

Dr. Schnabel  **FLUROFLEX®-N**

POLYFLURON® PTFE Bellows DIN/ASME

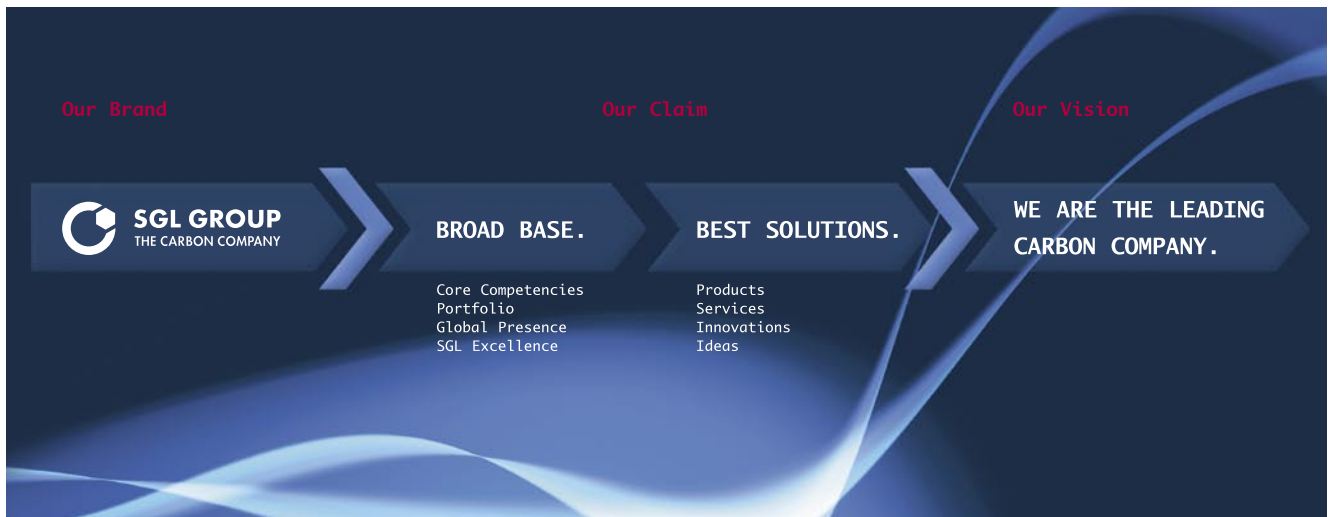
Process Technology



Broad Base. Best Solutions.



SGL Group – The Carbon Company



SGL Group – The Carbon Company – is one of the world’s leading manufacturers of carbon-based products. We have a comprehensive portfolio ranges from carbon and graphite products to carbon fibers and composites.

Our core competencies include a wide knowledge of raw materials, specialized production expertise and in-depth application and engineering know-how. As a result, we have built up a comprehensive technology and product portfolio. We operate on a global scale and are close to our customers anywhere at any time. Supported by this broad base, we offer our customers the best solutions.

That is what SGL Excellence stands for.

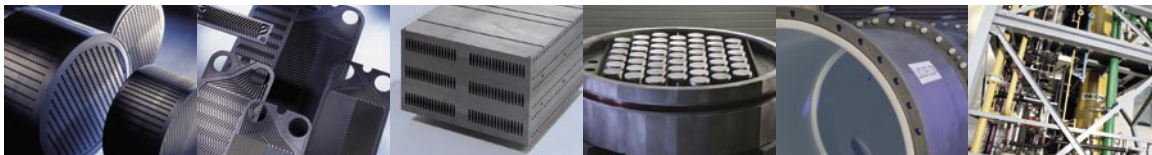
Process Technology

Perfection in Graphite and PTFE

Our Business Line Process Technology is focused on supporting the technical processes of our globally operating customers in the chemical industry, metal manufacturing and environmental protection technology. A maximum degree of know-how and expertise in corrosion protection, a global presence and full-package systems from a single source: that's what our customers need – and get from us:

- ▶ Long-standing experience and a high level of expertise in process technology
- ▶ Comprehensive process, material and design know-how on graphite, PTFE and silicon carbide (SiC)
- ▶ Closeness to customers: cost-effective manufacturing to international and local standards at our production sites in Europe, America and Asia, and worldwide customer service
- ▶ A consistently high standard of quality

Our comprehensive range of products and services extends from process equipment and components made from DIABON® graphite and POLYFLURON® virginal, paste-extruded PTFE through LICUFLON® skived PTFE sheet-lined steel equipment FLUROFLEX® bellows, FLUROPIPE® pipe systems, FLUROSIC® silicon carbide heat exchangers and DIABON® graphite or exotic metal pumps, to the planning and assembly of complex systems.



Contents

Engineering and Manufacturing Expertise	4	FLUROFLEX®– 16, Bellows for High Pressure	15
Family of the FLUROFLEX® PTFE Bellows	6	FLUROFLEX®– 10 and 25, Bellows for High Pressure	16
Temperature / Pressure Rating	8	Accessories for the FLUROFLEX®-Bellows	17-18
FLUROFLEX®-N 1 to FLUROFLEX®-N 2	10	Flange Dimensions, Effective Area and Spring Rates	19-20
FLUROFLEX®-N 3 to FLUROFLEX®-N 4	11	Temperature-Vacuum-Rating	21
FLUROFLEX®-N 5 to FLUROFLEX®-N 6	12	Materials of construction / How to Order	22
Types of FLUROFLEX® Special Bellows	13	Quality Management	23
FLUROFLEX®– 0, Bellows for Full Vacuum	14		

Engineering and Manufacturing Expertise



FLUROFLEX®-N Bellows up to DN 150/6" come with chromated flanges

R&D, Engineering & Manufacturing Performance

Dr. Schnabel FLUROFLEX® bellows are manufactured from virgin paste-extruded POLYFLURON® PTFE. They are designed for maximum flex-life in a wide range of high temperature/high purity Chemical Process Industries (CPI) applications. General FLUROFLEX® bellows or flexible connectors or expansion joints, are used in piping systems to absorb vibration caused by rotating equipment, to absorb thermal expansion and contraction of piping systems and protect stress-sensitive process equipment (glass, glass-lined steel, FRP, graphite, dual laminate, etc.). PTFE is ideal for use as a bellow material because of its near universal corrosion resistance, low spring rate and near unlimited flexlife. Providing this system flexibility, any bellow is virtually designed to be the most sensitive link in a piping system. Dr. Schnabel has conducted longterm POLYFLURON® PTFE studies to ensure comprehensive understanding of all aspects of the bellow design, manufacture and quality control to maximize performance and safety. We can supply our POLYFLURON® PTFE with static dissipating (antistatic) properties suitable for use with solvents and other liquids where static build up is an issue.

The steps in engineering & manufacturing optimization process were:

1. Optimize bellow geometry and wall thickness to achieve maximum burst pressure and minimize spring rate.
2. Manufacture the bellow according to the principles found in the theoretical calculations, without reducing the bellow performance due to manufacturing limitations.
3. Use best available PTFE liner (POLYFLURON® PTFE) to form the bellow.
4. Define operating parameters such as operating pressures that are important to the customer and take into account, that the lifetime of the bellow is influenced by PTFE creep.
5. Comply with the European Pressure Equipment Directive.

Engineering and Manufacturing Expertise

Optimize Bellow Geometry and Wall Thickness

For the optimization of the bellow design it is important to find a careful balance of wall thickness and bellow geometry. A thin wall thickness will lead to a low burst pressure but also good flexibility. A high bellow wall thickness without a change in bellow geometry and a limitation on bellow movement will lead to premature failure due to PTFE crimping (over compression in convolution radius).

Dr. Schnabel conducted a Finite Element Analysis (FEA) to optimize the bellow geometry and wall thickness. This Analysis showed clearly, that the maximum stress on the POLYFLURON® PTFE is in the inside of the convolution (green/yellow zone in Figure 2). Dr. Schnabel FLUROFLEX® bellows are designed to minimize the stress peak in this most sensitive area during operation.

Manufacturing of Bellows

Dr. Schnabel FLUROFLEX® bellows are made of virgin paste-extruded POLYFLURON® PTFE and are formed without machining. Dr. Schnabel FLUROFLEX® bellows are formed in such a way, that a uniform wall is assured.

Best Liner

Through more than 50 years of experience, Dr. Schnabel has continuously optimized the POLYFLURON® PTFE processing techniques to manufacture bellows. After sintering, Dr. Schnabel's virgin paste-extruded POLYFLURON® PTFE has uniform strength in both axial and lateral directions. The porosity, crystallinity, density, and tensile strength are constantly measured and controlled to guarantee the best performance. In addition, tests have shown that virgin paste-extruded POLYFLURON® PTFE is far superior to isostatically molded PTFE in terms of permeability reduction. See for example NACE-Paper 400.



Fig 1 Dr. Schnabel FLUROFLEX® bellow with the assured uniform wall thickness.

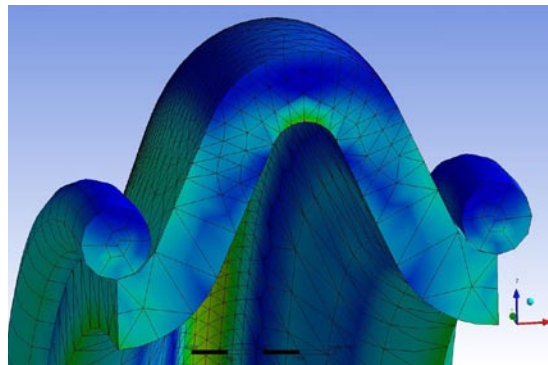
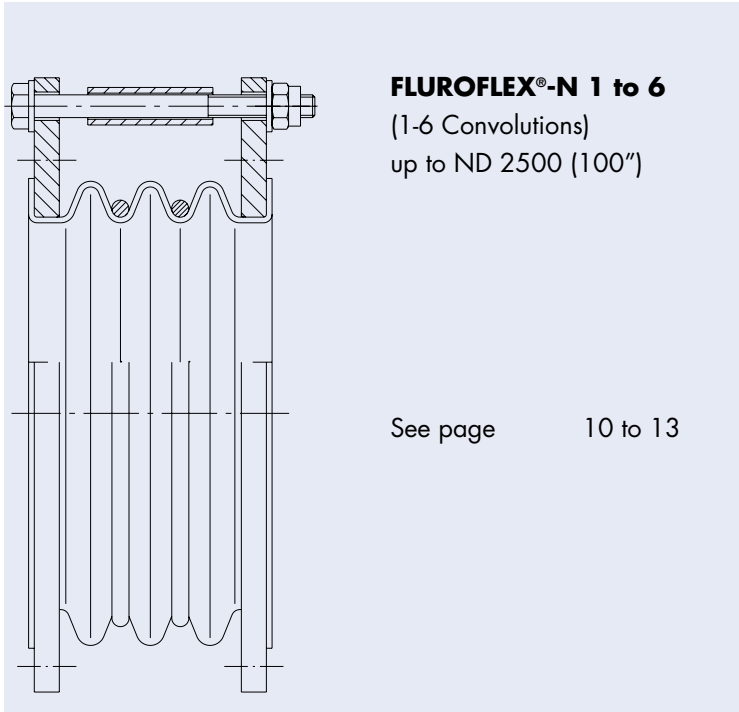


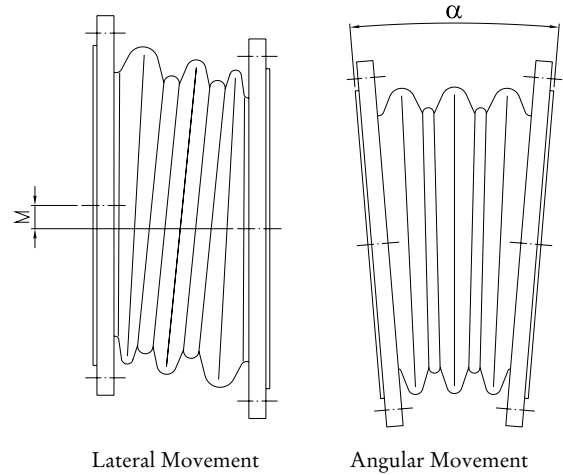
Fig 2 Finite element of a theoretical bellow. The maximum stress is found on the inside of the outside convolution (green/yellow zone). The minimum stress is found on the outside of the convolution (blue zone).

Family of the FLUROFLEX® PTFE Bellows



FLUROFLEX®-N 1 to 6
(1-6 Convolutions)
up to ND 2500 (100")

See page 10 to 13



Features and Options:

These bellows feature Dr. Schnabel's compression stops that prevent damage to the POLYFLURON® PTFE convolutions from over compression of the bellows in case pipe supports are not sufficient. Dr. Schnabel bellows are vacuum resistant, for details see page 21.

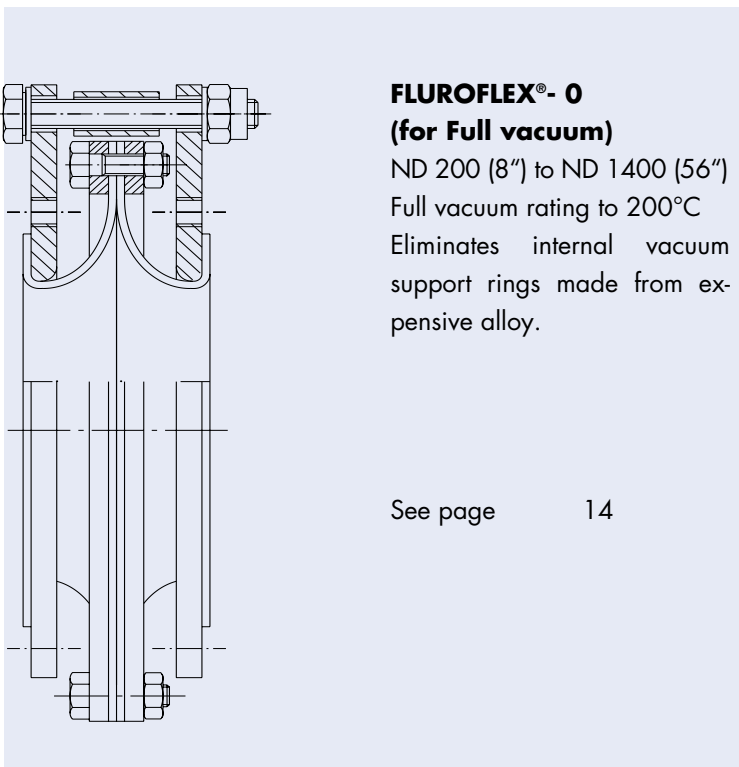
Non-standard flanges and clearance holes are available. Stainless steel flange material, J-Bolt flanges according to various standards are possible to customer specification. Reducing flange arrangements can also be supplied.

Axial/Lateral/Angular

Movement Restriction

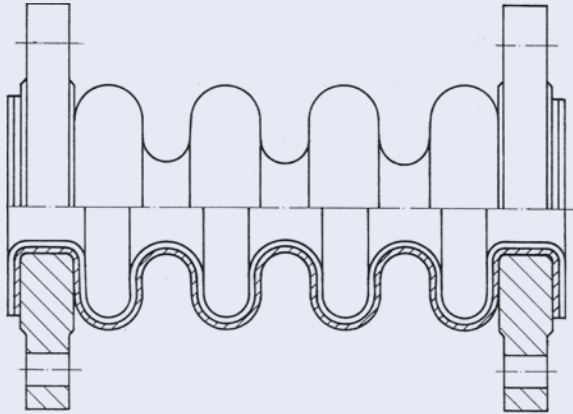
Dr. Schnabel FLUROFLEX® bellows can be supplied with tie rods engineered to restrict movements to customer requirements.

Dr. Schnabel can also provide plain lateral or plain angular (hinged) bellows.



FLUROFLEX®- 0
(for Full vacuum)
ND 200 (8") to ND 1400 (56")
Full vacuum rating to 200°C
Eliminates internal vacuum support rings made from expensive alloy.

See page 14

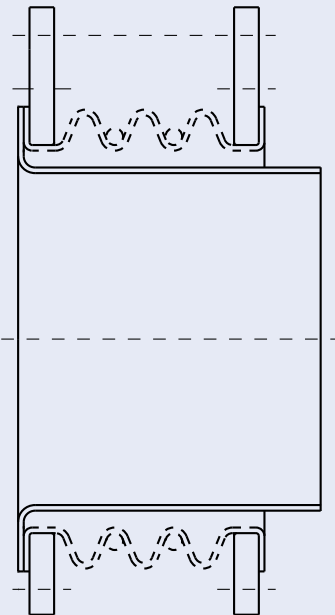


**FLUROFLEX®- 16
(for PN16)**

also available for PN25 or N10

ND 40 (1,5") to ND 600 (24")
Combines corrosion resistance of POLYFLURON® PTFE and high pressure rating of a stainless steel bellows. Multiple metal construction (HASTELLOY®, Titanium, etc. are also available) to minimize spring rate.

See page 15, 16



FXS Smoothbore Sleeve

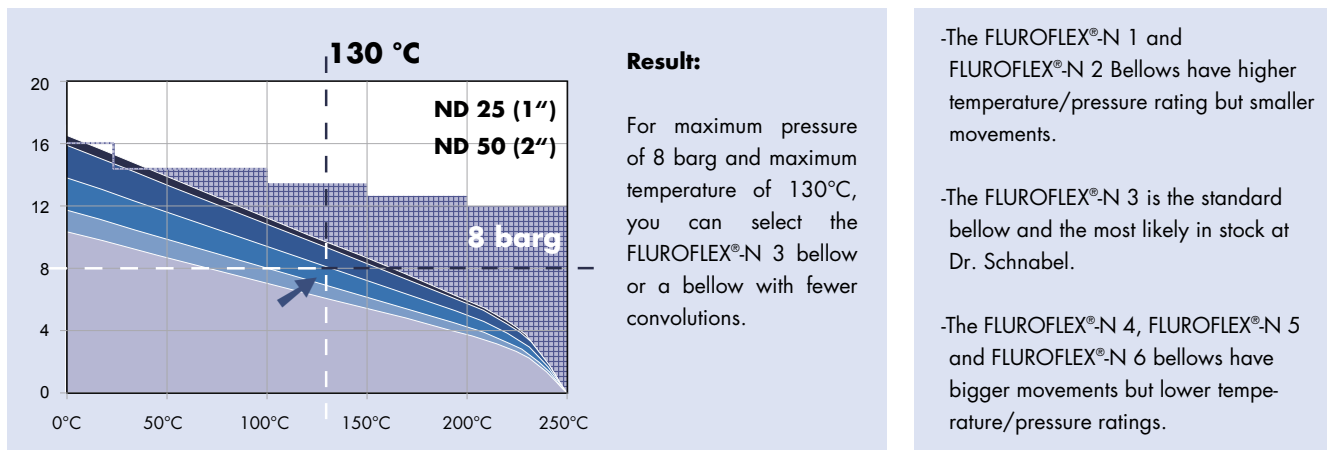
Prevents damage to POLYFLURON® PTFE convolutions in abrasive service and prevents build-up of solids in the convolution. POLYFLURON® PTFE is standard, but alloys are also available to customer-specified requirements.

See page 17,18

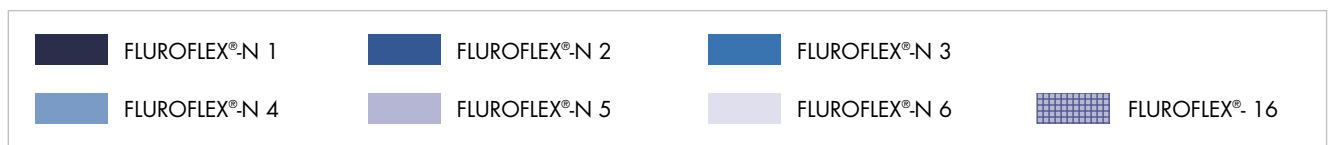
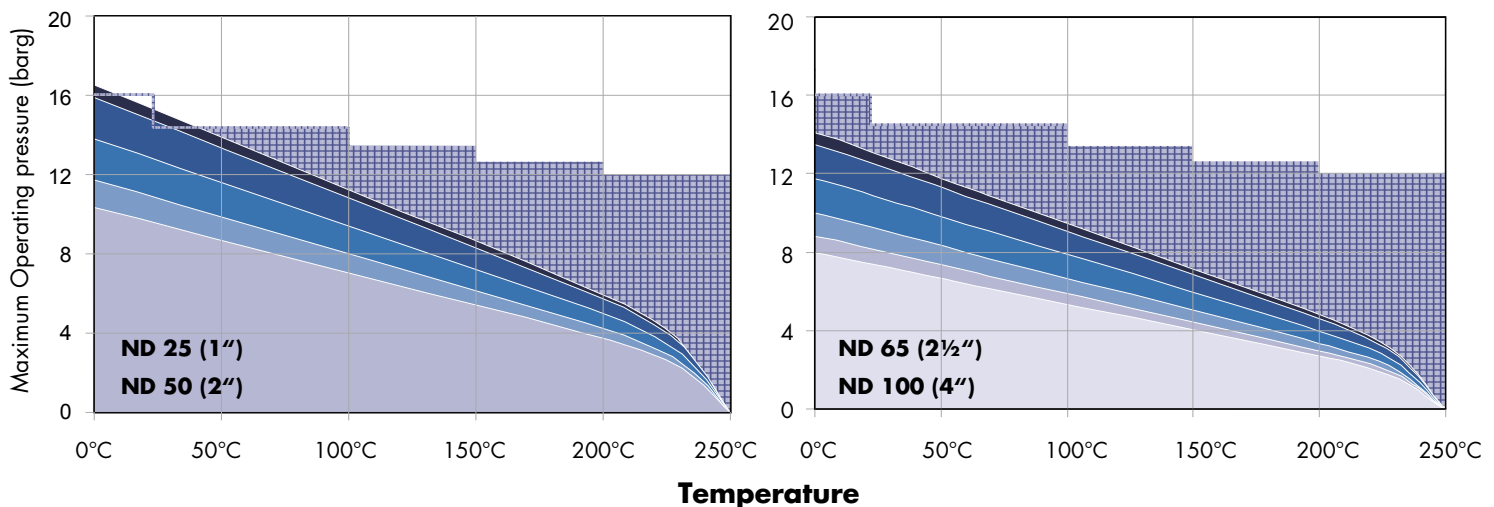
How to use the Temperature-Pressure diagram

Start by selecting the diagram with the nominal size of the bellow required. Continue by selecting the maximum operating pressure on the vertical axis and then the maximum operating temperature on the horizontal axis. The cut area where the two lines meet determines the appropriate type of bellow for your application. Although, bellows above this cut area (with fewer convolutions) can be likewise selected, bellows below this cut area are not recommended, due to their lesser temperature/pressure resistance. **Rule of thumb:** Bellows with fewer convolutions offer higher temperature/pressure ratings, but smaller movements compared to the bellows with more convolutions. The more convolutions the bigger the movements but the lower the temperature/pressure ratings. These temperature pressure diagrams are based on extensive research at a German University, TUEV and Dr. Schnabel. They contain safety margins starting with a minimum of 300% for new bellows at 20°C. In accordance with test regulations, we tested FLUROFLEX®-N bellows for long term operation at 150°C following DIN EN ISO 9080 and DVS 2205-1 sheet 21 with a safety factor of 2. For applications with high operating pressures and high temperatures, we recommend our POLYFLURON® PTFE lined bellows with metal body (FLUROFLEX® -16 / 10/ 25).

Example:

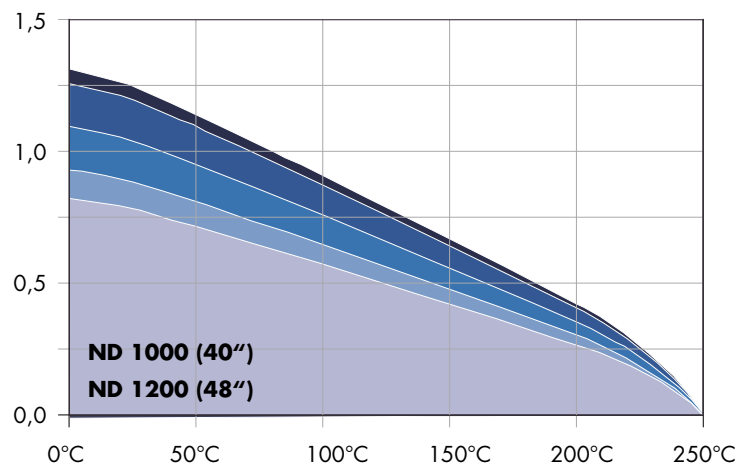
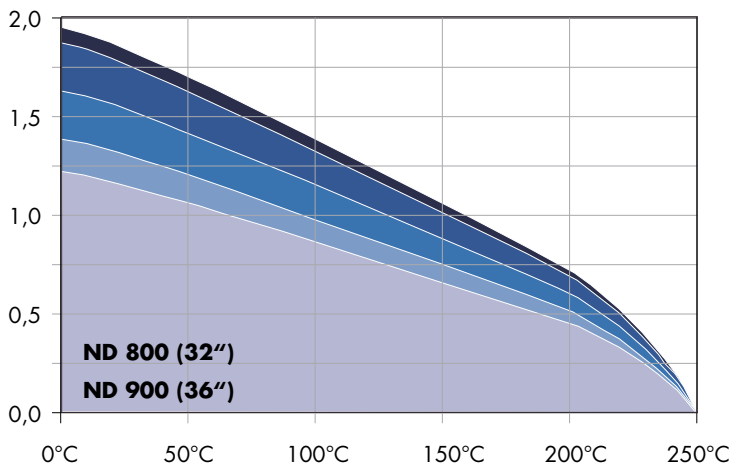
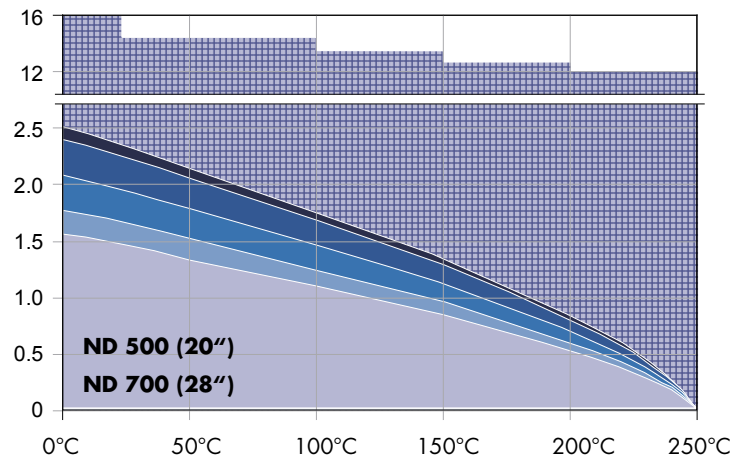
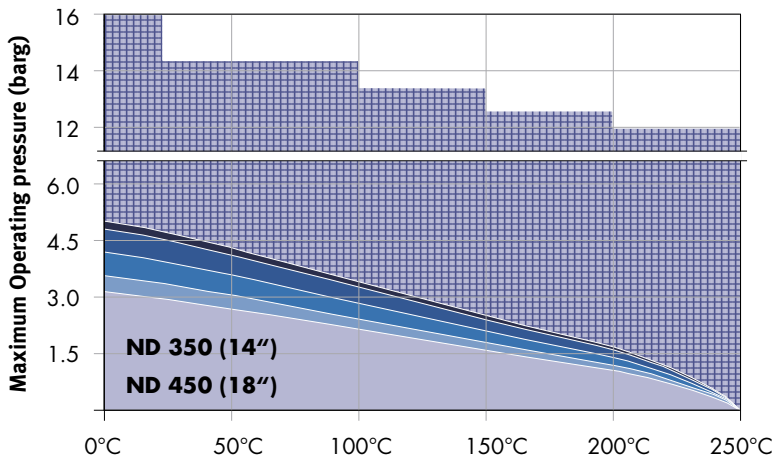
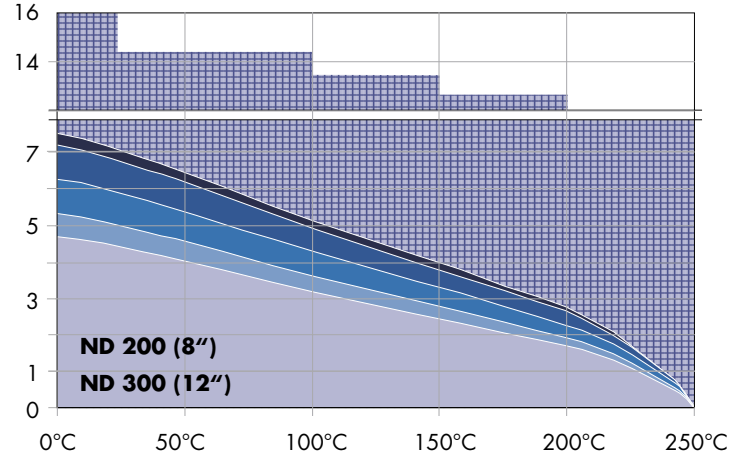
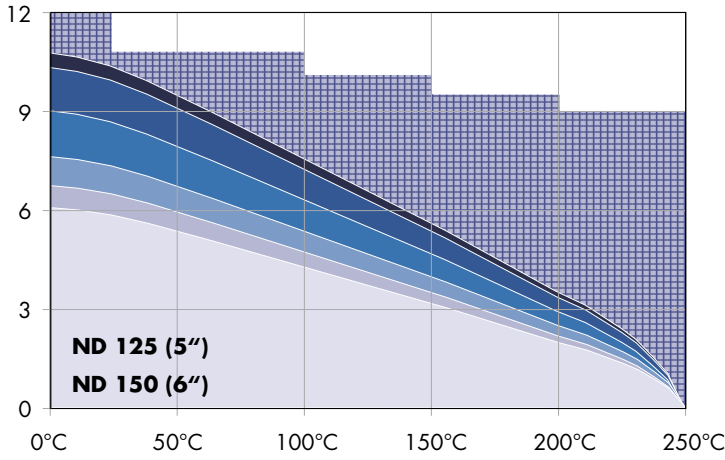


Maximum operating pressure versus temperature

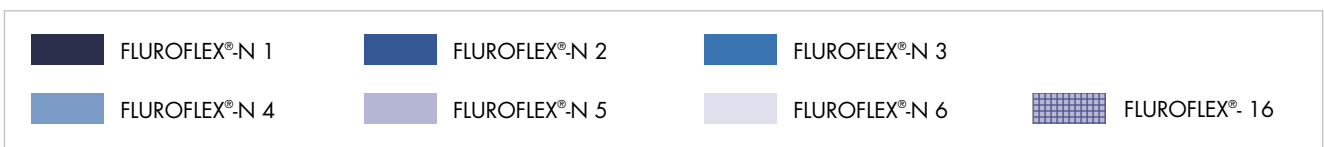


Maximum operating pressure versus temperature

Please contact us if the specified operating pressure is not sufficient for your application.



Temperature



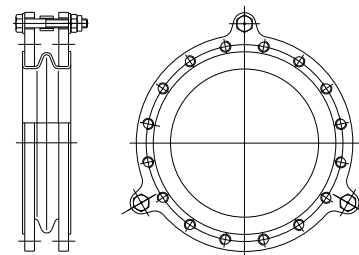
FLUROFLEX®-N1 to FLUROFLEX®-N2

All FLUROFLEX® bellows are supplied with carbon steel flanges as standard:

Special flange designs are available on request. (i.e. flanges for glass connections).

- 1) Flange drilling according to DIN 2501 PN 10 (the diameters ND 1300 and ND 1500 are not considered in the DIN standards)
- 2) Flange drilling according to ASME B 16.5 150 lb, from ND 28" to ND 60" according to MSS SP-44 150 lb.

The max. movements (axial, lateral, angular) indicated in the table, are values for non combined movements. For values at combined movements please contact us.



Flanges are threaded, except for the FLUROFLEX®-N2 from ND 80 up to ND 400.

ND		FLUROFLEX®-N1							FLUROFLEX®-N2							Weight	
		Operating Pressure		Length			Movement 4)		Operating Pressure		Length			Movement 4)			
DIN 1)	ASME 2)	Pmax @20°C	Pmax. @200°C	neutral 3)	min.	max.	lateral	angu-lar	Pmax @20°C	Pmax @200°C	neutral 3)	min.	max.	lateral	angu-lar	DIN	ASME
		barg	barg	mm	mm	mm	mm	degrees	barg	barg	mm	mm	mm	mm	degrees	kg	kg
25	1	15.6	6.1	40	34	43	2	2	15	5.7	54	48	60	3	4	1.9	1.7
32	1.25	15.6	6.1	40	34	43	2	2	15	5.7	56	50	62	3	4	2.5	2.0
40	1 1/2	15.6	6.1	40	34	43	2	2	15	5.7	56	50	62	3	4	3.0	2.3
50	2	15.6	6.1	48	41	53	2	2	15	5.7	68	58	78	5	5	4.3	3.8
65	2 1/2	13.2	4.8	54	45	60	3	3	12.6	4.6	78	66	90	5	5	5.1	4.8
80	3	13.2	4.8	60	50	67	3	3	12.6	4.6	88	73	103	5	6	5.7	5.5
100	4	13.2	4.8	64	54	71	3	4	12.6	4.6	88	73	103	8	6	7.4	6.8
125	5	10.4	3.6	70	58	78	4	4	9.9	3.4	95	80	110	8	5	9.0	9.0
150	6	10.4	3.6	75	63	84	4	4	9.9	3.4	105	90	120	8	5	13	12
200	8	7.0	2.7	85	71	95	4	3	7.0	2.7	110	95	125	10	5	17	17
250	10	7.0	2.7	93	79	103	5	3	7.0	2.7	128	108	148	10	4	24	25
300	12	7.0	2.7	100	84	110	5	3	7.0	2.7	140	120	160	10	4	37	46
350	14	4.7	1.7	103	87	113	5	2	4.7	1.7	145	125	165	10	4	44	51
400	16	4.7	1.7	103	87	113	5	2	4.7	1.7	145	125	165	12	3	54	63
450	18	4.7	1.7	103	87	113	5	2	4.7	1.7	145	115	165	12	3	59	65
500	20	2.3	0.9	103	87	113	5	2	2.3	0.9	145	115	165	12	3	67	76
600	24	2.3	0.9	103	87	113	5	2	2.3	0.9	145	115	165	12	2	97	113
700	28	2.3	0.9	103	87	113	5	1.5	2.3	0.9	145	115	165	12	2	122	138
800	32	1.8	0.5	103	87	113	5	1.5	1.8	0.5	155	125	175	12	2	131	156
900	36	1.8	0.5	103	87	113	5	1.5	1.8	0.5	155	125	175	12	2	166	198
1000	40	1.2	0.4	113	97	123	5	1.5	1.2	0.4	155	135	175	12	1.5	193	234
1200	48	1.2	0.4	113	97	123	5	1.5	1.2	0.4	155	135	175	12	1.5	248	295
1300	52	1.2	0.4	113	97	123	5	1	1.2	0.4	155	135	175	12	1	297	297
1400	56	1.2	0.4	113	97	123	5	1	1.2	0.4	155	135	175	12	1	347	329
1500	60	1.2	0.4	113	97	123	5	1	1.2	0.4	155	135	175	12	1	360	360

Operating temperature range: -10°C up to +250°C.

3) neutral length can be adjusted within min & max. length 4) at mentioned neutral length
 Technical specifications are subject to change without notice.

FLUROFLEX®-N3 to FLUROFLEX®-N4

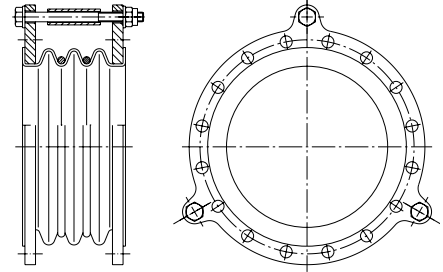
All FLUROFLEX® bellows are supplied with carbon steel flanges as standard:

- 1) Flange drilling according to DIN 2501 PN 10 (the diameters ND 1300 and ND 1500 are not considered in the DIN standards)
- 2) Flange drilling according to ASME B 16.5 150 lb, from ND 28" to ND 60" according to MSS SP-44 150 lb.

Flanges on FLUROFLEX®-N3 and FLUROFLEX®-N4 up to ND 65 (2 1/2") threaded, from ND 80 (3")

onwards are with clearance holes. Special flange designs are available on request. (i.e. flanges for glass connections).

The max. movements (axial, lateral, angular) indicated in the table, are values for non combined movements. For values at combined movements please contact us.



ND		FLUROFLEX®-N3								FLUROFLEX®-N4						Weight		
		Operating Pressure		Length			Movement 4)			Operating Pressure		Length			Movement 4)			
		Pmax @20°C	Pmax. @200°C	neutral 3)	min.	max.	lateral	angu-lar	Pmax @20°C	Pmax @200°C	neutral 3)	min.	max.	lateral	angu-lar			DIN
DIN 1)	ASME 2)	barg	barg	mm	mm	mm	mm	degrees	barg	barg	mm	mm	mm	mm	degrees	kg	kg	
25	1	13	5	70	60	80	5	6	11	4.2	85	72	98	6	8	2.1	1.9	
32	1.25	13	5	75	65	85	5	6	11	4.2	90	77	103	6	8	2.8	2.2	
40	1 1/2	13	5	80	65	95	5	6	11	4.2	98	80	116	6	8	3.3	2.5	
50	2	13	5	85	70	100	8	8	11	4.2	105	85	125	10	9	4.8	4.2	
65	2 1/2	11.2	4	100	80	120	8	8	9.2	3.5	122	97	147	10	10	5.7	5.3	
80	3	11.2	4	110	90	130	8	10	9.2	3.5	135	109	161	12	11	6.3	6.1	
100	4	11.2	4	110	85	135	12	10	9.2	3.5	137	104	170	15	13	8.2	7.6	
125	5	8.8	3	120	95	145	12	10	7.2	2.5	145	112	178	15	13	10	10	
150	6	8.8	3	130	105	155	12	8	7.2	2.5	155	122	188	15	12	14	13	
200	8	6.0	2.3	140	105	170	14	8	5.2	2.0	175	130	210	18	10	19	19	
250	10	6.0	2.3	165	125	195	14	6	5.2	2.0	195	150	235	18	10	27	28	
300	12	6.0	2.3	175	131	205	14	6	5.2	2.0	215	165	255	18	9	41	51	
350	14	4.0	1.4	190	146	225	18	6	3.5	1.3	235	175	277	22	8	49	57	
400	16	4.0	1.4	190	146	225	18	6	3.5	1.3	235	175	277	22	8	60	70	
450	18	4.0	1.4	190	146	225	18	5	3.5	1.3	235	175	277	22	7	65	72	
500	20	2.0	0.7	190	146	225	20	5	1.7	0.7	235	175	277	22	6	74	84	
600	24	2.0	0.7	190	146	225	20	4	1.7	0.7	235	175	277	22	6	108	125	
700	28	2.0	0.7	190	146	225	20	4	1.7	0.7	235	175	277	22	5	136	153	
800	32	1.5	0.6	190	155	225	20	3	1.2	0.4	235	191	277	22	4	146	173	
900	36	1.5	0.6	190	155	225	20	3	1.2	0.4	235	191	277	22	4	184	220	
1000	40	1.0	0.4	190	165	225	20	3	0.8	0.3	235	201	277	22	3	214	260	
1200	48	1.0	0.4	190	165	225	20	3	0.8	0.3	235	201	277	22	3	275	328	
1300	52	1.0	0.4	190	165	225	20	2	0.8	0.3	235	201	277	22	2	330	330	
1400	56	1.0	0.4	190	165	225	20	2	0.8	0.3	235	201	277	22	2	385	365	
1500	60	1.0	0.4	190	165	225	20	2	0.8	0.3	235	201	277	22	2	400	400	

Operating temperature range: -10°C up to +250°C.

3) neutral length can be adjusted within min & max. length 4) at mentioned neutral length
 Technical specifications are subject to change without notice.

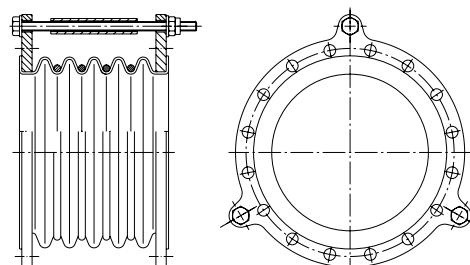
FLUROFLEX®-N5 to FLUROFLEX®-N6

All FLUROFLEX® bellows are supplied with carbon steel flanges as standard:

Special flange designs are available on request (in example flanges for glass-connections).

- 1) Flange drilling according to DIN 2501 PN 10 (the diameters ND 1300 and ND 1500 are not considered in the DIN standards)
 - 2) Flange drilling according to ASME B 16.5 150 lb, from ND 28" to ND 60" according to MSS SP-44 150 lb.
- Flanges up to ND 65 (2 1/2") threaded, from ND 80 (3") with clearance holes.

The max. movements (axial, lateral, angular) indicated in the table, are values for non combined movements. For values at combined movements please contact us.



ND		FLUROFLEX®-N5								FLUROFLEX®-N6								Weight	
		Operating Pressure		Length			Movement 4)			Operating Pressure		Length			Movement 4)				
DIN 1)	ASME 2)	Pmax @20°C	Pmax. @200°C	neutral 3)	min.	max.	lateral	angular	Pmax @20°C	Pmax @200°C	neutral 3)	min.	max.	lateral	angular	DIN	ASME		
		barg	barg	mm	mm	mm	mm	degrees	barg	barg	mm	mm	mm	mm	degrees	kg	kg		
25	1	9.6	3.8	100	85	115	8	10	8.8	3.3	115	95	135	10	13	2.5	2.3		
32	1.25	9.6	3.8	105	90	120	8	10	8.8	3.3	125	105	145	10	13	3	2.4		
40	1 1/2	9.6	3.8	115	95	135	8	12	8.8	3.3	132	102	162	10	15	4	3		
50	2	9.6	3.8	125	100	150	12	12	8.8	3.3	145	115	175	14	16	5.2	4.5		
65	2 1/2	8.2	3.1	145	115	175	12	14	7.6	2.8	168	128	208	14	16	6.8	6.4		
80	3	8.2	3.1	160	125	195	15	16	7.6	2.8	185	145	225	18	20	6.8	6.6		
100	4	8.2	3.1	165	125	205	18	16	7.6	2.8	192	142	242	22	20	9.8	9.1		
125	5	6.5	2.3	170	130	210	18	14	5.9	2	200	150	250	22	18	11	11		
150	6	6.5	2.3	180	140	220	18	13	5.9	2	210	160	260	22	16	17	16		
200	8	4.5	1.7	210	148	250	22	13	5)	5)	5)	5)	5)	5)	5)	21	21		
250	10	4.5	1.7	240	178	290	22	12	5)	5)	5)	5)	5)	5)	5)	32	34		
300	12	4.5	1.7	250	188	300	22	10	5)	5)	5)	5)	5)	5)	5)	44	55		
350	14	3.0	1.1	265	203	315	25	10	5)	5)	5)	5)	5)	5)	5)	59	68		
400	16	3.0	1.1	265	203	315	25	8	5)	5)	5)	5)	5)	5)	5)	65	76		
450	18	3.0	1.1	280	205	330	25	8	5)	5)	5)	5)	5)	5)	5)	78	86		
500	20	1.5	0.6	280	205	330	25	7	5)	5)	5)	5)	5)	5)	5)	80	91		
600	24	1.5	0.6	280	205	330	25	6	5)	5)	5)	5)	5)	5)	5)	130	150		
700	28	1.5	0.6	280	205	330	25	5	5)	5)	5)	5)	5)	5)	5)	147	165		
800	32	1.2	0.4	280	225	330	25	5	5)	5)	5)	5)	5)	5)	5)	175	208		
900	36	1.2	0.4	280	225	330	25	4	5)	5)	5)	5)	5)	5)	5)	199	238		
1000	40	0.8	0.2	280	235	330	25	4	5)	5)	5)	5)	5)	5)	5)	257	312		
1200	48	0.8	0.2	280	235	330	25	3	5)	5)	5)	5)	5)	5)	5)	297	354		
1300	52	0.8	0.2	280	235	330	25	2	5)	5)	5)	5)	5)	5)	5)	396	396		
1400	56	0.8	0.2	280	235	330	25	2	5)	5)	5)	5)	5)	5)	5)	416	394		
1500	60	0.8	0.2	280	235	330	25	2	5)	5)	5)	5)	5)	5)	5)	480	480		

Operating temperature range: -10°C up to +250°C.

3) neutral length can be adjusted within min & max. length 4) at mentioned neutral length 5) please contact us
 Technical specifications are subject to change without notice.

Types of FLUROFLEX® Special Bellows

Hinged Typed (angular) FLUROFLEX® Bellows

Hinged bellows allow only angular movement of the bellows about the centre of the bellows. This type of bellow can serve as a directional anchor for the piping system. The hinges are designed to carry the full weight of flooded pipe mounted to the bellows.

When combined with a bellow having slotted hinges these bellows can be used to handle large lateral misalignments using only two bellows as shown on the right.



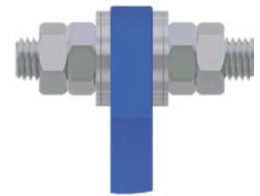
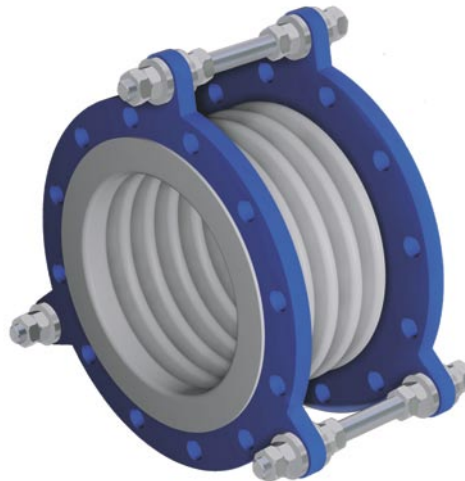
Hinged and slotted FLUROFLEX® bellows allow axial movement of the bellow in addition to angular movement.



Lateral FLUROFLEX® Bellows

The flanges of a FLUROFLEX® bellow can be tied using spherical washers and nuts that eliminate or reduce the axial travel of the bellow yet allow for full lateral offset of the bellow. This type of bellows replaces a direction anchor when properly located in the pipeline.

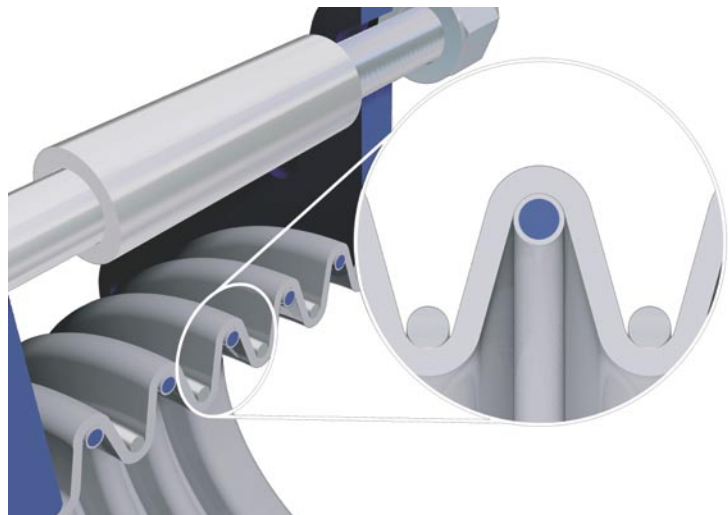
The spherical nuts and washers are supplied in carbon steel as standard.



FLUROFLEX®-N1 to N6 bellows with internal support rings for higher vacuum resistance

FLUROFLEX®-N1 to N6 bellows can be supplied with internal vacuum support rings made of virgin paste-extruded POLYFLURON® PTFE lined stainless steel rings. These rings increase the vacuum resistance of the bellows up to full vacuum depending on bellow size. The internal support rings are available also made of virgin paste-extruded POLYFLURON® PTFE lined HASTELLOY®, Tantalum etc.

A special design and manufacturing method of the ends of these rings provide long life-time for this component, as long as the bellows are used within our recommended limits.



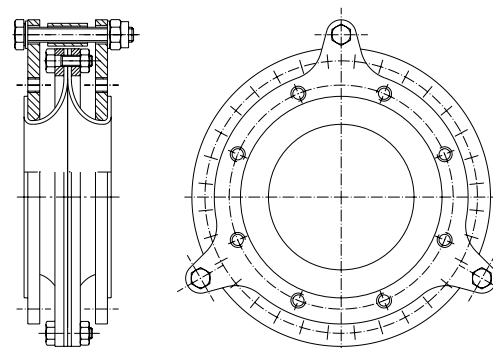
FLUROFLEX®- 0, Bellows for Full Vacuum

The FLUROFLEX®- 0 bellow for FULL VACUUM is available from ND 200 (8") to ND 1400 (56")

- 1) Flange drilling according to DIN 2501 PN 10
- 2) Flange drilling according to ASME B 16.5 150 lb, from ND 28" to ND 40" according to MSS SP-44 150 lb.

All flanges are with threaded holes. Special flange designs are available on request (in example flanges for glass-connections).

The max. movements (axial, lateral, angular) indicated in the table, are values for non combined movements. For values at combined movements please contact us.



ND		Operating Pressure			Length			Movement 1)		Weight	
		Vacuum 200°C	Pmax. @20°C	Pmax. @200°C	neutral	min.	max.	lateral	angular	DIN	ASME
DIN 1)	ASME 2)	barg	barg	barg	mm	mm	mm	mm	degrees	kg	kg
200	8	-1	3.0	3.0	150	135	165	5	4	29	29
250	10	-1	3.0	3.0	150	135	165	6	4	39	41
300	12	-1	3.0	3.0	150	130	170	7	4	53	64
350	14	-1	3.0	3.0	160	140	180	7	4	64	74
400	16	-1	3.0	2.0	160	140	180	8	3	76	88
450	18	-1	3.0	2.0	160	140	180	9	3	83	90
500	20	-1	3.0	2.0	160	140	180	9	3	96	108
600	24	-1	3.0	1.0	170	150	190	10	3	133	151
700	28	-1	1.0	0.5	170	145	195	10	2	165	184
800	32	-1	0.5	0.3	170	145	195	11	2	214	243
900	36	-1	0.1	0.1	170	145	195	12	2	238	276
1000	40	-1	0	0	170	145	195	12	2	277	324

Operating temperature range: -10°C up to +250°C.

1) at mentioned neutral length Technical specifications are subject to change without notice.

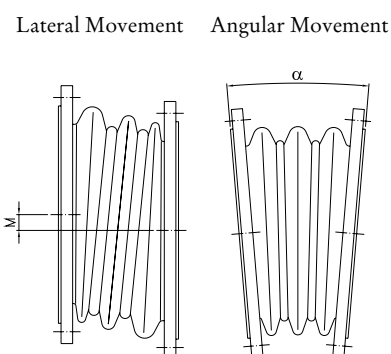
Features and Options:

These bellows feature Dr. Schnabel's compression stops that prevent damage to the POLYFLURON® PTFE convolutions from over compression of the bellows.

Stainless steel flange material, J-Bolt flanges according to various standards are possible to customer specification. Reducing flange arrangements can also be supplied.

Axial/Lateral/Angular Movement

Dr. Schnabel FLUROFLEX®-0 bellows are mainly designed for axial movements.



FLUROFLEX®- 16, PTFE lined Metal Bellows for High Pressure

The FLUROFLEX®- 16 is available from ND 40 (1 ½") to ND 600 (24").

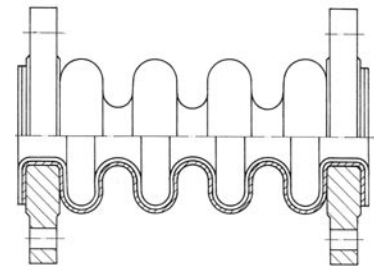
Combines corrosion resistance of POLYFLURON® PTFE and the high pressure rating of a metal bellows. Multiple metal layer design minimizes spring rates.

FLUROFLEX®-10/16/25 bellows are supplied standard with carbon steel flanges and stainless steel body.

1) Flange drilling according to DIN 2501 PN 10.

2) Flange drilling according to ASME B 16.5 150 lb.

Special flange designs are available on request.



ND		Operating Pressure		Length			Movement 3)		ca. Weight	
		Pmax. @20°C	Pmax. @200°C	neutral	min.	max.	lateral	angular	DIN	ASME
DIN 1)	ASME 2)	barg	barg	mm	mm	mm	mm	degrees	kg	kg
40	1 1/2	16	12.8	130	121	139	1	3	4	5
40	1 1/2	16	12.8	225	210	240	4	5	4.5	5
50	2	16	12.8	125	116	134	1	3	5	6
50	2	16	12.8	215	200	230	3	4	6	7
65	2 1/2	16	12.8	135	126	144	1	2	6	7
65	2 1/2	16	12.8	225	207	243	3	4	7	8
80	3	16	12.8	130	120	140	1	2	8	10
80	3	16	12.8	220	201	239	3	4	9	11
100	4	16	12.8	160	150	170	1	2	9	11
100	4	16	12.8	260	239	281	3	4	10	12
125	5	16	12.8	175	164	186	1	2	12	14
125	5	16	12.8	270	247	293	2	3	14	17
150	6	16	12.8	165	154	176	1	1	14	17
150	6	16	12.8	300	274	326	3	3	17	20
200	8	16	12.8	180	168	192	1	1	20	24
200	8	16	12.8	325	292	358	3	3	24	29
250	10	16	12.8	200	186	214	1	1	29	35
250	10	16	12.8	330	296	364	2	3	33	40
300	12	16	12.8	210	193	227	1	1	38	46
300	12	16	12.8	350	310	390	2	3	44	53
350	14	16	12.8	175	157	193	1	1	54	65
350	14	16	12.8	254	223	285	2	2	63	69
350	14	16	12.8	315	271	359	2	3	66	76
400	16	16	12.8	300	257	343	2	2	126	151
450	18	16	12.8	280	240	320	1	2	138	166
500	20	16	12.8	300	257	343	1	2	183	220
600	24	16	12.8	320	272	368	1	2	244	293

Operating temperature range: -10°C up to +250°C.

3) higher lateral and angular movements are possible, but then the max. operating pressure must be reduced, please contact us. Technical specifications are subject to change without notice.

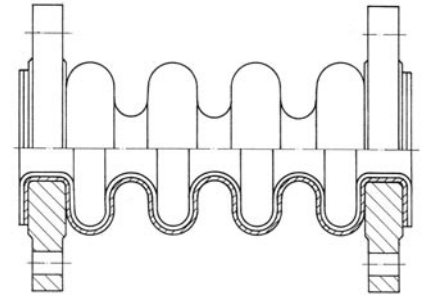
FLUROFLEX®- 10 and 25, PTFE lined Metal Bellows for High Pressure

The FLUROFLEX®- 25 or 10 is available from ND 40 (1 1/2") to ND 600 (24").

- 1) Flange drilling according to DIN 2501 PN 10.
- 2) Flange drilling according to ASME B 16.5 150 lb.

Combines corrosion resistance of POLYFLURON® PTFE and the high pressure rating of a metal bellows. Multiple metal layer design minimizes spring rates.

Special flange designs are available on request.



FLUROFLEX®- 10/16/25 bellows are supplied standard with carbon steel flanges and stainless steel body.

ND		FLUROFLEX®- 10								FLUROFLEX®- 25							
		Operating Pressure		Length			Movement 3)		Operating Pressure		Length			Movement 3)		Weight	
		Pmax. @20°C	Pmax. @200°C	neutral	min.	max.	lateral	angular	Pmax. @20°C	Pmax. @200°C	neutral	min.	max.	lateral	angular	DIN	ASME
DIN 1)	ASME 2)	barg	barg	mm	mm	mm	mm	degrees	barg	barg	mm	mm	mm	mm	degrees	kg	kg
40	1 1/2	10	8	145	135	155	1	4	25	20	145	137	153	1	3	1.7	2.1
40	1 1/2	10	8	250	232	268	4	6	25	20	260	246	274	3	5	1.8	2.3
50	2	10	8	140	130	150	1	3	25	20	150	142	158	1	2	2	3
50	2	10	8	220	203	237	3	5	25	20	240	225	255	3	5	2.2	2.8
65	2 1/2	10	8	150	138	162	1	3	25	20	145	136	154	1	2	3.3	4.1
65	2 1/2	10	8	220	201	239	3	5	25	20	230	214	246	2	4	3.7	4.6
80	3	10	8	130	120	140	1	2	25	20	160	149	171	1	2	5	6
80	3	10	8	220	200	240	2	4	25	20	225	209	241	2	3	9	11
100	4	10	8	140	128	152	1	2	25	20	155	145	165	1	2	12	15
100	4	10	8	260	237	283	2	4	25	20	220	203	237	2	3	13	16
125	5	10	8	170	159	181	1	2	25	20	220	208	232	1	2	16	20
125	5	10	8	240	219	261	1	3	25	20	300	280	320	2	3	18	22
150	6	10	8	160	150	170	1	1	25	20	205	194	216	1	1	14	17
150	6	10	8	260	236	284	1	3	25	20	295	275	315	1	2	17	20
200	8	10	8	175	163	187	1	1	25	20	230	217	243	1	1	20	24
200	8	10	8	265	239	291	1	2	25	20	325	300	350	2	2	24	29
250	10	10	8	185	172	198	1	1	25	20	220	208	232	1	1	29	35
250	10	10	8	285	253	317	1	2	25	20	330	303	357	1	2	33	40
300	12	10	8	195	178	212	1	1	25	20	235	220	250	1	1	38	46
300	12	10	8	265	233	297	1	2	25	20	345	312	378	1	2	44	53
350	14	10	8	160	142	178	1	1	25	20	195	179	211	1	1	54	65
350	14	10	8	275	236	314	2	2	25	20	315	280	350	1	2	65	69

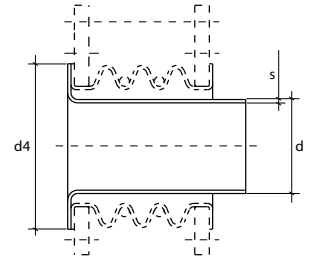
3) higher lateral and angular movements are possible, but then the max. operating pressure must be reduced, please contact us. Technical specifications are subject to change without notice.

Accessories for the FLUROFLEX®-Bellows

Smoothbore sleeves

Dr. Schnabel FXS smoothbore sleeves prevent damage to PTFE convolutions in abrasive service and prevent build-up of solids in the convolution. The smoothbore sleeves are recommended when

fluid velocity is high. POLYFLURON® PTFE sleeves are standard, but alloys are also available per customer specification.



Smoothbore sleeves for FLUROFLEX®-N1 to N6																	
ND		d 4		d	s	FLUROFLEX®-N1		FLUROFLEX®-N2		FLUROFLEX®-N3		FLUROFLEX®-N4		FLUROFLEX®-N5		FLUROFLEX®-N6	
		DIN	ASME			Length	Weight	Length	Weight	Length	Weight	Length	Weight	Length	Weight	Length	Weight
DIN	ASME	Ø mm	Ø mm	Ø mm	mm	mm	kg	mm	kg	mm	kg	mm	kg	mm	kg	mm	kg
25	1	68	51	21	3.5	53	0.03	70	0.04	90	0.05	107	0.06	125	0.06	145	0.07
32	1 1/4	78	64	28	3	53	0.05	72	0.06	95	0.07	114	0.08	130	0.09	155	0.11
40	1 1/2	88	73	35	3.5	53	0.07	72	0.08	105	0.11	125	0.12	145	0.14	167	0.16
50	2	102	92	45	3	63	0.09	88	0.11	110	0.13	135	0.15	160	0.17	185	0.20
65	2 1/2	122	105	56	3	70	0.13	100	0.16	130	0.20	157	0.23	185	0.27	213	0.30
80	3	138	127	67	3.5	77	0.18	113	0.23	140	0.28	172	0.32	205	0.38	245	0.44
100	4	158	157	87	3.5	81	0.29	113	0.36	145	0.43	179	0.51	215	0.59	252	0.67
125	5	188	186	109	4.5	88	0.43	120	0.53	155	0.65	187	0.75	220	0.86	260	1.0
150	6	212	216	137	4.5	94	0.56	130	0.71	165	0.85	197	0.98	230	1.1	270	1.3
200	8	268	270	166	5	115	0.92	145	1.1	190	1.32	230	1.5	270	1.8	-	-
250	10	320	324	212	5	123	1.3	168	1.6	215	1.96	255	2.2	310	2.6	-	-
300	12	370	381	266	5	130	1.7	180	2.1	225	2.55	275	3.0	320	3.4	-	-
350	14	430	413	315	5.5	133	2.3	185	2.9	245	3.63	297	4.2	335	4.7	-	-
400	16	482	470	347	5.5	133	2.6	185	3.3	245	4.05	297	4.7	335	5.2	-	-
450	18	532	533	401	5.5	133	2.9	185	3.6	245	4.47	297	5.2	350	6.0	-	-
500	20	585	584	450	5.5	133	3.5	185	4.4	245	5.40	297	6.3	350	7.2	-	-
600	24	685	692	550	5.5	143	4.5	195	5.5	255	6.79	307	7.9	360	9.0	-	-
700	28	800	800	650	5.5	143	5.5	195	6.7	255	8.22	307	9.5	360	10.8	-	-
800	32	905	914	750	5.5	143	6.4	205	8.2	255	9.57	307	11.0	360	12.5	-	-
900	36	1005	1022	850	5.5	143	7.3	205	9.2	255	10.85	307	12.5	360	14.2	-	-
1000	40	1110	1124	950	5.5	153	8.6	205	10.4	255	12.22	307	14.1	360	16.0	-	-
1200	48	1330	1359	1100	5.5	153	11.4	205	13.5	255	15.62	307	17.8	360	20.0	-	-
1300	52	1)	1461	1200	5.5	153	13.2	205	15.6	255	17.8	307	20.2	360	22.6	-	-
1400	56	1535	1575	1300	5.5	153	13.6	205	16.2	255	18.7	307	21.2	360	23.9	-	-
1500	60	1)	1676	1400	5.5	153	15.8	205	18.5	255	21.2	307	24.0	360	26.8	-	-

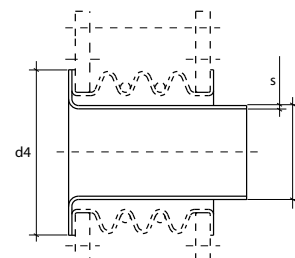
1) according to customer specification. Technical specifications are subject to change without notice.

Accessories for the FLUROFLEX®-0 Bellows

SMOOTHBORE SLEEVES

Dr. Schnabel FXS smoothbore sleeves prevent damage to PTFE convolutions in abrasive service and prevent build-up of solids in the convolution. The smoothbore sleeves are recommended when

fluid velocity is high. POLYFLURON® PTFE sleeves are standard, but alloys are also available per customer specification.



SMOOTHBORE SLEEVES for FLUROFLEX® - 0							
ND		d 4		d	s	FLUROFLEX® - 0	
DIN	ASME	DIN Ø mm	ASME Ø mm	Ø mm	mm	Length mm	Weight kg
200	8	268	270	166	5	185	1.3
250	10	320	324	212	5	185	1.7
300	12	370	381	266	5	190	2.2
350	14	430	413	315	5.5	200	3.1
400	16	482	470	347	5.5	200	3.5
450	18	532	533	401	5.5	200	3.8
500	20	585	584	450	5.5	200	4.6
600	24	685	692	550	5.5	220	6.1
700	28	800	800	650	5.5	225	7.5
800	32	905	914	750	5.5	225	8.7
900	36	1005	1022	850	5.5	225	9.9
1000	40	1110	1124	950	5.5	225	11.1

Technical specifications are subject to change without notice.



Safety Shields

It is highly recommended to use safety shields around flange connections and bellows if corrosive or other dangerous media is handled! Especially when the plant is used under the European Pressure Equipment Directive.

Please ask for our detailed RAMCO® Safety Shield catalogue.

Flange Dimensions, Effective Area and Spring Rates

ND		FLUROFLEX®- 0													
		Raised face Ø mm		Bolt circle Ø mm		Flange dimensions				Flange Thick- ness	Effective Area cm²		Spring rates +/-30% (at room temperature) ax. compr. ax. Expans.		
						Hole dimensions									
						DIN		ASME							
DIN	ASME	DIN	ASME	DIN	ASME	Series 1 (no. x ømm)	Series 2	Series 1 (no. x ømm)	Series 2	mm	DIN	ASME	N/mm	N/mm	
200	8	268	270	295	298	8 x 22	8 x M20	8 x 22	8 x 3/4"UNC	16	531	537	1212	800	
250	10	320	324	350	362	12 x 22	12 x M20	12 x 25	12 x 7/8"UNC	20	779	806	1455	960	
300	12	370	381	400	432	12 x 22	12 x M20	12 x 25	12 x 7/8"UNC	25	1026	1137	1667	1100	
350	14	430	413	460	478	16 x 22	16 x M20	12 x 29	12 x 1"UNC	25	1366	1459	1879	1240	
400	16	482	470	515	540	16 x 26	16 x M24	16 x 29	16 x 1"UNC	25	1735	1855	2045	1350	
450	18	532	533	565	578	20 x 26	20 x M24	16 x 32	16 x 1 1/8"8UN	25	2124	2206	2182	1440	
500	20	585	584	620	635	20 x 26	20 x M24	20 x 32	20 x 1 1/8"8UN	25	2552	2682	2424	1600	
600	24	685	692	725	749	20 x 30	20 x M27	20 x 35	20 x 1 1/4"8UN	30	3573	3754	2818	1860	
700	28	800	800	840	864	24 x 30	24 x M27	28 x 35	28 x 1 1/4"8UN	30	4808	5006	1)	1)	
800	32	905	914	950	978	24 x 33	24 x M30	28 x 41	28 x 1 1/2"8UN	30	6221	6538	1)	1)	
900	36	1005	1022	1050	1086	28 x 33	28 x M30	32 x 41	32 x 1 1/2"8UN	30	7698	8114	1)	1)	
1000	40	1110	1124	1160	1200	28 x 36	28 x M33	36 x 41	36 x 1 1/2"8UN	30	9458	9976	1)	1)	
1200	48	1330	1359	1380	1422	32 x 39	32 x M36	44 x 41	44 x 1 1/2"8UN	30	13478	14061	1)	1)	

1) please contact us. Technical specifications are subject to change without notice.

Temperature correction factors (TCF) for spring - rate conversion	
80°C	0.65
120°C	0.5
150°C	0.4

Example:
spring rate @ 120°C =
spring rate @ 20°C x 0,5



Flange Dimensions, Effective Area and Spring Rates

ND		FLUROFLEX®-N1 to N6										FLUROFLEX®-N3			
		Flange dimensions										Spring rates (@ 20°C) +/-30%			
		Raised face ø mm		Bolt circle ø mm		Hole dimensions				Flange Thickness	Effective Area	ax. Compr.	ax. Expans.	lateral	angular
		DIN	ASME	DIN	ASME	Series 1	Series 2	DIN	ASME						
25	1	68	51	85	79	4 x 14	4 x M12	4 x 16	4 x 1/2"UNC	10	10	109	109	72	1.4
32	1 1/4	78	64	100	89	4 x 18	4 x M16	4 x 16	4 x 1/2"UNC	10	14	115	115	105	2.0
40	1 1/2	88	73	110	98	4 x 18	4 x M16	4 x 16	4 x 1/2"UNC	10	21	122	122	138	2.7
50	2	102	92	125	121	4 x 18	4 x M16	4 x 19	4 x 5/8"UNC	12	30	185	185	160	3.1
65	2 1/2	122	105	145	140	4 x 18	4 x M16	4 x 19	4 x 5/8"UNC	12	49	153	153	193	3.7
80	3	138	127	160	152	8 x 18	8 x M16	4 x 19	4 x 5/8"UNC	12	70	153	153	227	4.4
100	4	158	157	180	191	8 x 18	8 x M16	8 x 19	8 x 5/8"UNC	15	106	193	193	256	5.0
125	5	188	186	210	216	8 x 18	8 x M16	8 x 22	8 x 3/4"UNC	15	160	300	300	396	7.7
150	6	212	216	240	241	8 x 22	8 x M20	8 x 22	8 x 3/4"UNC	18	225	367	367	536	10.4
200	8	268	270	295	298	8 x 22	8 x M20	8 x 22	8 x 3/4"UNC	20	353	130	86	400	10.6
250	10	320	324	350	362	12 x 22	12 x M20	12 x 25	12 x 7/8"UNC	22	531	170	112	500	15.0
300	12	370	381	400	432	12 x 22	12 x M20	12 x 25	12 x 7/8"UNC	25	723	209	138	600	22.0
350	14	430	413	460	476	16 x 22	16 x M20	12 x 29	12 x 1"UNC	30	1041	240	159	700	27.5
400	16	482	470	515	540	16 x 26	16 x M24	16 x 29	16 x 1"UNC	30	1346	273	180	800	33.1
450	18	532	533	565	578	20 x 26	20 x M24	16 x 32	16 x 1 1/8"8UN	30	1619	318	210	900	38.0
500	20	585	584	620	635	20 x 26	20 x M24	20 x 32	20 x 1 1/8"8UN	30	2075	349	230	1000	43.0
600	24	685	692	725	749	20 x 30	20 x M27	20 x 35	20 x 1 1/4"8UN	30	2961	424	280	1200	60.0
700	28	800	800	840	864	24 x 30	24 x M27	28 x 35	28 x 1 1/4"8UN	30	4004	500	330	1400	78.0
800	32	905	914	950	978	24 x 33	24 x M30	28 x 41	28 x 1 1/2"8UN	30	5204	1)	1)	1)	1)
900	36	1005	1022	1050	1086	28 x 33	28 x M30	32 x 41	32 x 1 1/2"8UN	30	6561	1)	1)	1)	1)
1000	40	1110	1124	1160	1200	28 x 36	28 x M33	36 x 41	36 x 1 1/2"8UN	35	8075	1)	1)	1)	1)
1200	48	1330	1359	1380	1422	32 x 39	32 x M36	44 x 41	44 x 1 1/2"8UN	35	11575	1)	1)	1)	1)
1300	52	2)	1461	2)	1537	2)	2)	44 x 48	44 x 1 3/4"8UN	35	13561	1)	1)	1)	1)
1400	56	1535	1575	1590	1651	36 x 42	36 x M39	48 x 48	48 x 1 3/4"8UN	35	15703	1)	1)	1)	1)
1500	60	2)	1676	2)	1759	2)	2)	52 x 48	52 x 1 3/4"8UN	35	18003	1)	1)	1)	1)

1) please contact us.

2) according to customer specification.

Technical specifications are subject to change without notice.

Convolution correction factors (CCF) for spring - rate conversion	
number of convolutions	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® 3x 0,6

Temperature correction factors (TCF) for spring - rate conversion	
Temperature	TCF
80°C	0.65
120°C	0.5
150°C	0.4

Example:
spring rate @ 120°C =
spring rate @ 20°C x 0,5

Temperature-Vacuum-Rating

The vacuum resistance can be increased up to full vacuum with internal support rings shown on page 13

ND		VACUUM RESISTANCE of 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	
		barg	barg	barg	barg	barg	barg	barg	barg	barg	barg	barg	barg	barg	barg	barg	barg	barg	barg	barg
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	-1.0
32	1 1/4	-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	-1.0	-1.0	-1.0	-1.0	-1.0
40	1 1/2	-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	-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	-1.0
65	2 1/2	-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	-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	-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	-1.0	-0.9	-1.0	-0.79
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	-0.79	-0.70
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	-0.70	-0.61	-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	-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	-0.70	-0.67	-0.52	-0.61	-0.59	-0.46	-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	-0.50	-0.68	-0.56	-0.44	-0.60	-0.49	-0.39	-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	-0.40	-0.57	-0.46	-0.35	-0.50	-0.40	-0.31	-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	-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	-0.20	-0.20
500	20	-0.55	-0.41	-0.28	-0.53	-0.40	-0.26	-0.44	-0.33	-0.22	-0.40	-0.30	-0.20	-0.35	-0.26	-0.18	-0.31	-0.23	-0.15	-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	-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	-0.06
800	32	-0.20	-0.13	-0.06	-0.18	-0.12	-0.06	-0.15	-0.10	-0.05	-0.14	-0.09	-0.05	-0.12	-0.08	-0.04	-0.11	-0.07	-0.04	-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	-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	-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	-0.03
1300	52	-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	-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	-0.03
1500	60	-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	-0.03

Technical specifications are subject to change without notice.

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

VACUUM RESISTANCE of FLUROFLEX® - 0						
ND		Operating temperature				
DIN	ASME	20°C	100°C	150°C	200°C	
		barg	barg	barg	barg	
200-1200	8 - 48	-1.0	-1.0	-1.0	-1.0	

Materials of construction/How to order

Materials of construction

flanges:	S235 JRG2 up to ND400/16" S355 J2G3 from ND450/18" upwards
surface protection:	flanges ND200/8" and bigger are painted with 2-components epoxy paint RAL 5003 smaller diameters are zinc galvanized & yellow chromated
bellow material:	virginal paste-extruded PTFE, white
external support rings:	1.4571, similar to AISI 316 Ti
tie rods:	8.8 A2P, carbon steel zinc galvanized
support flange:	S235 JRG2, painted with (FLUROFLEX®- 0) 2-components epoxy paint RAL 5003

Options:

flanges:	stainless steel, etc.
bellow material:	virginal paste-extruded PTFE, anti-static, black
external support rings:	HASTELLOY®,POLYFLURON® PTFE-lined metal
internal support rings:	stainless steel, HASTELLOY®, etc. always POLYFLURON® PTFE-lined
tie rods:	stainless steel, etc.
support flange:	stainless steel (FLUROFLEX®- 0)

How to order:

Example:

FX - N2 - 300 - D - C - C - W - 110 - SP - ANG - FXS
 | | | | | | | | | | | |
 A - B - C - D - E - F - G - H - I - J

A: number of convolutions 0 = means vacuum bellow 16 = means metal bellow POLYFLURON® PTFE-lined	E: flange material C = carbon steel S = stainless steel	H: TA = vacuum support rings tantalum/POLYFLURON® PTFE-lined HA = vacuum support rings HASTELLOY®/POLYFLURON® PTFE-lined
B: ND (mm or inch) according to flange standard under „C“	F: PTFE w = white a = anti-static	I: bellow type STD = standard bellow ANG = hinged bellow for plain angular movement LAT = plain lateral bellow AXI = bellow for plain axial movement
C: flange standard A = ASME 150 lbs D = DIN PN10 J = JIS	G: shipped length within min./max. range in mm or inch	J: FXS = with smooth bore sleeve
D: C = clearance holes T = drilled and tapped S= standard	H: internal support rings - = no rings SP = vacuum support rings stainless steel/POLYFLURON® PTFE-lined	

Quality Management by Process Technology

As a manufacturer of carbon and graphite products, process equipment and systems for the chemical industry and environmental protection technology, SGL Group maintains a targeted quality management system designed to attain and meet the product quality standards demanded by customers. Our quality management system meets the requirements of DIN EN ISO 9001:2000 and Pressure Equipment Directive 97/23/EC Annex III, Module H/H1 and has been certified by the approved associations of DQS and TÜV SÜD. In process equipment construction, Quality Management is responsible for the testing and approval of semi-finished graphite products, impregnating resin, cement components, outsourced parts, process equipment and components.



Heat exchanger during pressure testing

Synthetic resin impregnation, cementing and assembly are all subject to continuous monitoring. Appropriate marking of the semi-finished graphite products before and after synthetic resin impregnation, during machining and thereafter until assembly of the complete equipment or plant provides comprehensive evidence of the semi-finished products employed. Consequently, they meet the traceability requirement of specification AD 2000-Merkblatt N2 for pressure vessels made from electrographite and hard burned carbon. The conditions for synthetic resin impregnation of the semi-finished graphite products and those for cementing of the components are stipulated, monitored and checked.

Evidence of the quality characteristics of the material grades employed, as required by specification AD 2000-Merkblatt N2, is provided in a report issued by the testing laboratory of TÜV SÜD Industrie Service GmbH.



Process Technology Brochures

- ▶ Process Technology – We Combat Corrosion –
from Process Equipment and Components to Complex Systems
- ▶ DIABON® Graphite for Engineered Process Equipment
- ▶ DIABON® Shell and Tube Heat Exchangers
- ▶ DIABON® Block Heat Exchangers
- ▶ DIABON® Plate Heat Exchangers
- ▶ DIABON® Economizers for Heat Recovery
- ▶ DIABON® and LICUFLON® Columns and Column Internals
- ▶ DIABON® Hydrogen Chloride Synthesis Plants
- ▶ DIABON® and Exotic Metal Pumps
- ▶ DIABON® Safety Disks
- ▶ Systems – Solutions for Corrosive Processes
- ▶ ECOPOR® Porous Reactors
- ▶ FLUROFLEX® POLYFLURON® PTFE Bellows DIN/ASME
- ▶ FLUROPIPE® ANJA Safety Tapes
- ▶ FLUROPIPE® POLYFLURON® PTFE lined Steel Pipes and Fittings DIN
- ▶ FLUROPIPE® POLYFLURON® PTFE lined Steel Pipes and Fittings ASME
- ▶ FLUROPIPE® POLYFLURON® PTFE lined Dip Pipes DIN/ASME
- ▶ FLUROSIC® Silicon Carbide Plate & Frame Heat Exchanger
- ▶ FLUROSIC® Silicon Carbide Shell & Tube Heat Exchanger

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The data contained herein represent the current state of our product knowledge and are intended to provide general information on our products and their application spectra. In view of the variety and large number of application possibilities, these data should be regarded merely as general information that gives no guarantee of any specific properties and/or suitability of those products for any particular application. Consequently, when ordering a product, please contact us for specific information on the properties required for the application concerned. On request, our technical service will supply a profile of characteristics for your specific application requirements without delay.

Process Technology

Dr. Schnabel GmbH & Co KG

Offheimer Weg 21
65549 Limburg/Lahn
Phone +49 6431 9106-0
Fax +49 6431 9106-999
contact@dr-schnabel.de
pt@sglcarbon.de

www.sglgroup.com
www.sglcarbon.com

