



PTFE Chevron Seals for high level applications

simrit[®]

Simrit[®], Your Global Technology Specialist for Seals and Vibration Control

Simrit, Your Global Technology Specialist for Seals and Vibration Control offers you a complete service package. A unique range of products and services guarantees you numerous advantages over the competition.

Simrit acts as a partner to general industry. Its position as a market leader is achieved through continuous research, development and manufacture. We have the world's widest range of seals and vibration control products, and can offer you solutions based on the demands of state-of-the-art-technology, solutions which set standards.

This way we secure competitive advantages for you based on experience all around the world: Simrit has a presence throughout Europe, America and Asia, either directly or through its affiliated companies NOK (Japan) or Freudenberg-NOK (USA). The transfer of knowledge between these markets is incorporated directly into the Simrit service package.

With our many Simrit Service Centres and Simrit distribution Partners, we serve and supply more than 100,000 customers worldwide. Our Simrit Partners ensure rapid availability from stock. This means spare parts quickly arrive when and where they are needed. There is a Simrit Partner near you as well.

Make the most of Simrit's service package and give yourself a real competitive edge:

- + Constant innovations
- + Uniquely wide range of products
- + Strong product brands
- + Unique materials expertise
- + A wide range of value added services



Simrit offers a complete package of products and services, including leading brands such as Simmerring[®], Merkel, Integral Accumulator, Lederer and ISC O-Ring.

Vibration Control

Special Sealing Products: Bellows, Diaphragms, Elastomer Composite Parts and Precision Mouldings

Lederer Liquid Silicone Products

ISC O-Ring

Integral Accumulator

Merkel Hydraulics / Pneumatics

Simmerring[®]



Multi-part high-resistance sealing sets for translatory applications

Chevron sealing sets are multi-part sealing sets, primarily designed for translatory movements. They generally consist of a pressure ring, a support ring and several chevron seals. The profile design and number of parts as well as the combination/selection of materials are determined according to the operating conditions. Special high-pressure chevron sealing sets are available for chemical, thermal and mechanical loads occurring simultaneously.

Examples of use

- control and shut-off valves
- plunger pumps
- metering systems
- agitators
- hydraulic cylinders
- rotary joints

Sealing points are:

- spindles
- rods
- plungers
- slow turning shafts

Standard materials

pure PTFE, pure PTFE modified, PTFE/carbon, PTFE-impregnated plastic fabric, moulding material made of PTFE and graphite (Univerdit), UHMW PE (polyethylene), PEEK.

Other materials are available upon enquiry.

PTFE/PTFE compound chevron sealing sets

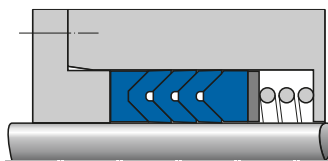
Chevron sealing sets made of PTFE or PTFE compound are available with different profiles. The following overview describes our three standard profiles including their applications and operating limits.

With PTFE chevron seals from Simrit you will enjoy numerous benefits

- universal chemical resistance
- high temperature resistance
- stable under compressive load
- good slide and lubrication properties
- not form-specific
- variable set heights

Chevron seals generally require separate guides for rods, spindles etc.

PTFE chevron sealing set DM 9403

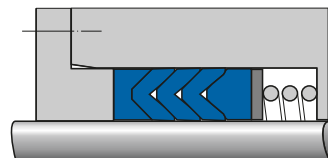


Pressure range: to 30 MPa

Properties

- stable profile
- used mainly for static sealing and pulsating pressures
- spring support to suppress thermal influences and to keep the set together with lifting movements

PTFE chevron sealing set DM 9406

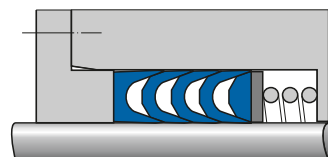


Pressure range: to 20 Mpa

Properties

- relatively stiff lip profile
- sealing function assisted by wedge effect
- spring support to suppress thermal influences and to keep the set together with lifting movements

PTFE chevron sealing set DM 9409



Pressure range: vacuum and pressures to 0.5 MPa

Properties:

- particularly flexible lip profile
- a spring with a relatively low level of pretension is required for pressure exertion



Recommended number of chevron seals in sets

Pressure levels	DM 9403		DM 9406		DM 9409	
	Pure PTFE to 100°C	PTFE compound to 220°C	Pure PTFE to 100°C	PTFE compound to 220°C	Pure PTFE to 100°C	PTFE compound to 220°C
Vacuum					3	3
< 0.5 MPa			2	2	3	3
< 1.6 MPa			2	2		
< 5.0 MPa	3	3	3	3		
< 10.0 MPa	4	3	4	3		
< 20.0 MPa	5	4	5	4		
< 30.0 MPa		5		5		

The temperature range specified for pure PTFE can be greatly increased by including components made of PTFE compound.

Linear velocities

Continuous operation	Intermittent operation
max. 0.5 m/s	max. 1.2 m/s

With lengthy duty cycles, jerky operation or other difficult operating conditions the recommended values given should not be used to the full. Operating temperatures of -200° to 260°C

are possible but should be seen in relation to pressure and linear velocity. The media also has an influence on the permissible dynamic limit parameters. Please consult with us in this regard.

Recommended dimensions for chevron sealing sets made of pure PTFE and PTFE compound

Profile 9409 (single chevron seal)				Profile 9403 (single chevron seal)				Profile 9406 (single chevron seal)									
Article list				DMS-50971	DMS-50987	DMS-60986	DMS-70985	DMS-40980	DMS-50979	DMS-60978	DMS-70977						
B	E	K	M min.	L*	E	K	M min.	L*	L*	L*	E	K	M min.	L*	L*	L*	L*
4.0	2.7	2.7	4.0	15	2.4	2.4	3.5	3	4	5	2.6	2.4	3.5	2	3	4	5
5.0	3.4	3.4	4.6	19	3.0	2.4	4.0	16	19	22	3.3	3.0	4.0	14	17	21	24
6.0	4.1	4.1	5.0	22	3.5	3.5	4.4	19	22	26	3.9	3.5	4.4	16	20	24	28
7.5	5.1	5.1	5.6	26	4.0	4.0	5.1	22	26	30	4.9	4.0	5.1	19	24	29	34
10.0	6.8	6.8	7.0	35	5.0	5.0	6.1	27	32	37	6.5	5.0	6.1	25	31	38	44
12.5	8.5	8.5	8.2	43	6.0	6.0	7.2	32	38	44	8.1	6.0	7.2	30	38	46	54
15.0	10.2	10.2	9.7	51	7.5	7.5	8.1	39	46	54	9.8	7.5	8.1	36	45	55	65

* minimum requirement

Surface quality

Peak-to-valley heights	ISO roughness characteristic	Mean roughness index R_a
Contact area	4	0.2
Installation space Outside diameter	6*	0.8
Installation space front faces	8	3.2

* minimum requirement

Installation space tolerances

Plunger diameter	Recommended fit	Housing diameter
≤ 80	H9/ f8	H8
> 80 – 120	H8/ f8	
> 120 – 200	H8/ f7	

Operating limits

Pressure/Temperature/Speed	Combined sealing sets
Pressure	30 MPa
Temperature	-200 to 260°C
Linear velocity	
– Continuous operation	0.5 m/s
– Intermittent operation	1.2 m/s

* With vacuum or pressure reversal to 0.2 MPa, housing closed

Fitting instructions

Pretensioning with spring elements: PTFE chevron seals show a relatively high level of thermal expansion and do not have the elasticity of elastomers. The PTFE chevron sealing set should therefore be kept permanently tensioned using a spring element. This prevents the occurrence of deformation due to thermal influences. The spring force depends on the type and dimension of the chevron seal profile. For the profile DM-9409 pretensioning of 0.2 N/mm² is required. With the profiles DM-9403 and DM-9406 pretensioning of the spring must be 0.8 N/mm², and also above in the case of small dimensions.

The data for the spring forces apply to standard applications. It is a general principle that leakage improves with greater spring forces. If the springs are installed on the non-pressurised side with highly aggressive media, pretensioning should be adjusted to the maximum pressure occurring.

Design of installation spaces: The dimensions of the installation spaces can be seen from the dimension lists. The installation space and rod or shaft should be installed at an angle to ensure that the sealing edges of the chevron seals are not damaged during fitting. The function and service life of the sealing sets are influenced by the fit and surface qualities of the metal parts in addition to the guide.

PTFE/fabric-chevron sealing sets (compression-moulded)

Mixed chevron sealing sets made of PTFE and PTFE-impregnated plastic fabric offer much greater stability under compressive load with lower thermal expansion than chevron sealing sets made of pure PTFE or PTFE compound. Depending on the application and the operating conditions PTFE-impregnated plastic fabric chevron seals can be installed on their own or combined with chevron seals made of pure PTFE or PTFE compound. Here it should be borne in mind that combined chevron sealing sets offer a greater sealing effect due to the sandwiched PTFE chevron seals.

Extreme loads in terms of temperature and pressure may call for the use of sets which are solely made of PTFE-impregnated plastic fabric. Our application engineers would be delighted to advise.

Based on the geometries of the turned PTFE chevron sealing sets we can supply a range of profiles.

Benefits of compression-moulded PTFE chevron sealing sets

- universal chemical resistance
- high temperature resistance
- excellent stability under compressive load
- reduced cold flow and extrusion tendency

Operating limits

	Combined sealing sets	Plastic fabric sealing sets
Pressure	40 MPa	70 MPa
Temperature	-200 to 260°C	-200 to 260°C
Linear velocity		
- Continuous operation	0.5 m/s	0.5 m/s
- Intermittent operation	0.8 m/s	0.8 m/s

With regard to the operating parameters listed please bear in mind that they stand in relation to each other and represent maximum values. Please agree

the type of chevron seal and permissible maximum values with us in relation to your application.

Surface quality

Peak-to-valley	ISO roughness characteristic	Mean roughness index R_a
Contact area	4	0.2
Installation space Outside diameter	6*	0.8
Installation space front faces	8	3.2

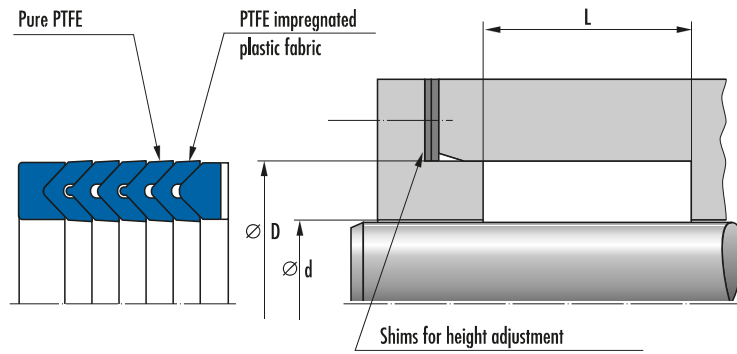
* minimum requirement

Installation space tolerances

Plunger diameter	Recommended fit	Housing diameter D
≤ 80	H9/f8	H8
> 80 – 120	H8/f8	
> 120 – 200	H8/f7	



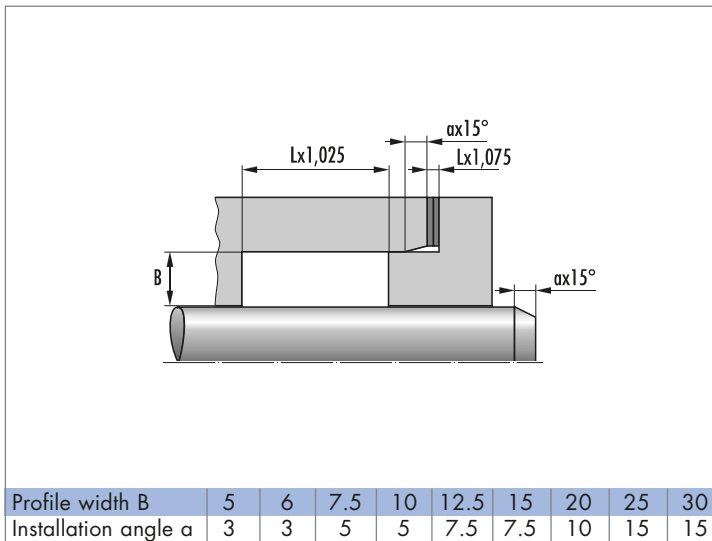
Article list TE



d	D	L	Article no.
20	32	27	24293250
22	34	27	24293251
25	40	27	24293252
28	43	27	24293253
30	45	27	24293254
32	47	27	24293255
35	50	27	24293256
36	51	27	24293257
40	55	27	24293258
45	65	31	24293259
50	70	31	24293260
55	75	45	24293261
56	76	45	24293262
60	80	45	24293263
63	83	45	24293264
65	85	45	24293265
70	90	45	24293266
75	95	45	24293267
80	100	45	24293268
85	105	45	24293269
90	110	45	24293270
100	120	45	24293271
125	150	52	24293273
140	165	52	24293274
150	180	67	24293275
160	190	67	24293276

Installation space and fitting instructions

PTFE-impregnated plastic fabric chevron seals and combined PTFE sealing sets are provided for adjustable installation spaces. These sealing sets are generally used without additional spring elements. For adjustable installation spaces an extension of 2.5% is recommended and an adjustment level of 7.5% of the L-dimension.



From the standard version to the individual solution

The standard models described above cover the requirements made on seals in the case of most applications. There are other applications which call for a customised solution. Product optimisation may be necessary with one or more operating parameters.

Examples of requirements sealing in pumps, spindles and valves

- longitudinal movement of rod, optionally with simultaneous rotation
- sealing effect according to maximum requirement
- low control forces required

Solution by including a Univerdit chevron seal

With a special mixture of a PTFE paste with graphite plus extra additives to homogenise the mixture it is possible to mould chevron seals in suitable forms. They are incorporated in standard sets between PTFE chevron seals forming chambers. By applying an axial restraining force to fix the chevron sealing set the ductile moulding material completely occupies the space between the two PTFE chevron seals.

The material moulds itself to the housing and rod to optimum effect through the axial restraint.

Benefits from development of seals in line with requirements

- reduced friction between chevron seal and rod or spindle due to PTFE and graphite material
- as a ductile material the PTFE compound completely fills the space between the PTFE chevron seals, forming chambers
- gapfree moulding of compound material to housing, with rod closing off leakage routes between surfaces of various materials
- diffusion-proof (gas tight) due to homogeneity of compression-moulded ductile PTFE compound material

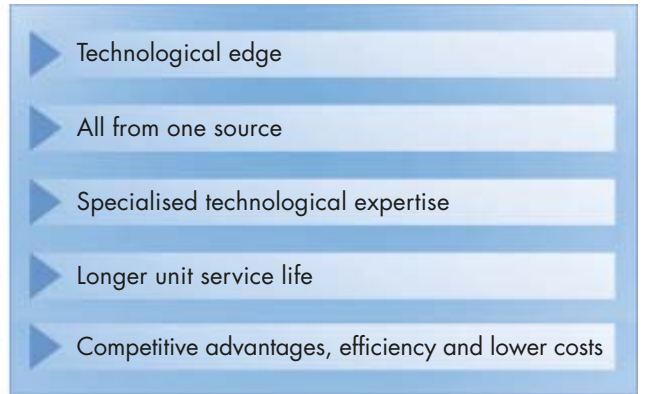


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Simrit Services



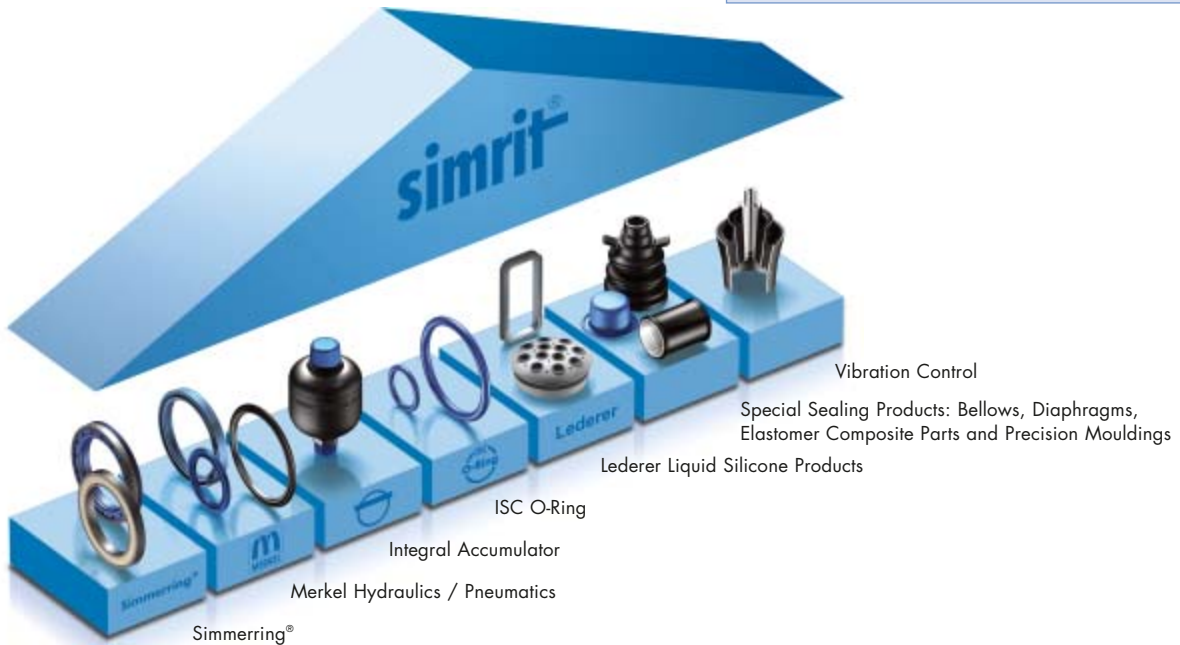
Your Benefits



e.g. PTFE Chevron Seals for high level applications

Your Benefits

- Broad-band resistance to chemicals
- High thermal stability
- Pressure-resistant



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