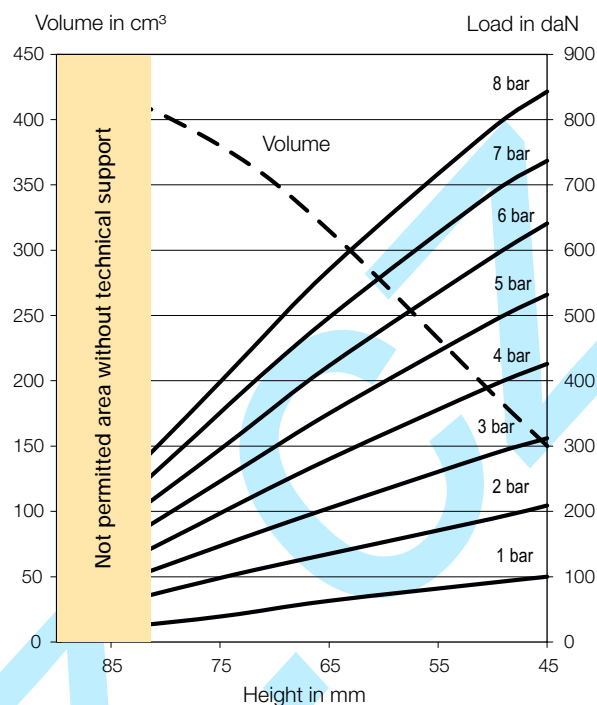
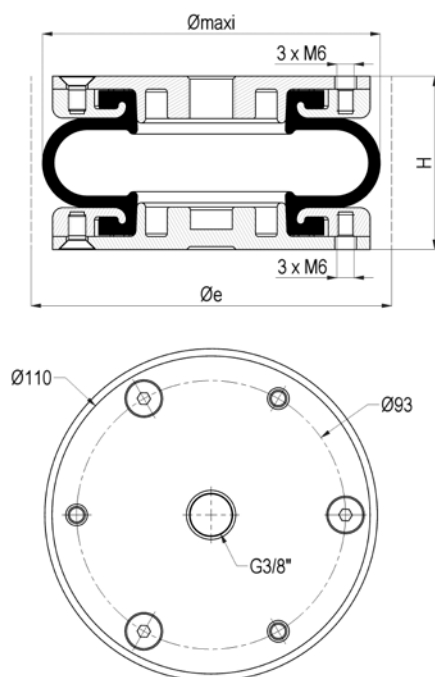


Type x Number of Convolution: **4.1/2" x 1, Ø 110**

Adiabatic characteristic curves / Dynamic movements



Order Code

Materials	Cups	Standard cups	Stainless steel cups
Standard temperature NR	Aluminium	9 109 400	-
High temperature CR		9 109 500	-
Extreme high temp. ECO		On request	-

Technical data

Air port inlet	G1/4"
Rec / Max pressure [bar]	5,5 / 8
Force [N] @ 0 bar to H (mm)	150 (50)
Weight [kg]	0,80

Dimensions [mm]

Ø maxi.	125
Øe	140
H static	65
H min.	45
H max.	90
H recommended	80

Fastening torque [Nm]

G1/4"	15 Nm
FHc M5	5 Nm
M6	5 Nm

Dynamic characteristic values

Pressure p [bar]	2	4	6
Force (load) [kN]	105	220	335
Stiffness [daN/cm]	74,9	131,8	184,9
Natural frequency [Hz]	4,2	3,9	3,7
Vol. V [cm³]	316	340	365
H2 rec for isolation [mm]	72	72	72

Misalignment for H between [mm]

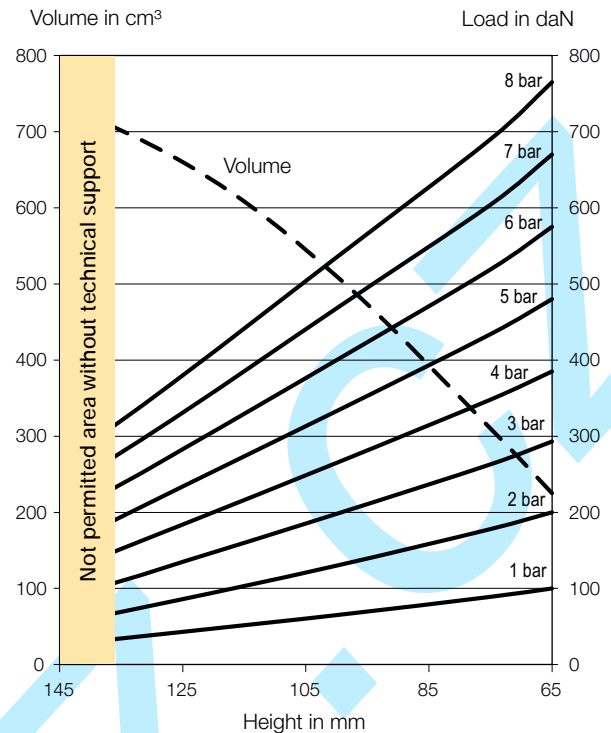
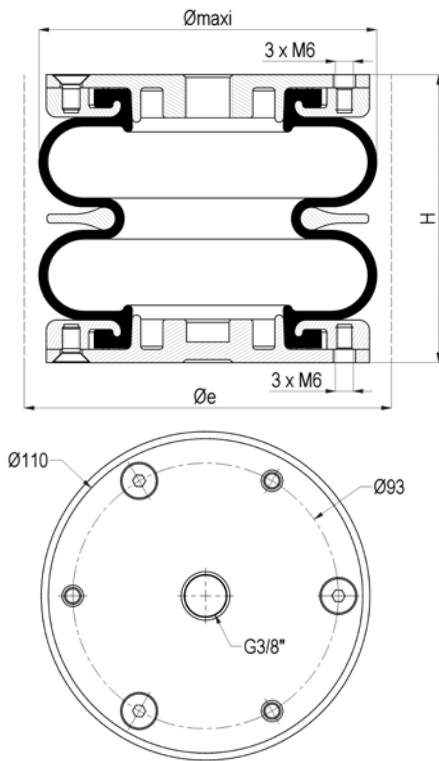
Axial	A = 5 mm	60 to 80
	A = 10 mm	70 to 90
Angular	Angle α = 5°	60 to 75
	Angle α = 10°	65 to 70
	Angle α = 15°	-

Static characteristic values

		Force F [daN]						Vol. V [cm³]
Pressure p [bar]		3	4	5	6	7	8	
Height H [mm]	45	312	426	532	641	737	843	150
	50	288	393	491	590	688	787	190
	65	205	280	350	423	497	570	315
	75	147	197	246	295	351	398	380
	90	56	70	91	112	126	144	440
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-

Type x Number of Convolution: **4.1/2" x 2, Ø 110**

Adiabatic characteristic curves / Dynamic movements



Order Code

Materials	Cups	Standard cups	Stainless steel cups
Standard temperature NR	Aluminium	9 109 401	-
High temperature CR		9 109 502	-
Extreme high temp. ECO		On request	-

Technical data

Air port inlet	G1/4"
Rec / Max pressure [bar]	5,5 / 8
Force [N] @ 0 bar to H (mm)	250 (65)
Weight [kg]	1,00

Dimensions [mm]

Ø maxi.	125
Øe	140
H static	100
H min.	65
H max.	145
H recommended	135

Fastening torque [Nm]

G1/4"	15 Nm
FHc M5	5 Nm
M6	5 Nm

Dynamic characteristic values

Pressure p [bar]	2	4	6
Force (load) [kN]	75	170	260
Stiffness [daN/cm]	26,5	49,5	71,4
Natural frequency [Hz]	2,9	2,7	2,6
Vol. V [cm³]	628	655	683
H2 rec for isolation [mm]	130	130	130

Misalignment for H between [mm]

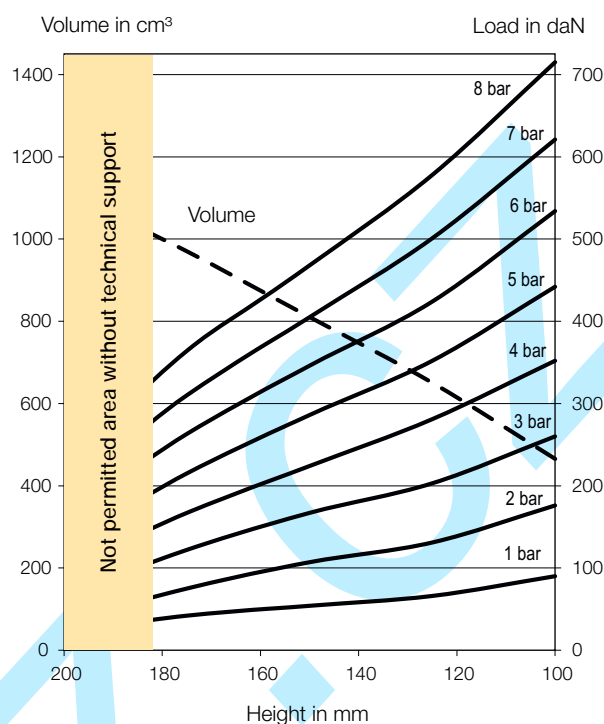
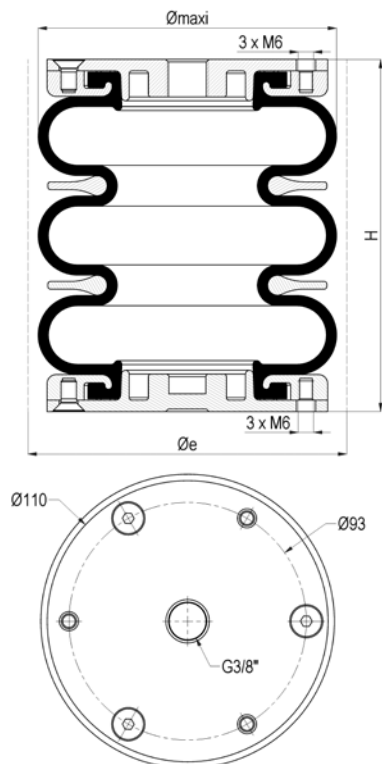
Axial	A = 5 mm	75 to 145
	A = 10 mm	85 to 135
Angular	Angle α = 5°	80 to 125
	Angle α = 10°	105 to 145
	Angle α = 15°	-

Static characteristic values

		Force F [daN]						Vol. V [cm³]
Pressure p [bar]		3	4	5	6	7	8	
Height H [mm]	65	293	385	480	575	670	765	225
	75	263	348	434	519	604	690	310
	100	198	265	333	400	468	535	510
	125	135	184	234	283	331	380	660
	145	86	120	156	193	228	263	740
	-	-	-	-	-	-	-	-

Type x Number of Convolution: **4.1/2" x 3, Ø 110**

Adiabatic characteristic curves / Dynamic movements



Order Code

Materials	Cups	Standard cups	Stainless steel cups
Standard temperature NR	Aluminium	9 109 402	-
High temperature CR		9 109 503	-
Extreme high temp. ECO		On request	-

Technical data

Air port inlet	G3/8"
Rec / Max pressure [bar]	5,5 / 8
Force [N] @ 0 bar to H (mm)	100 (100)
Weight [kg]	1,20

Dimensions [mm]

Ø maxi.	125
Øe	140
H static	145
H min.	100
H max.	200
H recommended	180

Fastening torque [Nm]

G1/4"	15 Nm
FHc M5	5 Nm
M6	5 Nm

Dynamic characteristic values

Pressure p [bar]	2	4	6
Force (load) [kN]	65	150	240
Stiffness [daN/cm]	13,1	25,5	36,8
Natural frequency [Hz]	2,2	2,0	2,0
Vol. V [cm³]	940	1010	1080
H2 rec for isolation [mm]	195	195	195

Misalignment for H between [mm]

Axial	A = 5 mm	120 to 200
	A = 10 mm	110 to 180
Angular	Angle α = 5°	125 to 180
	Angle α = 10°	130 to 170
	Angle α = 15°	-

Static characteristic values

		Force F [daN]						Vol. V [cm³]
Pressure p [bar]		3	4	5	6	7	8	
Height H [mm]	100	260	352	442	534	621	715	465
	125	203	281	352	424	501	578	650
	150	167	224	286	346	405	468	810
	175	122	167	215	263	310	364	970
	200	66	96	125	155	185	219	1105
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-

Part numbers for ordering, removable convoluted Air Bellows

Ø (mm) (Inch size)	Type	Nb conv.	Air port size BSP	Weight (kg)	Max stroke (mm)	Cups material	Max force (N) at 7 bar	Order code			
								Standard cups		Stainless steel cups	
								Standard bellows	High temp bellows	Standard bellows	High temp bellows
70 (2.3/4")	2.3/4 x 1	1	G1/4	0,35	20	Alu.	3020	9109025	9109525	/	/
	2.3/4 x 2	2		0,50	50		3067	9109009	9109509	/	/
	2.3/4 x 3	3		0,60	65		2672	9109010	9109510	/	/
110 (4.1/2")	4.1/2 x 1	1	G3/8	0,80	45	Alu.	7370	9109400	9109500	/	/
	4.1/2 x 2	2		1,00	80		6700	9109401	9109502	/	/
	4.1/2 x 3	3		1,20	100		6210	9109402	9109503	/	/
150 (6")	6 x 1	1	G1/2	2,00	55	Alu.	12900	9109004A	9109204A	/	/
	6 x 2	2		2,70	120		13800	9109001A	9109201A	/	/
	6 x 3	3		3,00	180		12600	9109007A	9109207A	/	/
150 (6")	6 x 1	1	G1/2	2,50	55	Steel or stainless steel	20980	9109004	9109204	9109004N	9109204N
	6 x 2	2		2,70	120		22290	9109001	9109201	9109001N	9109201N
	6 x 3	3		3,00	180		21040	9109007	9109207	9109007N	9109207N
200 (8")	8 x 1	1	G1/2	3,05	75	Steel or stainless steel	20980	9109014	9109214	9109014N	9109214N
	8 x 2	2		3,75	180		2290	9109011	9109211	9109011N	9109211N
	8 x 3	3		4,30	225		21040	9109017	9109217	9109017N	9109217N
250 (10")	10 x 1	1	G1/2	3,90	100	Steel or stainless steel	31700	9109024	9109224	9109024N	9109224N
	10 x 2	2		5,00	200		35390	9109021	9109221	9109021N	9109221N
	10 x 3	3		5,60	300		33000	9109031	9109231	9109031N	9109231N
300 (12")	12 x 1	1	G1/2	5,20	100	Steel or stainless steel	46070	9109044	9109244	9109044N	9109244N
	12 x 2	2		6,70	195		46760	9109041	9109241	9109041N	9109241N
	12 x 3	3		8,10	330		50520	9109051	9109251	9109051N	9109251N
370 (14.1/2")	14.1/2 x 1	1	G1/2	6,90	115	Steel or stainless steel	67710	9109064	9109264	9109064N	9109264N
	14.1/2 x 2	2		9,10	225		70930	9109061	9109261	9109061N	9109261N
	14.1/2 x 3	3		10,00	350		72010	9109069	9109269	9109069N	9109269N
410 (16")	16 x 1	1	G1/2	7,00	160	Steel or stainless steel	72080	9109026	9109226	9109026N	9109226N
	16 x 2	2		9,70	250		79840	9109171	9109271	9109171N	9109271N
	16 x 3	3 *		12,50	375		76520	9109177	9109277	9109177N	9109277N
550 (21.1/2")	21.1/2 x 2	2	G3/4	20,60	300	Alu.	168890	9109150	9109250	/	/
	21.1/2 x 2	2 **	-	11,50		-	/	9109153	9109253	/	/
660 (26")	26 x 2	2	G3/4	23,70	410	Steel	237600	9109156	/	/	/
	26 x 2	2 **	-	14,60		-	/	9109159	/	/	/

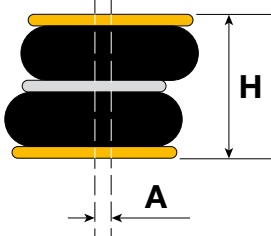
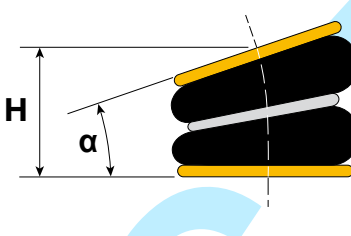
* Reinforced bellows 4 layers

** Air bellows less cups

Note: 16x2, 10x3, 12x3, 14.1/2x3 exist with reinforced 4 layers, add -4P at the end of the part number, ie 9109069-4P**Note:** 4.1/2x2, 8x2, 14.1/2x1 exist without cups on request

Air Bellows permissible misalignments when Air Bellows are used as actuators

H rec. = recommended installation height | ØN min = minimum space diameter need for installing the Air Bellows

It is not possible to combine angular misalignment with axial misalignment.				Axial			Angular			
The following values are for short time movement during stroke. The Air Bellows may not be exposed to axial misalignment permanently.										
Ø (mm) (Inch size)	Order code	Type	Nb conv.	ØN min (mm)	A = 5 mm for H (mm) between min to max	A = 10 mm for H (mm) between min to max	H rec. (mm)	Angle α = 5° for H (mm) between min to max	Angle α = 10° for H (mm) between min to max	Angle α = 15° for H (mm) between min to max
Ø 70 (2.3/4")	9109025	2.3/4 x 1	1	95			65			
	9109009	2.3/4 x 2	2		80 to 100	85 to 95	105	75 to 100	80 to 95	
	9109010	2.3/4 x 3	3		90 to 125	100 to 115	130	90 to 120	95 to 110	
Ø 110 (4.1/2")	9109400	4.1/2 x 1	1	140	60 to 80	70 to 90	80	60 to 75	65 to 70	
	9109401	4.1/2 x 2	2		75 to 145	85 to 135	135	80 to 125	105 to 145	
	9109402	4.1/2 x 3	3		120 to 200	110 to 180	180	125 to 180	130 to 170	
Ø 150 (6")	9109004A	6 x 1	1	190	65 to 95	75 to 85	100	65 to 90	70 to 85	
	9109001A	6 x 2	2		100 to 175	110 to 165	175		95 to 160	100 to 155
	9109007A	6 x 3	3		115 to 250	105 to 230	255	195 to 255	200 to 250	
Ø 150 (6")	9109004	6 x 1	1	190	65 to 95	75 to 85	95	65 to 90	70 to 85	
	9109001	6 x 2	2		100 to 175	110 to 165	170		95 to 160	100 to 155
	9109007	6 x 3	3		115 to 250	105 to 230	250	195 to 255	200 to 250	
Ø 200 (8")	9109014	8 x 1	1	245	70 to 120	65 to 115	115	60 to 105	70 to 100	
	9109011	8 x 2	2		85 to 240	95 to 230	220	90 to 210	100 to 205	
	9109017	8 x 3	3		110 to 280	100 to 260	300	250 to 305	255 to 300	
Ø 250 (10")	9109024	10 x 1	1	300	65 to 145	70 to 135	135	70 to 115	80 to 105	
	9109021	10 x 2	2		95 to 270	105 to 200	245		95 to 260	115 to 250
	9109031	10 x 3	3		175 to 390	165 to 380	350	245 to 370	280 to 350	
Ø 300 (12")	9109044	12 x 1	1	350	70 to 135	80 to 130	135		75 to 115	90 to 105
	9109041	12 x 2	2		95 to 280	105 to 270	245	100 to 255	110 to 245	
	9109051	12 x 3	3		140 to 410	150 to 400	350	230 to 340	250 to 310	
Ø 370 (14.1/2")	9109064	14.1/2 x 1	1	425	105 to 170	85 to 160	150	65 to 145	85 to 135	
	9109061	14.1/2 x 2	2		110 to 340	120 to 330	270		115 to 290	135 to 275
	9109069	14.1/2 x 3	3		160 to 440	170 to 430	420	300 to 390	310 to 370	
Ø 410 (16")	9109026	16 x 1	1	460		85 to 195	190		85 to 180	
	9109171	16 x 2	2		170 to 325	180 to 315	300	125 to 325	135 to 315	
	9109177	16 x 3	3 *		275 to 500	290 to 485	475		350 to 480	370 to 450
Ø 550 (21.1/2")	9109150	21.1/2 x 2	2	630			350			
Ø 660 (26")	9109156	26 x 2	2	750			425			

* Reinforced bellows 4 layers

■ = on request

Vibration isolation (damping) when Air Bellows are used as isolators

The stiffness is the reaction force that appears when Air Bellow deflects from its initial position.

Due to the compression of air the stiffness is not constant and it is a function of effective area variation, volume and pressure variations.

H2 rec. = recommended installation height for best isolation.

Isolation rate I (%) $I = 1 - \frac{1}{\left(\frac{f_e}{f_n}\right)^2 - 1}$ fe=exciting frequency (Hz) fn=natural frequency (Hz)							At 2 bar		At 4 bar		At 6 bar		At 0 bar
Ø (mm) (Inch size)	Order code	Type	Nb conv.	Max stroke (mm)	Static height (mm)	H2 rec. (mm)	Natural Frequency fn (Hz)	Stiffness (daN/mm)	Natural Frequency fn (Hz)	Stiffness (daN/mm)	Natural Frequency fn (Hz)	Stiffness (daN/mm)	Load (N) to obtain H (mm)
70 (2.3/4")	9109025	2.3/4 x 1	1	20	60	62	5,22	5,96	4,79	9,61	4,60	13,37	160 (50)
	9109009	2.3/4 x 2	2	50	90	90	4,14	3,17	3,76	5,25	3,60	7,25	125 (65)
	9109010	2.3/4 x 3	3	65	110	120	3,50	2,06	3,22	3,58	3,12	5,07	250 (80)
110 (4.1/2")	9109400	4.1/2 x 1	1	45	65	72	4,21	7,49	3,87	13,18	3,71	18,49	150 (50)
	9109401	4.1/2 x 2	2	80	100	130	2,94	2,65	2,71	4,95	2,62	7,14	250 (65)
	9109402	4.1/2 x 3	3	100	145	195	2,20	1,31	2,04	2,55	1,96	3,68	100 (100)
150 (6")	9109004A	6 x 1	1	55	80	90	3,76	10,63	3,47	19,19	3,33	27,22	250 (55)
	9109001A	6 x 2	2	120	130	160	2,51	4,41	2,33	7,94	2,25	11,40	170 (75)
	9109007A	6 x 3	3	180	190	230	2,07	2,99	1,91	5,40	1,85	7,73	230 (100)
150 (6")	9109004	6 x 1	1	55	80	85	3,71	9,43	3,43	17,40	3,30	24,90	250 (50)
	9109001	6 x 2	2	120	130	150	2,51	4,55	2,33	8,17	2,25	11,69	170 (70)
	9109007	6 x 3	3	180	190	225	2,07	2,91	1,91	5,27	1,85	7,55	230 (95)
200 (8")	9109014	8 x 1	1	75	90	100	3,05	13,40	2,86	23,79	2,77	34,21	220 (50)
	9109011	8 x 2	2	180	160	200	2,15	4,88	2,00	8,82	1,95	12,81	350 (80)
	9109017	8 x 3	3	225	205	280	1,82	3,34	1,67	6,02	1,60	8,51	280 (100)
250 (10")	9109024	10 x 1	1	100	100	120	2,71	15,00	2,54	27,10	2,46	38,50	150 (50)
	9109021	10 x 2	2	200	170	220	1,93	7,02	1,80	12,54	1,75	17,88	200 (75)
	9109031	10 x 3	3	300	250	320	1,58	4,40	1,47	7,60	1,43	11,00	250 (100)
300 (12")	9109044	12 x 1	1	100	100	120	2,69	23,00	2,51	41,30	2,44	58,80	280 (50)
	9109041	12 x 2	2	195	170	220	1,97	10,90	1,84	20,00	1,78	28,50	170 (75)
	9109051	12 x 3	3	330	250	320	1,58	7,60	1,48	13,30	1,44	18,90	400 (100)
370 (14.1/2")	9109064	14.1/2 x 1	1	115	110	130	2,48	32,80	2,30	55,90	2,22	78,40	360 (50)
	9109061	14.1/2 x 2	2	225	180	250	1,78	15,10	1,66	26,40	1,61	37,30	210 (75)
	9109069	14.1/2 x 3	3	350	280	370	1,43	9,20	1,35	16,30	1,31	23,30	210 (105)
410 (16")	9109026	16 x 1	1	160	130	150	2,29	24,80	2,14	51,30	2,07	73,30	150 (50)
	9109171	16 x 2	2	250	200	290	1,57	12,60	1,48	22,80	1,44	32,30	120 (80)
	9109177	16 x 3	3 *	375	300	400	1,35	9,60	1,26	16,80	1,24	24,40	200 (120)
550 (21.1/2")	9109150	21.1/2 x 2	2	300	200	300	1,71	31,00	1,56	53,80	1,50	75,60	480 (90)
660 (26")	9109156	26 x 2	2	410	200	350	1,37	31,60	1,27	56,00	1,23	79,20	150 (90)

* Reinforced bellows 4 layers