Expansion joint

Expansion joints are an important part in each exhaust pipe. The convoluted section of the expansion joint is designed to accommodate the movements due to thermal expansion in the piping system. It also prevents the propagation of vibrations.

Consequently the expansion joints have to be as flexible as possible. This flexibility is acquired by the use of very thin material as well as by making the bellows as high as possible. All the expansion joints which TIO has in her delivery program are therefore built out of several courses of stainless steel, through which a large accommodation of the movements is possible at a minimum axial and lateral load. The multiply, stainless steel bellows are hydraulic forced. This production method guarantees high flexibility and a durable performance.

With or without inner tube?

TIO multiply, stainless steel expansion joints can be executed with or without an inner tube. De advantages of an expansion joint with an inner tube are a durable performance and less back pressure. The disadvantage on the contrary is the limitation of the lateral movement.

Although TIO has both executions in her delivery program, the disadvantage of the limitation of the lateral movement is such, that it is better to choose for an expansion joint without an inner tube. The back pressure is negligible and due to the multiple construction the service life is nearly the same.

How many expansion joints must be applicated and where do they have to be installed?

The answer to this question depends on the length and the course of the exhaust pipe. The sum of the axial expansion can be calculated with the assistance of the next formula:

$$\Delta L = L_0 \times \alpha \times \Delta t$$

If you multiply the length of the exhaust pipe (L_0) by the lineair expansion coefficient α between T min and T max (ΔT), you will get the sum of the axial expansion (ΔL).
Like any other material, steel will expand too when it is heated. The undermentioned table contains several thermal expansion factors of carbon and stainless steel at different temperatures:

Thermal expansion factor α, 1°C (multiply tabulated values bij 10^{-6})

Example

- length exhaust pipe = 4.500 mm
- material exhaust pipe = carbon steel
- temperature min. = 20°C
- temperature max. = 450°C
- α average (ST37.2) = 12 x 10^{-6}

$\Delta L = 4.500 \times 12 \times 10^{-6} \times 430 = 23{,}22$ mm

°C	thermal expansion factor carbon steel	thermal expansion factor stainless steel
avg.	12,0	17,0
20	10,9	16,4
100	11,5	16,8
200	12,3	17,3
300	12,9	17,6
400	13,6	17,9
500	14,2	18,4
600	14,6	18,7

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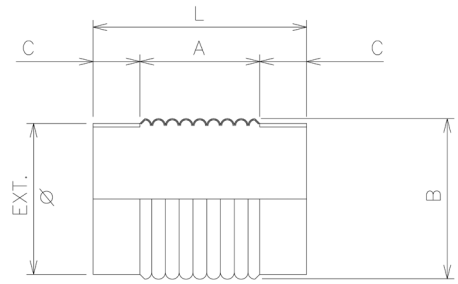
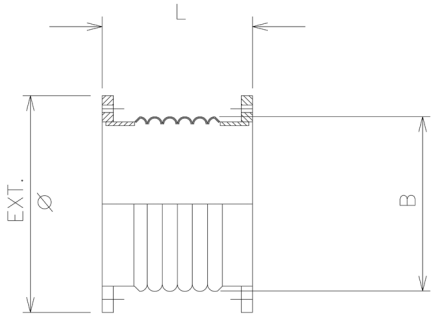
Expansion joint



TIO expansion joints type RVS



TIO expansion joints type EF

TIO expansion joints type RVS

Nominal bore		Total length	Weight	Bellow		Maximum movement			Welding ends	
Inches	mm	L(mm)	Kg	Length A(mm)	Diameter B(mm)	Axial mm	Lateral mm	Length C(mm)	Int. Ø mm	Ext. Ø mm
3/4″	20	165	0,17	89	33	12	8	38	21,6	26,9
1″	25	165	0,21	99	39	13	8	33	25,4	30,0
1-1/4″	32	165	0,31	97	48	15	8	34	32,8	38,0
1-1/2″	40	180	0,42	104	58	12	5	38	43,1	48,3
2″	50	195	0,58	113	70	16	7	41	54,5	60,3
2-1/2″	65	210	0,82	132	86	19	8	39	70,3	76,1
3″	80	250	1,6	126	110	16	5	62	82,5	88,9
3-1/2″	92	270	1,7	154	123	24	7	58	92,0	100,0
4″	100	290	2,1	192	142	23	9	49	107,1	114,3
5″	125	305	3,2	187	170	25	8	59	130,7	139,7
6″	150	305	3,9	183	201	28	7	61	159,3	168,3
8″	200	310	6,5	174	256	29	5	68	207,3	219,1
10″	250	320	8,7	200	313	29	5	60	260,4	273,0
12″	300	320	11,3	180	320	28	4	70	309,9	323,9
14″	350	330	20,7	180	355	28	4	75	341,6	355,6

TIO expansion joints EF

Nominal bore		Total length	Bellow		Maximum axial movement	Flanges	
Inches	mm	L(mm)	Length mm	Diameter B(mm)	mm	Pitch mm	Ext. Ø mm
12″	300	143	47	317	11	370 - 8x, Ø 22	420
14″	350	146	50	349	11	420 - 12x, Ø 22	470
16″	400	151	51	399	11	470 - 12x, Ø 22	520
18″	450	152	52	449	11	520 - 12x, Ø 22	570
20″	500	153	53	500	12	570 - 12x, Ø 22	620
24″	600	158	54	602	12	670 - 12x, Ø 22	720
28″	700	157	43	704	10	810 - 24x, Ø 24	860
32″	800	174	46	805	12	920 - 24x, Ø 30	975