

Dr. Schnabel® FLUROFLEX® PTFE expansion joints

Characterized by durable safety and long service life



↑ Expansion joints with white and antistatic black POLYFLURON linings

Dr. Schnabel FLUROFLEX® PTFE expansion joints have a unique combination of outstanding properties and are suitable for a very wide range of applications. The universal chemical resistance of POLYFLURON® PTFE allows its use with almost all types of aggressive media. Therefore, these expansion joints are widely used as components in the chemical industry.

FLUROFLEX expansion joints are installed in steel pipelines and steel pipelines lined with PTFE. Often, thanks to their wide adjustment range, they are also used in plastic and FRP piping, in glass or enamel piping, or in graphite apparatus and columns. Due to their flexibility and low spring rates, they are used for sensitive components with glass or enameled surfaces, as well as for graphite process equipment and graphite heat exchangers.

Thermal expansion is a well-known phenomenon in the operation of pipelines. It requires flexible length compensation, which must be considered during piping design.

FLUROFLEX expansion joints compensate for the thermal expansion of the pipelines and thus reduce any stresses that occur. They are therefore a compact alternative to material-intensive bend designs (e.g., Lyra bends). FLUROFLEX expansion joints are also suitable, for example, for absorbing oscillations and vibrations generated by pumps. This is where the very special properties of POLYFLURON PTFE come into play, e.g., the low tendency to material fatigue, embrittlement, and aging - compared to other polymers, elastomers, and certain metals.

Depending on the operating conditions and pipeline isometry, various FLUROFLEX expansion joints are available with different designs and a number of corrugations. They are also available with antistatic properties and therefore suitable for use with solvents and other liquids where electrostatic charging must be avoided.

High performance bellows material

With more than 60 years of experience, we have continuously optimized the processing techniques for the production of paste-extruded PTFE using the finest powder grades. POLYFLURON PTFE has a low pore content that minimizes permeation and provides unique flexural fatigue resistance. Pore content, density, elongation, and tensile strength are continuously measured and controlled to ensure superior performance.

Manufacturing process and design

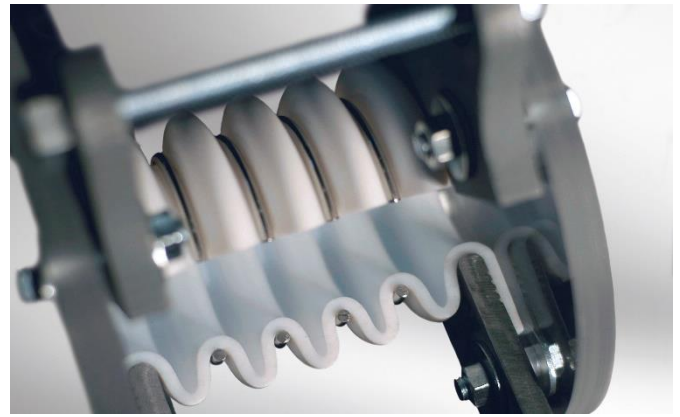
The convolutions are manufactured using a specially developed molding process. This results in a uniform wall thickness across the entire bellows cross-section. Accumulation of stress peaks in heavily loaded areas can be avoided which has a significant impact on the lifetime performance.

To prevent excessive movements, FLUROFLEX expansion joints are equipped with limit bolts between the flanges. In case of malfunction, they may act as protection against overstress, e.g., at full compression or expansion. This can potentially prevent damage to the bellows; however, the limit bolts are not specifically designed for this purpose. FLUROFLEX expansion joints come as standard with three limit bolts to provide some protection against lateral or angular overstress. Even our designs for solely lateral or angular movements are equipped with limit or guide elements.

Wide range of products

FLUROFLEX expansion joints are available with nearly unlimited diameters and up to 10 convolutions. Customized designs with non-standard flanges, clearance holes, and bolt circles, as well as stainless steel flanges are possible. Types with restricted movements - such as angular or lateral - can also be supplied.

FLUROFLEX expansion joints (type FLUROFLEX FX-0) are vacuum resistant for full vacuum operation at high temperatures. Types with electrically insulating limit bolts are also available.



↑ Expansion joints with guaranteed, uniform wall thickness

For high pressure applications we offer POLYFLURON PTFE lined metal expansion joints (FLUROFLEX FX-10, FX-16, or FX-25). The multiple metal layer design minimizes spring rates and can be supplied in special alloys too.

Properties of the FLUROFLEX bellows

FLUROFLEX expansion joints manufactured by SGL Carbon are characterized by exceptional safety and long service life. Their operational reliability is the result of our special manufacturing process, careful material selection, and targeted optimization through extensive practical tests and FEM simulations. On this basis, FLUROFLEX expansion joints are suitable for extreme operating conditions.

- Optimized geometry providing long service life and reliable operation of plants with FLUROFLEX expansion joints
- Uniform wall thickness for safe, reliable service life
- Simultaneous movement in all directions
- Reliable performance under pressure/temperature loading
- High vacuum resistance even under continuous negative pressure conditions
- No material fatigue and excellent long-term stability

Pressure stage

The approved pressure rating (maximum operating pressure at different temperatures) is the most important property of PTFE expansion joints, along with the permissible movements. However, there are no standards available to define and determine these values.

Often, therefore, the permissible pressure levels are determined by bursting pressure tests in which the internal pressure is increased to failure very quickly. A safety factor is then used to evaluate the permissible working pressure. For practical reasons, these tests are usually performed at ambient temperature with small sized expansion joints and extrapolated to larger nominal sizes. This procedure is fraught with high uncertainties and does not adequately represent real operating conditions.

In contrast, the maximum operating pressures for FLUROFLEX expansion joints were determined precisely for relevant ambient conditions both empirically and by numerical simulation. For this purpose, an adapted test method was developed with TÜV Süd and a large number of compensators of different nominal sizes were tested up to 200°C. In parallel, an FE model was established that considers the nonlinear plastic behavior of PTFE. With this deep understanding of the material behavior, it is possible to simulate the deformation of FLUROFLEX expansion joints at different temperatures and designs (diameter and number of convolutions) and to accurately predict the behavior at overpressure. The experimental and simulation results show remarkable consistency.

Creep rupture test

For creep rupture testing of the service life of plastic pipes at elevated temperatures, the ISO 9080 test method is used. This method can also be used for POLYFLURON expansion joints. Laboratory tests by the German TÜV have confirmed the creep resistance of FLUROFLEX expansion joints at 150°C.

Smoothbore sleeves

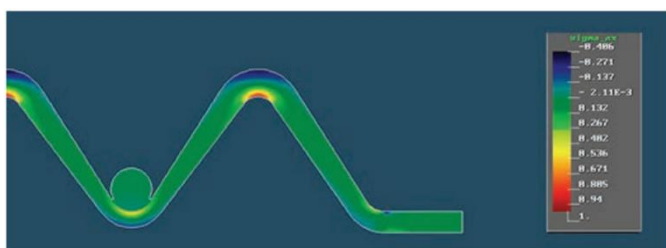
Smoothbore sleeves prevent damage to the PTFE convolutions in abrasive services or at high flow velocities. FXS protection tubes made of POLYFLURON PTFE are the standard design, but other materials are also available according to customer specifications.

Safety shields

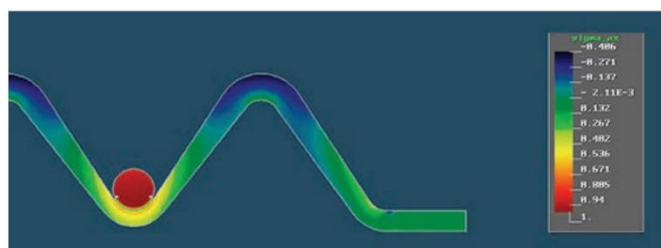
It is recommended to use safety devices on all flange connections and expansion joints in accordance with the regulations of the employers' liability insurance association and other applicable regulations (e.g., European Pressure Equipment Directive) if these are used with corrosive and/or hazardous media.

Delivery and assembly

FLUROFLEX expansion joints are set to neutral length during manufacture and flange faces are covered with wooden plates. These plates should only be removed directly before installation to avoid damage and deformation of the PTFE liner. The maximum permissible length must be adjusted after installation using the limit bolts, taking into account the combination of all movements. Please refer to the manual.



↑ FEM calculation: Maximum stress under axial load is located inside the "convolution crest" (area red/orange).



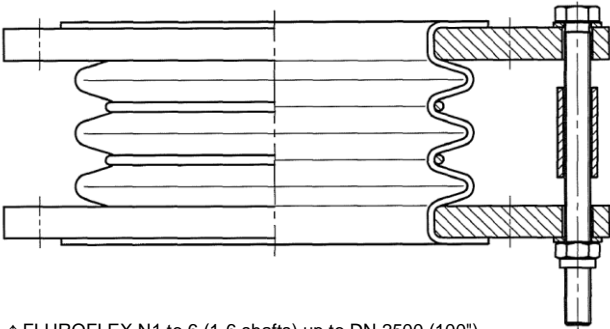
↑ FEM calculation: Maximum stress under lateral load is located at the outside of the "convolution valley" - near the support rings (area red/orange)

FLUROFLEX® PTFE expansion joints

Features and special designs

FLUROFLEX N expansion joints from SGL Carbon have movement limiters in both directions. These prevent damage to the expansion joints due to excessive movements. Our expansion joints are vacuum-resistant (for more details see page 14).

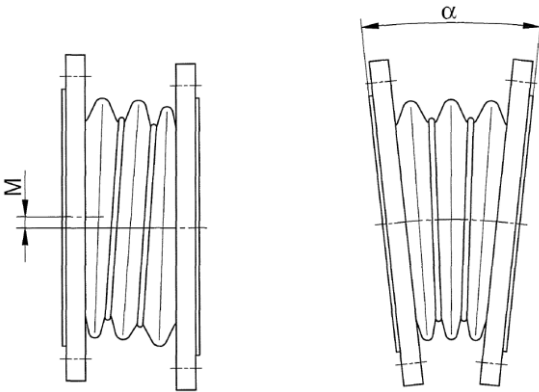
Special flanges and clearance holes are available. Flanges made of stainless steel, as well as designs for clamping flanges according to various standards are available based on customer specifications. Expansion joints with different flange sizes for nominal width reduction are also available.



↑ FLUROFLEX N1 to 6 (1-6 shafts) up to DN 2500 (100")

Pure axial, lateral, or joint compensators

Our FLUROFLEX expansion joints can be designed to allow movements in axial, lateral, or angular direction only.

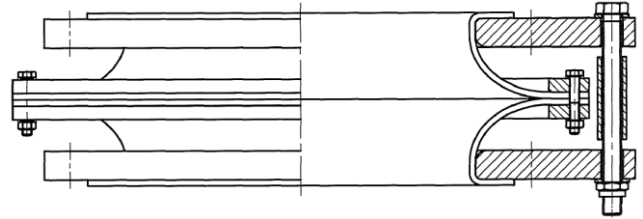


↑ Lateral movement

↑ Angular movement

Vacuum compensators

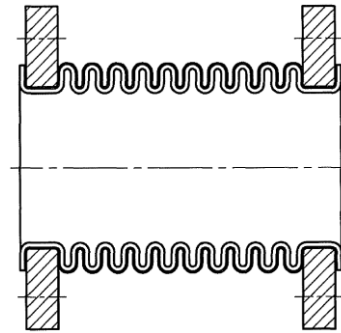
FLUROFLEX 0 expansion joints are specially designed for use under negative pressure conditions (for more details see page 9).



↑ FLUROFLEX 0 (for full vacuum) DN 200 (8") to DN 1400 (56")
Vacuum resistance up to 200°C replaces expansion joints with expensive, internal support rings.

Expansion joints for high operating pressures

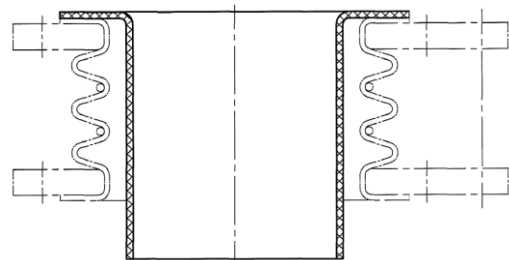
FLUROFLEX 10/16/25 for high operating pressures combine the corrosion resistance of our PTFE-based expansion joints with the pressure stability of metallic materials (for more details see pages 10 and 11).



↑ FLUROFLEX 16 (for PN16) also available in PN25 or PN10
DN 40 (1.5") to DN 600 (24") combines the corrosion resistance of POLYFLURON PTFE with the high pressure resistance of stainless steel expansion joints. The multilayer metal construction (also available in HASTELLOY®, titanium etc.) minimizes spring rates.

Smoothbore sleeves

The FXS smoothbore sleeves prevent damage to the PTFE material in the case of media loaded with solids or comprising high flow velocities (for more details see page 12).



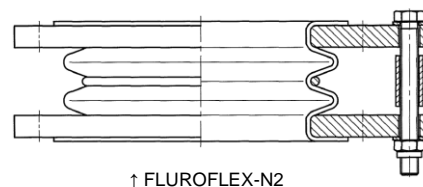
↑ FXS protection tubes prevent damage to POLYFLURON PTFE shafts in abrasive applications and the lodging of solids in the shafts.

FLUROFLEX[®] N1 to FLUROFLEX[®] N2

All FLUROFLEX expansion joints are supplied with carbon steel flanges as standard.

Flange holes are threaded, except for FLUROFLEX N2 from DN 80 to DN 400, which are designed with through holes.

Special flange dimensions are possible on request (e.g., flanges for glass connections). The maximum movements (axial, lateral and angular) listed in the table show values for non-combined movements. Please contact us regarding limits for combined movements.



FLUROFLEX N1										FLUROFLEX N2									
DN		Operating pressure			Length			Movement ³⁾		Operating pressure			Length			Movement ³⁾		Weight	
DIN	ASME ¹⁾	Pmax. @20°C [bar]	Pmax. @100°C [bar]	Pmax. @200°C [bar]	new- tral ²⁾ [mm]	min. [mm]	max. [mm]	lateral [mm]	angular [°]	Pmax. @20°C [bar]	Pmax. @100°C [bar]	Pmax. @200°C [bar]	new- tral ²⁾ [mm]	min. [mm]	max. [mm]	lateral [mm]	angular [°]	DIN	ASME
25	1	20.8	12.8	7.3	40	34	43	2	2	23.1	12.9	6.9	54	48	60	3	4	1.9	1.7
32	1 ¼	19.9	12.1	6.7	40	34	43	2	2	21.9	12.3	6.4	56	50	62	3	4	2.5	2.0
40	1 ½	19.1	11.5	6.2	40	34	43	2	2	21.0	11.7	6.0	56	50	62	3	4	3.0	2.3
50	2	18.3	10.9	5.8	48	41	53	2	2	20.0	11.2	5.6	68	58	78	5	5	4.3	3.8
65	2 ½	17.4	10.2	5.3	54	45	60	3	3	19.0	10.6	5.2	78	66	90	5	5	5.1	4.8
80	3	16.7	9.7	4.9	60	50	67	3	3	18.2	10.2	4.9	88	73	103	5	6	5.7	5.5
100	4	16.0	9.1	4.5	64	54	71	3	4	17.4	9.7	4.6	88	73	103	8	6	7.4	6.8
125	5	15.3	8.6	4.1	70	58	78	4	4	16.6	9.3	4.3	95	80	110	8	5	9.0	9.0
150	6	14.8	8.2	3.9	75	63	84	4	4	16.0	8.9	4.0	105	90	120	8	5	13	12
200	8	13.9	7.6	3.4	85	71	95	4	3	15.0	8.4	3.7	110	95	125	10	5	17	17
250	10	13.3	7.2	3.1	93	79	103	5	3	14.3	8.0	3.4	128	108	148	10	4	24	25
300	12	12.8	6.8	2.9	100	84	110	5	3	13.8	7.7	3.2	140	120	160	10	4	37	46
350	14	12.4	6.5	2.7	103	87	113	5	2	13.3	7.4	3.1	145	125	165	10	4	44	51
400	16	12.0	6.3	2.6	103	87	113	5	2	12.9	7.2	2.9	145	125	165	12	3	54	63
450	18	11.7	6.1	2.4	103	87	113	5	2	12.6	7.0	2.8	145	115	165	12	3	59	65
500	20	11.4	5.9	2.3	103	87	113	5	2	12.3	6.9	2.7	145	115	165	12	3	67	76
600	24	11.0	5.6	2.1	103	87	113	5	2	11.8	6.6	2.6	145	115	165	12	2	97	113
700	28	11.6	5.3	2.0	103	87	113	5	1.5	11.4	6.4	2.4	145	115	165	12	2	122	138
800	32	10.3	5.1	1.8	103	87	113	5	1.5	11.1	6.2	2.3	155	125	175	12	2	131	156
900	36	10.0	4.9	1.7	103	87	113	5	1.5	10.8	6.0	2.2	155	125	175	12	2	166	198
1000	40	9.8	4.8	1.6	113	97	123	5	1.5	10.6	5.9	2.1	155	135	175	12	1.5	193	234
1200	48	9.4	4.5	1.5	113	97	123	5	1.5	10.1	5.6	2.0	155	135	175	12	1.5	248	295
1400	56	9.0	4.3	1.3	113	97	123	5	1	9.8	5.4	1.9	155	135	175	12	1	347	329

For higher operating pressures, special sizes, or larger diameters, please contact us.

Possible operating temperatures: -10°C to +250°C

¹⁾ Flange holes according to ANSI B 16.5, 150 lbs.; from DN 28" to DN 60" these are designed according to MSS SP-44, 150 lbs.

²⁾ Delivery length corresponds to neutral length; can be changed within min./max. length on request

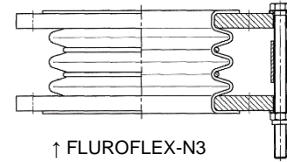
³⁾ for specified neutral length

Subject to technical changes

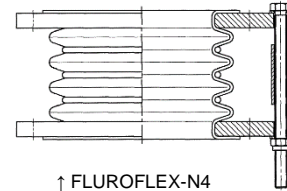
FLUROFLEX® N3 to FLUROFLEX® N4

All FLUROFLEX expansion joints are supplied with carbon steel flanges as standard.

Flange holes are designed with through holes. Except for the FLUROFLEX N3 and N4 in nominal sizes DN 25 - DN 65 (1" - 2½"). These feature threaded holes in the flanges. Special flange dimensions are possible on request (e.g., flanges for glass connections). The maximum movements (axial, lateral, and angular) listed in the table show values for non-combined movements. Please contact us regarding limits for combined movements.



↑ FLUROFLEX-N3



↑ FLUROFLEX-N4

DN		FLUROFLEX N3									FLUROFLEX N4									Weight	
		Operating pressure			Length			Movement ³⁾			Operating pressure			Length			Movement ³⁾				
DIN	ASME ¹⁾	Pmax. @20°C [bar]	Pmax. @100°C [bar]	Pmax. @200°C [bar]	new- tral ²⁾ [mm]	min. [mm]	max. [mm]	lateral [mm]	angular [°]	Pmax. @20°C [bar]	Pmax. @100°C [bar]	Pmax. @200°C [bar]	new- tral ²⁾ [mm]	min. [mm]	max. [mm]	lateral [mm]	angular [°]	DIN	ASME		
25	1	21.4	12.3	6.2	70	60	80	5	6	17.9	10.7	5.8	85	72	98	6	8	2.1	1.9		
32	1 ¼	20.2	11.5	5.8	75	65	85	5	5	17.0	10.2	5.4	90	77	103	6	8	2.8	2.2		
40	1 ½	19.1	10.9	5.4	80	65	95	5	6	16.3	9.7	5.1	98	80	116	6	8	3.3	2.5		
50	2	18.1	10.3	5.1	85	70	100	8	8	15.5	9.2	4.7	105	85	125	10	9	4.8	4.2		
65	2 ½	16.8	9.6	4.8	100	80	120	8	8	14.6	8.7	4.4	122	97	147	10	10	5.7	5.3		
80	3	15.9	9.1	4.5	110	90	130	8	10	13.9	8.2	4.1	135	109	161	12	11	6.3	6.1		
100	4	14.9	8.5	4.3	110	85	135	12	10	13.2	7.7	3.9	137	104	170	15	13	8.2	7.6		
125	5	14.0	8.0	4.0	120	95	145	12	10	12.4	7.3	3.6	145	112	178	15	13	10	10		
150	6	13.2	7.6	3.8	130	105	155	12	8	11.8	6.9	3.4	155	122	188	15	12	14	13		
200	8	12.1	6.9	3.5	140	105	170	14	8	10.9	6.3	3.1	175	130	210	18	10	19	19		
250	10	11.2	6.4	3.3	165	125	195	14	6	10.2	5.9	2.9	195	150	235	18	10	27	28		
300	12	10.5	6.0	3.1	175	131	205	14	6	9.6	5.5	2.8	215	165	255	18	9	41	51		
350	14	9.9	5.7	3.0	190	146	225	18	6	9.2	5.2	2.6	235	175	277	22	8	49	57		
400	16	9.4	5.5	2.9	190	146	225	18	6	8.8	5.0	2.5	235	175	277	22	8	60	70		
450	18	9.0	5.2	2.8	190	146	225	18	5	8.4	4.8	2.4	235	175	277	22	7	65	72		
500	20	8.6	5.0	2.7	190	146	225	20	5	8.1	4.6	2.4	235	175	277	22	6	74	84		
600	24	7.9	4.7	2.6	190	146	225	20	4	7.5	4.2	2.2	235	175	277	22	6	74	84		
700	28	7.4	4.4	2.4	190	146	225	20	4	7.1	3.9	2.1	235	175	277	22	5	136	153		
800	32	6.9	4.1	2.3	190	155	225	20	3	6.7	3.7	2.0	235	191	277	22	4	146	173		
900	36	6.5	3.9	2.3	190	155	225	20	3	6.3	3.5	2.0	235	191	277	22	4	184	220		
1000	40	6.2	3.7	2.2	190	165	225	20	3	6.0	3.3	1.9	235	201	277	22	3	214	260		
1200	48	5.6	3.4	2.1	190	165	225	20	3	5.5	2.9	1.8	235	201	277	22	3	275	328		
1400	56	5.1	3.2	2.0	190	165	225	20	2	5.0	2.6	1.7	235	201	277	22	2	385	365		

For higher operating pressures, special sizes, or larger diameters, please contact us.

Possible operating temperatures: -10°C to +250°C

¹⁾ Flange holes according to ANSI B 16.5, 150 lbs.; from DN 28" to DN 60" these are designed according to MSS SP-44, 150 lbs.

²⁾ Delivery length corresponds to neutral length; can be changed within min./max. length on request

³⁾ for specified neutral length

Subject to technical changes

FLUROFLEX® N5 to FLUROFLEX® N6

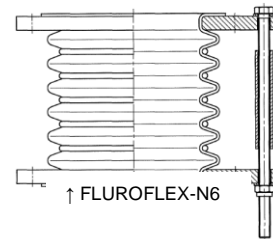
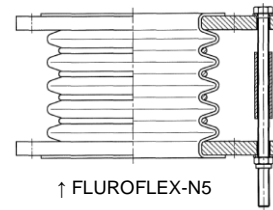
All FLUROFLEX expansion joints are supplied with carbon steel flanges as standard.

Flange holes are made with through holes. Except for the FLUROFLEX N5 and N6 in the nominal sizes DN 25 - DN 65 (1" - 2½"). These feature threaded holes in the flanges.

Special flange dimensions are possible on request (e.g., flanges for glass connections).

The maximum movements (axial, lateral, and angular) listed in the table show values for non-combined movements.

Please contact us regarding limits for combined movements.



FLUROFLEX N5										FLUROFLEX N6								Weight			
DN		Operating pressure				Length				Movement ³⁾		Operating pressure				Length				Movement ³⁾	
DIN	ASME ¹⁾	Pmax. @20°C [bar]	Pmax. @100°C [bar]	Pmax. @200°C [bar]	new- tral ²⁾ [mm]	min. [mm]	max. [mm]	lateral [mm]	angular [°]	Pmax. @20°C [bar]	Pmax. @100°C [bar]	Pmax. @200°C [bar]	new- tral ²⁾ [mm]	min. [mm]	max. [mm]	lateral [mm]	angular [°]	DIN	ASME		
25	1	12.9	8.4	4.2	100	85	115	8	10	11.7	6.3	3.8	115	95	135	10	13	2.5	2.3		
32	1 ¼	12.3	8.0	4.0	105	90	120	8	10	11.7	6.3	3.8	125	105	145	10	13	3	2.4		
40	1 ½	11.8	7.6	3.8	115	95	125	8	12	11.7	6.3	3.8	132	102	162	10	15	4	3		
50	2	11.2	7.2	3.7	125	100	150	12	12	11.7	6.3	3.8	145	115	175	14	16	5.2	4.5		
65	2 ½	10.6	6.8	3.5	145	115	175	12	14	11.7	6.3	3.8	168	128	208	14	16	6.8	6.4		
80	3	10.2	6.5	3.3	160	125	195	15	16	11.7	6.3	3.8	185	145	225	18	20	6.8	6.6		
100	4	9.6	6.2	3.1	165	125	205	18	16	11.7	6.3	3.8	192	142	242	22	20	9.8	9.1		
125	5	9.1	5.8	2.9	170	130	210	18	14	11.7	6.3	3.8	200	150	250	22	18	11	11		
150	6	8.7	5.5	2.8	180	140	220	18	13	11.7	6.3	3.8	210	160	260	22	16	17	16		
200	8	8.1	5.1	2.6	210	148	250	22	13	4)	4)	4)	4)	4)	4)	4)	4)	21	21		
250	10	7.6	4.7	2.4	240	178	290	22	12	4)	4)	4)	4)	4)	4)	4)	4)	32	34		
300	12	7.2	4.5	2.3	250	188	300	22	10	4)	4)	4)	4)	4)	4)	4)	4)	44	55		
350	14	6.8	4.2	2.2	265	203	315	25	10	4)	4)	4)	4)	4)	4)	4)	4)	59	68		
400	16	6.5	4.0	2.1	265	203	315	25	8	4)	4)	4)	4)	4)	4)	4)	4)	65	76		
450	18	6.2	3.9	2.0	280	205	330	25	8	4)	4)	4)	4)	4)	4)	4)	4)	78	86		
500	20	6.0	3.7	1.9	280	205	330	25	7	4)	4)	4)	4)	4)	4)	4)	4)	80	91		
600	24	5.6	3.4	1.8	280	205	330	25	6	4)	4)	4)	4)	4)	4)	4)	4)	130	150		
700	28	5.3	3.2	1.6	280	205	330	25	5	4)	4)	4)	4)	4)	4)	4)	4)	147	165		
800	32	5.0	3.0	1.5	280	225	330	25	5	4)	4)	4)	4)	4)	4)	4)	4)	175	208		
900	36	4.7	2.8	1.5	280	225	330	25	4	4)	4)	4)	4)	4)	4)	4)	4)	199	238		
1000	40	4.5	2.7	1.4	280	235	330	25	4	4)	4)	4)	4)	4)	4)	4)	4)	257	312		
1200	48	4.1	2.4	1.2	280	235	330	25	3	4)	4)	4)	4)	4)	4)	4)	4)	297	354		
1400	56	3.8	2.2	1.1	280	235	330	25	2	4)	4)	4)	4)	4)	4)	4)	4)	416	394		

For higher print rates, special sizes, or larger diameters, please contact us.

Possible operating temperatures: -10°C to +250°C

¹⁾ Flange holes according to ANSI B 16.5, 150 lbs.; from DN 28" to DN 60" these are designed according to MSS SP-44, 150 lbs.

²⁾ Delivery length corresponds to neutral length; can be changed within min./max. length on request

³⁾ for specified neutral length

⁴⁾ Please contact us

Subject to technical changes

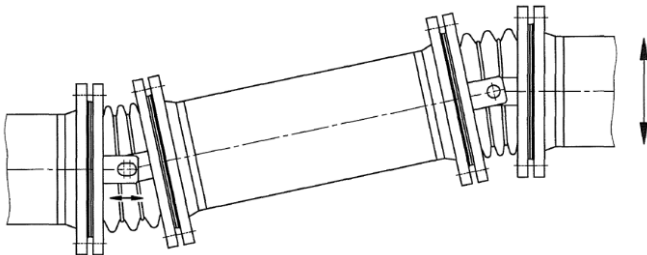
FLUROFLEX® special expansion joints

Hinged type (angular) FLUROFLEX expansion joints

Hinged expansion joints only allow angular movements about the center point. This type of expansion joint can serve as a "fixed point" for the piping system.



When combined with an expansion joint with slotted hinges, they can be used to handle large lateral displacements using only two bellows (see sketch below).

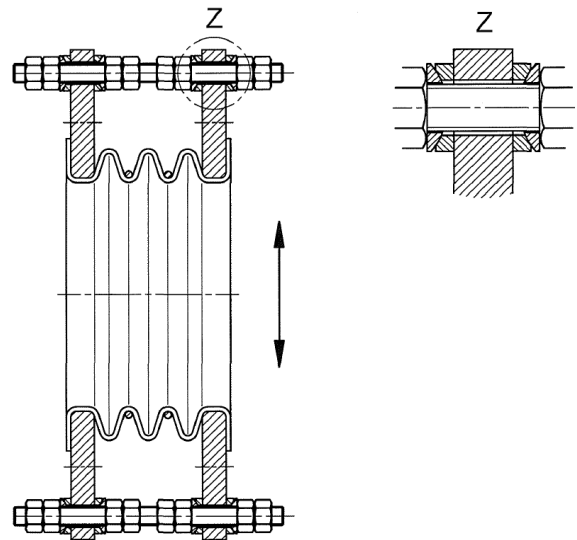


↑ Combination of hinged and slotted hinged FLUROFLEX expansion joints

Hinged and slotted hinged FLUROFLEX expansion joints allow axial movement of the expansion joints in addition to angular movements.

Spherical washers/conical seat on limit bolts

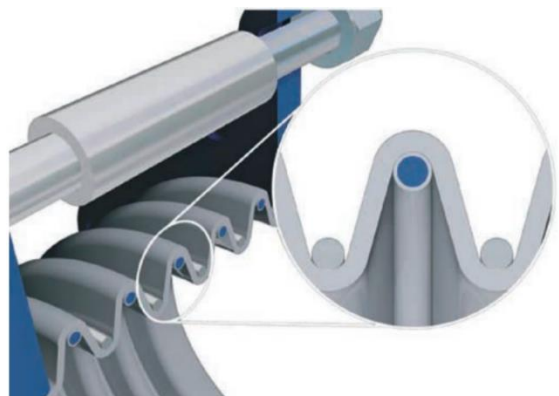
The flanges of a FLUROFLEX compensator can be guided by means of spherical washers/conical seat, which prevent or reduce axial movement of the compensator but allow for full lateral movement of the compensator.



The spherical washers/conical seat are only available in carbon and stainless steel.

FLUROFLEX N1 to N6 with inner support rings for high vacuum stability

FLUROFLEX N1 to N6 expansion joints can be supplied with internal vacuum support rings made of virgin paste extruded POLYFLURON PTFE lined stainless steel rings. These rings increase the vacuum stability, depending on the diameter, up to full vacuum and can also be used for larger diameters. These inner support rings are also available with paste extruded POLYFLURON PTFE lined special materials (HASTELLOY, Tantalum etc.).



FLUROFLEX® 0 expansion joints for full vacuum

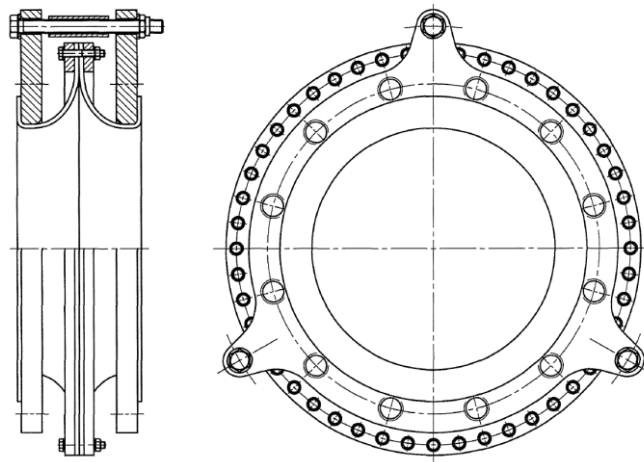
The FLUROFLEX 0 compensator for full vacuum is available from DN 200 (8") to DN 1200 (48").

All flange holes are threaded.

The maximum movements (axial, lateral, and angular) listed in the table show values for non-combined movements.

Please contact us regarding limits for combined movements.

FLUROFLEX 0 expansion joints are designed for operation under negative pressure conditions up to full vacuum. Operation under overpressure (even for a short time) therefore represents an impermissible load case and must be avoided. In this case, subsequent inspection or replacement of the compensator is mandatory. Nevertheless, FLUROFLEX 0 expansion joints are stable up to 3 bar overpressure for a short period of time, depending on the nominal size and temperature, to ensure immediate operational safety in the event of a malfunction. Please contact us for maximum possible short-term overpressures depending on nominal width and temperature.



DN		Operating pressure		Length			Movement ³⁾		Weight	
DIN ¹⁾	ASME ²⁾	Vacuum 200°C [bar]	neutral [mm]	min. [mm]	max. [mm]	lateral [mm]	angular ³⁾ [°]	DIN [kg]	ASME [kg]	
200	8	-1	150	135	165	5	4	29	29	
250	10	-1	150	135	165	6	4	39	41	
300	12	-1	150	130	170	7	4	53	64	
350	14	-1	160	140	180	7	4	64	74	
400	16	-1	160	140	180	8	3	76	88	
450	18	-1	160	140	180	9	3	83	90	
500	20	-1	160	140	180	9	3	96	108	
600	24	-1	170	150	190	10	3	133	151	
700	28	-1	170	145	195	10	2	165	184	
800	32	-1	170	145	195	11	2	214	243	
900	36	-1	170	145	195	12	2	238	276	
1000	40	-1	170	145	195	12	2	277	324	

For special sizes or larger diameter, please contact us.

Possible operating temperatures: -10°C to +250°C

¹⁾ Flange holes according to DIN 2501 PN 10

²⁾ Flange holes according to ANSI B 16.5, 150 lbs.; from DN 28" to DN 40" according to MSS SP-44, 150 lbs.

Special flange dimensions are available on request (e.g., flange connections for glass tubes)

³⁾ for specified neutral length

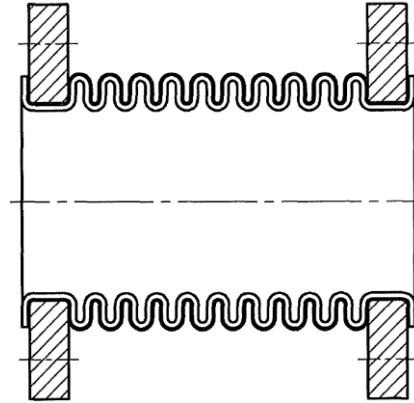
Subject to technical changes

FLUROFLEX® 10 Expansion joints

for high pressures

The FLUROFLEX 10 expansion joint is available from DN 40 (1½") to DN 500 (20"). It combines the corrosion resistance of POLYFLURON PTFE and the high strength of a metal expansion joint. Multi-layer design minimizes spring rate. FLUROFLEX 10/16/25 expansion joint types are supplied with carbon steel flanges and a POLYFLURON PTFE lined stainless steel shell as standard.

Special flange dimensions (e.g., PN 25 or ANSI 300 lbs.) and special steels for flanges and shells are available on request.



DN		Operating pressure		Length			Movement ³⁾		Weight	
DIN ¹⁾	ASME ²⁾	Pmax. @20°C [bar]	Pmax. @200°C [bar]	neutral [mm]	min. [mm]	max. [mm]	lateral [mm]	angular [°]	DIN [kg]	ASME [kg]
40	1 ½	10	8	145	135	155	1	4	5	4
40	1 ½	10	8	250	232	268	4	6	6	5
50	2	10	8	140	130	150	1	3	7	6
50	2	10	8	220	203	237	3	5	8	7
65	2 ½	10	8	150	138	162	1	3	8	9
65	2 ½	10	8	220	201	239	3	5	9	10
80	3	10	8	130	120	140	1	2	9	11
80	3	10	8	220	200	240	2	4	11	13
100	4	10	8	140	128	152	1	2	12	13
100	4	10	8	260	237	283	2	4	15	16
125	5	10	8	170	159	181	1	2	15	16
125	5	10	8	240	219	261	1	3	18	19
150	6	10	8	160	150	170	1	1	19	19
150	6	10	8	260	236	284	1	3	24	24
200	8	10	8	175	163	187	1	1	26	32
200	8	10	8	265	239	291	1	2	33	38
250	10	10	8	185 ⁴⁾	172	198	1	1	35	46
250	10	10	8	285 ⁵⁾	253	317	1	2	46	57
300	12	10	8	195	178	212	1	1	43	65
300	12	10	8	265	233	297	1	2	48	72
350	14	10	8	160 ⁶⁾	142	178	1	1	62	83
350	14	10	8	275 ⁷⁾	236	314	2	2	75	100

Possible operating temperatures: -10°C to +250°C

¹⁾ Flange holes according to DIN 2501 PN 10

²⁾ Flange holes according to ANSI B 16.5, 150 lbs

³⁾ High lateral and angular movements are possible, but the maximum operating pressure must be reduced in this case. Please contact us.

⁴⁾ Length with ASME B 16.5 150 lbs flanges -200 mm +/- 13 mm

⁵⁾ Length with ASME B 16.5 150 lbs flanges -300 mm +/- 32 mm

⁶⁾ Length with ASME B 16.5 150 lbs flanges -170 mm +/- 18 mm

⁷⁾ Length with ASME B 16.5 150 lbs flanges -285 mm +/- 39 mm

Subject to technical changes

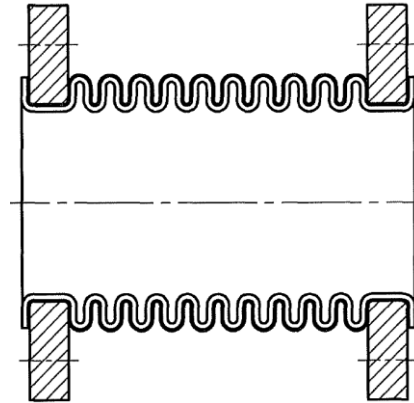
FLUROFLEX® 16 Expansion joints

for high pressures

The FLUROFLEX 16 expansion joint is available from DN 40 (1½") to DN 500 (20"). It combines the corrosion resistance of POLYFLURON PTFE and the high strength of a metal expansion joint. Multi-layer design minimizes spring rate. FLUROFLEX 16 expansion joints are supplied with carbon steel flanges and a POLYFLURON PTFE lined stainless steel shell as standard.

Special flange dimensions and special steels for flanges and shells are available on request.

Expansion joints with even higher pressure ratings (e.g., PN 25 or ANSI 300 lbs.) are available on request. Please contact us!



DN		Operating pressure		Length			Movement		Weight	
DIN ¹⁾	ASME ²⁾	Pmax. @20°C [bar]	Pmax. @200°C [bar]	neutral [mm]	min. [mm]	max. [mm]	lateral [mm]	lateral [mm]	DIN [kg]	ASME [kg]
40	1 ½	16	12.8	130	121	139	1	3	5	3
40	1 ½	16	12.8	225	210	240	4	5	5	3
50	2	16	12.8	125	116	134	1	3	6	5
50	2	16	12.8	215	200	230	3	4	6	5
65	2 ½	16	12.8	135	126	144	1	2	7	7
65	2 ½	16	12.8	215	207	243	3	4	8	8
80	3	16	12.8	130	120	140	1	2	7	8
80	3	16	12.8	220	201	239	3	4	9	9,5
100	4	16	12.8	160	150	170	1	2	10	12
100	4	16	12.8	260	239	281	3	4	11	13
125	5	16	12.8	175	164	186	1	2	12	14
125	5	16	12.8	270	247	293	2	3	14	15
150	6	16	12.8	165	154	176	1	1	16	17
150	6	16	12.8	300	274	326	3	3	16	17
200	8	16	12.8	180	168	192	1	1	23	27
200	8	16	12.8	325	292	358	3	3	25	30
250	10	16	12.8	200	186	214	1	1	34	38
250	10	16	12.8	330	296	364	2	3	35	40
300	12	16	12.8	210	193	227	1	1	44	59
300	12	16	12.8	350	310	390	2	3	46	61
350	14	16	12.8	175	157	193	1	1	65	78
350	14	16	12.8	315	271	359	2	3	68	80

Possible operating temperatures: -10°C to +250°C

¹⁾ Flange holes acc. to DIN 2501 PN 10

²⁾ Flange holes according to ANSI B 16.5 150 lbs.

³⁾ High lateral and angular movements are possible, but the maximum operating pressure must be reduced in this case. Please contact us.

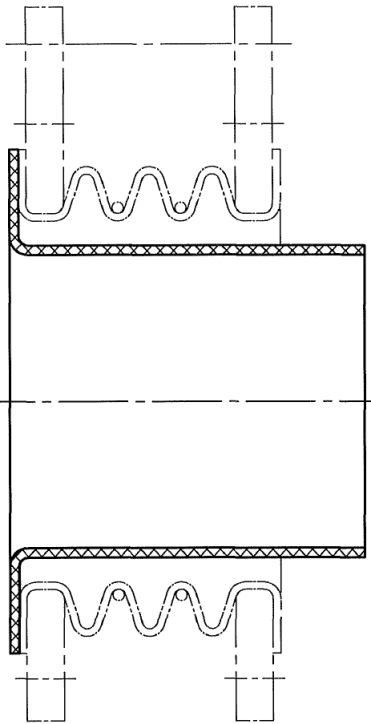
Subject to technical changes

Accessories for FLUROFLEX[®] expansion joints

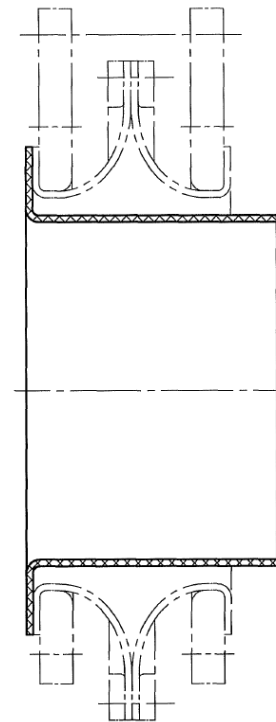
Smoothbore sleeves

FXS smoothbore sleeves prevent damage to PTFE material when used with solids or high flow velocities. FXS protection tubes made of POLYFLURON PTFE are the standard design,

but other materials are also available according to customer specifications.



↑ Protection tube for FLUROFLEX N1 - N6



↑ Protection tube for FLUROFLEX 0

Safety shields

In accordance with the regulations of the Employer's Liability Insurance Association and other applicable regulations (e.g., European Pressure Equipment Directive), we recommend using safety shields on all flange connections and expansion

joints when used with corrosive and/or hazardous media.

Please ask for our safety shields.

Effective bellows cross section and spring rates

FLUROFLEX 0					
Spring rates +/-30% at room temperature					
DN		Effective Bellows cross section [cm ²]		ax. Compr.	ax. expans.
DIN	ASME	DIN	ASME	[N/mm]	[N/mm]
200	8	531	537	1212	800
250	10	779	806	1455	960
300	12	1026	1137	1667	1100
350	14	1366	1459	1878	1240
400	16	1735	1855	2045	1350
450	18	2124	2206	2182	1440
500	20	2552	2682	2424	1600
600	24	3573	3754	2818	1860
700	28	4808	5006	¹⁾	¹⁾
800	32	6221	6538	¹⁾	¹⁾
900	36	7698	8114	¹⁾	¹⁾
1000	40	9458	9976	¹⁾	¹⁾
1200	48	13478	14061	¹⁾	¹⁾

¹⁾ Please contact us
Subject to technical changes

*Temperature correction factor (TCF) for spring rate conversion of

FLUROFLEX 0 and FLUROFLEX N1 - N6	
Temperature [°C]	TCF
80	0.65
120	0.5
150	0.4

Example: Spring rate at 120°C = Spring rate at 20°C x 0.5

FLUROFLEX N3							
Spring rates +/-30% at room temperature							
DN		Effective bellows cross cut [cm ²]	ax. Compr. [N/mm]	ax. expans. [N/mm]	lateral [N/mm]	angular [Nm/°]	
DIN	ASME	[cm ²]	[N/mm]	[N/mm]	[N/mm]	[Nm/°]	
25	1	10	109	109	72	1.4	
32	1 ¼	14	115	115	105	2.0	
40	1 ½	21	122	122	138	2.7	
50	2	30	185	185	160	3.1	
65	2 ½	49	153	153	193	3.7	
80	3	70	153	153	227	4.4	
100	4	106	193	193	256	5.0	
125	5	160	300	300	396	7.7	
150	6	225	367	367	536	10.4	
200	8	353	130	86	400	10.6	
250	10	531	170	112	500	15.0	
300	12	723	209	138	600	22.0	
350	14	1041	240	159	700	27.5	
400	16	1346	273	180	800	33.1	
450	18	1619	318	210	900	38.0	
500	20	2075	349	230	1000	43.0	
600	24	2961	424	280	1200	60.0	
700	28	4004	500	330	1400	78.0	
800	32	5204	¹⁾	¹⁾	¹⁾	¹⁾	
900	36	6561	¹⁾	¹⁾	¹⁾	¹⁾	
1000	40	8075	¹⁾	¹⁾	¹⁾	¹⁾	
1200	48	11575	¹⁾	¹⁾	¹⁾	¹⁾	
1400	56	15703	¹⁾	¹⁾	¹⁾	¹⁾	

¹⁾ Please contact us
Subject to technical changes

Shaft correction factor (CCF) for spring rate conversion

Number of shafts	CCF
1	3
2	1.5
3	1
4	0.75
5	0.6
6	0.5

Example: Spring rate FLUROFLEX 5 = Spring rate FLUROFLEX 3 x 0.6

Vacuum resistance as a function of temperature

Vacuum resistance can be increased to full vacuum with internal support rings.

DN		Vacuum resistance for FLUROFLEX N1 to N6																	
		FLUROFLEX N1			FLUROFLEX N2			FLUROFLEX N3			FLUROFLEX N4			FLUROFLEX N5			FLUROFLEX N6		
		Operating temperature			Operating temperature			Operating temperature			Operating temperature			Operating temperature			Operating temperature		
DIN	ASME	20°C	100°C	150°C	20°C	100°C	150°C	20°C	100°C	150°C	20°C	100°C	150°C	20°C	100°C	150°C	20°C	100°C	150°C
		[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]	[bar]
25	1	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
32	1 ¼	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
40	1 ½	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
50	2	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
65	2 ½	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
80	3	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-0.9
100	4	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-0.9	-0.9	-1.0	-0.9
125	5	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-0.9	-0.8	-0.9	-0.79	-0.7
150	6	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-0.9	-0.9	-0.8	-0.7	-0.79	-0.7	-0.61
200	8	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-0.8	-1.0	-0.9	-0.7	-0.8	-0.7	-0.6	-0.70	-0.61	-0.56
250	10	-1.0	-1.0	-0.81	-1.0	-1.0	-0.78	-1.0	-0.84	-0.65	-0.9	-0.76	-0.59	-0.7	-0.67	-0.52	-0.61	-0.59	-0.46
300	12	-1.0	-1.0	-0.69	-1.0	-0.84	-0.66	-0.85	-0.7	-0.55	-0.77	-0.63	-0.5	-0.68	-0.56	-0.44	-0.6	-0.49	-0.39
350	14	-0.89	-0.72	-0.55	-0.85	-0.68	-0.53	-0.71	-0.57	-0.44	-0.64	-0.51	-0.4	-0.57	-0.46	-0.35	-0.5	-0.4	-0.31
400	16	-0.75	-0.6	-0.43	-0.72	-0.58	-0.41	-0.6	-0.48	-0.34	-0.54	-0.43	-0.31	-0.48	-0.38	-0.27	-0.42	-0.34	-0.24
450	18	-0.65	-0.49	-0.34	-0.62	-0.47	-0.32	-0.52	-0.39	-0.27	-0.47	-0.35	-0.24	-0.42	-0.31	-0.22	-0.36	-0.27	-0.2
500	20	-0.55	-0.41	-0.28	-0.53	-0.4	-0.26	-0.44	-0.33	-0.22	-0.4	-0.3	-0.2	-0.35	-0.26	-0.18	-0.31	-0.23	-0.15
600	24	-0.4	-0.3	-0.19	-0.38	-0.29	-0.18	-0.32	-0.24	-0.15	-0.29	-0.22	-0.14	-0.26	-0.19	-0.12	-0.22	-0.17	-0.11
700	28	-0.29	-0.2	-0.11	-0.28	-0.19	-0.11	-0.23	-0.16	-0.09	-0.21	-0.14	-0.08	-0.18	-0.13	-0.07	-0.16	-0.11	-0.06
800	32	-0.2	-0.13	-0.06	-0.18	-0.12	-0.06	-0.15	-0.1	-0.05	-0.14	-0.09	-0.05	-0.12	-0.08	-0.04	-0.11	-0.07	-0.04
900	36	-0.13	-0.08	-0.05	-0.12	-0.07	-0.05	-0.1	-0.06	-0.04	-0.09	-0.05	-0.04	-0.08	-0.05	-0.03	-0.07	-0.04	-0.03
1000	40	-0.08	-0.05	-0.04	-0.07	-0.05	-0.04	-0.06	-0.04	-0.03	-0.05	-0.04	-0.03	-0.05	-0.03	-0.03	-0.04	-0.03	-0.03
1200	48	-0.05	-0.04	-0.03	-0.05	-0.04	-0.03	-0.04	-0.03	-0.03	-0.04	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03
1400	56	-0.04	-0.03	-0.03	-0.04	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03

Subject to technical changes

The FLUROFLEX® 0 is fully vacuum resistant up to 200°C

Materials / Options

Bellows: Virginal paste extruded POLYFLURON® - PTFE * (white or antistatic black)

Standard:

Flanges:

CS Steel

Outer reinforcement rings:

1.4571

Limit bolts:

Steel electrogalvanized

Surface protection of the flanges:

FLUROFLEX F0: 2-component epoxy paint, RAL 5003

FLUROFLEX F1-F6:

- DN 25-150 (DN 1"-6"): electrogalvanized
- \geq DN 200 (DN8"): 2-component epoxy paint, RAL 5003

Options:

Flanges:

Stainless steel, etc.

Outer reinforcement rings:

Hastelloy, etc.

Limiting screws:

Stainless steel, etc.

Inner support rings:

- Stainless steel / PTFE* coated
- Hastelloy / PTFE* coated

Special designs:

- Lateral compensator
- Angular compensator
- Cardan compensator
- one-sided without protrusion of the limiting screws

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Certified Service Partner
DIABON® | POLYFLURON®



In addition to our global presence via service centers, we offer our lifecycle service through certified service partners. The objective is to ensure maximum availability and minimum response time for our global customers. All external service partners are continuously trained and equipped to provide common maintenance activities in the same quality as our service centers. In any case, our partners are always available to take care of your requirements and needs on site.



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This information corresponds to the current state of our product knowledge and is intended to provide general information about our products and their possible applications. In view of the diversity of possible applications, the data is to be understood only as general information which does not guarantee any particular properties of the products for each specific application. In the event of an order, the properties required for the specific application must therefore be specifically requested from us. Our technical service will then promptly provide a property profile for the specific application upon request.