General

Rubber expansion joints are designed to absorb pipe movements in piping systems handling liquids and gases. The unique geometry and rubber compound of the bellows provide optimum flexibility in all directions and effectively compensate for movement in the pipework. Featuring flanged EN 1092 connections, the expansion joint is easy to install and offers excellent noise and vibration isolation, making it suitable for a wide range of industrial applications.

The suffix "L" in the product designation indicates that the expansion joint is fitted with tie rods (length restraint), for example AT 5980**L**32.

Marking

Date of manufacture and colour identification. The bellows and flanges are marked with DN, PN and manufacturer identification. The flanges are also marked with material designation.

Risks During Use

Leakage may occur if the rubber deteriorates, dries out or cracks.

Improper use, exceeding the specified temperature or pressure limits, or use with incompatible media may reduce product performance and service life.

Receiving Inspection

Check that the delivered goods correspond to the order and are free from damage. Any damage must be reported immediately.

Storage and Handling

The expansion joint should be stored in a dry, ventilated area and placed resting on its flanges. It is recommended that expansion joints be inspected for defects at least every two years.

Installation

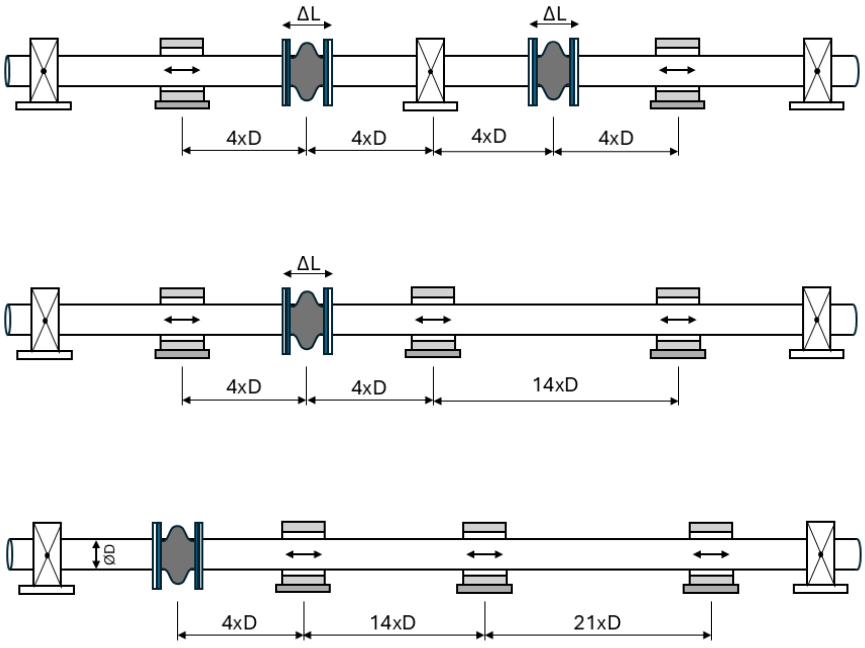
If the expansion joint is intended only for noise and vibration damping, the installed length should be approximately 10 mm shorter than its normal length (unloaded and not installed). If the expansion joint is intended only to absorb pressure effects, the installed length should be 5 mm shorter than its normal length. If tensile loads are expected, the installation length should be reduced by the amount corresponding to the maximum elongation caused by the tensile load. For vacuum applications, the installation dimension must be reduced by approximately 10 mm and the expansion joint should be fitted with a vacuum support ring.

The expansion joint is installed with a preset compression to ensure that the bellow is never stretched beyond their free length. Avoid twisting the rubber bellow. The expansion joint should always be installed in a location that is easily accessible for inspection and replacement. During welding work near the expansion joints, suitable protection must be used to prevent radiant heat and welding sparks from damaging the rubber bellow. The rubber bellow must never be painted or enclosed in insulation.

Anchor points and pipe guides shall be arranged to ensure that:

- The rubber expansion joint is not subjected to loads from the weight of the pipe.
- Bending caused by the positioning of supports is avoided.
- Suspension in self-aligning bearings is avoided. Plain bearings or roller bearings should be used as guide supports.

The distance between the expansion joint and the first pipe support must not exceed four pipe diameters (4 × DN). The distance between the first and second support must not exceed fourteen pipe diameters (14 × DN). The distance between subsequent supports must not exceed twenty-one pipe diameters (21 × DN). These distances may need to be reduced to maintain pipe stability.



Product Data

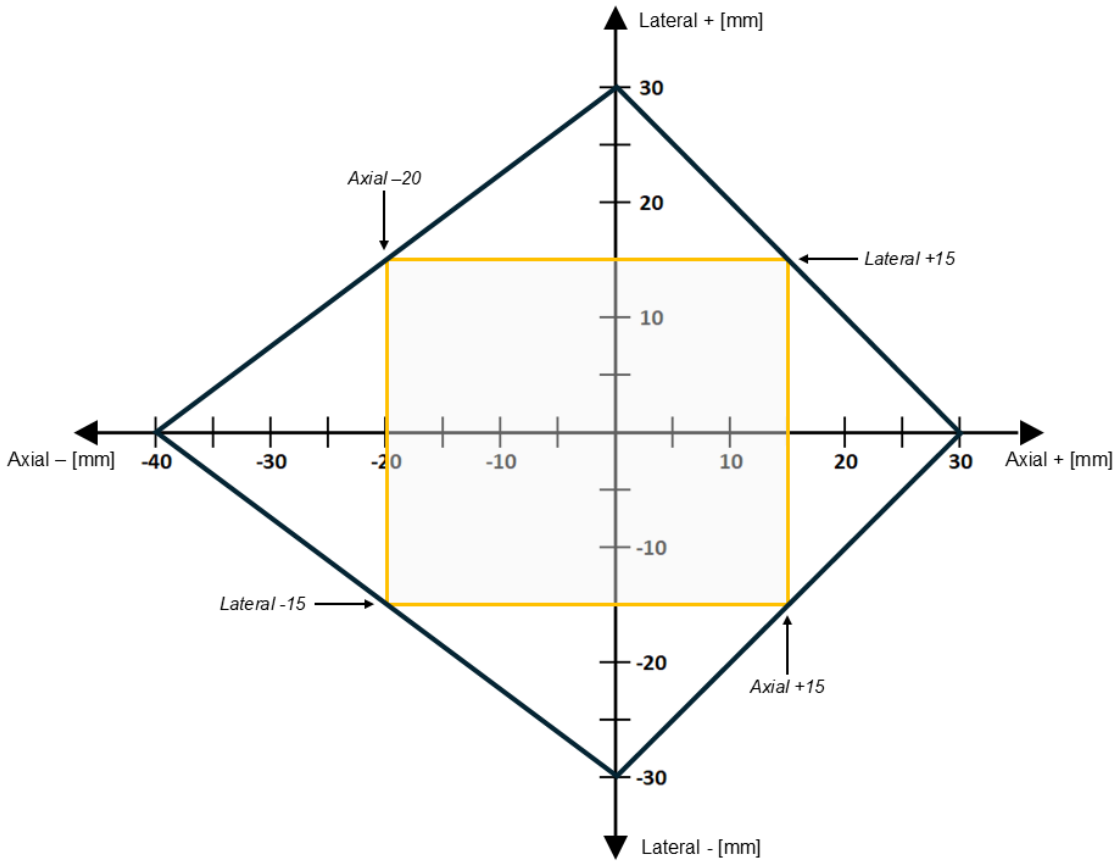
Movement Capability

DN	Axial + [mm]	Axial - [mm]	Lateral ± [mm]	Angular ± °
32 - 80	30	30	30	30
100 - 150	30	30	30	20
200 - 300	30	30	30	12
350 - 500	30	50	30	8

Combined Movement Capability

The diamond diagram below illustrates how a permissible combination of movement absorption can be represented. The combination of lateral and axial movement may result in a maximum utilisation of 100%. The combined movements must fit within the diamond shape as a rectangle.

The example below shows a diamond with axial movement absorption of +30 mm and -40 mm and lateral movement absorption of +/- 30 mm. An axial movement absorption of +15 mm and -20 mm combined with a lateral movement absorption of +/- 15 mm fits within the diamond and therefore represents the maximum permissible combination.



Maximum Operating Conditions

	Colour marking	°C	bar	°C	bar	°C	bar	°C	bar	Short-term °C
AT 5980*	**Yellow**	-20	10	50	16	70	10	90	10	100
**DN500*			8		10		8		6	
AT 5981	**Red SP**	-40	10	70	16	100	8	130	8	150
AT 5983	**Green**	-20	10	50	16	70	10	100	10	110

Axial stiffness rates

DN	0 bar [Nm/mm]	2.5 bar [Nm/mm]	4 bar [Nm/mm]	6 bar [Nm/mm]	10 bar [Nm/mm]	16 bar [Nm/mm]
32	31	68	128	192	243	270
40	30	66	124	186	236	261
50	25	51	98	134	173	192
65	24	53	100	150	190	211
80	28	58	104	158	185	205
100	35	71	116	206	274	304
125	36	71	137	214	282	313
150	49	102	189	293	390	433
200	100	180	365	568	735	864
250	105	207	388	600	778	864
300	123	248	448	658	883	980
350	105	177	349	567	753	836
400	154	261	516	535	1090	1210
500	196	376	686	1060	1364	1514

Note that a deviation of +/- 25% in stiffness may occur due to variations in materials and manufacturing processes.

Lateral stiffness rates

DN	0 bar [Nm/mm]	2.5 bar [Nm/mm]	4 bar [Nm/mm]	6 bar [Nm/mm]	10 bar [Nm/mm]	16 bar [Nm/mm]
32	64	125	184	240	240	300
40	62	121	178	233	256	291
50	50	65	80	105	145	205
65	40	78	115	150	165	188
80	35	74	136	155	173	200
100	55	88	143	168	192	228
125	100	200	236	293	383	518
150	120	260	309	366	466	616
200	323	723	836	949	1219	1624
250	379	806	1022	1173	1479	1933
300	392	837	1068	1216	1542	2031
350	305	610	762	875	1098	1433
400	338	642	817	946	1199	1579
500	426	818	1048	1204	1495	1932

Note that a deviation of +/- 25% in stiffness may occur due to variations in materials and manufacturing processes.

Angular stiffness torque

DN	0 bar [Nm/°]	2.5 bar [Nm/°]	4 bar [Nm/°]	6 bar [Nm/°]	10 bar [Nm/°]	16 bar [Nm/°]
32	0.2	0.5	0.9	1.3	1.7	1.9
40	0.3	0.6	1.1	1.6	2.0	2.3
50	0.3	0.6	1.1	1.6	2.0	2.2
65	0.4	0.9	1.7	2.5	3.2	3.6
80	1.0	1.0	2.0	3.0	4.0	5.0
100	1.0	2.0	4.0	7.0	9.0	10.0
125	2.0	3.0	6.0	10.0	13.0	15.0
150	3.0	7.0	12.0	19.0	25.0	28.0
200	11.0	20.0	41.0	63.0	82.0	91.0
250	18.0	35.0	65.0	102.0	130.0	144.0
300	29.0	58.0	105.0	154.0	206.0	229.0
350	34.0	57.0	113.0	183.0	244.0	270.0
400	65.0	110.0	218.0	226.0	460.0	511.0
500	125.0	239.0	436.0	674.0	886.0	963.0

Note that a deviation of +/- 25% in stiffness may occur due to variations in materials and manufacturing processes.

Installation

The rubber expansion joint is supplied ready for installation. The standard flanges can be rotated to any desired position. Separate gaskets are not required. Before installation, ensure that the sealing surface of the mating flange is free from damage.

Protruding pipe ends, grooves, keys, weld spatter, etc. must not be present, as they may damage the sealing surface of the connection. Ensure that the gap between the pipe ends is correct.

Forcing pipes together to close an excessive gap stretches the rubber bellows and may cause the sealing lip to slip unnoticed from its groove. During installation, the maximum permissible extension or compression is 5 mm. Excessive extension reduces the allowable movement range.

Use flange bolts of property class 8.8.

a) Insert all bolts and tighten evenly by hand.
b) Tighten the bolts gradually using a criss-cross tightening pattern in three stages.
   Check the gap width at the outer edge of the flange.
c) Wait ≥ 30 minutes.
d) Tighten all bolts in three stages to approximately 2/3 of the final tightening torque, using a crosswise pattern.
   Check the gap width again.
e) Wait ≥ 60 minutes.
f) Apply the final tightening torque in two crosswise tightening sequences.

Retightening after commissioning is not required.

Operation and Maintenance

The first inspection should be carried out after one week, followed by quarterly inspections until month 12. After month 12, inspections should be carried out annually.

Inspection and Maintenance Checks

All inspections should include:

- Verification of installation position.
- Inspect for external damage.
- Check for blisters.
- Check for cracks.
- Check for hardening of rubber.