °C ... + 100 °C	1,0 m/s	10 bar (145 psi)	**seal part** s-mart NBR	**base plate & guide ring** s-mart POM & PA
	K73 •••	**pneumatic, double acting** the profile K73 pneumatic piston seal is a double u-ring with an integral guiding surface for double-acting pistons.	-30 °C ... + 80 °C	1,0 m/s	16 bar (232 psi)	**seal part** s-mart NBR	
	K74 •••	**pneumatic, double acting** the profile K74 pneumatic piston seal is a u-ring with an integral guiding surface for single acting pistons.	-30 °C ... + 80 °C	1,0 m/s	16 bar (232 psi)	**seal part** s-mart NBR	
	K75 •	**pneumatic, double acting** the profile K75 pneumatic cylinder seal has been developed for use in pneumatic cylinders and in valves. the double-acting cylinder seal requires only small housing dimensions. low friction cylinder seal with two micro sealing edges and grease deposit in between.	-20 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +150 °C -25 °C ... +150 °C -30 °C ... +110 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C	1,0 m/s - - - - - - - -	12 bar (174 psi) - - - - - - - -	**seal part** s-mart NBR s-mart FKM s-mart EPDM** s-mart HNBR s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU	
	K76 •	**pneumatic, double acting** the piston K76 can be pressurised on both sides with grooves on the front side for pressure activation	-20 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +150 °C -25 °C ... +150 °C -30 °C ... +110 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C	1,0 m/s - - - - - - - -	12 bar (174 psi) - - - - - - - -	**seal part** s-mart NBR s-mart FKM s-mart EPDM** s-mart HNBR s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU	

application	profile	description	temperature	max speed	max pressure	material		
	K77 •	**pneumatic, double acting** the piston seal K77 can be pres surised on both sides with grooves on the front side for pressure activation.	-20 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +150 °C -25 °C ... +150 °C -30 °C ... +110 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C	1,0 m/s - - - - - - - -	10 bar (145 psi) - - - - - - - -	**seal part** s-mart NBR s-mart FKM s-mart EPDM** s-mart HNBR s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU		
	K78 ••	**hydraulic, single acting** piston seal consist of NBR, NBR-impregnated fabric, POM.	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	**seal part** s-mart NBR	**back-up ring** NBR fabric	**guide-ring** s-mart POM
	K79 ••	**hydraulic, single acting** piston seal consist of NBR, NBR-impregnated fabric, POM.	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	**seal part** s-mart NBR	**back-up ring** NBR fabric	**guide-ring** s-mart POM
	K80 ••	**hydraulic, single acting** piston seal consist of NBR, NBR-impregnated fabric, POM.	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	**seal part** s-mart NBR	**back-up ring** NBR fabric	**guide-ring** s-mart POM
	K81 ••	**hydraulic, single acting** the piston seal K81 consists of a preformed fabric back and an elastomer part which are vulcanized together to form a single unit	-30 °C ... +100 °C	0,5 m/s	250 bar (3625 psi)	**seal part** NBR fabric	**back-up ring** s-mart NBR	
	K82 ••	**hydraulic, single acting** the piston seal K82 consists of a preformed fabric back and an elastomer part which are vulcanized together to form a single unit. a support ring is integrated on the outer diameter of the seal.	-30 °C ... +100 °C	0,5 m/s	700 bar (10152 psi)	**seal part** NBR fabric	**back-up ring** s-mart NBR	**guide-ring** s-mart POM
	K83 ••	**hydraulic, single acting** piston and piston rod seal with symmetrical sealing lips wich are cut at an angle of less than 45°. the lip segment made of elastomer and the fabric block at the back are vulcanized together to form a single unit.	-30 °C ... +100 °C	0,5 m/s	180 bar (2610 psi)	**seal part** s-mart NBR	**back-up ring** NBR fabric	
	K84 ••	**hydraulic, single acting** the piston seal K84 with symmetrical sealing lips which are cut at an angle of less than 45°. the lip segment made of elastomer and the fabric block at the back are vulcanized together to form a single unit. a support ring is integrated on the outer diameter of the seal unit.	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	**seal part** s-mart NBR	**back-up ring** NBR fabric	**guide-ring** s-mart POM
	K85 ••	**hydraulic, single acting** the piston seal K85 with symmetrical sealing lips which are cut at an angle of less than 45°. the lip segment made of elastomer and the fabric block at the back are vulcanized together to form a single unit. a support ring is integrated on the outer diameter of the seal unit.	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	**seal part** s-mart NBR	**back-up ring** NBR fabric	**guide-ring** s-mart POM
	K86 •	**hydraulic, single acting** the piston seal K86 with asymmetrical profile and press fit at the outside diameter.	-30 °C ... +110 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C	0,5 m/s - - - -	400 bar (5800 psi) - - - -	**seal part** s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU		

application	profile	description	temperature	max speed	max pressure	material	
	K88 •	**hydraulic, single acting**				**seal part**	
		the piston seal K86 with asymmetrical profile and press fit at the outside diameter.	-30 °C ... +110 °C	1,0 m/s	10 bar (145 psi)-	s-mart NBR	
			-30 °C ... +110 °C	-	-	s-mart PU	
			-20 °C ... +110 °C	-	-	s-mart HPU	
			-20 °C ... +110 °C	-	-	s-mart SPU	
			-50 °C ... +110 °C	-	-	s-mart LTPU	
			-30 °C ... +110 °C	-	-	s-mart GPU	
			-20 °C ... +110 °C	-	-	s-mart FKM	
			-50 °C ... +110 °C	-	-	s-mart EPDM**	
			-30 °C ... +110 °C	-	-	s-mart HNBR	

hydraulics & pneumatics : rod seal

	S01-P •	**hydraulic, single acting**					
		asymmetric rod seal for standard applications. interference fit on outside diameter maintains stable fit in the housing. design provides ultimate sealing effect over a wide temperature range and good back pumping ability. also used as secondary seal in combination with PTFE-seal type S09	-30 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU	
			-20 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart HPU	
			-20 °C ... +110 °C	0,7 m/s	400 bar (5800 psi)	s-mart SPU	
			-50 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart LTPU	
			-30 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart GPU	
	S01-R •	**hydraulic, single acting**					
		as profile S01-P, but more adaptation possibilities for diverse temperatures and media by selection of suitable seal material.	-30 °C ... +100 °C	0,5 m/s	160 bar (2300 psi)	s-mart NBR	
			-20 °C ... +200 °C	0,5 m/s	160 bar (2300 psi)	s-mart FKM	
			-50 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart EPDM**	
			-25 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart HNBR	
			-60 °C ... +200 °C	-	-	s-mart MVQ	
	S01-SC •	**pneumatic, single acting**					
		he profile S01-SC rod seal is a lip seal specially developed for use in pneumatics.	-20 °C ... + 80 °C	1,0 m/s	16 bar (232 psi)	s-mart NBR	
			-20 °C ... +200 °C	-	-	s-mart FKM	
			-50 °C ... +150 °C	-	-	s-mart EPDM**	
			-25 °C ... +150 °C	-	-	s-mart HNBR	
			-30 °C ... +110 °C	-	-	s-mart PU	
			-20 °C ... +110 °C	-	-	s-mart HPU	
			-20 °C ... +110 °C	-	-	s-mart SPU	
			-50 °C ... +110 °C	-	-	s-mart LTPU	
			-30 °C ... +110 °C	-	-	s-mart GPU	
	S02-P •	**hydraulic, single acting**				**seal part**	**back-up ring**
		asymmetric rod seal for standard applications as S01-P, but due to design with active back-up ring suitable for larger extrusion gaps or higher pressure range. S02-P for standard housing design.	-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart PU	s-mart POM / PA*
			-20 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart HPU	s-mart POM / PA*
			-20 °C ... +100 °C	0,7 m/s	700 bar (10.000 psi)	s-mart SPU	s-mart POM / PA*
			-40 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart LTPU	s-mart POM / PA*
			-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart GPU	s-mart POM / PA*
	S02-PD	**hydraulic, single acting**				**seal part**	**back-up ring**
		asymmetric rod seal for standard applications as S01-P, but due to design with active back-up ring suitable for larger extrusion gaps or higher pressure range. S02-PD for standard housing design.	-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart PU	s-mart POM / PA*
			-20 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart HPU	s-mart POM / PA*
			-20 °C ... +100 °C	0,7 m/s	700 bar (10.000 psi)	s-mart SPU	s-mart POM / PA*
			-40 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart LTPU	s-mart POM / PA*
			-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart GPU	s-mart POM / PA*
	S02-R	**hydraulic, single acting**				**seal part**	**back-up ring**
		as profile S02-P, but more adaptation possibilities to diverse temperatures and media by selection of suitable seal material. S02-R for standard housing design.	-30 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart NBR	s-mart POM*
			-30 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart NBR	s-mart PA*
			-20 °C ... +200 °C	0,5 m/s	250 bar (3600 psi)	s-mart FKM	s-mart PTFE glass
			-50 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart EPDM**	s-mart POM*
			-40 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart EPDM**	s-mart PA*
			-50 °C ... +150 °C	0,5 m/s	250 bar (3600 psi)	s-mart EPDM**	s-mart PTFE glass
			-25 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart HNBR	s-mart POM*
			-25 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart HNBR	s-mart PA*
			-25 °C ... +150 °C	0,5 m/s	250 bar (3600 psi)	s-mart HNBR	s-mart PTFE glass
	S02-RD	**hydraulic, single acting**				**seal part**	**back-up ring**
		as profile S02-P, but more adaptation possibilities to diverse temperatures and media by selection of suitable seal material. S02-RD for standard housing design.	-30 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart NBR	s-mart POM*
			-30 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart NBR	s-mart PA*
			-20 °C ... +200 °C	0,5 m/s	250 bar (3600 psi)	s-mart FKM	s-mart PTFE glass
			-50 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart EPDM**	s-mart POM*
			-40 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart EPDM**	s-mart PA*
			-50 °C ... +150 °C	0,5 m/s	250 bar (3600 psi)	s-mart EPDM**	s-mart PTFE glass
			-25 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart HNBR	s-mart POM*
			-25 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart HNBR	s-mart PA*
			-25 °C ... +150 °C	0,5 m/s	250 bar (3600 psi)	s-mart HNBR	s-mart PTFE glass

application	profile	description	temperature	max speed	max pressure	material		
	S02-S	**hydraulic, single acting**				**seal part**	**back-up ring**	
		asymmetric rod seal, for special housings (DIN/ISO 7425 part 2) and for the use as primary rod seal in sealing systems. due to design with active back-up ring suitable for high pressure peaks or larger extrusion gaps.	-30 °C ... +100 °C	5,0 m/s	400 bar (5800 psi)	s-mart PU	s-mart POM / PA*	
			-20 °C ... +100 °C	5,0 m/s	400 bar (5800 psi)	s-mart HPU	s-mart POM / PA*	
			-40 °C ... +100 °C	5,0 m/s	400 bar (5800 psi)	s-mart SPU	s-mart POM / PA*	
			-20 °C ... +100 °C	7,0 m/s	400 bar (5800 psi)	s-mart LTPU	s-mart POM / PA*	
			-30 °C ... +100 °C	5,0 m/s	400 bar (5800 psi)	s-mart GPU	s-mart POM / PA*	
	S02-SA •	**hydraulic, single acting**				**seal part**	**back-up ring**	
		seal-mart u-ring with asymmetrical profile of the sealing lips, fabric reinforcement on the dynamic sealing side and back-up ring as a gap sealing component.	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart NBR	s-mart POM*	
			-20 °C ... +200 °C	-	-	s-mart FKM	s-mart PTFE glass	
			-50 °C ... +100 °C	-	-	s-mart EPDM**	s-mart POM / PA*	
			-50 °C ... +150 °C	-	-	s-mart EPDM**	s-mart PTFE glass	
			-25 °C ... +100 °C	-	-	s-mart HNBR	s-mart POM / PA*	
			-25 °C ... +150 °C	-	-	s-mart HNBR	s-mart PTFE glass	
	S03-P •	**hydraulic, single acting**				**seal part**	**o-ring**	
		o-ring activated, asymmetrical rod seal. interference fit on outside diameter maintains stable fit in the housing. design provides ultimate sealing effect. especially suitable for short stroke applications (e.g. spindle seals, coupling actuators)	-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU	s-mart NBR	
			-20 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart HPU	s-mart NBR	
			-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart LTPU	s-mart NBR	
			-20 °C ... +100 °C	0,7 m/s	400 bar (5800 psi)	s-mart SPU	s-mart NBR	
			-30 °C ... +100 °C	0,5 m/s	400 bar (5800 psi)	s-mart GPU	s-mart NBR	
	S03-F •	**hydraulic, single acting**				**seal part**	**o-ring**	
		o-ring activated, asymmetrical PTFE rod seal, low friction, good dry running properties and adaptation possibilities for diverse temperatures and media by selection of suitable o-ring material, almost no dead spots as required for applications in food & pharma industry.	-20 °C ... +200 °C	1,0 m/s	100 bar (1450 psi)	s-mart PTFE virgin	s-mart FKM	
			-20 °C ... +200 °C	1,0 m/s	160 bar (2300 psi)	s-mart PTFE glass	s-mart FKM	
			-25 °C ... +150 °C	1,0 m/s	100 bar (1450 psi)	s-mart PTFE virgin	s-mart HNBR	
			-25 °C ... +150 °C	1,0 m/s	160 bar (2300 psi)	s-mart PTFE glass	s-mart HNBR	
			-60 °C ... + 80 °C	0,5 m/s	200 bar (2900 psi)	s-mart UHMWPE	s-mart MVQ	
			-60 °C ... +200 °C	1,0 m/s	100 bar (1450 psi)	s-mart PTFE virgin	s-mart MVQ	
			-60 °C ... +200 °C	1,0 m/s	160 bar (2300 psi)	s-mart PTFE glass	s-mart MVQ	
	S03-S •	**hydraulic, single acting**				**seal part**	**spring**	
		helicoil spring activated, asymmetrical PTFE rod seal, low friction and good dry running properties, excellent chemical and thermal resistance, mainly used in chemical, pharma and food industry.	-200 °C ...+260 °C	1,0 m/s	100 bar (1450 psi)	s-mart PTFE virgin	1.4310	
			-200 °C ...+260 °C	1,0 m/s	160 bar (2300 psi)	s-mart PTFE glass	1.4310	
			-200 °C ...+ 80 °C	0,5 m/s	200 bar (2900 psi)	s-mart UHMWPE	1.4310	
	S03 SA ••	**hydraulic, single acting**				**seal part**	**energizer**	
		additional to the machined seals the S09-SG and the S09-SF for housings due to ISO 7425/2 (rubber energised plastic seals) the S03-SA has been developped as an injection molded seal of polyurethane material to fit in the same ISO housings. the integrated NBR o-ring improves the performance at low pressure and low temperature applications. polyurethan is a proved material for u-cups due to their good mechanical properties. the S03-SA can be installed as a single seal for low to medium duty applications; for sealing systems, the S03-SA shall be installed mainly as a secondary seal together with the S09-SG as primary seals.	-30 °C ... +100 °C	up to 0,5 m/s	250 bar (3625 psi)	s-mart PU	s-mart NBR	
			-20 °C ... +100 °C	-	-	s-mart HPU	s-mart NBR	
			-40 °C ... +100 °C	-	-	s-mart SPU	s-mart NBR	
			-30 °C ... +100 °C	-	-	s-mart LTPU	s-mart NBR	
			-30 °C ... +100 °C	-	-	s-mart GPU	s-mart NBR	
	S04-P •	**hydraulic, single acting**				**seal part**	**o-ring**	**back-up ring**
		asymmetric rod seal for standard applications as S03-P, but due to design with active back-up ring suitable for larger extrusion gaps or higher pressure range. S04-P for standard housing design	-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart PU	s-mart NBR	s-mart POM / PA*
			-20 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart HPU	s-mart NBR	s-mart POM / PA*
			-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart SPU	s-mart NBR	s-mart POM / PA*
			-20 °C ... +100 °C	0,7 m/s	700 bar (10.000 psi)	s-mart LTPU	s-mart NBR	s-mart POM / PA*
			-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart GPU	s-mart NBR	s-mart POM / PA*
	S04-PD •	**hydraulic, single acting**				**seal part**	**o-ring**	**back-up ring**
		asymmetric rod seal for standard applications as S03-P, but due to design with active back-up ring suitable for larger extrusion gaps or higher pressure range. S04-PD for short housings	-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart PU	s-mart NBR	s-mart POM / PA*
			-20 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart HPU	s-mart NBR	s-mart POM / PA*
			-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart SPU	s-mart NBR	s-mart POM / PA*
			-20 °C ... +100 °C	0,7 m/s	700 bar (10.000 psi)	s-mart LTPU	s-mart NBR	s-mart POM / PA*
			-30 °C ... +100 °C	0,5 m/s	700 bar (10.000 psi)	s-mart GPU	s-mart NBR	s-mart POM / PA*
	S05-P •	**pneumatic, single acting**						
		asymmetric rod seal, extremely wear resistant, for use in lubricated or dry pneumatic applications. special design of sealing lip allows retention of initial lubricating film.	-30 °C ... +110 °C	1,0 m/s	25 bar (360 psi)	s-mart PU		
			-20 °C ... +110 °C	1,0 m/s	25 bar (360 psi)	s-mart HPU		
			-20 °C ... +110 °C	2,0 m/s	25 bar (360 psi)	s-mart SPU		
			-50 °C ... +110 °C	1,0 m/s	25 bar (360 psi)	s-mart LTPU		
			-30 °C ... +110 °C	1,0 m/s	25 bar (360 psi)	s-mart GPU		

application	profile	description	temperature	max speed	max pressure	material	
	S05-R •	**pneumatic, single acting**					
		as profile S05-R, good wear resistance and adaptation possibilities for diverse temperatures and media by selection of suitable seal material. special design of sealing lip allows retention of initial lubricating film.	-30 °C ... + 80 °C -20 °C ... +200 °C -50 °C ... +150 °C -25 °C ... +150 °C	1,0 m/s 1,0 m/s 1,0 m/s 1,0 m/s	25 bar (360 psi) 25 bar (360 psi) 25 bar (360 psi) 25 bar (360 psi)	s-mart NBR s-mart FKM s-mart EPDM** s-mart HNBR	
	S05-SA •	**pneumatic, single acting**					
		the S05-SA rod seal has been redesigned with respect to the traditional u-profile used in pneumatics to give significant improvements.	-30 °C ... + 80 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C	1,0 m/s - - - -	16 bar (232 psi) - - - -	s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU	
	S06-P •	**hydraulic, single acting**					
		symmetric rod seal for simple standard applications, not recommended for new designs (profile S01-P should be preferred).	-30 °C ... +110 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C	0,5 m/s 0,5 m/s 0,7 m/s 0,5 m/s 0,5 m/s	400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi)	s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU	
	S06-R •	**hydraulic, single acting**					
		as profile S06-P, but more adaptation possibilities for diverse temperatures and media by selection of suitable seal material.	-30 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +150 °C -25 °C ... +150 °C -60 °C ... +200 °C	0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s -	160 bar (2300 psi) 160 bar (2300 psi) 160 bar (2300 psi) 160 bar (2300 psi) -	s-mart NBR s-mart FKM s-mart EPDM** s-mart HNBR s-mart MVQ	
	S06-SA •	**hydraulic & pneumatic, single acting**					
		u-ring with symmetrical profile or pistons/rods.	-30 °C ... +100 °C -30 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +150 °C -25 °C ... +150 °C	0,5 m/s - - - -	100 bar (1450 psi) - - - -	s-mart NBR s-mart NBR s-mart FKM s-mart EPDM** s-mart HNBR	
	S07-P •	**hydraulic, single acting**				**seal part**	**o-ring**
		o-ring activated symmetric rod seal for simple standard applications, not recommended for new designs (profile S03-P preferred).	-30 °C ... +100 °C -20 °C ... +100 °C -20 °C ... +100 °C -30 °C ... +100 °C -30 °C ... +100 °C	0,5 m/s 0,5 m/s 0,7 m/s 0,5 m/s 0,5 m/s	400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi)	s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU	s-mart NBR s-mart NBR s-mart NBR s-mart NBR s-mart NBR
	S07-SA •	**hydraulic, single acting**				**seal part**	**o-ring**
		profile S07-SA is the consequence of a further development of the lipseal. it combines the advantages of a highly elastic o-ring and the abrasion resistance of a lipseal compound. this special seal is mainly used in the mobile hydraulic industry because of its special feature the fitted o-ring. the o-ring guarantees the preloading of the seal lips under low pressure or vacuum; this is necessary for the sealing function. the sealing force is largely independent of temperature variations, and it ensures the necessary preloading even if a certain amount of abrasion takes place. the lip is loaded according to increasing system pressure, transmitted through the pressure-dependent deformation of the o-ring.	-35 °C ... +110 °C -30 °C ... +100 °C -20 °C ... +100 °C -20 °C ... +100 °C -50 °C ... +100 °C -30 °C ... +100 °C	up to 0,5 m/s - - - - -	350 bar (5076 psi) - - - - -	s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU	s-mart NBR s-mart NBR s-mart NBR s-mart NBR s-mart NBR
	S08-P •	**hydraulic, double acting**					
		asymmetric compact rod seal with stable fit in the housing. compact design mainly used to seal high viscosity fluids or for extreme small housings, not suitable for high speed applications. S08-P compact design, no groove	-30 °C ... +110 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +100 °C	0,3 m/s 0,3 m/s 0,4 m/s 0,3 m/s 0,5 m/s	400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi)	s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU	
	S08-PE •	**hydraulic, double acting**					
		asymmetric compact rod seal with stable fit in the housing. compact design mainly used to seal high viscosity fluids or for extreme small housings, not suitable for high speed applications. S08-PE with small groove.	-30 °C ... +110 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +100 °C	0,3 m/s 0,3 m/s 0,4 m/s 0,3 m/s 0,5 m/s	400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi)	s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU	

application	profile	description	temperature	max speed	max pressure	material	
	S08-R •	**hydraulic, single acting** as profile S08-P, but more adaptation possibilities for diverse temperatures and media by selection of suitable seal material.	-30 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +150 °C -25 °C ... +150 °C	0,3 m/s 0,3 m/s 0,3 m/s 0,3 m/s	160 bar (2300 psi) 160 bar (2300 psi) 160 bar (2300 psi) 160 bar (2300 psi)	s-mart NBR s-mart FKM s-mart EPDM** s-mart HNBR	
	S08-SA •	**pneumatic, single acting** the S08-SA seal with asymmetrical profile and press fit at the outside diameter.	-30 °C ... +110 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C	0,5 m/s - - - -	400 bar (5800 psi) - - - -	s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU	
	S08-SB •	**hydraulic, single acting** the S08-SB is a double lip seal in a compact design. the compact S08-SB is designed for small grooves. suitable for use in space-saving designs. the S08-SB has two sealing lips in the dynamic sealing zone. the compact form with two sealing lips provides an improvement in the leakage behaviour at low system pressures. due to the incorporation of an oil trap between the two sealing lips, friction at pressures above approx. 10 MPa is reduced.	-35 °C ... +110 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C	0,5 m/s - - - -	400 bar (5800 psi) - - - -	s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU	
	S09-E •	**hydraulic, single acting** o-ring activated asymmetric PTFE rod seal, low friction. in tandem design together with double acting wipers for extreme low or high speed or positioning functions. as primary seal in combination with secondary S01-P seal with good resistance to pressure shocks used in mobile hydraulics,machine tools, injection moulding machines, heavy hydraulics.	-30 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +150 °C -60 °C ... +200 °C -60 °C ... +80 °C -30 °C ... +110 °C	10,0 m/s 10,0 m/s 10,0 m/s 10,0 m/s 10,0 m/s 5,0 m/s	400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 600 bar (8700 psi)	**glide ring** s-mart PTFE glass s-mart PTFE bronze s-mart PTFE carbon s-mart UHMWPE s-mart XPU	**o-ring** s-mart NBR s-mart FKM s-mart EPDM ** s-mart MVQ s-mart MVQ s-mart NBR
	S09-D •	**hydraulic, double acting** o-ring activated symmetric PTFE rod seal, low friction. for extreme low or high speed, suitable for positioning functions.	-30 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +150 °C -60 °C ... +200 °C -60 °C ... +80 °C -30 °C ... +110 °C	10,0 m/s 10,0 m/s 10,0 m/s 10,0 m/s 10,0 m/s 5,0 m/s	400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 600 bar (8700 psi)	**glide ring** s-mart PTFE glass s-mart PTFE bronze s-mart PTFE carbon s-mart UHMWPE s-mart XPU	**o-ring** s-mart NBR s-mart FKM s-mart EPDM ** s-mart MVQ s-mart MVQ s-mart NBR
	S09-P	**hydraulic, single acting** o-ring activated asymmetric PU rod seal with excellent dynamic sealing capacity. used as secondary seal in tandem design (together with primary S09-E) to minimize residual oil film. for mobile hydraulics, injection moulding machines, heavy hydraulics.	-30 °C ... +100 °C -20 °C ... +100 °C -30 °C ... +100 °C -20 °C ... +100 °C -30 °C ... +100 °C	1,0 m/s 1,0 m/s 1,0 m/s 1,4 m/s 1,0 m/s	250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi)	**glide ring** s-mart PU s-mart HPU s-mart LTPU s-mart SPU s-mart GPU	**o-ring** s-mart NBR s-mart NBR s-mart NBR s-mart NBR s-mart NBR
	S09-ES	**hydraulic, single acting** 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.	-30 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +150 °C -25 °C ... +150 °C -30 °C ... +110 °C	10,0 m/s 10,0 m/s 10,0 m/s 10,0 m/s 5,0 m/s	400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 600 bar (8700 psi)	**glide ring** s-mart PTFE glass s-mart PTFE bronze s-mart PTFE carbon s-mart XPU	**energizer** s-mart NBR s-mart FKM s-mart EPDM** s-mart HNBR s-mart NBR
	S09-DS	**hydraulic, double acting** profile ring-activated symmetric PTFE rod seal, similar to S09-D, but special heavy duty design for heavy industry hydraulics or for special housing dimensions.	-30 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +150 °C -25 °C ... +150 °C -30 °C ... +110 °C	10,0 m/s 10,0 m/s 10,0 m/s 10,0 m/s 5,0 m/s	400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 600 bar (8700 psi)	**glide ring** s-mart PTFE glass s-mart PTFE bronze s-mart PTFE carbon s-mart XPU	**energizer** s-mart NBR s-mart FKM s-mart EPDM** s-mart HNBR s-mart NBR
	S09-SA •	**hydraulic, double acting** the rod seal S09-SA is a further technical development of the S09-D seal which has been successfully used for decades. it is fully interchangeable with the earlier S09-D seals in all new applications. the benefits of the patented seal concept are provided by the innovative functional principle of the trapezoidal profile cross-section.	-30 °C ... +100 °C -50 °C ... +150 °C -25 °C ... +150 °C -20 °C ... +200 °C -50 °C ... +150 °C -25 °C ... +150 °C	15,0 m/s 15,0 m/s 15,0 m/s 15,0 m/s 15,0 m/s 15,0 m/s	600 bar (8702 psi) 600 bar (8702 psi) 250 bar (3626 psi) 250 bar (3626 psi) 250 bar (3626 psi) 800 bar (11603 psi)	**seal part** s-mart PTFE bronze s-mart PTFE bronze PTFE + carbon fibre PTFE + carbon fibre PTFE + carbon fibre s-mart PU	**energizer** s-mart NBR s-mart FKM s-mart NBR s-mart FKM s-mart EPDM** s-mart NBR

application	profile	description	temperature	max speed	max pressure	material	
	S09-SB •	**hydraulic, double acting**				**seal part**	**energizer**
		the rod seal S09-SB is an rubber energised plastic faced seal. the seal is designed to expand and improve the service parameters of o-ring and is installed in existing o-ring grooves.	-30 °C ... +100 °C	15,0 m/s	350 bar (5076 psi)	s-mart PTFE bronze	s-mart NBR
			-10 °C ... +200 °C	15,0 m/s	350 bar (5076 psi)	s-mart PTFE bronze	s-mart FKM
			-30 °C ... +100 °C	15,0 m/s	250 bar (3626 psi)	PTFE + carbon fibre	s-mart NBR
			-10 °C ... +200 °C	15,0 m/s	250 bar (3626 psi)	PTFE + carbon fibre	s-mart FKM
			-45 °C ... +145 °C	15,0 m/s	250 bar (3626 psi)	PTFE + carbon fibre	s-mart EPDM**
	S09-SC •	**hydraulic, double acting**				**seal part**	**energizer**
		the rod seal S09-SC, consisting of a PTFE rod sealing ring and an o-ring, is a system for sealing rods and plungers in hydraulic cylinders. the sealing set S09-SC is appropriate for dynamic applications as an alternative to an o-ring, for situations where sealing performance and friction have to be optimized.	-30 °C ... +100 °C	4,0 m/s	350 bar (5076 psi)	s-mart PTFE + bronze	s-mart NBR
	S09-SD •	**hydraulic, double acting**				**seal part**	**energizer**
		rod seal S09-SD consisting of profile ring and o-ring as a preload component.	-30 °C ... +100 °C	2,0 m/s	160 bar (2320 psi)	s-mart PTFE + bronze	s-mart NBR
	S09-SF •	**hydraulic, single acting**				**seal part**	**energizer**
		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.	-45 °C ... +100 °C	5,0 m/s	600 bar (8702 psi)	s-mart PU	s-mart NBR
	S09-SG •	**hydraulic, single acting**				**seal part**	**energizer**
		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.	-30 °C ... +100 °C	15,0 m/s	600 bar (8702 psi)	s-mart PTFE bronze	s-mart NBR
			-10 °C ... +200 °C	15,0 m/s	600 bar (8702 psi)	s-mart PTFE bronze	s-mart FKM
			-30 °C ... +100 °C	15,0 m/s	800 bar (11603 psi)	PTFE + high bronze	s-mart NBR
			-10 °C ... +200 °C	15,0 m/s	800 bar (11603 psi)	PTFE + high bronze	s-mart FKM
			-30 °C ... +100 °C	15,0 m/s	250 bar (3626 psi)	PTFE + carbon fibre	s-mart NBR
			-10 °C ... +200 °C	15,0 m/s	250 bar (3626 psi)	PTFE + carbon fibre	s-mart FKM
			-45 °C ... +145 °C	15,0 m/s	250 bar (3626 psi)	PTFE + carbon fibre	s-mart EPDM**
			-30 °C ... +100 °C	15,0 m/s	600 bar (8702 psi)	PTFE + high carbon fibre	s-mart NBR
			-10 °C ... +200 °C	15,0 m/s	600 bar (8702 psi)	PTFE + high carbon fibre	s-mart FKM
			-45 °C ... +145 °C	15,0 m/s	600 bar (8702 psi)	PTFE + high carbon fibre	s-mart EPDM**
			-30 °C ... +100 °C	15,0 m/s	300 bar (4351 psi)	s-mart PTFE glass	s-mart NBR
			-10 °C ... +200 °C	15,0 m/s	300 bar (4351 psi)	s-mart PTFE glass	s-mart FKM
			-30 °C ... +100 °C	15,0 m/s	600 bar (8702 psi)	PTFE + carbon graphite	s-mart NBR
			-10 °C ... +200 °C	15,0 m/s	600 bar (8702 psi)	PTFE + carbon graphite	s-mart FKM
			-45 °C ... +145 °C	15,0 m/s	600 bar (8702 psi)	PTFE + carbon graphite	s-mart EPDM**
			-30 °C ... +100 °C	15,0 m/s	800 bar (11603 psi)	s-mart PU	s-mart NBR
	S1012-M •	**hydraulic, single acting**				**S10-A** / **S11-M**	**S12-M**
		chevron sealing set, parting surface design. for heavy industry hydraulics.	-30 °C ... +100 °C	0,5 m/s	500 bar (7200 psi)	s-mart POM / PA* / s-mart PU	s-mart POM / PA*
			-20 °C ... +100 °C	0,5 m/s	500 bar (7200 psi)	s-mart POM / PA* / s-mart HPU	s-mart POM / PA*
			-40 °C ... +100 °C	0,5 m/s	500 bar (7200 psi)	s-mart POM / PA* / s-mart LTPU	s-mart POM / PA*
			-20 °C ... +100 °C	0,7 m/s	500 bar (7200 psi)	s-mart POM / PA* / s-mart SPU	s-mart POM / PA*
			-30 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart PTFE glass / s-mart NBR	s-mart PTFE glass
			-20 °C ... +200 °C	0,5 m/s	250 bar (3600 psi)	s-mart PTFE glass / s-mart FKM	s-mart PTFE glass
			-50 °C ... +150 °C	0,5 m/s	250 bar (3600 psi)	s-mart PTFE glass / s-mart EPDM	s-mart PTFE glass
			-25 °C ... +150 °C	0,5 m/s	250 bar (3600 psi)	s-mart PTFE glass / s-mart HNBR	s-mart PTFE glass
	S1012-T •	**hydraulic, single acting**				**S10-A** / **S11-M**	**S12-M**
		chevron sealing set, machined surface design. for heavy industry hydraulics.	-30 °C ... +100 °C	0,5 m/s	500 bar (7200 psi)	s-mart POM / PA* / s-mart PU	s-mart POM / PA*
			-20 °C ... +100 °C	0,5 m/s	500 bar (7200 psi)	s-mart POM / PA* / s-mart HPU	s-mart POM / PA*
			-40 °C ... +100 °C	0,5 m/s	500 bar (7200 psi)	s-mart POM / PA* / s-mart LTPU	s-mart POM / PA*
			-20 °C ... +100 °C	0,7 m/s	500 bar (7200 psi)	s-mart POM / PA* / s-mart SPU	s-mart POM / PA*
			-30 °C ... +100 °C	0,5 m/s	250 bar (3600 psi)	s-mart PTFE glass / s-mart NBR	s-mart PTFE glass
			-20 °C ... +200 °C	0,5 m/s	250 bar (3600 psi)	s-mart PTFE glass / s-mart FKM	s-mart PTFE glass
			-50 °C ... +150 °C	0,5 m/s	250 bar (3600 psi)	s-mart PTFE glass / s-mart EPDM	s-mart PTFE glass
			-25 °C ... +150 °C	0,5 m/s	250 bar (3600 psi)	s-mart PTFE glass / s-mart HNBR	s-mart PTFE glass

application	profile	description	temperature	max speed	max pressure	material		
	S1012-SA •	**hydraulic, single acting** S1012-SA seals are sets of fabric reinforced chevron rings. they are composed by a support ring, "V" shaped sealing rings and a pressure energizing ring. the support ring or base ring guides and sustains the other "V" shaped rings for best performance. special versions provide incorporated anti-extrusion rings, either on the inner or outer side, for rod or piston applications. in standard version the support ring is manufactured in cotton fabric reinforced rubber, for a good anti-extrusion resistance. the intermediate "V" shaped rings (v-rings) are the real sealing elements of K1012-SA seals. their particular shape confirs the capacity of increasing sealing effectiveness under high pressure. in standard version they are made in cotton fabric reinforced NBR and pure NBR. the energizer ring ensures uniform loading of pressure on the other rings. this element is manufactured in acetal resin, or cotton fabric reinforced nitrile for diameters over 300 mm.				**seal part**	**back-up ring**	**guide ring**
			-30 °C ... +130 °C	0,5 m/s	400 bar (5800 psi)	NBR fabric	NBR fabric	s-mart POM
			-20 °C ... +150 °C	0,5 m/s	400 bar (5800 psi)	FKM fabric	FKM fabric	s-mart POM
			-20 °C ... +200 °C	0,5 m/s	400 bar (5800 psi)	FKM fabric	FKM fabric	s-mart PTFE
			-30 °C ... +100 °C	-	-	s-mart PU	s-mart POM / PA*	s-mart POM / PA*
			-20 °C ... +100 °C	-	-	s-mart HPU	s-mart POM / PA*	s-mart POM / PA*
			-40 °C ... +100 °C	-	-	s-mart LTPU	s-mart POM / PA*	s-mart POM / PA*
			-20 °C ... +100 °C	-	-	s-mart SPU	s-mart POM / PA*	s-mart POM / PA*
			-30 °C ... +100 °C	-	-	s-mart NBR	s-mart PTFE glass	s-mart PTFE glass
			-20 °C ... +200 °C	-	-	s-mart FKM	s-mart PTFE glass	s-mart PTFE glass
			-50 °C ... +150 °C	-	-	s-mart EPDM**	s-mart PTFE glass	s-mart PTFE glass
			-25 °C ... +150 °C	-	-	s-mart HNBR	s-mart PTFE glass	s-mart PTFE glass
	S1315-T	**hydraulic, single acting** chevron sealing set, design with flexible sealing lips, good sealing ability in higher pressure range. for heavy industry hydraulics, water hydraulic systems				**S13-T**	**S14-T**	**S15-T**
			-30 °C ... +100 °C	0,5 m/s	600 bar (8700 psi)	s-mart POM / PA*	s-mart PU	s-mart POM / PA*
			-20 °C ... +100 °C	0,5 m/s	600 bar (8700 psi)	s-mart POM / PA*	s-mart HPU	s-mart POM / PA*
			-40 °C ... +100 °C	0,5 m/s	600 bar (8700 psi)	s-mart POM / PA*	s-mart LTPU	s-mart POM / PA*
			-20 °C ... +100 °C	0,7 m/s	600 bar (8700 psi)	s-mart POM / PA*	s-mart SPU	s-mart POM / PA*
			-30 °C ... +100 °C	0,5 m/s	600 bar (8700 psi)	s-mart POM / PA*	s-mart GPU	s-mart POM / PA*
	S16-A	**hydraulic/pneumatic, single acting** simple hat seal, usually fixed in housing with clamp flange. mainly used for replacement in old hydraulic and pneumatic cylinders or for secondary applications.						
			-30 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart PU		
			-20 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart HPU		
			-50 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart LTPU		
			-20 °C ... +110 °C	0,7 m/s	160 bar (2300 psi)	s-mart SPU		
			-30 °C ... +100 °C	0,5 m/s	160 bar (2300 psi)	s-mart NBR		
			-25 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart HNBR		
			-20 °C ... +200 °C	0,5 m/s	160 bar (2300 psi)	s-mart FKM		
			-50 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart EPDM**		
	S16-B	**hydraulic/pneumatic, single acting** simple hat seal, usually fixed in housing with clamp flange. mainly used for replacement in old hydraulic and pneumatic cylinders or for secondary applications.						
			-30 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart PU		
			-20 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart HPU		
			-50 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart LTPU		
			-20 °C ... +110 °C	0,7 m/s	160 bar (2300 psi)	s-mart SPU		
			-30 °C ... +100 °C	0,5 m/s	160 bar (2300 psi)	s-mart NBR		
			-25 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart HNBR		
			-20 °C ... +200 °C	0,5 m/s	160 bar (2300 psi)	s-mart FKM		
			-50 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart EPDM**		
	S16-SB •••	**hydraulic/pneumatic, single acting** lip seal, spring-loaded in some cases. clamping flange for fixing in the housing.				**seal part**	**energizer**	
			-30 °C ... +100 °C	0,5 m/s	10 bar (145 psi)	s-mart NBR	spring	
	S17-P •	**hydraulic, single acting** asymmetric rod seal with additional sealing- respectively stabilizing lip. interference fit on outside diameter maintains stable fit in the housing. design mainly used for telescopic cylinders, mobile hydraulic or for special housing dimensions.						
			-30 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU		
			-20 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart HPU		
			-20 °C ... +110 °C	0,7 m/s	400 bar (5800 psi)	s-mart SPU		
			-50 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart LTPU		
			-30 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart GPU		
	S17-R •	**hydraulic, single acting** as profile S17-P, but more adaptation possibilities for diverse temperatures and media by selection of suitable seal material.						
			-30 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart NBR		
			-20 °C ... +110 °C	0,5 m/s	160 bar (2300 psi)	s-mart FKM		
			-50 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart EPDM**		
			-25 °C ... +150 °C	0,5 m/s	160 bar (2300 psi)	s-mart HNBR		
	S17-SA •	**hydraulic, single acting** the rod seal S17-SA with asymmetrical profile, inner lip set back, additional support edge and sealing edge as well as press fit at the outside diameter.						
			-30 °C ... +110 °C	0,5 m/s	400 bar (5800 psi)	s-mart PU		
			-20 °C ... +110 °C	-		s-mart HPU		
			-20 °C ... +110 °C	-	-	s-mart SPU		
			-50 °C ... +110 °C	-	-	s-mart LTPU		
			-30 °C ... +110 °C	-	-	s-mart GPU		
					-			

application	profile	description	temperature	max speed	max pressure	material		
	S17-SB •	**hydraulic, single acting**						
		the rod seal S17-SB with asymmetrical profile, inner lip set back, grooved contact surface on the inside diameter as well as press fit at the outside diameter.	-30 °C ... +110 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C	0,6 m/s - - - -	320 bar (4641 psi) - - - -	s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU		
	S18-P •	**hydraulic/pneumatic, single acting**				**seal part**	**back-up ring**	
		asymmetric rod seal as S17-P, but due to design with active back-up ring suitable for larger extrusion gaps or higher pressure range.	-30 °C ... +100 °C -20 °C ... +100 °C -20 °C ... +100 °C -40 °C ... +100 °C -30 °C ... +100 °C	- - - - -	600 bar (8700 psi) 600 bar (8700 psi) 600 bar (8700 psi) 600 bar (8700 psi) 600 bar (8700 psi)	s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU	s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart POM / PA*	
	S18-R	**hydraulic/pneumatic, single acting**				**seal part**	**back-up ring**	
		asymmetric rod seal with additional sealing- respectively stabilizing lip and back ring. good adaptation possibilities for diverse temperatures and media by selection of suitable seal material, due to design with active back-up ring suitable for larger extrusion gaps or higher pressure range.	-30 °C ... +100 °C -30 °C ... +100 °C -20 °C ... +200 °C -40 °C ... +100 °C -40 °C ... +100 °C -50 °C ... +150 °C -20 °C ... +100 °C -20 °C ... +100 °C -20 °C ... +150 °C	0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s	250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi) 250 bar (3600 psi)	s-mart NBR s-mart NBR s-mart FKM s-mart EPDM** s-mart EPDM** s-mart EPDM** s-mart HNBR s-mart HNBR s-mart HNBR	s-mart POM s-mart PA s-mart PTFE glass s-mart POM s-mart PA s-mart PTFE glass s-mart POM s-mart PA s-mart PTFE glass	
	S19-F •	**PTFE-rodseal, single acting**				**seal part**	**spring**	
		finger spring activated, asymmetrical PTFE rod seal, low friction and good dry running properties, excellent chemical and thermal resistance, mainly used in chemical, pharma and food industry.	-200 °C ... +260 °C -200 °C ... +260 °C -200 °C ... +260 °C -200 °C ... + 80 °C	15,0 m/s 15,0 m/s 15,0 m/s 15,0 m/s	100 bar (1450 psi) 160 bar (2300 psi) 160 bar (2300 psi) 200 bar (2900 psi)	s-mart PTFE virgin s-mart PTFE glass s-mart PTFE Bronze s-mart PE	1.4310 1.4310 1.4310 1.4310	
	S20-R	**hydraulic, double acting**				**seal part**	**back-up ring**	
		space saving, compact rod seal,fits standard o-ring housings. advantage compared to o-ring : integrated active back-up rings for high pressure, design with interference fit on outside diameter maintains non-twisting in dynamic applications.	-30 °C ... +100 °C -20 °C ... +100 °C -20 °C ... +200 °C -25 °C ... +150 °C	0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s	700 bar (10000 psi) 700 bar (10000 psi) 700 bar (10000 psi) 700 bar (10000 psi)	s-mart NBR s-mart HNBR s-mart FKM s-mart HNBR	s-mart POM / PA* s-mart POM / PA* s-mart PAEK / PTFE s-mart PAEK / PTFE	
	S21-P	**hydraulic, single acting**				**seal part**	**o-ring**	
		o-ring activated symmetric rod seal with sharp-edged sealing lips, good sealing effect for high viscosity fluids, not recommended for new designs (profile S03-P preferred).	-30 °C ... +100 °C -20 °C ... +100 °C -30 °C ... +100 °C -20 °C ... +100 °C -30 °C ... +100 °C	0,5 m/s 0,5 m/s 0,5 m/s 0,7 m/s 0,5 m/s	400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi)	s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU	s-mart NBR 70 s-mart NBR 70 s-mart NBR 70 s-mart NBR 70 s-mart NBR 70	
	S22-P	**hydraulic, single acting**				**seal part**	**support ring**	
		symmetric rod seal with support ring for simple applications to serve repair purpose, not recommended for new designs (profile S01-P preferred). retainer ring in angled design possible.	-30 °C ... +100 °C -20 °C ... +100 °C -40 °C ... +100 °C -20 °C ... +100 °C -30 °C ... +100 °C	0,5 m/s 0,5 m/s 0,5 m/s 0,7 m/s 0,5 m/s	400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi)	s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU	s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart POM / PA*	
	S22-R	**hydraulic, single acting**				**seal part**	**support ring**	
		symmetric rod seal as S22-P, but more adaptation possibilities for diverse temperatures and media by selection of suitable seal material. retainer ring in angled design possible.	-30 °C ... +100 °C -30 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +100 °C -40 °C ... +100 °C -50 °C ... +150 °C -25 °C ... +100 °C -25 °C ... +100 °C -25 °C ... +150 °C	0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s 0,5 m/s	160 bar (2300 psi) 160 bar (2300 psi) 160 bar (2300 psi) 160 bar (2300 psi) 160 bar (2300 psi) 160 bar (2300 psi) 160 bar (2300 psi) 160 bar (2300 psi) 160 bar (2300 psi)	s-mart NBR s-mart NBR s-mart FKM s-mart EPDM** s-mart EPDM** s-mart EPDM** s-mart HNBR s-mart HNBR s-mart HNBR	s-mart POM s-mart PA s-mart PTFE glass s-mart POM s-mart PA s-mart PTFE glass s-mart POM s-mart PA s-mart PTFE glass	
	S24-P	**hydraulic, single acting**				**seal part**	**o-ring**	**back-up ring**
		o-ring activated rod seal with additional stabilizing lips and integrated active back ring for larger extrusion gaps, mainly used in mining industry.	-30 °C ... +100 °C -20 °C ... +100 °C -30 °C ... +100 °C -20 °C ... +100 °C -30 °C ... +100 °C	0,5 m/s 0,5 m/s 0,5 m/s 0,7 m/s 0,5 m/s	700 bar (10000 psi) 700 bar (10000 psi) 700 bar (10000 psi) 700 bar (10000 psi) 700 bar (10000 psi)	s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU	s-mart NBR s-mart NBR s-mart NBR s-mart NBR s-mart NBR	s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart POM / PA*

application	profile	description	temperature	max speed	max pressure	material		
	S24-SA •	**hydraulic, single acting** the profile S24-Sa rod seal is the result of a further development od us with a secondary sealing lip and a highly extrusion resistant back-up ring. due to the secondary lip, additional lubricant is retained in the sealing gap. (this greatly prevents dry-run and wear, thus increasing the seal's service life). additionally, this second sealing lip may even act as a substitute for a costly tandem arrangement when, under certain conditions, satisfactory sealing performance can only be achieved by two seals placed one behind the other in separate installation grooves. these seals may be used for all applications where the physical properties of normal or fabric reinforced elastomers are insufficient.	-35 °C ... +110 °C -20 °C ... +100 °C -30 °C ... +100 °C -20 °C ... +100 °C -30 °C ... +100 °C	0,5 m/s - - - -	500 bar (7251 psi) - - - -	**seal part** s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU	**energizer** s-mart NBR s-mart NBR s-mart NBR s-mart NBR s-mart NBR	**back-up ring** s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart POM / PA*
	S2527-F	**PTFE chevron set, single acting** optimized for low pressure, unequal angled chevron design results in good contact pressure even in low pressure range. external spring pretension necessary. mainly used in chemical, pharma and food industry.	-200 °C ... +260 °C	1,5 m/s	100 bar (1450 psi)	**S 25-F** s-mart PTFE glass	**S 26-F** s-mart PTFE virgin	**S 27-F** s-mart PTFE glass
	S2931-F	**PTFE chevron set, single acting** optimized for high pressure, equal angled chevron design suitable for high pressure range. external spring pretension necessary. mainly used in chemical, pharma and food industry.	-200 °C ... +260 °C	1,5 m/s	315 bar (4500 psi)	**S 29-F** s-mart PTFE glass	**S 30-F** s-mart PTFE virgin	**S 31-F** s-mart PTFE glass
	S32-P	**hydraulic, double acting** chevron set, design with extremely flexiblesealing lips for difficult operating conditions(bad guiding, large tolerance range). availa-ble as total chevron set as well as intermediate chevrons only (in case of metal maleand female adaptors)	-30 °C ... +100 °C -20 °C ... +100 °C -40 °C ... +100 °C -20 °C ... +100 °C -30 °C ... +100 °C	0,5 m/s 0,5 m/s 0,5 m/s 0,7 m/s 0,5 m/s	500 bar (7200 psi) 500 bar (7200 psi) 500 bar (7200 psi) 500 bar (7200 psi) 500 bar (7200 psi)	**seal part** s-mart PU s-mart HPU s-mart LTPU s-mart SPU s-mart GPU	**collar** s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart POM / PA*	**back-up ring** s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart POM / PA*
	S35-P	**hydraulic, double acting** compact rod seal with almost no dead spots as required for applications in food and pharma industry, also commonly used as o-ring replacement, because design with interference fit on outside diameter maintains non-twisting in dynamic applications.	-30 °C ... +110 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C	0,4 m/s 0,4 m/s 0,5 m/s 0,4 m/s 0,4 m/s	400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi) 400 bar (5800 psi)	s-mart PU s-mart HPU s-mart LTPU s-mart SPU s-mart GPU		
	S60 •	**hydraulic, single acting** the rod seal range has been designed to meet the needs of hydraulic equipments operating at high pressures and subjected to severe loading and vibration conditions. the main sealing element is manufactured in a highly compression set resistant nitrile. the most important quality of this element is the design of the multiple sealing lips for maximum sealing efficiency and end face configuration, which ensures that the S60 can tolerate vibrations and severe misalignment. the support ring is made in cotton fabric reinforced nitrile elastomer; the "U" shape is energised when pressure is applied. the last element is the anti-extrusion ring manufactured in POM.	-40 °C ... +130 °C -20 °C ... +100 °C	0,5 m/s -	700 bar (10152 psi) -	**seal part** s-mart NBR s-mart HPU	**energizer** NBR fabric s-mart HPU	**back-up ring** s-mart POM / PA* s-mart POM / PA*
	S61 ••	**hydraulic, single acting** S61 with second sealing edge on the dunamic and static sealing side as well as fabric reinforcement on the dynamic sealing side and back-up ring as a gap sealing component.	-20 °C ... +110 °C -20 °C ... +200 °C -50 °C ... +100 °C -50 °C ... +150 °C -25 °C ... +100 °C -25 °C ... +150 °C	0,5 m/s - - - - -	500 bar (7251 psi) - - - - -	**seal part & energizer** s-mart NBR s-mart FKM s-mart EPDM** s-mart EPDM** s-mart HNBR s-mart HNBR	**support ring** s-mart POM / PA* s-mart PTFE glass s-mart POM /PA* s-mart PTFE glass s-mart POM /PA* s-mart PTFE glass	
	S62 ••	**hydraulic, single acting** the S62 rod seal consisting of an elastomeric sealing element and an integrated fabric reinforced base. due to the radial pre-load an excellent sealing performance will be achieved even at low pressures. the fabric reinforced base prevents the seal from extrusion.	-30 °C ... +130 °C	0,5 m/s	250 bar (3625 psi)	**seal part & energizer** s-mart NBR	**support ring** NBR fabric	

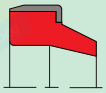
application	profile	description	temperature	max speed	max pressure	material		
	S63 •••	**hydraulic, single acting** the S63 rod seal consisting of an elastomeric sealing element and an integrated fabric reinforced base. due to the radial pre-load an excellent sealing performance will be achieved even at low pressures. the fabric reinforced base prevents the seal from extrusion. where extrusion gaps are greater than those specified or for higher pressure conditions the serie S63 with incorporated anti-extrusion ring shall be selected.	-30 °C ... +130 °C -20 °C ... +100 °C	0,5 m/s -	400 bar (5800 psi) -	**seal part** s-mart NBR s-mart HPU	**energizer** NBR fabric s-mart HPU	**back-up ring** s-mart POM s-mart POM / PA*
	S64 •	**hydraulic, single acting** the S64 rod seal is a single acting polyurethane rod seal with a unique design offering a hydrodynamic backpumping ability over the complete working pressure range. the pressure-independent, hydrodynamic sealing ability of this new sealing element requires no lubrication reservoir in the sealing area and ensures a constant and controlled pressure distribution over a wide pressure range.	-35 °C ... +110 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C	0,5 m/s - - - -	400 bar (5800 psi) - - - -	s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU		
	S65 ••	**hydraulic, single acting** S65 with integrated back-up ring, additional support edge and sealing edge, components for axial fixing in the housing and press fit at the outside diameter.	-35 °C ... +110 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C	0,5 m/s - - - -	400 bar (5800 psi) - - - -	seal part & energizer s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU	guide ring s-mart POM /PA* s-mart POM /PA* s-mart POM /PA* s-mart POM /PA* s-mart POM /PA*	
	S66 •	**hydraulic, single acting** the profile 66 rod seal is a compact design which may be mounted without a back up ring. due to radial interference, the sealing lip intensively removes any liquid film. the sealing performance is excellent, even at low pressures or pressureless movement of the rod.	-35 °C ... +110 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C	0,5 m/s - - - -	400 bar (5800 psi) - - - -	s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU		
	S67 ••	**hydraulic, single acting** the profile S67 glide seal for piston rods consists of an elastomer part and a special sliding ring. it has exceptionally good sliding properties and high tightness.	-30 °C ... +100 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C	1,0 m/s - - - -	315 bar (4568 psi) - - - -	s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU		
	S68 ••	**hydraulic, single acting** the profile S68 rod seal is a compact seal consisting of a fabric reinforced u-ring with an integral rubber sealing part. the sealing edges at the rubber part wipes off the film of liquid on the rod surface due to their radial preload. therefore an excellent sealing performance will be achieved, even at low pressures or in case of zero pressure movements of the rod. higher pressures will be transferred to the fabric reinforced u-ring, which, due to its stability, will prevent extrusion.	-30 °C ... +100 °C	0,5 m/s	250 bar (3625 psi)	**seal part** NBR fabric & NBR		
	S69 ••	**hydraulic, single acting** the profile S69 rod seal is a sealing element of compact design with a special anti-extrusion ring. the main advantages of this combination are smooth running, excellent sealing performance and high wear resistance, even under exceptionally hard working conditions. these rod seals guarantee a leakfree performance even at low pressures or when rod movement occurs without pressure.	-30 °C ... +110 °C	0,5 m/s	315 bar (4568 psi)	**seal part** s-mart NBR	**guide ring** s-mart PTFE	
	S70 ••	**hydraulic, single acting** single-piece rod seal with a rubber head set in the fabric part.	-30 °C ... +100 °C	0,5 m/s	250 bar (3625 psi)	s-mart NBR		
	S73 •	**pneumatic, double acting** single-piece rod seal with a rubber head set in the fabric part.	-20 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +150 °C -25 °C ... +150 °C -30 °C ... +110 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C	1,0 m/s - - - - - - - -	12 bar (174 psi) - - - - - - - -	s-mart NBR s-mart FKM s-mart EPDM** s-mart HNBR s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU		

application	profile	description	temperature	max speed	max pressure	material	
	S74 ••	**hydraulic, single acting**				seal part	
		rod and piston rod seal with symmetrical sealing lips wich are cut at an angle of less than 45°. the lip segment made of elastomer and the fabric block at the back are vulcanized together to form a single unit.	-30 °C ... +100 °C -20 °C ... +100 °C	0,5 m/s -	180 bar (2610 psi) -	s-mart NBR + NBR (fabric) s-mart HPU	
	S75 ••	**hydraulic, single acting**				seal part	guide ring
		the rod seal S75 with symmetrical sealing lips which are cut at an angle of less than 45°. the lip segment made of elastomer and the fabric block at the back are vulcanized together to form a single unit. a support ring is integrated on the outer diameter of the seal unit.	-30 °C ... +100 °C -20 °C ... +100 °C	0,5 m/s -	400 bar (5800 psi) -	s-mart NBR + NBR (fabric) s-mart HPU	s-mart POM s-mart POM / PA*
	S76 ••	**hydraulic, single acting**				seal part	guide ring
		the rod seal S76 is designed for small grooves. it is thus particularly suitable for use in space-saving designs. for large gaps and high prssure peaks, the rod seal S76 has an integrated back up ring. this seal has two sealing lips in the dynamic sealing zone. this shape with two sealing lips provides an improvement in the leakage behaviour at low system pessures. due to the incorporation of an oil trap between the two sealing lips, friction at pressures above approx. 10 Mpa is reduced. furthermore, the second sealing lip prevent the entry of dirt from the atmosphere side.	-30 °C ... + 80 °C -30 °C ... +100 °C -20 °C ... +100 °C -20 °C ... +100 °C -50 °C ... +100 °C -30 °C ... +100 °C	0,5 m/s - - - - -	400 bar (5800 psi) - - - - -	s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU	s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart POM / PA* s-mart POM / PA*
	S78 •••	**pneumatic, single acting**					
		valve seal for spool valves according to ISO 5599.	-30 °C ... + 80 °C	up to 1,0 m/s	16 MPa (232 psi)	s-mart NBR	

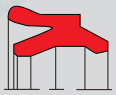
hydraulics & pneumatics : wiper

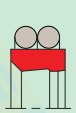
	A01-A	**hydraulic, single acting**				
		wiper with interference fit on outside diameter, providing a technically accurate closure at the cylinder. wiping edge assures a reliable protection against penetration of dust and dirt whilst allowing backflow of residual oil film. back support area prevents tilting of wiper. for housings according ISO 6195-Type A	-30 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -20 °C ... +110 °C -30 °C ... +110 °C -30 °C ... +100 °C -25 °C ... +150 °C -20 °C ... +200 °C -50 °C ... +150 °C	4,0 m/s 4,0 m/s 4,0 m/s 5,0 m/s 4,0 m/s 4,0 m/s 4,0 m/s 4,0 m/s 4,0 m/s		s-mart PU / s-mart XPU s-mart HPU/ s-mart XHPU s-mart LTPU s-mart SPU/ s-mart XSPU s-mart GPU s-mart NBR s-mart HNBR s-mart FKM s-mart EPDM**
	A01-B	**hydraulic, single acting**				
		as profile A01-A, but without back support area. for housings according ISO 6195-Type A	-30 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -20 °C ... +110 °C -30 °C ... +110 °C -30 °C ... +100 °C -25 °C ... +150 °C -20 °C ... +200 °C -50 °C ... +150 °C	4,0 m/s 4,0 m/s 4,0 m/s 5,0 m/s 4,0 m/s 4,0 m/s 4,0 m/s 4,0 m/s 4,0 m/s		s-mart PU / s-mart XPU s-mart HPU/ s-mart XHPU s-mart LTPU s-mart SPU/ s-mart XSPU s-mart GPU s-mart NBR s-mart HNBR s-mart FKM s-mart EPDM**
	A02-A	**hydraulic, single acting**				
		wiper with interference fit on outside diameter. wiping edge assures a reliable protection against penetration of dust and dirt whilst allowing backflow of residual oil film. back support area prevents tilting of wiper.	-30 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -20 °C ... +110 °C -30 °C ... +110 °C -30 °C ... +100 °C -25 °C ... +150 °C -20 °C ... +200 °C -50 °C ... +150 °C	4,0 m/s 4,0 m/s 4,0 m/s 5,0 m/s 4,0 m/s 4,0 m/s 4,0 m/s 4,0 m/s 4,0 m/s		s-mart PU / s-mart XPU s-mart HPU/ s-mart XHPU s-mart LLTPU s-mart SPU/ s-mart XSPU s-mart GPU s-mart NBR s-mart HNBR s-mart FKM s-mart EPDM**

application	profile	description	temperature	max speed	max pressure	material
	A02-B	**hydraulic, single acting** wiper with interference fit on outside diameter. wiping edge assures a reliable protection against penetration of dust and dirt whilst allowing backflow of residual oil film.	-30 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -20 °C ... +110 °C -30 °C ... +110 °C -30 °C ... +100 °C -25 °C ... +150 °C -20 °C ... +200 °C -50 °C ... +150 °C	4,0 m/s 4,0 m/s 4,0 m/s 5,0 m/s 4,0 m/s 4,0 m/s 4,0 m/s 4,0 m/s 4,0 m/s		s-mart PU / s-mart XPU s-mart HPU/ s-mart XHPU s-mart LLTPU s-mart SPU/ s-mart XSPU s-mart GPU s-mart NBR s-mart HNBR s-mart FKM s-mart EPDM**
	A02-I	**hydraulic, single acting** as profile A02-A, but without back support area. special housing design according ISO 6195-Type C	-30 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -20 °C ... +110 °C -30 °C ... +110 °C -30 °C ... +100 °C -25 °C ... +150 °C -20 °C ... +200 °C -50 °C ... +150 °C	4,0 m/s 4,0 m/s 4,0 m/s 5,0 m/s 4,0 m/s 4,0 m/s 4,0 m/s 4,0 m/s 4,0 m/s		s-mart PU / s-mart XPU s-mart HPU/ s-mart XHPU s-mart LLTPU s-mart SPU/ s-mart XSPU s-mart GPU s-mart NBR s-mart HNBR s-mart FKM s-mart EPDM**
	A02-SA •	**hydraulic, single acting** these scrapers are manufactured in polyurethane. the static sealing lip ensures against the intrusion of dirt and fluids over the outer diameter. the scraper A02-SA has no interference at the outside diameter and can have a radial movement due rod deviations.	-35 °C ... + 80 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C -30 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +150 °C -25 °C ... +150 °C	1,0 m/s - - - - - - - -		s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU s-mart NBR s-mart FKM s-mart EPDM** s-mart HNBR
	A02-SB •	**hydraulic, single acting** these scrapers are manufactured in polyurethane. the static sealing lip ensures against the intrusion of dirt and fluids over the outer diameter. the A02-SB has an interference to the groove outside diameter.	-35 °C ... + 80 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C -30 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +150 °C -25 °C ... +150 °C	1,0 m/s - - - - - - - -		s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU s-mart NBR s-mart FKM s-mart EPDM** s-mart HNBR
	A03-A	**hydraulic, single acting** wiper with mounting cage for press-fit installation into axially open housings. wiping edge assures a reliable protection against penetration of dust and dirt, the use of plastic mounting cages avoids corrosion in the press-fit. for housings according ISO 6195-Type B	-30 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -20 °C ... +110 °C -30 °C ... +110 °C -30 °C ... +100 °C -25 °C ... +150 °C -20 °C ... +200 °C -50 °C ... +150 °C	4,0 m/s 4,0 m/s 4,0 m/s 5,0 m/s 4,0 m/s 4,0 m/s 4,0 m/s 4,0 m/s 4,0 m/s		**wiping part** / **housing** smart PU / smart XPU — s-mart POM / PA* smart HPU/ smart XHPU — s-mart POM / PA* smart LLTPU — s-mart POM / PA* smart SPU/ smart XSPU — s-mart POM / PA* smart GPU — s-mart POM / PA* smart NBR — s-mart POM / PA* smart HNBR — s-mart POM / PA* smart FKM — s-mart PAEK smart EPDM** — s-mart PAEK
	A03-SA ••	**hydraulic, single acting** dirt wiper with metal housing, wiper lip protruding; A03-SA with slightly rounded sealing edge.	-30 °C ... +110 °C -30 °C ... +110 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C -20 °C ... +200 °C -50 °C ... +150 °C -25 °C ... +150 °C	2,0 m/s 1,0 m/s - - - - - - -		**wiping part** / **housing** s-mart PU — s-mart POM/PA*/metal s-mart NBR — s-mart POM/PA*/metal s-mart HPU — s-mart POM / PA* / metal s-mart SPU — s-mart POM / PA* / metal s-mart LTPU — s-mart POM / PA* / metal s-mart GPU — s-mart POM / PA* / metal s-mart HNBR — s-mart POM / PA* / metal s-mart FKM — s-mart PEEK / metal s-mart EPDM** — s-mart PEEK / metal

application	profile	description	temperature	max speed	max pressure	material	
	A03-SC ••	**hydraulic, single acting**				**wiping part**	**housing**
		dirt wiper with metal housing, wiper lip protruding with sharp, punched sealing edge.	-30 °C ... +110 °C	2,0 m/s		s-mart PU	s-mart POM / PA* / metal
			-20 °C ... +110 °C	-		s-mart HPU	s-mart POM / PA* / metal
			-20 °C ... +110 °C	-		s-mart SPU	s-mart POM / PA* / metal
			-50 °C ... +110 °C	-		s-mart LTPU	s-mart POM / PA* / metal
			-30 °C ... +110 °C	-		s-mart GPU	s-mart POM / PA* / metal
			-30 °C ... +100 °C	-		s-mart NBR	s-mart POM / PA* / metal
			-20 °C ... +200 °C	-		s-mart HNBR	s-mart POM / PA* / metal
			-50 °C ... +150 °C	-		s-mart FKM	s-mart PEEK / metal
			-25 °C ... +150 °C	-		s-mart EPDM**	s-mart PEEK / metal
	A03-SD ••	**hydraulic, single acting**				**wiping part**	**housing**
		dirt wiper with metal housing, wiper lip protruding; A03-SA with slightly rounded sealing edge.	-30 °C ... +110 °C	2,0 m/s		s-mart PU	s-mart POM / PA* / metal
			-30 °C ... +100 °C	2,0 m/s		s-mart NBR	s-mart POM / PA* / metal
			-20 °C ... +110 °C	-		s-mart HPU	s-mart POM / PA* / metal
			-20 °C ... +110 °C	-		s-mart SPU	s-mart POM / PA* / metal
			-50 °C ... +110 °C	-		s-mart LTPU	s-mart POM / PA* / metal
			-30 °C ... +110 °C	-		s-mart GPU	s-mart POM / PA* / metal
			-20 °C ... +200 °C	-		s-mart HNBR	s-mart POM / PA* / metal
			-50 °C ... +150 °C	-		s-mart FKM	s-mart PEEK / metal
			-25 °C ... +150 °C	-		s-mart EPDM**	s-mart PEEK / metal
	A04-A	**pneumatic, single acting**					
		wiper with interference fit on outside diameter, providing a technically accurate closure at the cylinder. wiping edge assures a reliable protection against penetration of dust and dirt whilst allowing backflow of residual oil film. back support area prevents tilting of wiper. for housings according ISO 6195-Type A	-30 °C ... +110 °C	4,0 m/s		s-mart PU / s-mart XPU	
			-20 °C ... +110 °C	4,0 m/s		s-mart HPU/ s-mart XHPU	
			-50 °C ... +110 °C	4,0 m/s		s-mart LTPU	
			-20 °C ... +110 °C	5,0 m/s		s-mart SPU/ s-mart XSPU	
			-30 °C ... +110 °C	4,0 m/s		s-mart GPU	
			-30 °C ... +100 °C	4,0 m/s		s-mart NBR	
			-25 °C ... +150 °C	4,0 m/s		s-mart HNBR	
			-20 °C ... +200 °C	4,0 m/s		s-mart FKM	
			-50 °C ... +150 °C	4,0 m/s		s-mart EPDM**	
	A04-B	**pneumatic, single acting**					
		as profile A04-A, but without back support area. for housings according ISO 6195-Type A	-30 °C ... +110 °C	4,0 m/s		s-mart PU / s-mart XPU	
			-20 °C ... +110 °C	4,0 m/s		s-mart HPU/ s-mart XHPU	
			-50 °C ... +110 °C	4,0 m/s		s-mart LTPU	
			-20 °C ... +110 °C	5,0 m/s		s-mart SPU/ s-mart XSPU	
			-30 °C ... +110 °C	4,0 m/s		s-mart GPU	
			-30 °C ... +100 °C	4,0 m/s		s-mart NBR	
			-25 °C ... +150 °C	4,0 m/s		s-mart HNBR	
			-20 °C ... +200 °C	4,0 m/s		s-mart FKM	
			-50 °C ... +150 °C	4,0 m/s		s-mart EPDM**	
	A05-A	**pneumatic, single acting**					
		wiper with interference fit on outside diameter. special design of wiping lip allows retention of initial lubricating film. back support area prevents tilting of wiper.	-30 °C ... +110 °C	4,0 m/s		s-mart PU / s-mart XPU	
			-20 °C ... +110 °C	4,0 m/s		s-mart HPU/ s-mart XHPU	
			-50 °C ... +110 °C	4,0 m/s		s-mart LTPU	
			-20 °C ... +110 °C	5,0 m/s		s-mart SPU/ s-mart XSPU	
			-30 °C ... +110 °C	4,0 m/s		s-mart GPU	
			-30 °C ... +100 °C	4,0 m/s		s-mart NBR	
			-25 °C ... +150 °C	4,0 m/s		s-mart HNBR	
			-20 °C ... +200 °C	4,0 m/s		s-mart FKM	
			-50 °C ... +150 °C	4,0 m/s		s-mart EPDM**	
	A05-B	**pneumatic, single acting**					
		wiper with interference fit on outside diameter. special design of wiping lip allows retention of initial lubricating film.	-30 °C ... +110 °C	4,0 m/s		s-mart PU / s-mart XPU	
			-20 °C ... +110 °C	4,0 m/s		s-mart HPU/ s-mart XHPU	
			-50 °C ... +110 °C	4,0 m/s		s-mart LTPU	
			-20 °C ... +110 °C	5,0 m/s		s-mart SPU/ s-mart XSPU	
			-30 °C ... +110 °C	4,0 m/s		s-mart GPU	
			-30 °C ... +100 °C	4,0 m/s		s-mart NBR	
			-25 °C ... +150 °C	4,0 m/s		s-mart HNBR	
			-20 °C ... +200 °C	4,0 m/s		s-mart FKM	
			-50 °C ... +150 °C	4,0 m/s		s-mart EPDM**	
	A05-I	**pneumatic, single acting**					
		as profile A05-A, but without back support area. special housing design according ISO 6195-Type C	-30 °C ... +110 °C	4,0 m/s		s-mart PU / s-mart XPU	
			-20 °C ... +110 °C	4,0 m/s		s-mart HPU/ s-mart XHPU	
			-50 °C ... +110 °C	4,0 m/s		s-mart LTPU	
			-20 °C ... +110 °C	5,0 m/s		s-mart SPU/ s-mart XSPU	
			-30 °C ... +110 °C	4,0 m/s		s-mart GPU	
			-30 °C ... +100 °C	4,0 m/s		s-mart NBR	
			-25 °C ... +150 °C	4,0 m/s		s-mart HNBR	
			-20 °C ... +200 °C	4,0 m/s		s-mart FKM	
			-50 °C ... +150 °C	4,0 m/s		s-mart EPDM**	

application	profile	description	temperature	max speed	max pressure	material	
						wiping part	**housing**
	A06-A	**pneumatic, single acting**					
		wiper with mounting cage for press-fit installation into axially open housings. special design of wiping lip allows retention of initial lubricating film, the use of plastic mounting cages avoids corrosion at the press-fit. for housings according ISO 6195-Type B	-30 °C ... +110 °C	4,0 m/s		s-mart PU / s-mart XPU	s-mart POM / PA*
			-20 °C ... +110 °C	4,0 m/s		s-mart HPU/ s-mart XHPU	s-mart POM / PA*
			-50 °C ... +110 °C	4,0 m/s		s-mart LTPU	s-mart POM / PA*
			-20 °C ... +110 °C	5,0 m/s		s-mart SPU/ s-mart XSPU	s-mart POM / PA*
			-30 °C ... +110 °C	4,0 m/s		s-mart GPU	s-mart POM / PA*
			-30 °C ... +100 °C	4,0 m/s		s-mart NBR	s-mart POM / PA*
			-25 °C ... +150 °C	4,0 m/s		s-mart HNBR	s-mart POM / PA*
			-20 °C ... +200 °C	4,0 m/s		s-mart FKM	s-mart PAEK
			-50 °C ... +150 °C	4,0 m/s		s-mart EPDM**	s-mart PAEK
	A07-A	**pneumatic, single acting**					
		wiper to fit in angled housings (30°angle). design mainly used in british equipment, in inch as well as metric dimensions.	-30 °C ... +110 °C	4,0 m/s		s-mart PU / s-mart XPU	
			-20 °C ... +110 °C	4,0 m/s		s-mart HPU/ s-mart XHPU	
			-50 °C ... +110 °C	4,0 m/s		s-mart LTPU	
			-20 °C ... +110 °C	5,0 m/s		s-mart SPU/ s-mart XSPU	
			-30 °C ... +110 °C	4,0 m/s		s-mart GPU	
			-30 °C ... +100 °C	4,0 m/s		s-mart NBR	
			-25 °C ... +150 °C	4,0 m/s		s-mart HNBR	
			-20 °C ... +200 °C	4,0 m/s		s-mart FKM	
			-50 °C ... +150 °C	4,0 m/s		s-mart EPDM**	
	A07-SA ••	**hydraulic, single acting**					
		single-acting	-40 °C ... +100 °C	4,0 m/s		s-mart NBR	
			-30 °C ... +110 °C	-		s-mart PU	
			-20 °C ... +110 °C	-		s-mart HPU	
			-20 °C ... +110 °C	-		s-mart SPU	
			-50 °C ... +110 °C	-		s-mart LTPU	
			-30 °C ... +110 °C	-		s-mart GPU	
			-20 °C ... +200 °C	-		s-mart FKM	
			-50 °C ... +150 °C	-		s-mart EPDM**	
			-25 °C ... +150 °C	-		s-mart HNBR	
	A08-A	**hydraulic/pneumatic, single acting**					
		wiper usually fixed in housing with clamp flange. mainly used for replacement in old hydraulic and pneumatic cylinders or for secondary applications.	-30 °C ... +110 °C	4,0 m/s		s-mart PU / s-mart XPU	
			-20 °C ... +110 °C	4,0 m/s		s-mart HPU/ s-mart XHPU	
			-50 °C ... +110 °C	4,0 m/s		s-mart LTPU	
			-20 °C ... +110 °C	5,0 m/s		s-mart SPU/ s-mart XSPU	
			-30 °C ... +110 °C	4,0 m/s		s-mart GPU	
			-30 °C ... +100 °C	4,0 m/s		s-mart NBR	
			-25 °C ... +150 °C	4,0 m/s		s-mart HNBR	
			-20 °C ... +200 °C	4,0 m/s		s-mart FKM	
			-50 °C ... +150 °C	4,0 m/s		s-mart EPDM**	
	A08-B	**hydraulic/pneumatic, single acting**					
		wiper usually fixed in housing with clamp flange. mainly used for replacement in old hydraulic and pneumatic cylinders or for secondary applications.	-30 °C ... +110 °C	4,0 m/s		s-mart PU / s-mart XPU	
			-20 °C ... +110 °C	4,0 m/s		s-mart HPU/ s-mart XHPU	
			-50 °C ... +110 °C	4,0 m/s		s-mart LTPU	
			-20 °C ... +110 °C	5,0 m/s		s-mart SPU/ s-mart XSPU	
			-30 °C ... +110 °C	4,0 m/s		s-mart GPU	
			-30 °C ... +100 °C	4,0 m/s		s-mart NBR	
			-25 °C ... +150 °C	4,0 m/s		s-mart HNBR	
			-20 °C ... +200 °C	4,0 m/s		s-mart FKM	
			-50 °C ... +150 °C	4,0 m/s		s-mart EPDM**	
	A09-A	**hydraulic, single acting**					
		wiper with dimensioning according to common types used in USA. for housings according AN 6231, ANSI/B93.35	-30 °C ... +110 °C	4,0 m/s		s-mart PU / s-mart XPU	
			-20 °C ... +110 °C	4,0 m/s		s-mart HPU/ s-mart XHPU	
			-50 °C ... +110 °C	4,0 m/s		s-mart LTPU	
			-20 °C ... +110 °C	5,0 m/s		s-mart SPU/ s-mart XSPU	
			-30 °C ... +110 °C	4,0 m/s		s-mart GPU	
			-30 °C ... +100 °C	4,0 m/s		s-mart NBR	
			-25 °C ... +150 °C	4,0 m/s		s-mart HNBR	
			-20 °C ... +200 °C	4,0 m/s		s-mart FKM	
			-50 °C ... +150 °C	4,0 m/s		s-mart EPDM**	
	A10-A	**hydraulic, single acting**					
		wiper with dimensioning according to common types used in USA. fixed relation between cross-section and height of wiper. for housings according AN 6231, ANSI/B93.35	-30 °C ... +110 °C	4,0 m/s		s-mart PU / s-mart XPU	
			-20 °C ... +110 °C	4,0 m/s		s-mart HPU/ s-mart XHPU	
			-50 °C ... +110 °C	4,0 m/s		s-mart LTPU	
			-20 °C ... +110 °C	5,0 m/s		s-mart SPU/ s-mart XSPU	
			-30 °C ... +110 °C	4,0 m/s		s-mart GPU	
			-30 °C ... +100 °C	4,0 m/s		s-mart NBR	
			-25 °C ... +150 °C	4,0 m/s		s-mart HNBR	
			-20 °C ... +200 °C	4,0 m/s		s-mart FKM	
			-50 °C ... +150 °C	4,0 m/s		s-mart EPDM**	

application	profile	description	temperature	max speed	max pressure	material	
	A11-A	**hydraulic/pneumatic, double acting**					
		wiper including additional sealing lip. used in combination with o-ring activated PTFE seals (tandem) to reduce residual oil film. also used as complete solution for pneumatic applications in small diameter range. max. allowed pressure load: 16 bar (230 psi)	-30 °C ... +110 °C	4,0 m/s		s-mart PU	
			-20 °C ... +110 °C	4,0 m/s		s-mart HPU	
			-50 °C ... +110 °C	4,0 m/s		s-mart LTPU	
			-20 °C ... +110 °C	5,0 m/s		s-mart SPU	
			-30 °C ... +110 °C	4,0 m/s		s-mart GPU	
			-30 °C ... +100 °C	4,0 m/s		s-mart NBR	
			-25 °C ... +150 °C	4,0 m/s		s-mart HNBR	
			-20 °C ... +200 °C	4,0 m/s		s-mart FKM	
			-50 °C ... +150 °C	4,0 m/s		s-mart EPDM**	
	A11-I	**hydraulic/pneumatic, double acting**	-30 °C ... +110 °C	4,0 m/s		s-mart PU	
		wiper usually fixed in housing with clamp flange. mainly used for replacement in old hydraulic and pneumatic cylinders or for secondary applications.	-20 °C ... +110 °C	4,0 m/s		s-mart HPU	
			-50 °C ... +110 °C	4,0 m/s		s-mart LTPU	
			-20 °C ... +110 °C	5,0 m/s		s-mart SPU	
			-30 °C ... +110 °C	4,0 m/s		s-mart GPU	
			-30 °C ... +100 °C	4,0 m/s		s-mart NBR	
			-25 °C ... +150 °C	4,0 m/s		s-mart HNBR	
			-20 °C ... +200 °C	4,0 m/s		s-mart FKM	
			-50 °C ... +150 °C	4,0 m/s		s-mart EPDM**	
	A11-SA •	**pneumatic, double acting**	- 5 °C ... +150 °C	1,0 m/s	10 bar (145 psi)	s-mart FKM	
		A11-SA combination wiper seal without metal reinforcement with special pneumatic sealing edge.	-30 °C ... + 80 °C	1,0 m/s	10 bar (145 psi)	s-mart PU	
			-20 °C ... +110 °C	-	-	s-mart HPU	
			-20 °C ... +110 °C	-	-	s-mart SPU	
			-50 °C ... +110 °C	-	-	s-mart LTPU	
			-30 °C ... +110 °C	-	-	s-mart GPU	
			-30 °C ... +100 °C	-	-	s-mart NBR	
			-50 °C ... +150 °C	-	-	s-mart EPDM**	
			-25 °C ... +150 °C	-	-	s-mart HNBR	
	A11-SB •	**pneumatic, double acting**	-20 °C ... +100 °C	1,0 m/s	10 bar (145 psi)	s-mart NBR	
		A11-SB wiper seal without metal reinforcement with special pneumatic sealing edge.	-30 °C ... +110 °C	-	-	s-mart PU	
			-20 °C ... +110 °C	-	-	s-mart HPU	
			-20 °C ... +110 °C	-	-	s-mart SPU	
			-50 °C ... +110 °C	-	-	s-mart LTPU	
			-30 °C ... +110 °C	-	-	s-mart GPU	
			-20 °C ... +200 °C	-	-	s-mart FKM	
			-50 °C ... +150 °C	-	-	s-mart EPDM**	
			-25 °C ... +150 °C	-	-	s-mart HNBR	
	A11-SC •	**pneumatic, double acting**	-20 °C ... +100 °C	1,0 m/s	10 bar (145 psi)	s-mart NBR	
		A11-SC wiper seal without metal reinforcement with special pneumatic sealing edge.	-30 °C ... + 90 °C	1,0 m/s	10 bar (145 psi)	s-mart PU	
			-20 °C ... +110 °C	-	-	s-mart HPU	
			-20 °C ... +110 °C	-	-	s-mart SPU	
			-50 °C ... +110 °C	-	-	s-mart LTPU	
			-30 °C ... +110 °C	-	-	s-mart GPU	
			-20 °C ... +200 °C	-	-	s-mart FKM	
			-50 °C ... +150 °C	-	-	s-mart EPDM**	
			-25 °C ... +150 °C	-	-	s-mart HNBR	
	A11-SF ••	**hydraulics, single acting**				**seal part**	**housing**
		wiper seal for hydraulic with metal case.	-40 °C ... +100 °C	1,0 m/s		s-mart PU	s-mart POM / PA* / Metal
			-20 °C ... +110 °C	-		s-mart HPU	s-mart POM / PA* / Metal
			-20 °C ... +110 °C	-		s-mart SPU	s-mart POM / PA* / Metal
			-50 °C ... +110 °C	-		s-mart LTPU	s-mart POM / PA* / Metal
			-30 °C ... +110 °C	-		s-mart GPU	s-mart POM / PA* / Metal
			-30 °C ... +100 °C	-		s-mart NBR	s-mart POM / PA* / Metal
			-25 °C ... +150 °C	-		s-mart HNBR	s-mart POM / PA* / Metal
			-20 °C ... +200 °C	-		s-mart FKM	s-mart POM / PA* / Metal
			-50 °C ... +150 °C	-		s-mart EPDM**	s-mart POM / PA* / Metal
	A11-SG ••	**hydraulics, single acting**				**seal part**	**housing**
		wiper seal for hydraulic with metal case.	-20 °C ... +100 °C	1,0 m/s	10 bar (145 psi)	s-mart NBR	s-mart POM / PA* / Metal
			-30 °C ... +110 °C	-	-	s-mart PU	s-mart POM / PA* / Metal
			-20 °C ... +110 °C	-	-	s-mart HPU	s-mart POM / PA* / Metal
			-20 °C ... +110 °C	-	-	s-mart SPU	s-mart POM / PA* / Metal
			-50 °C ... +110 °C	-	-	s-mart LTPU	s-mart POM / PA* / Metal
			-30 °C ... +110 °C	-	-	s-mart GPU	s-mart POM / PA* / Metal
			-25 °C ... +150 °C	-	-	s-mart HNBR	s-mart POM / PA* / Metal
			-20 °C ... +200 °C	-	-	s-mart FKM	s-mart POM / PA* / Metal
			-50 °C ... +150 °C	-	-	s-mart EPDM**	s-mart POM / PA* / Metal

application	profile	description	temperature	max speed	max pressure	material	
	A11-SJ ••	**hydraulics, single acting**				**seal part**	**housing**
		combination wiper seal with metal reinforcement and pecial pneumatic sealing edge.	-20 °C ... +100 °C	1,0 m/s	10 bar (145 psi)	s-mart NBR	s-mart POM / PA* / Metal
			-10 °C ... +200 °C	1,0 m/s	10 bar (145 psi)	s-mart FKM	s-mart POM / PA* / Metal
			-30 °C ... +110 °C	-	-	s-mart PU	s-mart POM / PA* / Metal
			-20 °C ... +110 °C	-	-	s-mart HPU	s-mart POM / PA* / Metal
			-20 °C ... +110 °C	-	-	s-mart SPU	s-mart POM / PA* / Metal
			-50 °C ... +110 °C	-	-	s-mart LTPU	s-mart POM / PA* / Metal
			-30 °C ... +110 °C	-	-	s-mart GPU	s-mart POM / PA* / Metal
			-25 °C ... +150 °C	-	-	s-mart HNBR	s-mart POM / PA* / Metal
			-50 °C ... +150 °C	-	-	s-mart EPDM**	s-mart POM / PA* / Metal
	A11-SK ••	**pneumatic, double acting**					
		the profile design of the profile A11-SK rod seal/wiper combines the profile geometry of our trie and proven profile A11-SC with the requirements of mini pneumatics, i.e. the dimensions of profile A11-SK are considerably smaller and friction values are even lower. s-mart	-35 °C ... + 80 °C	1,0 m/s	16 bar (232psi)	s-mart PU	
			-20 °C ... +110 °C	-	-	s-mart HPU	
			-20 °C ... +110 °C	-	-	s-mart SPU	
			-50 °C ... +110 °C	-	-	s-mart LTPU	
			-30 °C ... +110 °C	-	-	s-mart GPU	
			-30 °C ... +100 °C	-	-	s-mart NBR	
			-25 °C ... +150 °C	-	-	s-mart HNBR	
			-20 °C ... +200 °C	-	-	s-mart FKM	
			-50 °C ... +150 °C	-	-	s-mart EPDM**	
	A11-SL ••	**pneumatic, double acting**					
		the scraper A11-SL is a double- acting scraper of polyurethane for severe operating conditions and heavy attack of dirt. the special design of the inward-facing sealing lip contributes to an optimum contact pressure resulting in a very high scraper effect of the residual oil film. the outward-facing scraper lip leans against the housing. this ensures an optimum sealing force and further it prevents the penetration of dirt and water across the groove bottom. also at heavy attacks of dirt and side steering of the piston rod the scraper effect remains stable. the material polyurethane ensures a high service life, also at heavy requirements, and it is proof against installation damage.	-35 °C ... + 80 °C	up to 0,5 m/s	50 bar (725psi)	s-mart PU	
			-20 °C ... +110 °C	-	-	s-mart HPU	
			-20 °C ... +110 °C	-	-	s-mart SPU	
			-50 °C ... +110 °C	-	-	s-mart LTPU	
			-30 °C ... +110 °C	-	-	s-mart GPU	
			-30 °C ... +100 °C	-	-	s-mart NBR	
			-25 °C ... +150 °C	-	-	s-mart HNBR	
			-20 °C ... +200 °C	-	-	s-mart FKM	
			-50 °C ... +150 °C	-	-	s-mart EPDM**	
	A12-A	**hydraulic, single acting**					
		wiper with secondary lip, the technically accurate closure at the cylinder is providing reliable protection, even for heavy contamination.	-30 °C ... +110 °C	4,0 m/s		s-mart PU / s-mart XPU	
			-20 °C ... +110 °C	4,0 m/s		s-mart HPU/ s-mart XHPU	
			-50 °C ... +110 °C	4,0 m/s		s-mart LLTPU	
			-20 °C ... +110 °C	5,0 m/s		s-mart SPU/ s-mart XSPU	
			-30 °C ... +110 °C	4,0 m/s		s-mart GPU	
	A12-B	**hydraulic, double acting**					
		wiper including additional sealing lip and secondary lip. used in combination with tandem seal systems to reduce residual oil film, also used as complete solution for pneumatic applications in small diameter range (max. 16 bar or 230 psi). the technically accurate closure at the cylinder is providing reliable protection, even for heavy contamination.	-30 °C ... +110 °C	4,0 m/s	16 bar (230 psi)	s-mart PU	
			-20 °C ... +110 °C	4,0 m/s	16 bar (230 psi)	s-mart HPU	
			-50 °C ... +110 °C	4,0 m/s	16 bar (230 psi)	s-mart LTPU	
			-20 °C ... +110 °C	5,0 m/s	16 bar (230 psi)	s-mart SPU	
			-30 °C ... +110 °C	4,0 m/s	16 bar (230 psi)	s-mart GPU	
	A13-A	**hydraulic/pneumatic, single acting**					
		scraper ring, mainly used in combination with wiper A02 or A01. firmly clinging dirt and extremely heavy soiling (mud, tar, ice) is wiped off, following elastomeric wiper is protected from damage. recommended materials provide good dry running properties, high stiffness and breaking strenght.	-50 °C ... + 80 °C	1,0 m/s		s-mart POM	
			-40 °C ... + 80 °C	1,0 m/s		s-mart PA*	
			-50 °C ... +260 °C	1,0 m/s		s-mart PEEK	
	A25-F	**hydraulic/pneumatic, single acting**				**glide ring**	**energizer**
		PTFE or PU 57 shore D with o-ring as preloading element. PTFE part takes over wiping function, o-ring maintains equal contact pressure. good dry running roperties, no "stick-slip". excellent chemical and thermal resistance (depends on o-ring).	-30 °C ... +100 °C	10,0 m/s		s-mart PTFE glass	s-mart NBR
			-20 °C ... +200 °C	10,0 m/s		s-mart PTFE glass	s-mart FKM
			-30 °C ... +100 °C	10,0 m/s		s-mart PTFE bronze	s-mart NBR
			-20 °C ... +200 °C	10,0 m/s		s-mart PTFE bronze	s-mart FKM
			-30 °C ... +100 °C	10,0 m/s		s-mart PTFE carbon	s-mart NBR
			-20 °C ... +200 °C	10,0 m/s		s-mart PTFE carbon	s-mart FKM
			-30 °C ... +110 °C	5,0 m/s		s-mart XPU	s-mart NBR
	A26-F	**hydraulic/pneumatic, single acting**				**glide ring**	**energizer**
		PTFE or PU 57 shore D double wiper with two o-rings as preloading elements. wiping edge assures a reliable protection against penetration of dust and dirt. additional sealing lip for reduction of residual oil film if used in combination with o-ring activated PTFE seals type S09 (tandem). excellent chemical and thermal resistance (depends on o-ring).	-30 °C ... +100 °C	10,0 m/s	16 bar (230 psi)	s-mart PTFE glass	s-mart NBR
			-20 °C ... +200 °C	10,0 m/s	16 bar (230 psi)	s-mart PTFE glass	s-mart FKM
			-30 °C ... +100 °C	10,0 m/s	16 bar (230 psi)	s-mart PTFE bronze	s-mart NBR
			-20 °C ... +200 °C	10,0 m/s	16 bar (230 psi)	s-mart PTFE bronze	s-mart FKM
			-30 °C ... +100 °C	10,0 m/s	16 bar (230 psi)	s-mart PTFE carbon	s-mart NBR
			-20 °C ... +200 °C	10,0 m/s	16 bar (230 psi)	s-mart PTFE carbon	s-mart FKM
			-30 °C ... +110 °C	5,0 m/s	600 bar (8700 psi)	s-mart XPU	s-mart NBR

application	profile	description	temperature	max speed	max pressure	material	
	A27-F	**hydraulic/pneumatic, single acting**				**glide ring**	**energizer**
		PTFE or PU 57 shore D wiper with o-ring as preloading element. PTFE part takes over wiping function, o-ring maintains equal contact pressure. good dry running properties, no "stick-slip". excellent chemical and thermal resistance (depends on o-ring).	-30 °C ... +100 °C	10,0 m/s	16 bar (230 psi)	s-mart PTFE glass	s-mart NBR
			-20 °C ... +200 °C	10,0 m/s	16 bar (230 psi)	s-mart PTFE glass	s-mart FKM
			-30 °C ... +100 °C	10,0 m/s	16 bar (230 psi)	s-mart PTFE bronze	s-mart NBR
			-20 °C ... +200 °C	10,0 m/s	16 bar (230 psi)	s-mart PTFE bronze	s-mart FKM
			-30 °C ... +100 °C	10,0 m/s	16 bar (230 psi)	s-mart PTFE carbon	s-mart NBR
			-20 °C ... +200 °C	10,0 m/s	16 bar (230 psi)	s-mart PTFE carbon	s-mart FKM
			-30 °C ... +110 °C	5,0 m/s	600 bar (8700 psi)	s-mart XPU	s-mart NBR
	A27-SA •	**hydraulic & pneumatic, double acting**				**glide ring**	**energizer**
		the function of wiper rings is to prevent dust, dirt, grains of sand and metal swarf from penetrating into axially moving rods and plungers. thus the development of scratches is largely prevented, guiding elements are protected and the working life of seals is extended. profile A27-SA consists of a PTFE wiper ring and an o-ring as pretensioning element.	-30 °C ... +100 °C	4,0 m/s		s-mart PTFE bronze	s-mart NBR
			-30 °C ... +100 °C	-		s-mart PTFE glass	s-mart NBR
			-20 °C ... +200 °C	-		s-mart PTFE glass	s-mart FKM
			-20 °C ... +200 °C	-		s-mart PTFE bronze	s-mart FKM
			-30 °C ... +100 °C	-		s-mart PTFE carbon	s-mart NBR
			-20 °C ... +200 °C	-		s-mart PTFE carbon	s-mart FKM
			-30 °C ... +110 °C	-		s-mart PU	s-mart NBR
	A27-SB •	**hydraulic & pneumatic, double acting**				**glide ring**	**energizer**
		two piece double wiper consisting of a dynamic wiper ring and static o-ring	-30 °C ... +100 °C	up to 15,0 m/s		s-mart PTFE bronze	s-mart NBR
			-30 °C ... +100 °C	up to 2,0 m/s		s-mart PU	s-mart NBR
			-30 °C ... +100 °C	-		s-mart PTFE glass	s-mart NBR
			-20 °C ... +200 °C	-		s-mart PTFE glass	s-mart FKM
			-20 °C ... +200 °C	-		s-mart PTFE bronze	s-mart FKM
			-30 °C ... +100 °C	-		s-mart PTFE carbon	s-mart NBR
			-20 °C ... +200 °C	-		s-mart PTFE carbon	s-mart FKM
	A27-SC •	**hydraulic & pneumatic, double acting**				**glide ring**	**energizer**
		the A27-SC is a double-acting scraper with two geometrically different scraper lips which are installed back-to-back. A27-SC is always installed together with an elastic o-ring in one groove. the scraper function is performed by the A27-SC. the o-ring maintains the pressure of the scraper lips against the sliding surface and can compensate any deflections of the piston rod.	-30 °C ... +100 °C	up to 15,0 m/s		s-mart PTFE bronze	s-mart NBR
			-10 °C ... +200 °C	up to 15,0 m/s		s-mart PTFE bronze	s-mart FKM
			-30 °C ... +100 °C	up to 15,0 m/s		PTFE + carbon fibre	s-mart NBR
			-10 °C ... +200 °C	up to 15,0 m/s		PTFE + carbon fibre	s-mart FKM
			-45 °C ... +145 °C	up to 15,0 m/s		PTFE + carbon fibre	s-mart EPDM
			-30 °C ... +100 °C	up to 2,0 m/s		s-mart PU	s-mart NBR
			-30 °C ... +100 °C	-		s-mart PTFE glass	s-mart NBR
			-20 °C ... +200 °C	-		s-mart PTFE glass	s-mart FKM
			-30 °C ... +100 °C	-		s-mart PTFE carbon	s-mart NBR
			-20 °C ... +200 °C	-		s-mart PTFE carbon	s-mart FKM
	A27-SD •	**hydraulic & pneumatic, double acting**				**glide ring**	**energizer**
		the A27-SD is a patented double-acting scraper with two geometrically different scraper lips which are installed back-to-back. the scraper is installed together with an o-ring as elastic energizing element in one groove. the scraper function is performed by the A27-SD. the o-ring maintains the pressure of the scraper lips against the sliding surface and can compensate deflections of the piston rod.	-30 °C ... +100 °C	up to 15,0 m/s		s-mart PTFE + bronze	s-mart NBR
			-10 °C ... +200 °C	up to 15,0 m/s		s-mart PTFE + bronze	s-mart FKM
			-30 °C ... +100 °C	up to 15,0 m/s		PTFE + carbon fibre	s-mart NBR
			-10 °C ... +200 °C	up to 15,0 m/s		PTFE + carbon fibre	s-mart FKM
			-45 °C ... +145 °C	up to 15,0 m/s		PTFE + carbon fibre	s-mart EPDM
			-30 °C ... +100 °C	up to 2,0 m/s		s-mart PU	s-mart NBR
			-30 °C ... +100 °C	-		s-mart PTFE glass	s-mart NBR
			-20 °C ... +200 °C	-		s-mart PTFE glass	s-mart FKM
			-30 °C ... +100 °C	-		s-mart PTFE carbon	s-mart NBR
			-20 °C ... +200 °C	-		s-mart PTFE carbon	s-mart FKM
	A60 •	**hydraulic, single acting**				**glide ring**	
		wiper with a sharply defined lip edge.	-40 °C ... +100 °C	0,5 m/s		s-mart NBR	
			-30 °C ... +110 °C	-		s-mart PU	
			-20 °C ... +110 °C	-		s-mart HPU	
			-20 °C ... +110 °C	-		s-mart SPU	
			-50 °C ... +110 °C	-		s-mart LTPU	
			-30 °C ... +110 °C	-		s-mart GPU	
			-20 °C ... +200 °C	-		s-mart FKM	
			-50 °C ... +150 °C	-		s-mart EPDM**	
			-25 °C ... +150 °C	-		s-mart HNBR	
	A61 •	**hydraulic, single acting**					
		wiper seal with material from polyamide (PA).	-40 °C ... +100 °C	4,0 m/s		s-mart PA	
	A62-A ••	**hydraulic, single acting**				**wiping part**	**housing**
		A62-A are polyurethane manufactured lipped wipers with integrated metal reinforcement for open groove assembly. these are typically used in severe applications where there is abrasion due to solid matter on rod surface.	-35 °C ... +100 °C	1,0 m/s		s-mart PU	s-mart POM / PA* / Metal
			-20 °C ... +110 °C	-		s-mart HPU	s-mart POM / PA* / Metal
			-20 °C ... +110 °C	-		s-mart SPU	s-mart POM / PA* / Metal
			-50 °C ... +110 °C	-		s-mart LTPU	s-mart POM / PA* / Metal
			-30 °C ... +110 °C	-		s-mart GPU	s-mart POM / PA* / Metal
			-30 °C ... +110 °C	-		s-mart NBR	s-mart POM / PA* / Metal

application	profile	description	temperature	max speed	max pressure	material		
	A62-A ••	**hydraulic, single acting (continued)**				**wiping part**	**housing**	
		A62-A are polyurethane manufactured lipped wipers with integrated metal reinforcement for open groove assembly. these are typically used in severe applications where there is abrasion due to solid matter on rod surface.	-25 °C ... +150 °C -20 °C ... +200 °C -50 °C ... +150 °C	- - -		s-mart HNBR s-mart FKM s-mart EPDM**	s-mart POM / PA* / Metal s-mart POM / PA* / Metal s-mart POM / PA* / Metal	
	A62-C ••	**hydraulic, single acting**				**wiping part**	**housing**	
		the profile A62-C wiper ring serves the purpose of preventing the penetration of dust, dirt, sand, and metal swarf at the spherical bearings of a hydraulic cylinder rod end. this reduces the danger of scuffing on the swivel bolt as a result of contamination from external sources. the excellent wiping effect is achieved by the special design of the wiper lip. furthermore, the wiper lip opens up during lubrication allowing excess lubricant to escape. the proven PU stands for high abrasion resistance, minor permanent deformation, and robustness vis-a-vis external mechanical impact. by means of a press fit of the metal scan vis-a-vis the external diameter of the seal housing, the wiper is securely held in place in the axially open installation housing.	-35 °C ... +100 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C -30 °C ... +110 °C -25 °C ... +150 °C -20 °C ... +200 °C -50 °C ... +150 °C	2,0 m/s - - - - - - - -		s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU s-mart NBR s-mart HNBR s-mart FKM s-mart EPDM**	s-mart POM / PA* / Metal s-mart POM / PA* / Metal s-mart POM / PA* / Metal s-mart POM / PA* / Metal s-mart POM / PA* / Metal s-mart POM / PA* / Metal s-mart POM / PA* / Metal s-mart POM / PA* / Metal s-mart POM / PA* / Metal	
	A63 ••	**hydraulic, single acting**						
		dirt wiper with additional static sealing lip and bearing segments; sealing edge of wiper lip slightly rounded.	-30 °C ... +110 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C -30 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +150 °C -25 °C ... +150 °C	2,0 m/s - - - - - - - -		s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU s-mart NBR s-mart FKM s-mart EPDM** s-mart HNBR		
	A64 •••	**hydraulic, single acting**				**inner scraper lip**	**metal housing**	**outer scraper lip**
		the A64 is a special scraper with two different scraper lips - a thin metallic lip and a elastomer lip. the two scraper lips are arranged in tandem behind one another in a compact metal housing. the A64 lip is designed to remove firmly adhering soiling and ice particles. the secondary lip of elastomer material enhances the overall scraping effect, i.e. fine sand grains, water and similar foreign matter are reliably scraped off. both scraper lips have a smaller diameter than the nominal diameter of the piston rod, thus ensuring a tight fit of the scraper lips. the metallic lip is guided flexibly in radial direction and can easily follow any possible deflections of the piston rod.	-40 °C ... +120 °C	1,0 m/s	400 bar (5800 psi)	s-mart NBR	sheet metal	brass
	A65 ••	**hydraulic, single acting**						
		combination wiper seal without metal reinforcement with special pneumatic sealing edge.	-30 °C ... +110 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C -30 °C ... +100 °C -20 °C ... +200 °C -50 °C ... +150 °C -25 °C ... +150 °C	1,0 m/s - - - - - - - -		s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU s-mart NBR s-mart FKM s-mart EPDM** s-mart HNBR		
	A66 •	**hydraulic, single acting**						
		the self-retaining pneumatic rod seal/wiper set profile A66 for piston rods in pneumatic cylinders combines three functions sealing, wiping, fixing.	-30 °C ... +110 °C -30 °C ... +110 °C -20 °C ... +110 °C -20 °C ... +110 °C -50 °C ... +110 °C -30 °C ... +110 °C -20 °C ... +200 °C -50 °C ... +150 °C -25 °C ... +150 °C	1,0 m/s - - - - - - - -	16 bar (232 psi) - - - - - - - -	s-mart NBR s-mart PU s-mart HPU s-mart SPU s-mart LTPU s-mart GPU s-mart FKM s-mart EPDM** s-mart HNBR		
	A67 ••	**pneumatic, double acting**				**seal part**		**housing**
		the profile A67 pneumatic rod seal, wiper and guidance system is used for rods in pneumatic cylinders. it combines the following functional features: sealing, wiping, fixing.	-35 °C ... + 80 °C -20 °C ... +110 °C -20 °C ... +110 °C	up to 1,0 m/s - -	16 bar (232 psi) - -	s-mart PU s-mart HPU s-mart HPU		alumunium metal alumunium

application	profile	description	temperature	max speed	max pressure	material	
	A68 ••	**hydraulic & pneumatic, double acting**				**glide ring**	**energizer**
		A68 double wiper consisting of one profile ring made from PTFE with a sealing edge and a wiper edge, as well as two o-rings as sealing and pre-load components.	-30 °C ... +100 °C	5,0 m/s		s-mart PTFE bronze	s-mart NBR
			-10 °C ... +200 °C	5,0 m/s		s-mart PTFE bronze	s-mart FKM
			-30 °C ... +100 °C	-		s-mart PTFE glass	s-mart NBR
			-20 °C ... +200 °C	-		s-mart PTFE glass	s-mart FKM
			-30 °C ... +100 °C	-		s-mart PTFE carbon	s-mart NBR
			-20 °C ... +200 °C	-		s-mart PTFE carbon	s-mart FKM
			-30 °C ... +110 °C	-		s-mart PU	s-mart NBR
	A69 ••	**hydraulic & pneumatic, single acting**					
		the cushioning seal has been designed specifically for use in braking systems at the end stroke of the piston, in pneumatic cylinders. the profile eliminates the limitations in this particular application that some seal types, like o-rings and lip seals have. the inlet chamfer on the sealing lip and the groove on the sealing border at the bottom makes the cushioning very effective. another advantage is the utilisation of polyurethane, which with its high impact and abrasion resistance gives the part a very long life.	-30 °C ... + 80 °C	up to 1,0 m/s	16 bar (230 psi)	s-mart PU	
			-20 °C ... +110 °C	-	-	s-mart HPU	
			-20 °C ... +110 °C	-	-	s-mart SPU	
			-50 °C ... +110 °C	-	-	s-mart LTPU	
			-30 °C ... +110 °C	-	-	s-mart GPU	
			-30 °C ... +100 °C	-	-	s-mart NBR	
			-20 °C ... +200 °C	-	-	s-mart FKM	
			-50 °C ... +150 °C	-	-	s-mart EPDM**	
			-25 °C ... +150 °C	-	-	s-mart HNBR	
	A70 ••	**hydraulic & pneumatic, single acting**					
		the cushioning seal type A70 provides cushioning at the end of the stroke in pneumatic cylinders and is designed for a smaller groove than type A69. as can be seen in the dimensions list, this profile for a cushioning seal can substitute a standard o-ring. this permits to a reduction in the dimensions of the cylinder head.	-30 °C ... + 80 °C	up to 1,0 m/s	16 bar (230 psi)	s-mart PU	
			-20 °C ... +110 °C	-	-	s-mart HPU	
			-20 °C ... +110 °C	-	-	s-mart SPU	
			-50 °C ... +110 °C	-	-	s-mart LTPU	
			-30 °C ... +110 °C	-	-	s-mart GPU	
			-30 °C ... +100 °C	-	-	s-mart NBR	
			-20 °C ... +200 °C	-	-	s-mart FKM	
			-50 °C ... +150 °C	-	-	s-mart EPDM**	
			-25 °C ... +150 °C	-	-	s-mart HNBR	
	A71 ••	**hydraulic & pneumatic, single acting**					
		the profile A71 pneumatic cushioning seal is specially designed for cushioning spears in pneumatic cylinders.	-30 °C ... + 80 °C	up to 1,0 m/s	16 bar (230 psi)	s-mart PU	
			-20 °C ... +110 °C	-	-	s-mart HPU	
			-20 °C ... +110 °C	-	-	s-mart SPU	
			-50 °C ... +110 °C	-	-	s-mart LTPU	
			-30 °C ... +110 °C	-	-	s-mart GPU	
			-30 °C ... +100 °C	-	-	s-mart NBR	
			-20 °C ... +200 °C	-	-	s-mart FKM	
			-50 °C ... +150 °C	-	-	s-mart EPDM**	
			-25 °C ... +150 °C	-	-	s-mart HNBR	
	A72 ••	**hydraulic & pneumatic, single acting**					
		the profile A72 pneumatic cushioning seal is specially designed for cushioning spears in pneumatic cylinders.	-30 °C ... + 80 °C	up to 1,0 m/s	16 bar (230 psi)	s-mart PU	
			-20 °C ... +110 °C	-	-	s-mart HPU	
			-20 °C ... +110 °C	-	-	s-mart SPU	
			-50 °C ... +110 °C	-	-	s-mart LTPU	
			-30 °C ... +110 °C	-	-	s-mart GPU	
			-30 °C ... +100 °C	-	-	s-mart NBR	
			-20 °C ... +200 °C	-	-	s-mart FKM	
			-50 °C ... +150 °C	-	-	s-mart EPDM**	
			-25 °C ... +150 °C	-	-	s-mart HNBR	
	A73 ••	**hydraulic & pneumatic, single acting**					
		damper Seal A73 with spacer lug and flow passages.	-30 °C ... + 80 °C	up to 1,0 m/s	16 bar (230 psi)	s-mart PU	
			-20 °C ... +110 °C	-	-	s-mart HPU	
			-20 °C ... +110 °C	-	-	s-mart SPU	
			-50 °C ... +110 °C	-	-	s-mart LTPU	
			-30 °C ... +110 °C	-	-	s-mart GPU	
			-30 °C ... +100 °C	-	-	s-mart NBR	
			-20 °C ... +200 °C	-	-	s-mart FKM	
			-50 °C ... +150 °C	-	-	s-mart EPDM**	
			-25 °C ... +150 °C	-	-	s-mart HNBR	
	A74 ••	**hydraulic & pneumatic, single acting**					
		damper seal A74 with spacer lug and flow passages. Integrated nonreturn valve function due to axial seal, spacer lugs and flow passages.	-30 °C ... + 80 °C	up to 1,0 m/s	25 bar (362 psi)	s-mart PU	
			-20 °C ... +110 °C	-	-	s-mart HPU	
			-20 °C ... +110 °C	-	-	s-mart SPU	
			-50 °C ... +110 °C	-	-	s-mart LTPU	
			-30 °C ... +110 °C	-	-	s-mart GPU	
			-30 °C ... +100 °C	-	-	s-mart NBR	
			-20 °C ... +200 °C	-	-	s-mart FKM	
			-50 °C ... +150 °C	-	-	s-mart EPDM**	
			-25 °C ... +150 °C	-	-	s-mart HNBR	

hydraulics & pneumatics : guide ring

profile	description	temperature	max speed	max pressure	material
F01•	**guide ring** most common guide ring for rod or piston application. Used in many standard cylinders, majority of applications require split version for installation into closed housing, non split design available (bushings)	- 50 °C ... +100 °C - 40 °C ... +100 °C -200 °C ... +200 °C -200 °C ... +200 °C - 40 °C ... +130 °C	4,0 m/s 4,0 m/s 4,0 m/s 5,0 m/s 1,0 m/s	25 N/mm2 25 N/mm2 3 N/mm2 4,5 N/mm2 90 N/mm2	s-mart POM s-mart PA* s-mart PTFE glass s-mart bronze s-mart TEX
F02 •	**guide ring** for rod or piston application, split and non split design available. not only used as guidering, also as plain washer or spacer.	- 50 °C ... +100 °C - 40 °C ... +100 °C -200 °C ... +200 °C -200 °C ... +200 °C - 40 °C ... +130 °C	4,0 m/s 4,0 m/s 4,0 m/s 5,0 m/s 1,0 m/s	25 N/mm2 25 N/mm2 3 N/mm2 4,5 N/mm2 90 N/mm2	s-mart POM s-mart PA* s-mart PTFE glass s-mart bronze s-mart TEX
F03	**guide ring** for piston application. angled design combines guide ring and back-up ring function. split and non split design available.	- 50 °C ... +100 °C - 40 °C ... +100 °C -200 °C ... +200 °C -200 °C ... +200 °C - 40 °C ... +130 °C	4,0 m/s 4,0 m/s 4,0 m/s 5,0 m/s 1,0 m/s	25 N/mm2 25 N/mm2 3 N/mm2 4,5 N/mm2 90 N/mm2	s-mart POM s-mart PA* s-mart PTFE glass s-mart bronze s-mart TEX
F04	**guide ring** as profile F03 but for rod application.	- 50 °C ... +100 °C - 40 °C ... +100 °C -200 °C ... +200 °C -200 °C ... +200 °C - 40 °C ... +130 °C	4,0 m/s 4,0 m/s 4,0 m/s 5,0 m/s 1,0 m/s	25 N/mm2 25 N/mm2 3 N/mm2 4,5 N/mm2 90 N/mm2	s-mart POM s-mart PA* s-mart PTFE glass s-mart bronze s-mart TEX
F05 •	**guide ring** with integrated collar on inside diameter, for piston application. split and non split design available.	- 50 °C ... +100 °C - 40 °C ... +100 °C -200 °C ... +200 °C -200 °C ... +200 °C - 40 °C ... +130 °C	4,0 m/s 4,0 m/s 4,0 m/s 5,0 m/s 1,0 m/s	25 N/mm2 25 N/mm2 3 N/mm2 4,5 N/mm2 90 N/mm2	s-mart POM s-mart PA* s-mart PTFE glass s-mart bronze s-mart TEX
F06	**guide ring** with integrated collar on outside diameter, for rod application. split and non split design available.	- 50 °C ... +100 °C - 40 °C ... +100 °C -200 °C ... +200 °C -200 °C ... +200 °C - 40 °C ... +130 °C	4,0 m/s 4,0 m/s 4,0 m/s 5,0 m/s 1,0 m/s	25 N/mm2 25 N/mm2 3 N/mm2 4,5 N/mm2 90 N/mm2	s-mart POM s-mart PA* s-mart PTFE glass s-mart bronze s-mart TEX
F07	**guide ring** with groove on inside diameter, for piston application. split and non split design available.	- 50 °C ... +100 °C - 40 °C ... +100 °C -200 °C ... +200 °C -200 °C ... +200 °C - 40 °C ... +130 °C	4,0 m/s 4,0 m/s 4,0 m/s 5,0 m/s 1,0 m/s	25 N/mm2 25 N/mm2 3 N/mm2 4,5 N/mm2 90 N/mm2	s-mart POM s-mart PA* s-mart PTFE glass s-mart bronze s-mart TEX
F08	**guide ring** with groove on outside diameter, for rod application. split and non split design available.	- 50 °C ... +100 °C - 40 °C ... +100 °C -200 °C ... +200 °C -200 °C ... +200 °C - 40 °C ... +130 °C	4,0 m/s 4,0 m/s 4,0 m/s 5,0 m/s 1,0 m/s	25 N/mm2 25 N/mm2 3 N/mm2 4,5 N/mm2 90 N/mm2	s-mart POM s-mart PA* s-mart PTFE glass s-mart bronze s-mart TEX

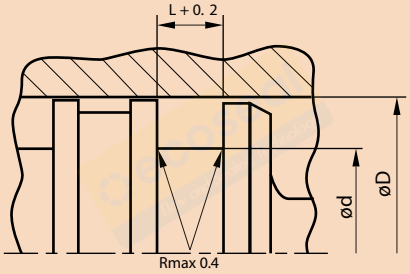
hydraulics & pneumatics : back-up ring

		back-up ring common inactive back-up ring, mainly used with o-ring to avoid gap extrusion. split and non split design available.	- 50 °C ... +100 °C - 40 °C ... +100 °C -200 °C ... +260 °C -200 °C ... +260 °C - 30 °C ... +110 °C - 20 °C ... +110 °C - 50 °C ... +110 °C - 30 °C ... +110 °C			s-mart POM s-mart PA* s-mart PTFE s-mart PTFE glass s-mart PU s-mart HPU s-mart LTPU s-mart GPU	
	ST09 •	**back-up ring** common inactive back-up ring especially for o-ring to avoid gap extrusion. split and non split design available.	-200 °C ... +260 °C - 30 °C ... +110 °C - 20 °C ... +110 °C - 50 °C ... +110 °C - 30 °C ... +110 °C			s-mart PTFE s-mart PU s-mart HPU s-mart LTPU s-mart GPU	
	ST10	**back-up ring** standard active back-up ring for piston seal type PD. normally already included in PD-type seal profiles, designed for automatic pressure activation. split and non split design available.	- 50 °C ... +100 °C - 40 °C ... +100 °C -200 °C ... +260 °C			s-mart POM s-mart PA* s-mart PTFE glass	
	ST11	**back-up ring** standard active back-up ring for rod seal type PD. normally already included in PD type seal profiles, designed for automatic pressure activation. split and non split design available.	- 50 °C ... +100 °C - 40 °C ... +100 °C -200 °C ... +260 °C			s-mart POM s-mart PA* s-mart PTFE glass	
	ST12	**back-up ring** triangular back-up ring for rod applications, fits in special shaped housings (see seal data sheets). also used as integrated active back-up ring in special high pressure or low friction seal profiles. split and non split design available.	- 50 °C ... +100 °C - 40 °C ... +100 °C -200 °C ... +260 °C			s-mart POM s-mart PA* s-mart PTFE glass	
	ST13	**back-up ring** triangular back-up ring for piston applications, fits in special shaped housings (see seal data sheets). also used as integrated active back-up ring in special high pressure or low friction seal profiles. split and non split design available.	- 50 °C ... +100 °C - 40 °C ... +100 °C -200 °C ... +260 °C			s-mart POM s-mart PA* s-mart PTFE glass	
	ST60 •••	**back-up ring** spiral-shaped split bearing component with rectangular cross section.	-200 °C ... +260 °C -200 °C ... +260 °C -200 °C ... +260 °C	up to 2,0 m/s up to 2,0 m/s up to 2,0 m/s	2500 bar (36259 psi) 400 bar (5801 psi) 150 bar (2175 psi)	s-mart PTFE virgin s-mart PTFE virgin s-mart PTFE virgin	static applications dynamic applications oscillating

piston seal housing details and recommendations

indicated dimensions
are required to process an order

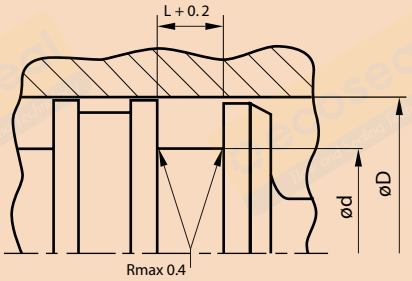
øD . . . . . outside diameter
ød . . . . . inside diameter
L . . . . . groove length



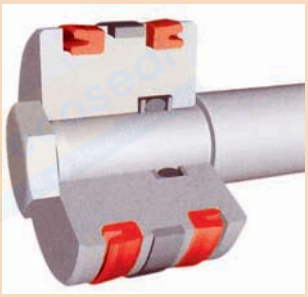
surface roughness	R tmax (µm)	Ra (µm)
sliding surface for PU/RUBBER seals	≤2,5	≤0,1 - 0,5
sliding surface for PTFE seals	≤ 2	≤0,05 - 0,3
bottom of groove	≤6,3	≤1,6
groove face	≤15	≤3
bearing area Tp	50% - 95%	

seal housing tolerances	
Ø d	h10
Ø D	H9

easy ordering procedure	K01-P	s-smart HPU	160 x 140 x 12
	profile	material	nominal housing dimensions



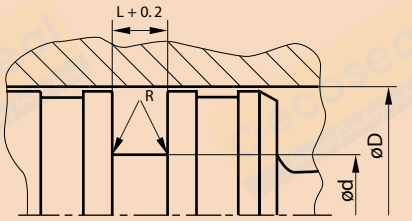
K01 K21
K02 K35
K03
K04
K05
K06
K07
K20



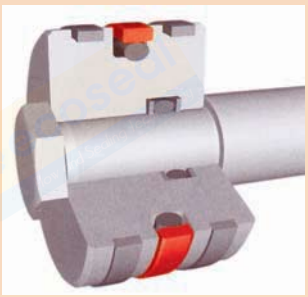
main applications:
support- and retaining cylinders
standard cylinders

advantages:
stable fit in the housing,
ultimate sealing effect,
wide temperature range

standard materials:
s-mart PU or s-mart NBR, FKM, EPDM, HNBR & MVQ



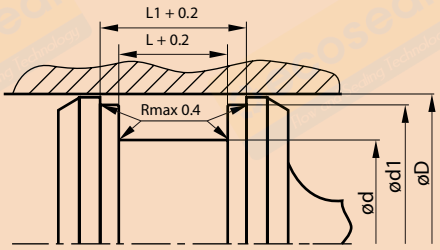
K08
K23



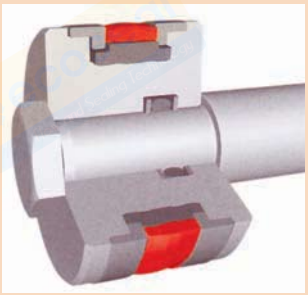
main applications:
standard cylinders for positioning
functions, mobile hydraulics, etc.

advantages:
low friction, no stick-slip, excellent
resistance against pressure shocks

standard materials:
s-mart PTFE virgin/glass/bronze/carbon/
XPU + s-mart NBR/FKM



K09
K17

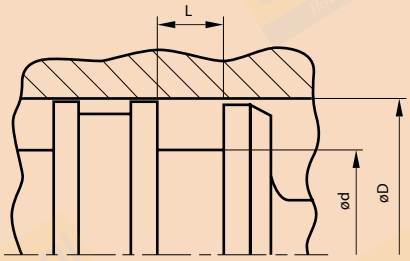


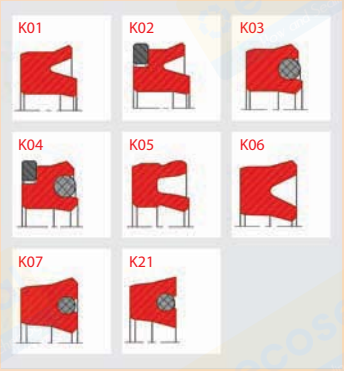
main applications:
support- and retaining cylinders
standard cylinders

advantages:
excellent static and dynamic sealing
capacity, integrated guide rings

standard materials:
s-mart PTFE virgin/glass/bronze/carbon/
XPU + s-mart NBR/FKM/EPDM/MVQ + s-mart POM/PA

housing recommendations
single acting piston seals
lip type (u-cup) seals
compact seals

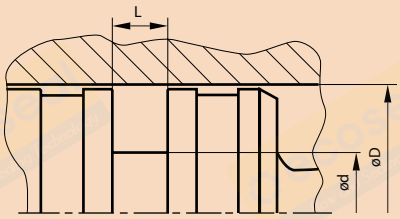




øD	ød	L	(øD-ød)/2
5 - 24,9	øD-8	6	4
25 - 49,9	øD-10	7	5
50 - 74,9	øD-12	8	6
75 - 149,9	øD-16	10	8
150 - 299,9	øD-20	12	10
300 - 500	øD-24	18	12
500 - 750	øD-30	20	15
> 750	øD-40	26	20

please note that we are able to produce those profiles to your specific need to any non-standard housing.

housing recommendations
single/double acting piston seals
o-ring activated PTFE (PU) seals

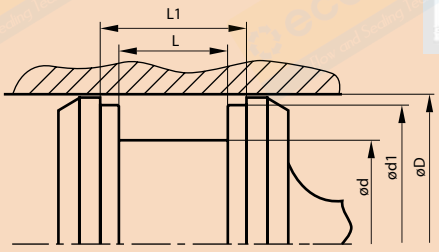


øD	ød	L	(øD-ød)/2
8-14,9	øD-4,9	2,2	2,45
15-39,9	øD-7,5	3,2	3,75
40-79,9	øD-11	4,2	5,5
80-132,9	øD-15,5	6,3	7,75
133 - 329,9	øD-21	8,1	10,5
330 - 669,9	øD-24,5	8,1	12,25
670 - 1.000	øD-28	9,5	14*
> 1.000	øD-28	9,5	14*

please note that we are able to produce those profiles to your specific need to any non-standard housing.

* only profiles K08-D and K08-E, not for profile K08-P

housing recommendations
double acting piston seals
compact type



øD	ød	ød1	L*	L1*
20 - 49,9	øD-10	øD-3	12,5	20,5
50 - 79,9	øD-15	øD-4	20	28
80 - 149,9	øD-20	øD-5	25	36
150 - 399,9	øD-25	øD-6	32	46
400 - 750	øD-30	øD-8	36	50
>750	øD-40	øD-8	40	54

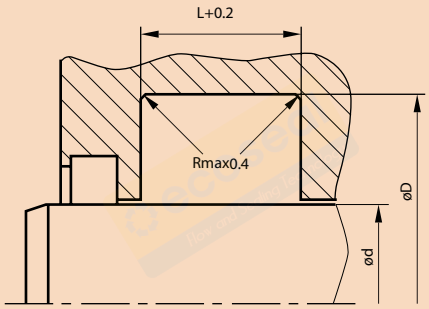
please note that we are able to produce those profiles to your specific need to any non-standard housing.

* not valid for profile K09-H

rod seal housing details and recommendations

Indicated dimensions
are required to process an order

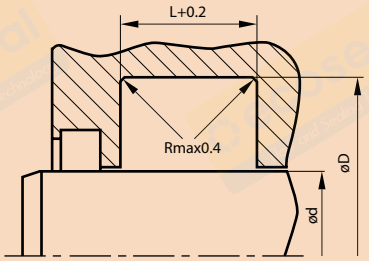
øD . . . . . outside diameter
ød . . . . . inside diameter
L . . . . . groove length



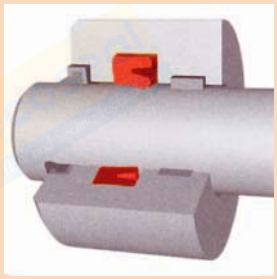
surface roughness	R tmax (µm)	Ra (µm)
sliding surface for PU/RUBBER seals	≤2,5	≤0,1 - 0,5
sliding surface for PTFE seals	≤ 2	≤0,05 - 0,3
bottom of groove	≤6,3	≤1,6
groove face	≤15	≤3
bearing area Tp	50% - 95%	

seal housing tolerances	
Ø d	f8
Ø D	H10

easy ordering procedure	S01-P	s-smart PU	60 x 75 x 10
	profile	material	nominal housing dimensions



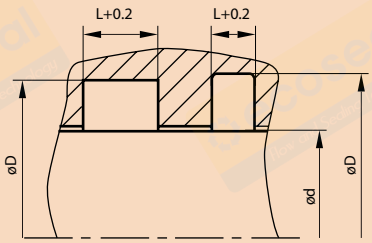
S01 S17
S02 S18
S03 S19
S04 S35
S05
S06
S07
S08



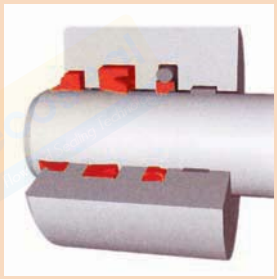
main applications:
standard cylinders
light & standard hydraulic applications

advantages:
stable fit in the housing, ultimate sealing effect, wide temperature range, good backpumping ability

standard materials:
s-smart PU or s-smart NBR, FKM, EPDM, HNBR & MVQ



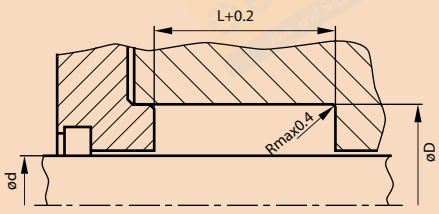
S09



main applications:
earth moving equipment,
heavy hydraulics

advantages:
excellent resistance against pressure shocks, long lifetime

standard materials:
S09: s-smart PTFE virgin/glass/bronze/carbon/ XPU + s-smart NBR/FKM
S01: s-smart PU or s-smart NBR, FKM, EPDM, HNBR & MVQ



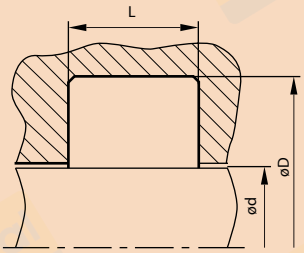
S1012
S1315
S32

main applications:
heavy industry hydraulics, presses

advantages:
suitable for old,worn rods, splitted version for easy installation available

standard materials:
s-smart PU + s-smart POM

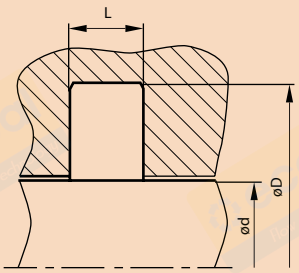
housing recommendations
single acting rod seals
lip type (u-cup) seals
compact seals



ød	øD	L	(øD-ød)/2
5 - 24,9 *	ød+8	6,3	4
25 - 49,9	ød+10	8	5
50 - 149,9	ød+15	10	7,5
150 - 299,9	ød+20	14	10
300 - 499,9	ød+25	17	12,5
500 - 699,9	ød+30	25	15
700 - 1.000	ød+40	32	20
> 1.000	ød+40	32	20

please note that we are able to produce those profiles to your specific need to any non-standard housing.

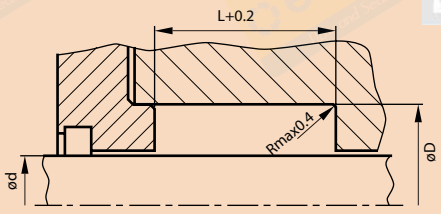
housing recommendations
single/double acting rod seals
o-ring activated PTFE (PU) seals



ød	øD	L	(øD-ød)/2
5 - 7,9	ød+4,9	2,2	2,45
8 - 18,9	ød+7,3	3,2	3,65
19 - 37,9	ød+10,7	4,2	5,35
38 - 199,9	ød+15,1	6,3	7,55
200 - 255,9	ød+20,5	8,1	10,25
256 - 649,9	ød+24	8,1	12
650 - 1.000	ød+27,3	9,5	13,65
> 1.000	ød+27,3	9,5	13,65

please note that we are able to produce those profiles to your specific need to any non-standard housing.

housing recommendations
single acting rod seals
chevron packings



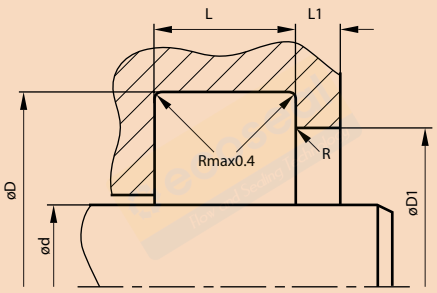
ød	øD	L	(øD-ød)/2
10 - 39,9	ød+10	16	5
40 - 74,9	ød+15	25	7,5
75 - 149,9	ød+20	32	10
150 - 199,9	ød+25	40	12,5
200 - 300	ød+30	50	15
> 300	ød+40	63	20

please note that we are able to produce those profiles to your specific need to any non-standard housing.

wiper housing details and recommendations

indicated dimensions
are required to process an order

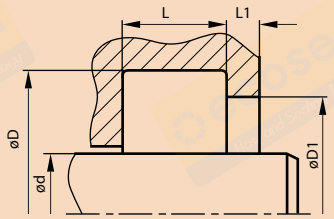
øD . . . . . outside diameter
ød . . . . . inside diameter (rod)
L . . . . . groove length
H . . . . . total wiper height



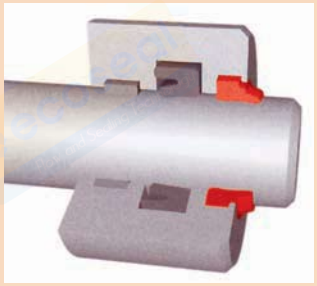
surface roughness	R tmax (µm)	Ra (µm)
sliding surface for PU/RUBBER seals	≤2,5	≤0,1 - 0,5
sliding surface for PTFE seals	≤ 2	≤0,05 - 0,3
bottom of groove	≤6,3	≤1,6
groove face	≤15	≤3
bearing area Tp	50% - 95%	

Seal housing tolerances	
Ø D1 H11	L<10 mm +0,2
Ø D H11	L>10 mm +0,3

easy ordering procedure	A01	s-smart SPU	60 x 68 x 4/7
	profile	material	nominal housing dimensions / total wiper height



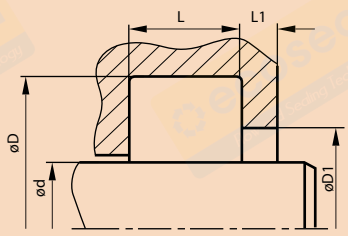
A01
A04



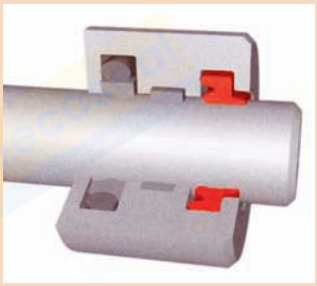
main applications:
standard wiper for hydraulic

advantages:
easy installation (snap-in)
excellent wear resistance,
technically accurate closure

standard materials:
smart PU/XPU or smart NBR, FKM, EPDM,
HNBR & MVQ



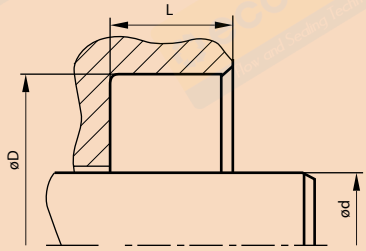
A11
A02
A05
A12



main applications:
in combination with O-ring activated
PTFE rod seals (S09)

advantages:
excellent wear resistance,
double acting function

standard materials:
smart PU/XPU or smart NBR, FKM, EPDM,
HNBR & MVQ



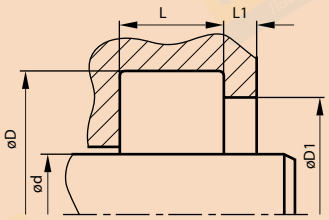
A03
A06

main applications:
standard hydraulic applications,
pressfit for axially open housings

advantages:
excellent wear resistance,
plastic retainer ring, no oxidation problem
between retainer and housing

standard materials:
smart PU/XPU + smart POM or
smart NBR, FKM, EPDM, HNBR & MVQ + smart POM

housing recommendations
single acting wipers

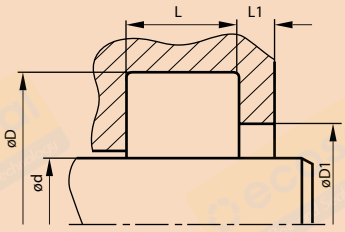


ød	øD	øD1	L	L1	H*
6 - 100	ød+8	ød+6	4	1	7
100,1 - 149,9	ød+12	ød+9	5,5	1,5	10
≥150	ød+15	ød+11	6,5	2	13

* H = total wiper height

please note that we are able to produce those profiles
to your specific need to any non-standard housing.

housing recommendations
single/double acting wipers

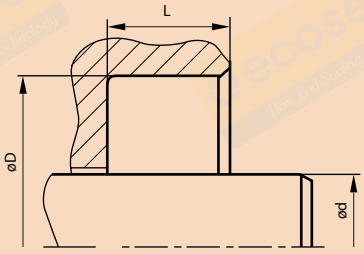


ød	øD	øD1	L	L1	H*
6 - 49,9	ød+8	ød+4	5	min. 2	8
50 - 99,9	ød+10	ød+5	6	min. 2	9,7
≥100	ød+15	ød+7,5	8,5	min. 2	13

* H = total wiper height

please note that we are able to produce those profiles
to your specific need to any non-standard housing.

housing recommendations
single acting wipers



ød	øD	L	H*
6 - 9,9	ød+8	5	8
10 - 99,9	ød+10	7	10
100 - 200	ød+15	9	12
> 200	ød+20	12	16

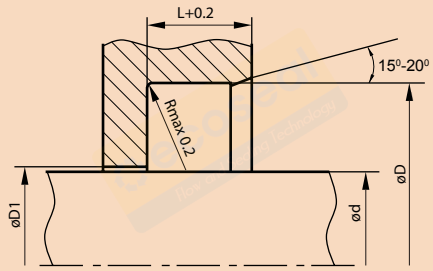
* H = total wiper height

please note that we are able to produce those profiles
to your specific need to any non-standard housing.

rotary seal housing details and recommendations

indicated dimensions
are required to process an order

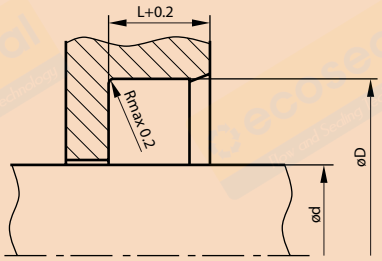
øD . . . . . outside diameter
ød . . . . . inside diameter (shaft)
L . . . . . groove length



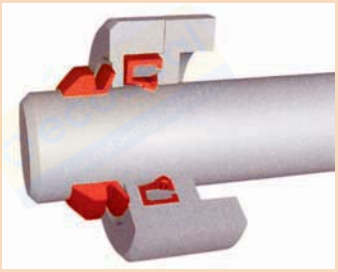
surface roughness	R tmax (µm)	Ra (µm)
sliding surface for PU/RUBBER seals	≤2,5	≤0,1 - 0,5
sliding surface for PTFE seals	≤ 2	≤0,05 - 0,3
bottom of groove	≤6,3	≤1,6
groove face	≤15	≤3
bearing area Tp	50% - 95%	

seal housing tolerances	
Ø d	f8
Ø D	H8

easy ordering procedure	R01	s-smart NBR/s-smart POM	60 x 80 x 10
	profile	material	nominal housing dimensions



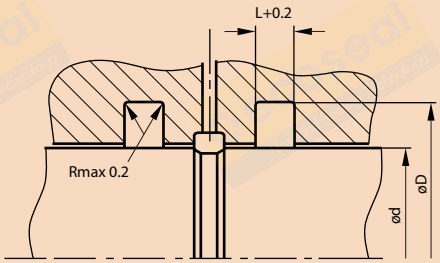
R01
R02



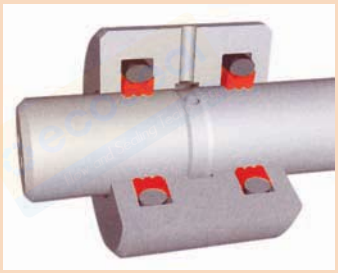
main applications:
bearing protection

advantages:
good adaptation possibilities for diverse temperatures and media

standard materials:
s-mart PU/NBR/FKM + s-mart POM/alumunium



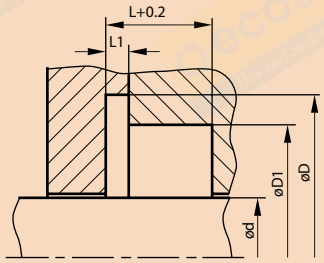
R09



main applications:
rotary pivots

advantages:
for high pressure

standard materials:
s-mart PTFE glass/bronze/carbon + s-mart NBR/FKM



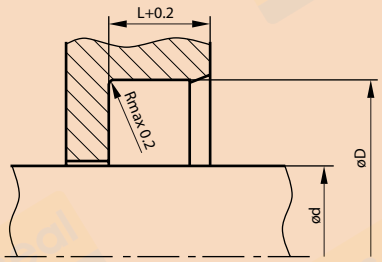
R19

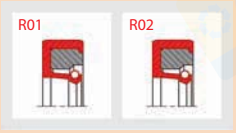
main applications:
bearing protection for chemical and pharma industries

advantages:
low friction, good chemical and thermal resistance, suitable for high speed

standard materials:
s-mart PTFE glass/bronze/carbon, stainless steel spring

housing recommendations
single acting rotary seals
oil seals / radial shaft seals

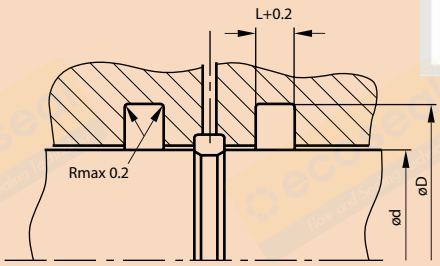




ød	øD	L	(øD-ød)/2
6 - 59,9	ød+12	7	6
60 - 139,9	ød+15	8	7,5
140 - 299,9	ød+20	10	10
300 - 499,9	ød+30	12	15
500 - 800	ød+40	20	20
> 800	ød+50	22	25

please note that we are able to produce those profiles to your specific need to any non-standard housing.

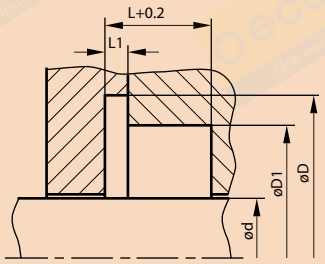
housing recommendations
double acting rotary seals
o-ring activated PTFE seals



ød	øD	L	(øD-ød)/2
6 - 18,9	ød+4,9	2,2	2,45
19 - 37,9	ød+7,5	3,2	3,75
38 - 199,9	ød+11	4,2	5,5
200 - 255,9	ød+15,5	6,3	7,75
256 - 649,9	ød+21	8,1	10,5
>650	ød+28	9,5	14

please note that we are able to produce those profiles to your specific need to any non-standard housing.

housing recommendations
single acting rotary seals
spring activated PTFE seals

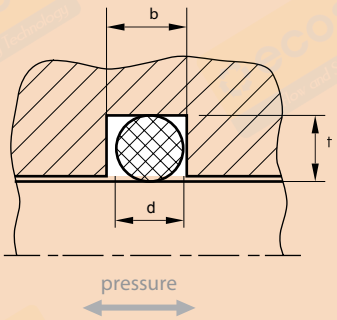


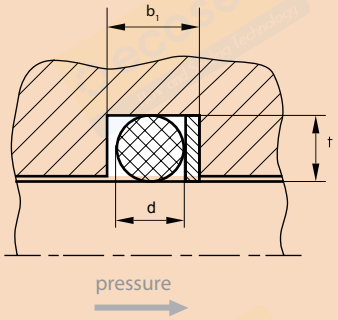
ød	øD	øD1	L	L1
5 - 19,9	ød+9	ød+5	3,6	0,85
20 - 39,9	ød+12,5	ød+7	4,8	1,35
40 - 399,9	ød+17,5	ød+10,5	7,1	1,8
≥400	ød+22	ød+14	9,5	2,8

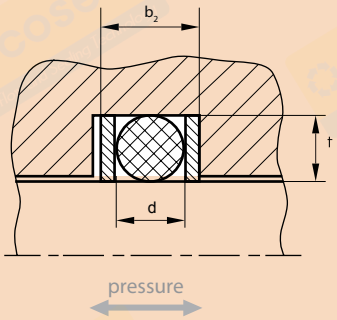
please note that we are able to produce those profiles to your specific need to any non-standard housing.

o-ring housing details and recommendations

for static applications



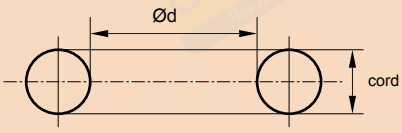


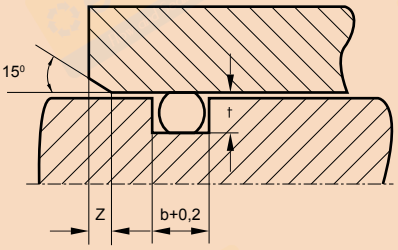


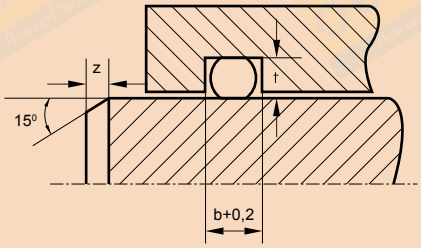
cord diameter (mm)	groove (mm)	no back-up ring (mm)	one back-up ring (mm)	2 back-up rings (mm)	recommended back-up ring width (mm)
	t ± 0,05	b + 0,25	b1 + 0,25	b2 + 0,25	
1,50	1,10	2,1	3,1	4,1	1,0
1,78	1,35	2,5	3,5	4,5	1,0
2,00	1,56	2,7	4,2	5,7	1,5
2,50	2,05	3,3	4,8	6,3	1,5
2,62	2,18	3,5	5,0	6,5	1,5
3,00	2,52	3,9	5,4	6,9	1,5
3,50	3,00	4,4	5,9	7,4	1,5
3,53	3,00	4,4	5,9	7,4	1,5
4,00	3,40	5,0	6,7	8,4	1,7
5,00	4,25	6,3	8,0	9,7	1,7
5,33	4,53	6,7	8,4	10,1	1,7
5,70	4,85	7,1	9,1	11,1	2,0
6,00	5,10	7,5	9,5	11,5	2,0
6,99	5,94	8,8	10,8	12,8	2,0
7,00	5,95	8,8	10,8	12,8	2,0
8,00	6,80	10,0	12,5	15,0	2,5
10,00	8,50	12,5	15,0	17,5	2,5

o-ring housing details and recommendations

for dynamic applications







cord diameter (mm)	groove depth t (mm)	groove depth b (mm)	chamfer 15° (z mm)
1,50	1,3 ±0,03	1,50	1,50
1,78	1,5 ±0,04	1,78	1,78
2,00	1,7 ±0,04	2,00	2,00
2,62	2,3 ±0,05	2,62	2,62
3,00	2,6 ±0,06	3,00	3,00
3,50	3,1 ±0,07	3,50	3,50
3,53	3,1 ±0,07	3,53	3,53
4,00	3,5 ±0,08	4,00	4,00
5,00	4,4 ±0,10	5,00	5,00
5,33	4,7 ±0,11	5,33	5,33
5,70	5,0 ±0,11	5,70	5,70
6,99	6,2 ±0,14	6,99	6,99
7,00	6,2 ±0,14	7,00	7,00
8,00	7,1 ±0,16	8,00	8,00
10,00	8,8 ±0,20	10,00	10,00

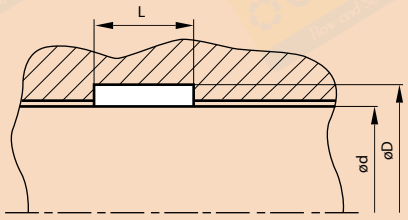
guide ring housing details and recommendations

for dynamic applications

our standard guide rings are available in 45°-splitted versions.
those can be ordered as well as endless -90°-splitted versions on yard ware.

seal housing tolerances	
Ø d	f8
Ø D	H8
L+0,2	

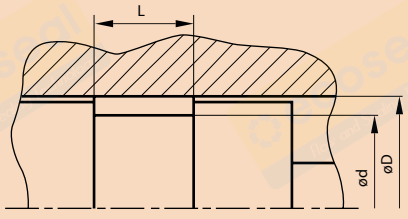
for standard housing dimensions:
guide rings
rod



ød	øD	L	(øD-ød)/2
6 - 29,9	ød+3	4	1,5
30 - 39,9	ød+3	5,6	1,5
50 - 99,9	ød+5	9,7	2,5
100 - 799,9	ød+5	15	2,5
800 - 1.000	ød+8	25	4
> 1.000	ød+8	25	4

please note that we are able to produce those profiles to your specific need to any non-standard housing.

for standard housing dimensions:
guide rings
piston

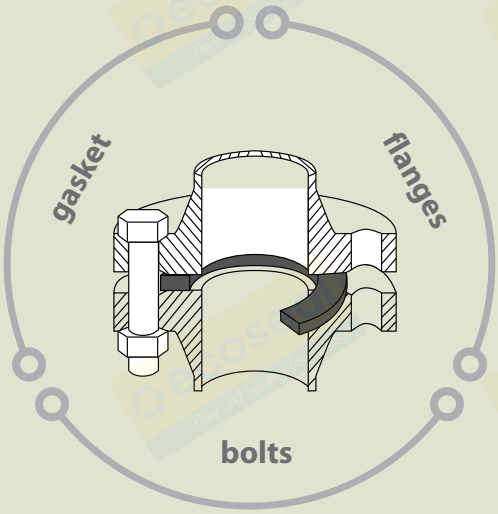


øD	ød	L	(øD-ød)/2
6 - 29,9	øD-3	4	1,5
30 - 39,9	øD-3	5,6	1,5
50 - 99,9	øD-5	9,7	2,5
100 - 799,9	øD-5	15	2,5
800 - 1.000	øD-8	25	4
> 1.000	øD-8	25	4

please note that we are able to produce those profiles to your specific need to any non-standard housing.

gaskets

a gasket is placed in between two objects in order to prevent leakage of any kind of the pressurized or not pressurized media. most important is the compression set of a gasket to adapt to flange irregularities and to any dimensional changes of the flange system caused by temperature changes during operation. the gasket requires resistance against media and temperature within the range of the given application.



requirements for a gasket are:
- **good compressibility and face adaptability**
- **good recovery**
- **strength**
- **limited relaxation**
- **chemical resistance**
- **temperature resistance**

bench marks for excellent gasket properties:
- **chemical resistance of PTFE**
- **temperature resistance of mica**
- **mechanical property of steel**
- **compression set of soft rubber**

the flange connection is the widest spread gasket application. the flange connection is a sealing system, which consists of:
- **flanges**
- **gasket and**
- **bolts**

only the right choice and combination of this 3 individual parts will result in a leakage free operation with long service life.

gaskets can be classified into two main categories:

metallic & semi-metallic gaskets
- corrugated metal gaskets
- camprofile (grooved) gaskets
- metal jacketed gaskets
- ring joints
- spiral wound gaskets
- others

non-metallic gaskets
- fibre reinforced gaskets
- graphite gaskets
- PTFE gaskets
- rubber gaskets
- others

metallic or semi-metallic gaskets consists of metal or a combination of metal parts and non metal parts. these gaskets are suitable for medium and high pressure applications. metallic gaskets require a much higher quality of the sealing surface than non-metallic gaskets.

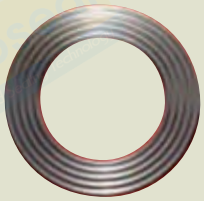
non-metallic materials are used in low to medium pressure applications usually up to nominal pressures of 40 or 63 bars on the raised face and up to 200 bars in tongue grooved flanges.

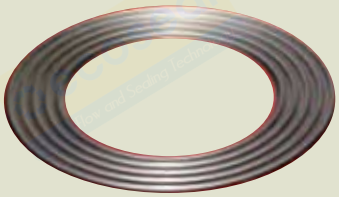
metallic & semi-metallic gaskets

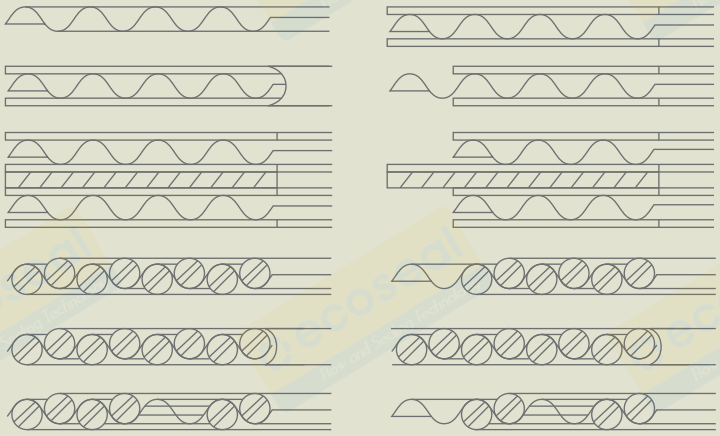
corrugated metal gaskets

a metallic or semi-metallic gasket system.

- ⊕ high sealing pressure at the metal corrugation
- ⊕ high blow out resistance
- ⊖ in case of metal to metal, a perfect flange surface (Ra < 3,2) is required





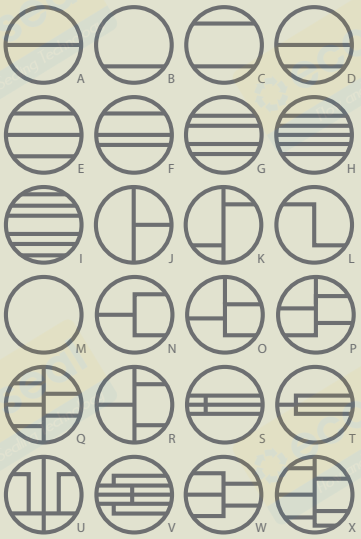


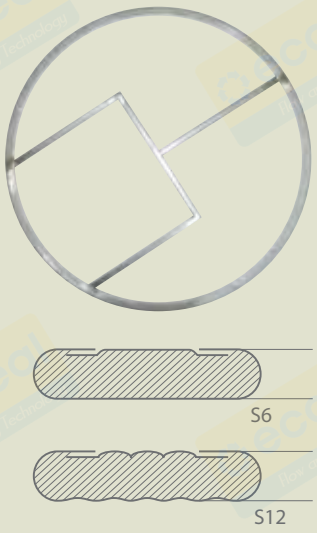
metal jacketed gaskets

a semi-metallic gasket system. also called per tradition heat exchanger gaskets, which indicates the typical application. the gasket consists of a soft filler encapsulated with a metal cover. the metal jacket provides compressive strength and blow out resistance. the filler provides compressibility and resilience.

- ⊕ good shelve life
- ⊕ robust, can be handled and installed without special care
- ⊕ wide range of shapes
- ⊖ requires a good flange surface (Ra < 1,6) because of metal to metal sealing

profile shapes: profile S6 or S12
metal cover: carbon steel, SS, monel, copper, etc.
fillers: CSF, expanded graphite etc
dimension: from 250 mm to 3000 mm

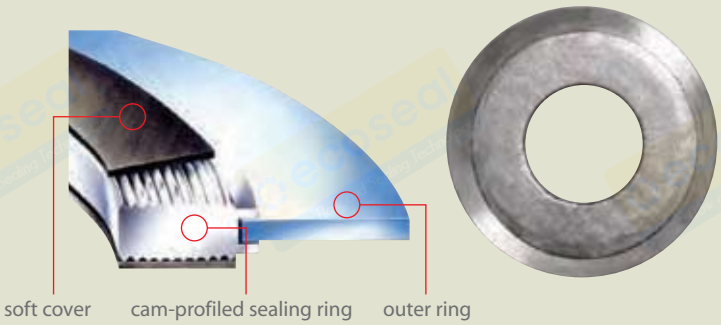




camprofile (grooved) gaskets

a semi-metallic gasket system, which consist of:
centering (outer) ring made of special steel
cam-profiled (sealing) ring made of special steel
soft covering layer made of graphite, ptfe, ..
typical applications: pipelines, heat exchanger

- ⊕ the soft cover adapts flange surfaces with Ra < 6,3
- ⊕ the soft covering layer (in most of the cases expanded graphite), is trapped in the tread and can not be extruded into the gap
- ⊕ the trapped graphite provides good compressibility and resilience
- ⊕ the cam profiled ring can be re-used again several times
- ⊖ a good quality camprofile gasket can be very expensive

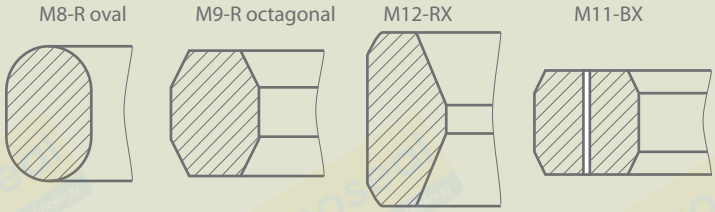


profile shapes: parallel (M18L, M20L, M21LM), or convex (M38L, M40L, M41LM)
standard material of core: carbon steel, SS 316L, SS 304, SS 321; other materials are on demand
material of soft cover: CSF, expanded graphite, PTFE
dimensions: from 250 mm to 5000 mm

ring joints

metallic gaskets, which are manufactured from a variety of metals and alloys, usually oval or octagonal in cross-section, depending on the flange design.
ring joints are designed to serve at high pressure (up to 1500 bar) and high temperature (up to 1000° C) applications.

- ⊕ very safe and reliable sealing system; will be always applied, when aggressive media or explosive gases are involved;
- ⊖ risk in the choice of ring joint material: the ring joint material must be softer than the flange material but the hardness of the flange material is normally not indicated
- ⊖ metal to metal sealing; requires therefore good (Ra < 1,6) flange surface

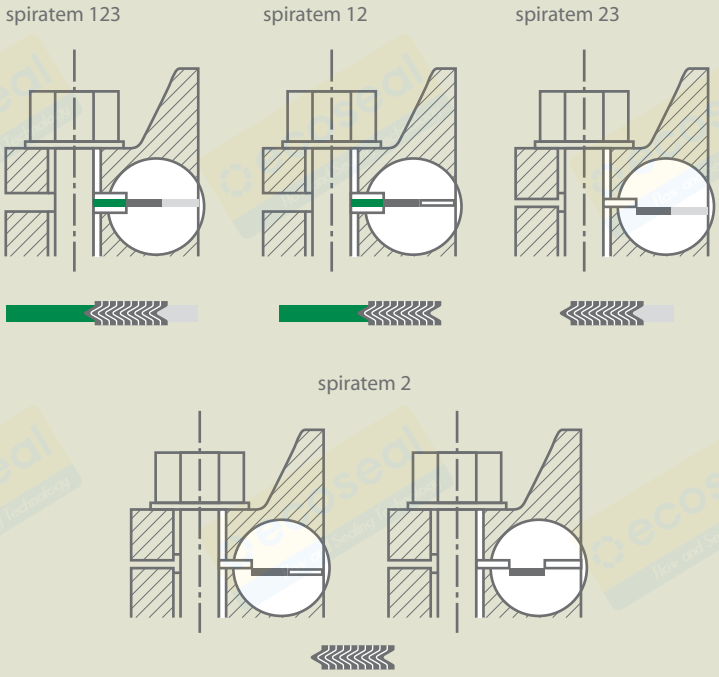


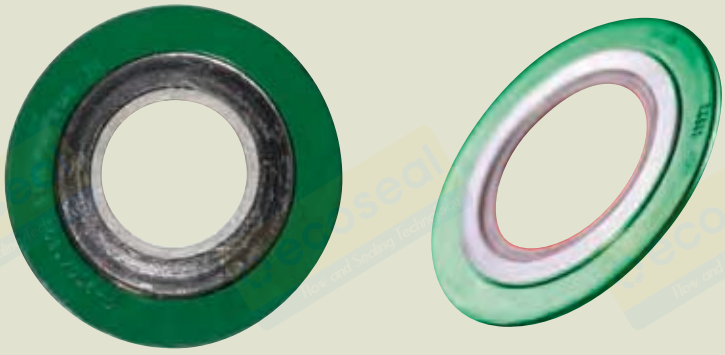
profile shapes: R oval, R octagonal, RX, BX
standard metals: soft iron, LC carbon, range of SS; other materials on demand

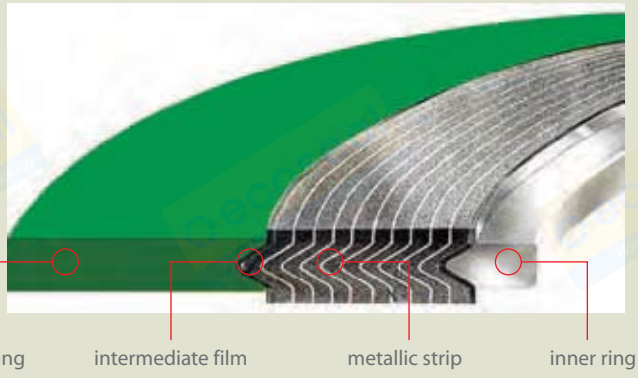
spiral wound gaskets

a semi-metallic gasket system, consisting of:
- centering (outer) ring made of special steel
- a spiral wound V-shaped metal strip filled with graphite, ptfe, ceramic, mica, ...
- inner ring made of special steel

- ⊕ covers a wide pressure and temperature range and is therefore a real multi purpose (universal) gasket
- ⊕ the spiral wound gasket does not stick to the flange surface and can be easy removed
- ⊕ has a good shelve life and requires no special care during handling and installation
- ⊕ good resilience because of the V-shaped metal strips
- ⊕ very popular gasket system and therefore good availability
- ⊖ needs very parallel flange faces
- ⊖ quality control difficult, as the quality of winding and the welding can not be checked







standard sizes: acc. to EN, ASME/ANSI, BS, DIN, GOST; non standard sizes (from 15 mm to 3200 mm are also available with us;)
standard fillers: expanded graphite, PTFE, ceramic, mica
thickness of fillers: from 2.5 mm up to 7.2 mm (standard thickness 4.8 mm)
standard metals: low carbon steel (paint or zinc plated finish), SS 316L, SS 304, SS 321, monel and other exotic materials are on demand

fibre reinforced gaskets

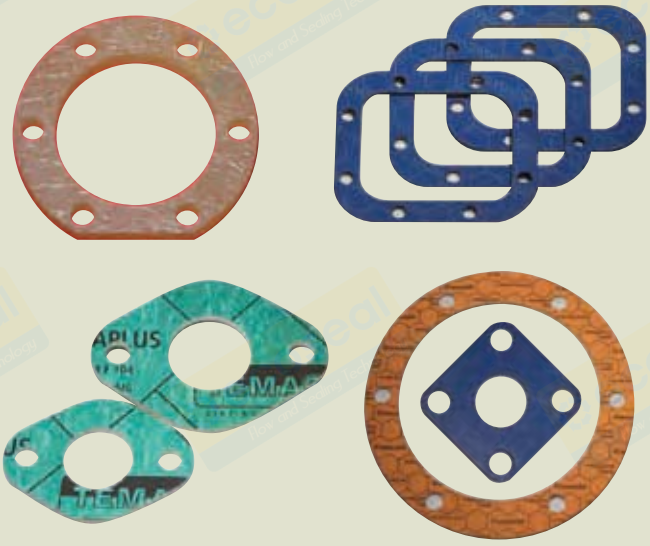
fibre reinforced gaskets are either cut or punched to shape out of fiber reinforced sheet material. these sheet materials are kalandered products, basically consisting of fibres, fillers and binders. the quality and composition of this 3 components and the production process determine the gasket properties. most commonly NBR is used as a high quality binder for gasket materials. because of outstanding technical properties aramide is the most important fibre used in these kind of non-asbestos gaskets.

glass fibre

aramide fibre

commonly used fibres in non-asbestos sheets

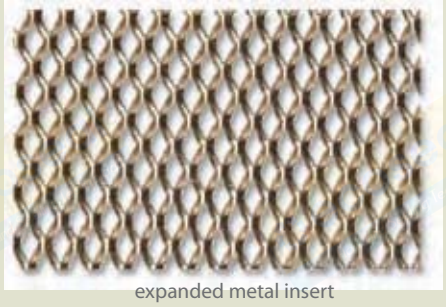
aramide fibre	aromatic amide fibre, offering high strength and stability, with medium temperature suitability. raw fibres can fibrillate
carbon fibre	high thermal conductivity ensures rapid heat dissipation and allows high temperature capability (except in oxidising atmospheres). wide chemical resistance, and may be used in the pH range 0 - 14, although must not be used in oxidising environments
cellulose fibre	natural fibre, suitable for low temperature and medium pressure applications. raw fibres can fibrillate
glass fibre	inorganic complex of metal silicates, which offers good strength and moderate chemical resistance. suitable for medium to high temperature applications. the fibres do not fibrillate.
mineral fibre	also referred to as "mineral wool". inorganic fibres consisting of metal silicates, with a wide range of diameters. suitable for medium to high temperature applications. fibres do not fibrillate.



- ⊕ cheap and good availability
- ⊕ easy to cut/punch to size
- ⊖ limited in temperature resistance due to the rubber binder

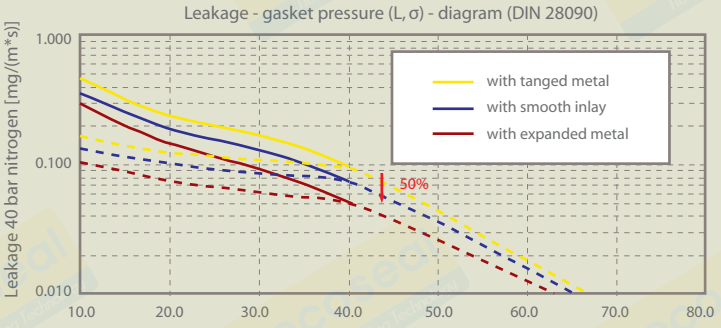
graphite gaskets

only graphite with a purity of > 99% elemental carbon can be used. not only purity but the composition of the ashes is of crucial importance for the performance of a graphite gasket. graphite gaskets usually are reinforced with a stainless steel insert. important is the design of the reinforcement. currently common are smooth metal, tanged metal and expanded metal inserts.



expanded metal insert

the graph below shows the influence of the metal insert of a graphite gasket on leak rates.



expanded metal optimizes the distribution of surface pressure. the exceptional compression set of graphite allows very good microsealing and flange adaptability. when replacing fibre reinforced gaskets by graphite gaskets, the gasket thickness can be reduced. graphite has got a superior chemical resistance against a wide range of media. it can be used up to 450-550°C application temperature. with expanded metal graphite gaskets even metallic gaskets can be replaced in many applications.

- ⊕ can follow easy any flange irregularity, Ra < 12,5
- ⊕ no creeping
- ⊖ no resistance in oxidizing environments

PTFE gaskets

PTFE provides an outstanding chemical resistance. PTFE is attacked only by molten alkali metals and fluorine gas and has excellent anti-stick and dielectric properties. usually the leak rates of PTFE gaskets are remarkably low the only draw back of PTFE is creeping and poor mechanical properties.

- ⊕ very dense sealing material
- ⊕ adapts perfect to the flange
- ⊕ very good chemical resistance
- ⊖ limited temperature resistance
- ⊖ creeping

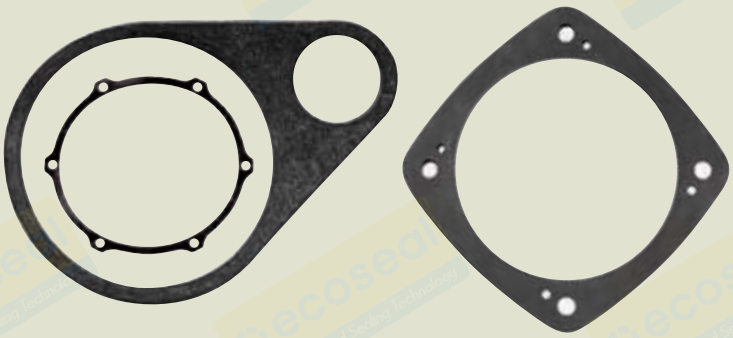
	temperature range	chemical resistance	mechanical properties
fibre reinforced gasket	ca. -100 to 150°C	*	****
graphite gasket	ca. -150 to 550°C	**	****
PTFE gasket	ca. -200 to 250°C	*****	**

various form of PTFE

rubber gaskets

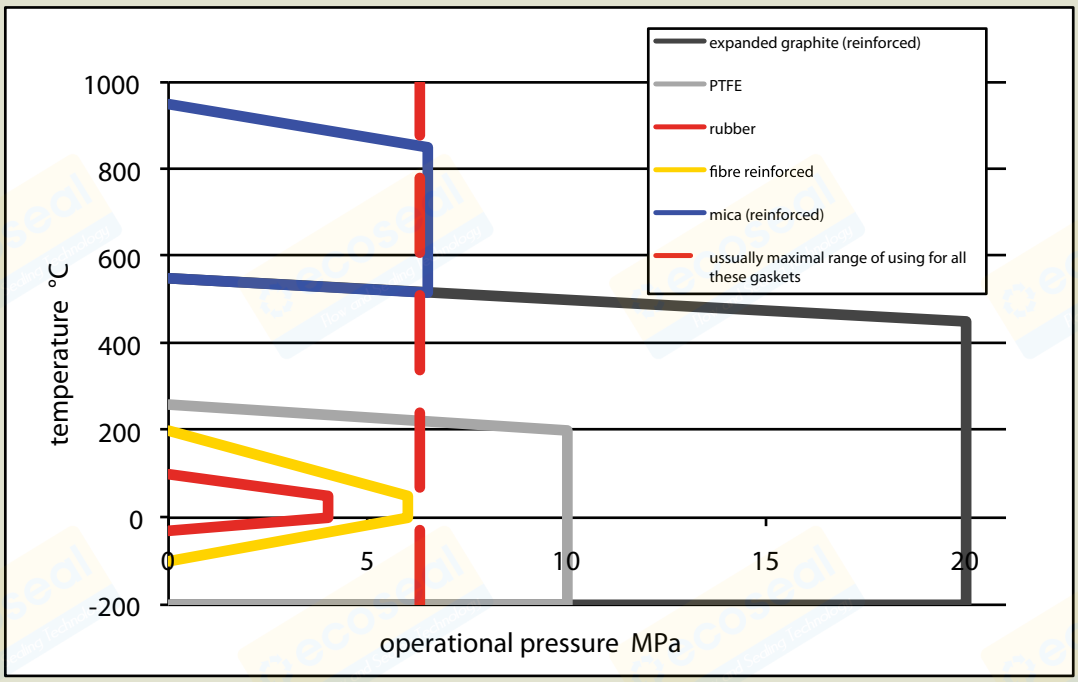
rubber gaskets are cut or punched to shape from industrial manufactured rubber sheets made from industrially produced rubber. the following rubber compounds are available in sheets:

acrylonitrile-butadiene rubber	NBR	-30° C ....100° C	improved chemical resistance and temperature capabilities to neoprene. good resistance to hydrocarbons and oils. not suitable for chlorinated hydrocarbons, esters, ketones and strong oxidising agents.
silicone	VMQ, PVMQ	-60° C ....200° C	excellent temperature properties, and unaffected by ozone and sunlight. not suitable for many hydrocarbons and steam.
chlorbutadiene rubber	CR	-45° C ....100° C	excellent resistance to oils, ozone and weathering. suitable for moderate acids, alkalis, salt solutions, petroleum, solvents, oils and fuels. it is not recommended for strong acids or hydrocarbons
natural rubber	NR	-60° C ....80° C	excellent for recovery properties. good resistance to most inorganic salts, mild acids and alkalis. not recommended for oils and solvents, or where exposure to ozone, oxygen or sunlight is prominent.
ethylene propylene diene rubber	EPDM	-50° C ....150° C	elastomer which offers good resistance to ozone, steam, strong acids and alkalis, but is not suitable for solvents and aromatic hydrocarbons.
butyl rubber	IIR	-40° C ....150° C	an elastomer offering good resistance to ozone and gas permeation. suitable for mild acids, alkalis and esters, but little resistance to oils and fuels.
styrene butadiene rubber	SBR	-50° C ....100° C	suitable for use with weak organic acids and moderate chemicals. not suitable for strong acids, most hydrocarbons or ozone.
fluoroelastomer	FKM	-20° C ....200° C	excellent for oils and greases, fulls and aliphatic as well as aromatic hydrocarbons, some fire retardant hydraulic liquids and synthetic aviation engine oils.

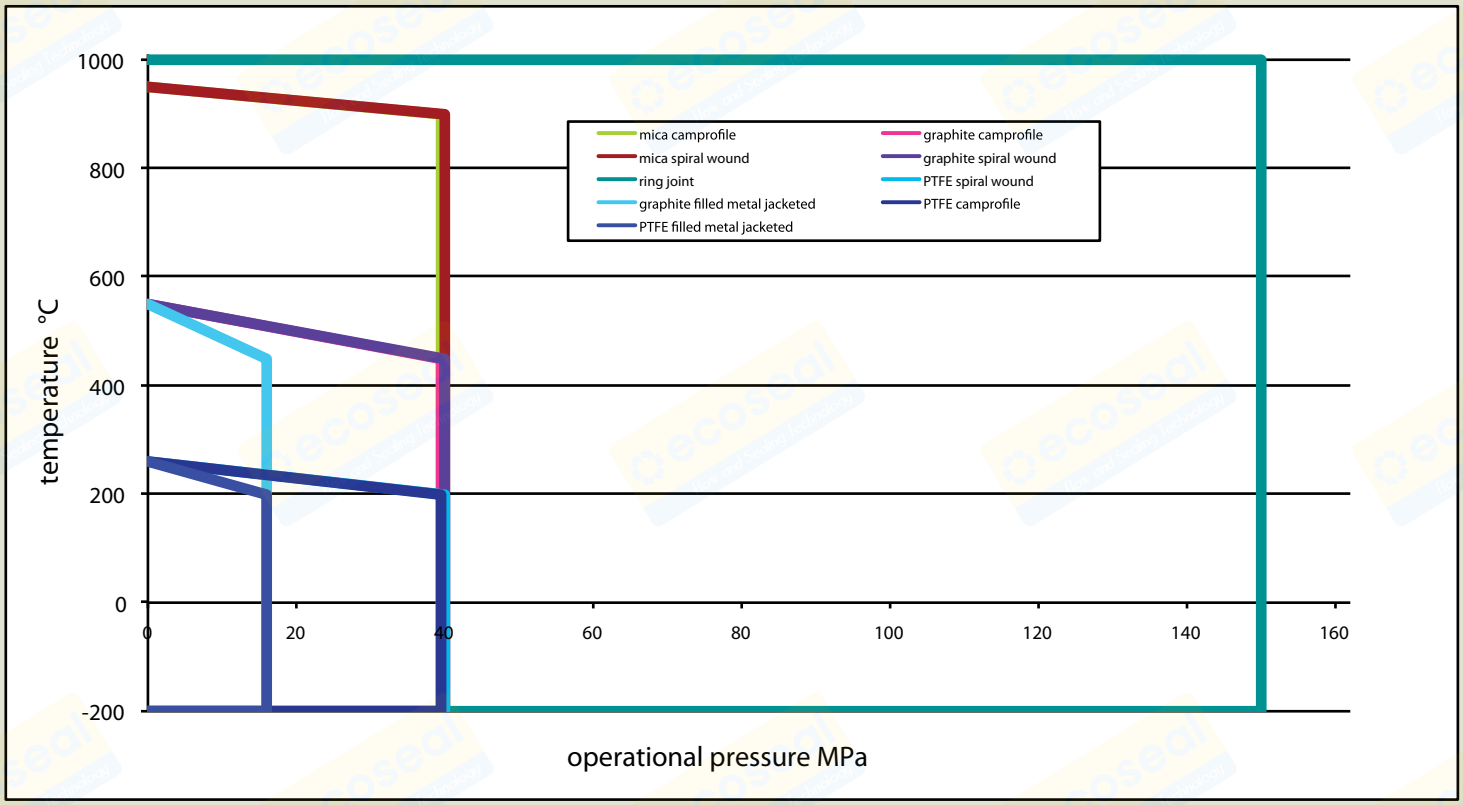


- ⊕ adapts very good to the flange
- ⊕ best resilience
- ⊕ good sealing material
- ⊖ very limited temperature resistance

pressure & temperature limits for non-metallic gaskets



pressure & temperature limits for semi-metallic gaskets



oil & gass, offshore & petrochemical

Main issue in this industry is safety. To get the right material and design of a seal requests an experienced partner like seal-mart. Independent if a gasket, a seal or any engineered plastic product is required, seal-mart will be your good choice.

typical appications
>> christmas tree seals
>> flow breakers
>> swivel seals
>> down hole packing seals
>> stem seals
>> needle seals

paper, pulp & packaging

In paper production speed of the process is increasing every time. Low friction seals are required to suit this application. In pulp treatment heavy potential contamination requires best sealing solution from both, design and material of the seals. We can offer seals in all fields including pulp mills, paper mills and related applications.

typical appications
>> low friction seals
>> rotary seals for rollers
>> actuation cylinder seals
>> filling seals
>> water gaskets

marine

Sea water resistance is a must in this industry. But also leak free long term working under extreme circumstances is necessary when-ever we speak about marine application. We can offer all kinds of seals for this demanding applications. Whenever a vessel comes in port or even in the dock, we can deliver with short lead time all relevant seals and gaskets for maintenance.

typical appications
>> rudder seals
>> stem tube seals
>> oil throwers
>> propeller seals
>> extruded profiles

mining industry

In this industry seals are faced to the hardest conditions i.e. water and stone powder. Often working underground seals must perform without leakage and failure. Maintenance is very difficult due to reduced space underground. Therefore seal selection is a key factor for designer and end customer. Our materials are successfully used in this demanding industry.

typical appications
>> piston seals
>> gland seals
>> scraper
>> guide rings
>> rotary shaft seals

cement & lime industry

Abrasive environment is always present in this industry. Seals have to offer good resistance against these aggressive circumstances to protect valuable elements like bearings or gear boxes. Additional lips are often necessary to have a trouble free solution. we can offer adapted seals designs for this industry in short production time.

typical appications
>> rotary shaft seals
>> scraper
>> bearing protection seals

automotive industry

Weight saving and space saving in combination with reliability for the car life is key in this segment. Quality must be highest standard and this for millions of pieces. In automotive industry it makes sense to think about non standard solutions which fits absolutely the needs of the application. Therefore seal-mart is your best choice from the prototyping to the series.

typical appications
>> engineered plastic parts
>> rotary shaft seals
>> extruded profiles

pump & valve

Whatever is the medium in the pump or valve, every single application needs the best adapted seal to perform most reliable. Selection of the seals can be so different as the applications it selves, like waste-water-treatment or drinking water transportation. Temperature and pressure can also be very different and we are prepared to offer the suitable seals for every application.

typical appications
>> o-rings
>> engineered plastic parts
>> scraper

mechanical handling

Space saving is important i.e. for telescopic cylinders. Also stick-slip-free seals are needed in man-lifter or fork lifts. We can serve all customers need from the smallest pneumatic cylinder to the biggest container handler in the harbour.

typical appications
>> fluid power seals
>> low friction cylinder seals

wind power

Working in the free environment under the ozone from the sun and with heavy weather, especially off-shore wind mills, in combination with the sea water are the circumstances for seals running in this industry. Trouble free running for a long time is almost the most important point for the seal selection. Maintenance on top of the wind mill is not that easy.

typical appications
>> extruded profiles
>> radial shaft seals
>> engineered plastic parts

mechanical engineering

In this industry we are faced with all kinds of requirements from low quantity sample production to series production with thousands of seals for all kinds of applications. We offers from the beginning of the design of a machine to be the partner of our customer to select the right design and material to fulfil all customers' needs.

typical appications
>> special gaskets
>> water cut profiles
>> radial shaft seals
>> guide rings
>> bearing protection seals
>> mechanical engineering plastics

repair & refurbishment (MRO)

After a long working life time some machines are worn out and no standard seals fit in the original housings. Therefore metal parts have to re-work and this will create non-standard housings. This is our core competence to serve our customers with seals which fit into these re-worked housings with non-standard dimension, both in metric and imperial sizes. Even when we only get samples of failed seals we can manufacture new ones when we have the housing dimensions in short delivery time.

typical appications
>> any seal type
>> gasket
>> engineered plastic parts
>> o-rings

fluid power

This industry covers a large variety of hydraulic and pneumatic applications wherever powered movement is present. We offers all profiles to suit all piston, rod and wiper applications in material which is suitable for high or low temperature, low friction and also water resistance.

typical appications
>> piston seals
>> rod seals
>> wiper seals
>> wear ring

food & beverage

Our materials are FDA compliant and capable of withstanding CIP procedures, and at the same time, out last and out perform traditional seals. Our state-of-the-art manufacturing system provides the opportunity to upgrade your equipment at little or no added cost. For machinery made overseas, means non European standards, seal-mart can produce completely interchangeable seals with no lead times, and a local supply from bottling and canning plants to yogurt filling, from bakers to ready meals, seal-mart will keep your machines running.

typical appications
>> christmas tree seals
>> flow breakers
>> swivel seals
>> down hole packing seals
>> stem seals
>> needle seals

steel & non ferrous industry

In this very demanding industry heat, speed, heavy load and contamination are always present. Seal-mart has much experience in sealing applications in the steel and aluminium industry. From ore extraction through smelting and further to final rolling, we have the technology to increase production by reducing downtime, and if unplanned maintenance is necessary, then seal-mart can provide turned seals in hours. Our materials are successfully used in many steel and aluminium plants world-wide - we have materials which can operate at the extremes of temperature and pressure.

typical appications
>> low friction seals
>> rotary seals for rollers
>> actuation cylinder seals
>> filling seals
>> water gaskets

presses

Reliability is a must in this industry. This is typically for large forging presses which are not running continuously. For large presses with large hydraulic cylinders, traditional equipped with rubber and fabric sealing, seal-mart can manufacture sealing systems up to 4 metres in diameter in modern materials in very short lead time.

typical appications
>> rudder seals
>> stem tube seals
>> oil throwers
>> propeller seals
>> extruded profiles

other industry

Whatever is not named earlier can be in this field. Don't hesitate and send us your technical information to enable us supporting you most efficiently.

typical appications
>> off highway equipment & machines
>> on highway equipment & machines
>> sanitary facility & household appliances
>> agriculture
>> timber industry
>> semi-conductor manufacturing
>> chemical industry
>> sugar industry

ผู้แทนจำหน่าย ซีลกันรั่วทุกชนิดจากต่างประเทศ ecoseal Flow and Sealing Technology จำหน่ายปลีก-ส่ง พร้อมบริการหลังการขาย

seal-mart GAPI FP Hallite CDI KASTAS GUARNITEC VALQUA SAKAGAMI FORSHEDA Busak+Shamban simrit MERKEL POLYPAC DOWTY EVC MEIWA

จัดทำ-จำหน่าย และจัดหา

- O-RING / โอริง
- OIL SEAL / ออยซีล
- HYDRAULIC SEAL / ไฮดรอลิคซีล
- PNEUMATIC SEAL / นิวเมติกซีล
- V-RING / วีริง (วัสดุ ทุกชนิด เช่น NBR, EPDM, VITON และอื่นๆ)
- รับทำชิ้นส่วนพลาสติก ทุกชนิด เช่น TEFLON, NYLON, PE, POM, PVC, PP, PC และวัสดุอื่นๆด้วยเครื่อง CNC
- รับกลึงซีลพิเศษตามคำสั่งของลูกค้า (MADE TO ORDER)

บริการ

- รับซ่อม, สร้างระบบไฮดรอลิคและระบบลม, เปลี่ยนซีลกันรั่ว ทุกชนิด

O-RING

OIL SEAL

V-RING

HYDRAULIC SEAL

PNEUMATIC SEAL

O-RING ASSORTMENT KITS

ให้คำปรึกษาแนะนำ

- การเลือกใช้วัสดุในเชิงวิศวกรรม โดยวิศวกรที่ชำนาญงาน
- ออกแบบชิ้นส่วนเครื่องจักร และอุปกรณ์ให้เหมาะกับงาน
- ให้คำแนะนำการจัดเก็บ stock อะไหล่ชิ้นส่วนของเครื่องจักร เพื่อให้มีอายุยาวนานขึ้น

จัดอบรม (ทั้งใน-นอกสถานที่) ฟรี

- อบรมการใช้งาน, การดูแลชิ้นส่วนของเครื่องจักร
- วิเคาระห์และแก้ปัญหาที่เกิดกับเครื่องจักร
- ให้ความรู้กับเจ้าหน้าที่จัดซื้อ, จัดหา, วิศวกร, ช่างเกี่ยวกับซีลทุกชนิด

ECOPLAST ENGINEERING PLASTIC SOLUTIONS NYLACAST ENGINEERING PLASTIC SOLUTIONS Global EPP SCHWARTZ TECHNICAL PLASTICS GUARNIFLON GAPI OKULEN CATTANEO GEHR QUADRANT ENGINEERING PLASTIC PRODUCTS

WORLD BRIDGE ENVIRO-TECH.,LTD. Primary & Secondary Tank Seal GOODYEAR GUTTELING BV composite hoses TRELLEBORG KANON LOADING EQUIPMENT TAT LEE LAMONS LAMONS GASKET COMPANY PROSEEL SGL GROUP THE CARBON COMPANY Frenzelit TEMAC