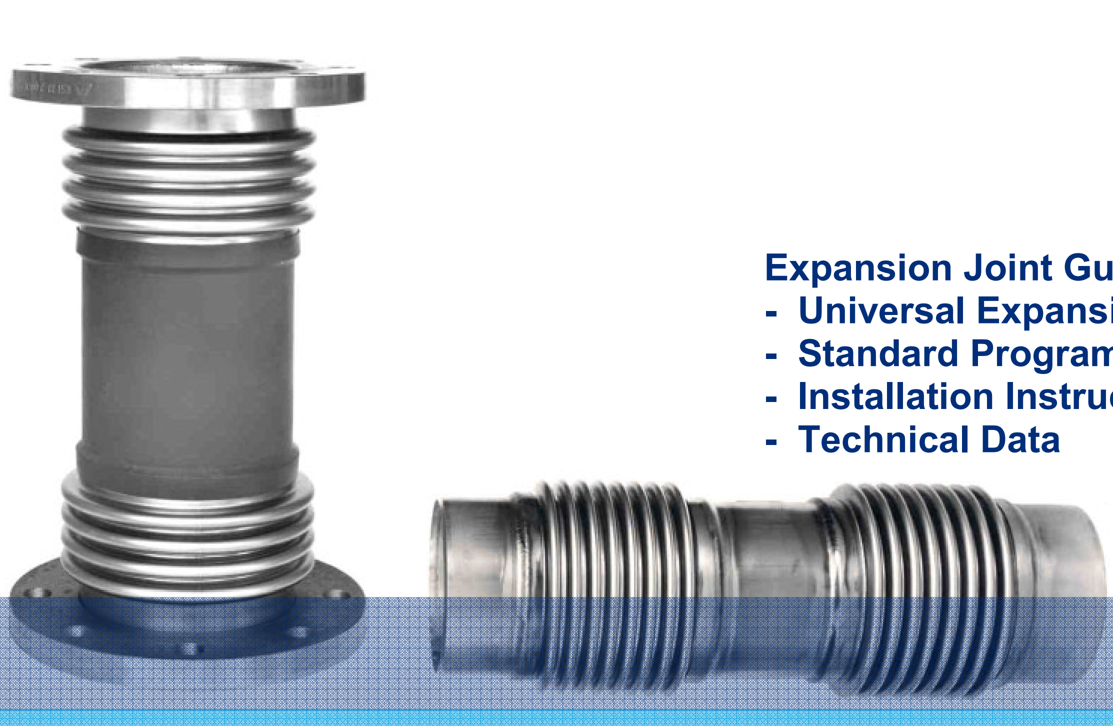
BOA® Group

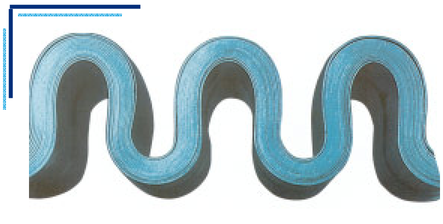
Expansion Joint Guide Module 5

- Universal Expansion Joints General
- Standard Program (EFB)
- Installation Instructions
- Technical Data



Expansion Joints Guide

Summary Module 5

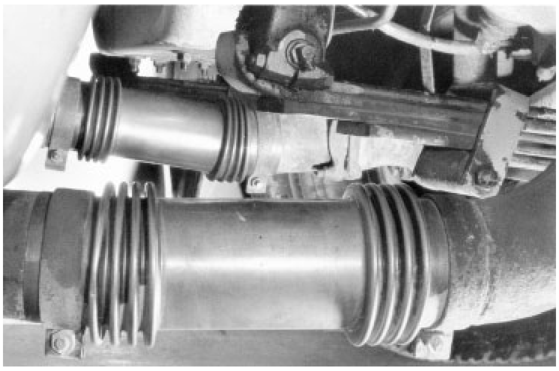


Elastomer Formed Bellows (EFB):

- several to multi-ply (2 to 16 layers)
- high flexibility
- short construction length
- low displacement forces
- big movement capacity
- small corrugation height
- vibration absorbing

1 Universal Expansion Joints General

BOA universal expansion joints are used wherever large movements are to be compensated for in both axial and lateral direction. Their structure consists of two multi-ply, corrosion resistant bellows, which are connected to an intermediate tube. They are either available with welded-on flanges or with weld ends.



BOA universal expansion joints in a truck exhaust system

When installing BOA universal expansion joints, three decisive points must be considered for proper functioning:

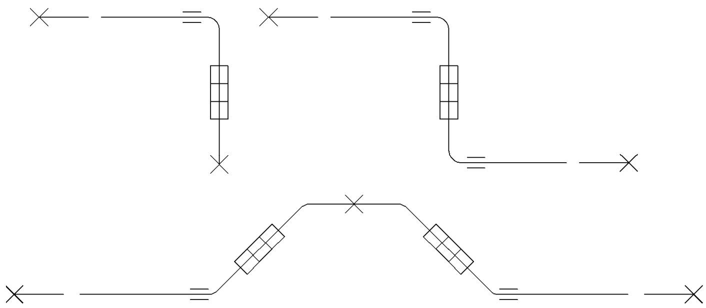
Anchor points

- The pipe section to be compensated for must be firmly fixed with anchors at both ends.
- To calculate the anchors, the axial forces must be considered (sum of the expansion joint's spring rates, reaction force and frictional force of the pipeline), as well as the lateral forces (displacement force).
- The reaction force is the product of the effective area of the bellows and the pipeline pressure (test pressure).
- The displacement force is the product of lateral or axial spring rate and the associated movement.

Pipe guides

- No pipe weight shall load the expansion joint.
- Pipe guides must be installed where a straight pipe routing is wanted (see installation example).
  The pipe guides installed adjacent to the expansion joint must be strong enough to withstand the forces imposed on them by the expansion joint.

Installation examples:



Prerestraint

The indicated axial and lateral movements must not be exceeded. In case of asymmetrical movements, the axial or lateral displacement capacity can no longer be fully used. Hence, while installing, the expansion joint should be prerestrained into the position which corresponds to the installation temperature. As the temperature of the pipe at the moment of the installation seldom corresponds to the lowest operating temperature, it is advisable to give some prerestraint values in the assembly plans corresponding to various temperature levels.

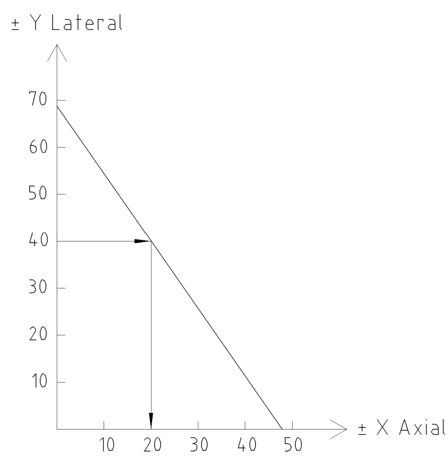
Torsion

The expansion joints must never be subject to torsion. This should particularly be considered when welding in counter flanges.

Movement splitting axial / lateral

The movements indicated in the tables are maximum values. In order to achieve the full load cycles required, only one of the movements can be fully used. If axial and lateral movements occur simultaneously, the permissible combination has to be determined by the diagram beside.

The maximum movements, taken from the diagram, form the corners of the triangle motion (or the movement limiting line) within whose boundaries any movement combination can be established for the corresponding service life.



Calculation example

given: Type UFS 6-20, DN 200, 1000 full load cycles
requested: lateral movement ± 40mm

Proceeding

a) Mark the values of the maximum axial and lateral movement for 1000 full load cycles, taken from the dimension table, onto the X- and Y-axis.
maximum axial movement = ± 46 mm
maximum lateral movement = ± 77 mm
b) By connecting these corner points, the movement triangle is obtained (movement limiting line)
c) Mark the requested lateral movement (if the movement distribution is asymmetrical, take the maximum lateral movement part). At the intersection with the movement limiting line, the maximum permissible axial movement of ± 22 mm can be determined.

So the expansion joint type UFS 6-20, DN 200, allows simultaneous axial movement of ± 22 mm, in addition to the requested lateral movement of ± 40 mm.

Calculation of the prerestraint

Movement formula:

H = movement = total movement [mm]

Prerestraint formula:

$$\text{prerestraint} = \frac{H}{2} - \frac{H \cdot (t_e - t_{min})}{t_{max} - t_{min}} \, [\text{mm}]$$

t_{min} = minimum temperature [°C]
t_{max} = maximum temperature [°C]
t_e = installation temperature [°C]

Example

axial movement = ± 22 mm
lateral movement = ± 40 mm
t_{min} = 0 °C
t_{max} = 120 °C
t_e = 20 °C

$$\text{axial prerestraint} = \frac{44}{2} - \frac{44 \cdot (20 - 0)}{120 - 0} = 14{,}67 \text{ mm} \cong \underline{\mathbf{14.7\ mm}}$$

$$\text{lateral prerestraint} = \frac{80}{2} - \frac{80 \cdot (20 - 0)}{120 - 0} = 26{,}67 \text{ mm} \cong \underline{\mathbf{26.7\ mm}}$$

2 Standard Program BOA Universal Expansion Joints (EFB)

2.1 General

Expansion joints manufactured by BOA AG Switzerland are formed in the elastomer process (EFB). The core element is the multi-ply metal bellows (2 to 16 layers) made of austenitic steel. Expansion joints produced by this method have a large expansion capacity and are very flexible. They are especially appropriate to compensate for thermal expansion and minor misalignment during installation. Their advantages are:

- BOA AG has over 70 years experience in manufacturing expansion joints
- multi-ply construction of the bellows, made of high-grade stainless steel (1.4571 and 1.4541), which means high resistance against ageing, temperature, UV-rays and most of aggressive media.
- very low spring rate due to the multi-ply construction of the bellows.
- large movements at short construction lengths
- due to reasonable stocks, various types in different sizes and pressure ranges are usually available at short time.

Inner sleeve
Inner sleeves protect the bellows and prevent it from being stimulated to oscillate by the fluid. The installation of an inner sleeve is recommended in the following cases:

- abrasive media
- large temperature variations
- flow rates **higher than approx. 8m/s for gaseous media**
- flow rates **higher than approx. 3m/s for liquid media**

When installing, the flow direction must be observed!

Universal expansion joints usually must absorb large lateral movements /vibrations. Therefore, they are usually used without inner sleeve. An inner guide sleeve structure allowing large lateral movements inevitably leads to a strong constriction of the flow cross-section. The resulting local acceleration of the flow medium very often is not accepted. On request (extra charge) inner sleeves may be installed.
Of course expansion joints can be designed and manufactured specifically for other materials, pressure ranges and life cycles.

2.2 Reduction

2.2.1 Expansion capacity

NOTE (Hereinafter the term **load cycle** is used for full load change cycle.)
The maximum permissible expansion capacity is indicated on the expansion joint. It refers to 1000 load cycles (for expansion joints conforming to EC standards: 500 load cycles with safety factor 2). At higher load cycles, the expansion capacity must be reduced by the load cycle factor K_L according to table 1. For the accurate determination of the load factor K_L the following formula can be applied:

$$K_L = (1000 / N_{adm})^{0.29}$$

Load cycles N_{adm}	Load cycle factor K_L
1'000	1.00
2'000	0.82
3'000	0.73
5'000	0.63
10'000	0.51
30'000	0.37
50'000	0.32
100'000	0.26
200'000	0.22
1'000'000	0.14
25'000'000	0.05

Table 1

2.2.2 Temperature related movement and pressure reduction

NOTE
The admissible operating pressure is determined by the nominal pressure considering the reduction factor K_P according to tab. 2. At higher temperatures, the expansion capacity K_Δ has to be reduced according to the reduction factors.

Reduction factors [1] for pressure [K_P] and expansion capacity [K_Δ]		
Temperature °C	K_P	K_Δ
-10...20	1.00	1.00
50	0.92	0.97
100	0.87	0.94
150	0.83	0.92
200	0.79	0.90
250	0.74	0.88
300	0.67	0.86
350	0.60	0.85
400	0.53	0.84

Table 2

[1] linear interpolation for intermediate values

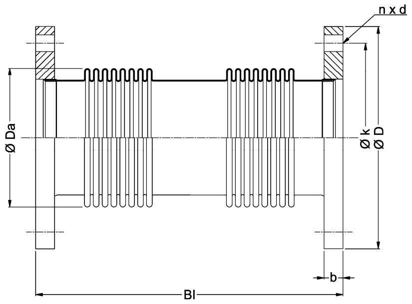
2.3 Universal expansion joints

2.3.1 Universal expansion joints with flanges

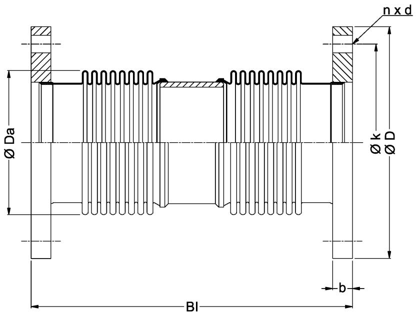
2.3.1.1 Type UFS

- Expansion joints of type UFS are equipped with **flanges firmly welded onto the bellows.**
- As a standard, expansion joints of type UFS are manufactured in nominal diameters from DN 40 to 1000 and in pressure ranges of PN 6, 10, 16 and 25.
- As a standard, flanges are made of carbon steel and are primer coated.
- The variant with particularly large lateral movement (Design II) is equipped with an intermediate tube made of carbon steel.
- The design type I or II is indicated in the last column of the standard tables (see fig.).

Design I
Universal expansion joint with integrated intermediate tube



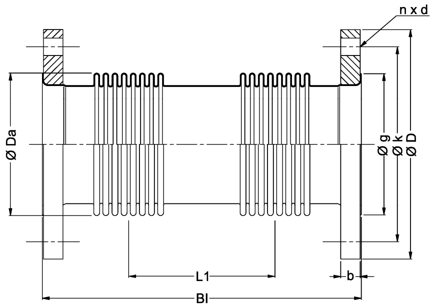
Design II
Universal expansion joint with attached intermediate tube



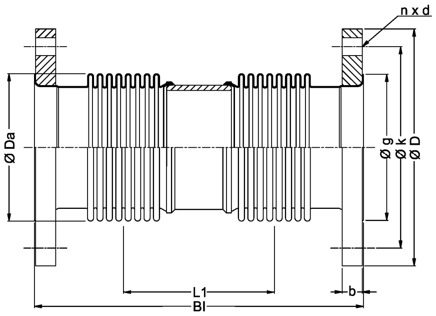
2.3.1.2 Type UFB

- Expansion joints of type UFB are equipped **with movable, collared flanges**. The inside medium is only in contact with the austenitic bellows material.
- As a standard, expansion joints of type UFB are manufactured in nominal diameters from DN 40 until DN 300 mm and in pressure ranges of PN 6, 10, 16 and 25.
- As a standard, flanges are made of carbon steel and are primer coated.
- The variant with particularly large lateral movement (Design II) is equipped with an intermediate tube made of carbon steel.
- The design type I or II is indicated in the last column of the standard tables (see fig.).

Design I
Universal expansion joint with integrated intermediate tube



Design II
Universal expansion joint with attached intermediate tube

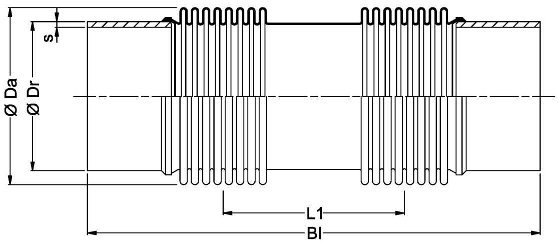


2.3.2 Universal expansion joint with weld ends

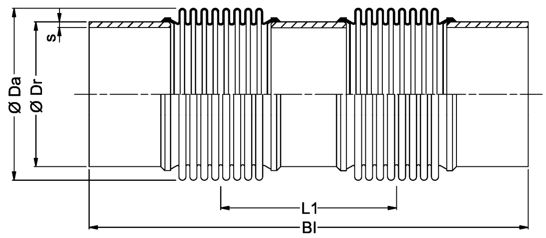
2.3.2.1 Type UW

- **The bellows and weld ends** of expansion joints of type UW are **tightly welded**.
- As a standard, expansion joints of type UW are manufactured in nominal diameters from DN 40 until DN 1000 mm and in pressure ranges of PN 6, 10, 16 and 25.
- As a standard, weld ends are made of carbon steel and are primer coated.
- The variant with particularly large lateral movement (Design II) is equipped with an intermediate tube made of carbon steel.
- The design type I or II is indicated in the last column of the standard tables (see fig.).

Design I
Universal expansion joint with integrated intermediate tube



Design II
Universal expansion joint with attached intermediate tube



3 Installation Instructions Universal Expansion Joints

3.1 General safety recommendations

Prior to installation and start-up, installation and start-up instructions must be read and observed. Installation, start-up and maintenance work shall only be performed by **qualified and authorized staff.**

Maintenance
Universal expansion joints are maintenance free.

CAUTION
Prior to disassembly and maintenance, the system must be
- depressurized,
- cooled down,
- emptied.

Otherwise there is a risk of accident!

Transport, packaging and storage
- The consignment must be checked for completeness upon receipt.
- Any transport damage must be reported to the carrier and the manufacturer.
- At an intermediate storage we recommend to use the original packaging.

Admissible ambient conditions for storage and transport:
- ambient temperature - 4°C to +70 °C
- relative humidity up to 95%.

Universal expansion joints must be protected against wetness, humidity, dirt, shocks and damage.

Warranty
A warranty claim requires professional installation and start-up in accordance with installation and start-up instructions. The necessary installation, start-up and maintenance work must be performed by qualified and authorized staff.

Operating pressure
NOTE
- The permissible operating pressure results in the nominal pressure considering the reduction factors given in section 2.2 "Reduction".
- At higher temperatures, the expansion capacity has to be reduced according to the reduction factors (see section 2.2).

Start-up and check
Before starting-up check if
- the pipeline is installed with sufficient inclination to avoid water pockets
- there is sufficient drainage
- pipe anchors and pipe supports/ guides are firmly installed prior to filling and pressure testing the system
- the expansion joint is not stressed by torsion, especially not expansion joints with socket attachment
- the flow direction has been observed for expansion joints with inner sleeves
- the steel bellows is free of dirt, welding, plaster or mortar splatters or any other soiling; clean if necessary
- all screwed connections are tightened properly
- the general due diligence requirements to avoid corrosion damage are observed, such as water treatment, or prevention of galvanic corrosion in copper and galvanized pipes.

Insulation
Expansion joints may be insulated exactly as the pipeline.
- If no coating is provided, protect the bellows by means of a slidable metal sleeve to avoid insulation material dropping into the convolutions.
- If the expansion joint is to be placed under plaster, a protective cover is essential. This ensures the bellows' function, protects against soiling and avoids contact with structure materials.

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Improper operation
- The limits given in the technical data of the standard range must not be exceeded.
- Swinging suspensions adjacent to expansion joints are not permitted.
- Do not clean the newly installed pipeline by blowing it with steam to avoid water hammers and unacceptable vibration stimulating of the bellows.

System start-up
CAUTION
- During pressure testing and operation, the allowable test pressure or operating pressure defined for the expansion joint must not be exceeded.
- Excessive pressure peaks as a consequence of valves closing too abruptly, water hammers etc. are not permitted.
- Avoid contact with aggressive media.
- The start-up of steam lines must be performed such that the condensate has time to drain off.

3.2 Installation advice

Assembly

- Anchor points and pipe guides must be firmly installed before filling and pressure testing the system.
- Expansion joints must be installed without being subject to torsion. This applies particularly to expansion joints with socket connection.
- The steel bellows must be protected against damage and dirt (e.g. welding, plaster or mortar splatter).
- Steam pipelines should be installed in such a way that water hammers are avoided. This can be achieved by adequate drainage, insulation, by preventing water pockets and by sufficient inclination of the line.
- Observe the flow direction while installing expansion joints with inner sleeves.
- Avoid the installation of expansion joints in the immediate vicinity of pressure reducers, hot steam coolers and shut-down valves, if high-frequency oscillations are expected due to turbulence. Otherwise special measures must be installed (e.g. thick-walled sleeves, perforated disks, calming sections etc.).
- If high frequency vibrations or turbulence or high flow speed are expected, we recommend the installation of expansion joints with inner sleeve.
- Inner sleeves are also recommended for expansion joints with DN ≥ 150, if the flow speed of air, gas or steam media exceeds 8 m/s, or 3 m/s in case of liquid media.

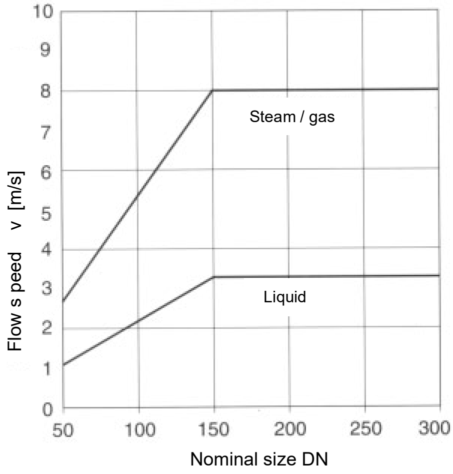


Diagram 1

Pipe guides, pipe supports

- Provide inclination for drainage
- Align the pipeline, distance between pipe guides according to fig. 1, table 3 and diagram 2

NOTE
Sliding or roller supports are the safest measures to avoid buckling and lifting of the pipeline.

CAUTION
Swing suspensions are not permitted adjacent to expansion joints!

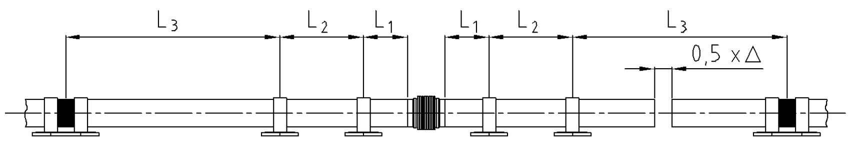


Fig. 1

Δ = expansion capacity of the expansion joint [mm]
L_1 = max. 2 x DN + Δ/2 [mm]
L_2 = 0.7 x L_3 [mm]
L_3 = 400 x $\sqrt{DN}$ [mm] valid only for steel pipelines
L_3 is the distance between the pipe supports according to the formula above. If buckling must be expected, L_3 must be reduced according to diagram 2.

DN	L_1 [mm]	L_2 [mm]	L_3 [mm]
15	30 +Δ	1050	1550
20	40 +Δ	1200	1750
25	50 +Δ	1400	2000
32	64 +Δ	1550	2250
40	80 +Δ	1750	2500
50	100 +Δ	1950	2800
65	130 +Δ	2250	3200
80	160 +Δ	2500	3550
100	200 +Δ	2800	4000
125	250 +Δ	3100	4450
150	300 +Δ	3450	4900
200	400 +Δ	3950	5650
250	500 +Δ	4400	6300
300	600 +Δ	4850	6900
350	700 +Δ	5200	7450
400	800 +Δ	5600	8000
450	900 +Δ	5900	8450
500	1000 +Δ	6250	8900
600	1200 +Δ	6850	9800
700	1400 +Δ	7450	10600
800	1600 +Δ	7900	11300

Tabelle 3 (only valid for steel pipelines)

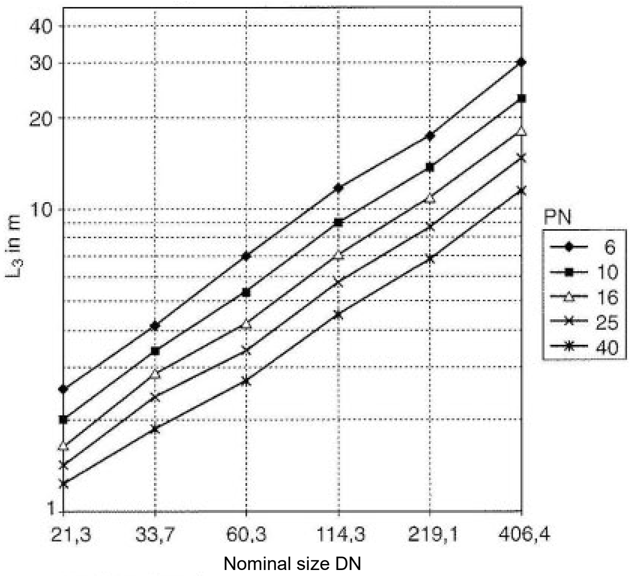


Diagram 2

Anchor points

- Install main anchors at locations where the pipeline changes direction.
- Limit by anchors each pipe section to be compensated for.
  - Only one expansion joint is allowed between two anchors.
  - Main anchors must be installed at locations where the pipeline changes direction. They must take up the pressure thrusts of the expansion joints as well as the frictional forces of the pipe supports/ guides.
  - Intermediate anchors must be installed if the movement capacity of one axial expansion joint is not sufficient to compensate for the entire expansion of a long pipeline. In that case, several axial expansion joints are required.
  - In vacuum mode, the anchor points must be capable to take up tensile and pressure forces.

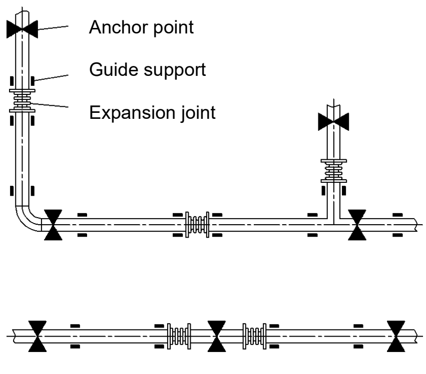


Fig. 2

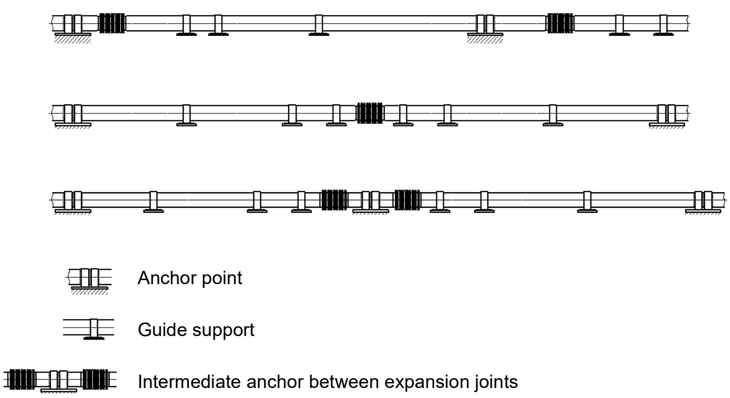


Fig. 3

Vibration compensation

- The expansion joint should be installed as close as possible to the vibrating unit to make use of its entire absorption capacity.
- The vibration absorber must be installed as close as possible to the vibration source so as to avoid resonance of the other parts.
- Primarily it must be ensured that the vibration amplitude acts laterally, i.e. perpendicular to the vibration absorber axis.
- Install an anchor directly behind the expansion joint. Installation is made without prerestraint.

CAUTION

If unrestrained vibration absorbers are installed, the reaction force must be taken into account.

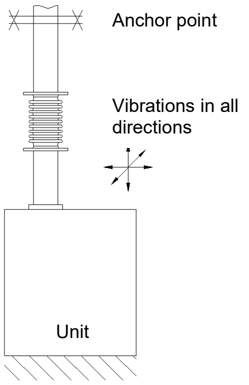


Fig. 4

Prerestraint

All common expansion joints must be installed prerestrained by 50% of their movement capacity (for heating systems: overall length of expansion joint plus 50%, whereas for cooling systems: overall length of expansion joint minus 50% of the movement). If an expansion joint is not installed at the lowest operating temperature of a heating system or at the highest operating temperature of a cooling system (e.g. repair of a still-warm pipe), an individual prerestraint mode must be chosen (see diagram 3).

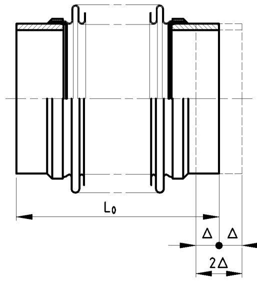


Fig. 5

Prerestraint diagram

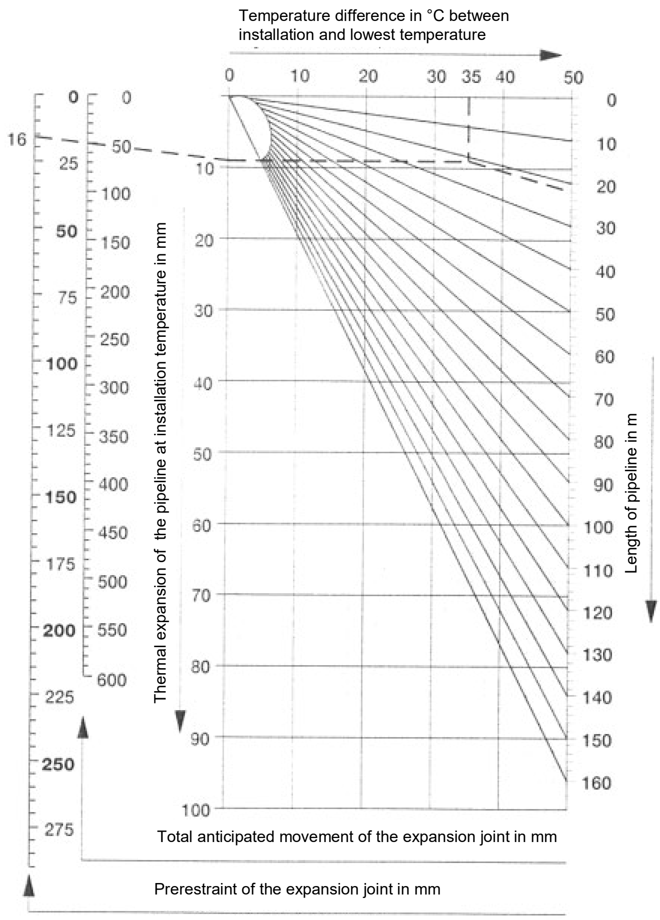


Diagram 3

Example for Diagram 3

Order is placed for a universal expansion joint to be installed in a pipeline of 22 m length.
Lowest temperature: –15°C.
Highest temperature: +165°C.
Max. expansion corresponding to 180°C heating = 50 mm.
The expansion joint shall be restrained by 50% of this expansion = prerestrained by 25 mm, i.e. pulled apart.
The remaining 50% = 25 mm will be compressed in operation mode.
Special attention must be given to the restraint during installation. The temperature shall not be –15°C, but +20°C.
This results in a corresponding expansion of the pipeline of 9 mm (see diagram 3), by which the expansion joint must be less prerestrained: 25-9 = 16 mm.

The prerestraint diagram (3) allows to determine the correct prerestraint value without intermediate calculation:

1. Temperature difference between installation and lowest temperature: –15°C to +20°C = 35°C.
2. Length of the pipe section to be compensated for: = 22 m.
3. Draw a straight line from point "22 m pipe length“ to the "0°C" point.
4. Draw a vertical line from the "35°C" point towards the beam coming from "22 m".
5. Draw a horizontal line from this intersection to the line "Thermal expansion of pipeline in mm"; the result is, as stated above, 9 mm.
6. Draw a straight line from the "9 mm" point to "Total anticipated movement" = 50 mm, and lengthen the connecting straight line to "Prerestraint of the expansion joint in mm".

This results in a prerestraint value of 16 mm, which is the value by which the universal expansion joint must be pulled apart during installation.

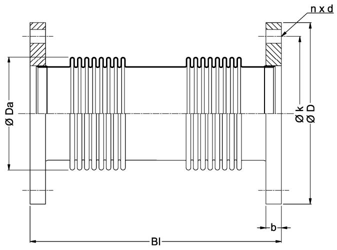
4 Technical Data BOA Standard Universal Expansion Joints (EFB)

4.1 Universal expansion joint with flanges

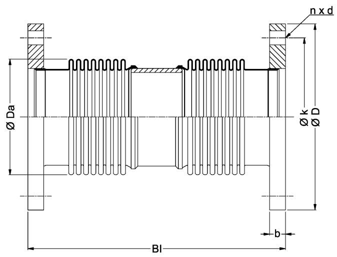
4.1.1 Type UFS (flanges firmly welded onto the bellows)

- expansion joints of type UFS are equipped with **flanges firmly welded onto the bellows;**
- as a standard, expansion joints of type UFS are manufactured in nominal diameters from DN 40 to 1000 and in pressure ranges of PN 6, 10, 16 and 25;
- as a standard, flanges are made of carbon steel and are primer coated;
- the variant with particularly large lateral movement (Design II) is equipped with an intermediate tube made of carbon steel.
- the design type I or II is indicated in the last column of the standard tables (see fig.).

Design I
Universal expansion joint with integrated intermediate tube



Design II
Universal expansion joint with attached intermediate tube



Overall length unrestrained
Consider the reaction force of the expansion joint: 10x cross section area = reaction force in [N/bar]
[1)] Nominal expansion capacity: these indications are meant for 1000 full load cycles SL=1 at 20°C either axial or lateral
Type designation: L = with inner sleeve; B = without inner sleeve; * = optionally with/without inner sleeve
If an inner guide sleeve is required by the customer, the construction length can be different from the data table below.

		Type	Nominal expansion capacity[1)]				Flange					Bellows				
DN	PN	UFS	Axial	Lateral	Overall length unrestrained	Weight (without inner sleeve)	Outside Ø	Thickness	Hole circle Ø	Number of holes	Hole Ø	Outside Ø	Effective area of bellows	Spring rate ± 30%	Spring rate ± 30%	Design
			$\pm\Delta_{ax}$	$\pm\Delta_{lat}$	Bl.	m	D	b	k	n	d	Ø Da	A_B	C_{ax}	C_{lat}	
-	-	-	mm	mm	mm	kg	mm	mm	mm	-	mm	mm	cm^2	N/mm	N/mm	-
40	6	UFS6-11	±30	±49	278	3.3	130	14	100	4	14	69.8	27.0	87.0	7.6	I
40	6	UFS6-20	±30	±114	428	4.0	130	14	100	4	14	69.8	27.0	87.0	2.2	II
40	10	UFS16-11	±22	±36	278	4.8	150	16	110	4	18	70.0	27.0	184.0	16.1	I
40	10	UFS16-20	±22	±85	428	5.4	150	16	110	4	18	70.0	27.0	184.0	4.1	II
40	16	UFS16-11	±22	±36	278	4.8	150	16	110	4	18	70.0	27.0	184.0	16.1	I
40	16	UFS16-20	±22	±85	428	5.4	150	16	110	4	18	70.0	27.0	184.0	4.1	II
40	25	UFS25-11	±16	±50	368	5.0	150	18	110	4	18	69.0	27.0	232.0	8.0	I
40	25	UFS25-20	±16	±79	488	5.9	150	18	110	4	18	69.0	27.0	232.0	4.0	II
50	6	UFS6-11	±32	±44	278	3.9	140	14	110	4	14	82.8	39.0	102.0	12.5	I
50	6	UFS6-20	±32	±106	438	4.8	140	14	110	4	14	82.8	39.0	102.0	3.1	II
50	10	UFS16-11	±26	±35	278	6.5	165	18	125	4	18	83.8	39.0	173.0	22.0	I
50	10	UFS16-20	±26	±85	438	7.4	165	18	125	4	18	83.8	39.0	173.0	5.1	II
50	16	UFS16-11	±26	±35	278	6.5	165	18	125	4	18	83.8	39.0	173.0	22.0	I
50	16	UFS16-20	±26	±85	438	7.4	165	18	125	4	18	83.8	39.0	173.0	5.1	II
50	25	UFS25-11	±18	±46	362	6.8	165	20	125	4	18	83.0	39.0	231.0	11.0	I
50	25	UFS25-20	±18	±75	482	7.9	165	20	125	4	18	83.0	39.0	231.0	5.0	II
65	6	UFS6-11	±35	±37	278	4.8	160	14	130	4	14	105.0	66.0	110.0	22.0	I
65	6	UFS6-20	±35	±100	468	6.1	160	14	130	4	14	105.0	66.0	110.0	4.3	II

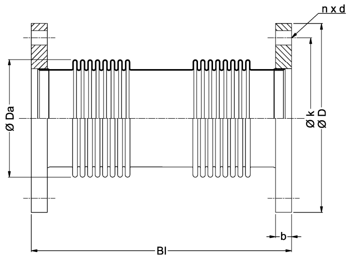
		Type	Nominal expansion capacity[1)]				Flange					Bellows				
DN	PN	UFS	Axial	Lateral	Overall length unrestrained	Weight (without inner sleeve)	Outside Ø	Thickness	Hole circle Ø	Number of holes	Hole Ø	Outside Ø	Effective area of bellows	Spring rate ± 30%	Spring rate ± 30%	Design
			$\pm\Delta_{ax}$	$\pm\Delta_{lat}$	Bl.	m	D	b	k	n	d	Ø Da	A_B	C_{ax}	C_{lat}	
-	-	-	mm	mm	mm	kg	mm	mm	mm	-	mm	mm	cm^2	N/mm	N/mm	-
65	10	UFS16-11	±30	±32	278	7.8	185	18	145	4	18	107.0	66.0	165.0	35.0	I
65	10	UFS16-20	±30	±86	468	9.1	185	18	145	4	18	107.0	66.0	165.0	7.2	II
65	16	UFS16-11	±30	±32	278	7.8	185	18	145	4	18	107.0	66.0	165.0	35.0	I
65	16	UFS16-20	±30	±86	468	9.1	185	18	145	4	18	107.0	66.0	165.0	7.2	II
65	25	UFS25-11	±23	±46	386	10.0	185	24	145	8	18	106.0	66.0	232.0	18.0	I
65	25	UFS25-20	±23	±75	506	11.5	185	24	145	8	18	106.0	66.0	232.0	8.0	II
80	6	UFS6-11	±38	±37	278	6.9	190	16	150	4	18	117.4	84.0	73.0	18.6	I
80	6	UFS6-20	±38	±100	468	8.6	190	16	150	4	18	117.4	84.0	73.0	3.6	II
80	10	UFS16-11	±34	±32	278	10.0	200	20	160	8	18	119.6	84.0	166.0	44.0	I
80	10	UFS16-20	±34	±87	468	11.7	200	20	160	8	18	119.6	84.0	166.0	9.0	II
80	16	UFS16-11	±34	±32	278	10.0	200	20	160	8	18	119.6	84.0	166.0	44.0	I
80	16	UFS16-20	±34	±87	468	11.7	200	20	160	8	18	119.6	84.0	166.0	9.0	II
80	25	UFS25-11	±23	±40	366	11.5	200	26	160	8	18	118.5	84.0	182.0	20.0	I
80	25	UFS25-20	±23	±75	536	13.6	200	26	160	8	18	118.5	84.0	182.0	7.0	II
100	6	UFS6-11	±42	±33	280	8.7	210	16	170	4	18	143.2	127.0	108.0	41.0	I
100	6	UFS6-20	±42	±100	510	11.6	210	16	170	4	18	143.2	127.0	108.0	6.4	II
100	10	UFS16-11	±35	±27	282	12.2	220	22	180	8	18	145.4	127.0	158.0	65.0	I
100	10	UFS16-20	±35	±76	482	14.8	220	22	180	8	18	145.4	127.0	158.0	11.7	II
100	16	UFS16-11	±35	±27	282	12.2	220	22	180	8	18	145.5	127.0	158.0	65.0	I
100	16	UFS16-20	±35	±76	482	14.8	220	22	180	8	18	145.5	127.0	158.0	11.7	II
100	25	UFS25-11	±27	±35	364	15.7	235	26	190	8	22	145.0	127.0	220.0	40.0	I
100	25	UFS25-20	±27	±56	474	18.0	235	26	190	8	22	145.0	127.0	220.0	20.0	II
125	6	UFS6-11	±48	±30	276	10.4	240	18	200	8	18	170.8	184.0	65.0	38.0	I
125	6	UFS6-20	±48	±78	446	13.2	240	18	200	8	18	170.8	184.0	65.0	8.1	II
125	10	UFS10-11	±43	±27	284	15.5	250	24	210	8	18	172.0	184.0	132.0	71.0	I
125	10	UFS10-20	±43	±76	494	18.8	250	24	210	8	18	172.0	184.0	132.0	13.0	II
125	16	UFS16-11	±41	±26	292	16.6	250	24	210	8	18	173.2	184.0	173.0	95.0	I
125	16	UFS16-20	±41	±76	502	19.9	250	24	210	8	18	173.2	184.0	173.0	17.0	II
125	25	UFS25-11	±33	±36	386	22.0	270	28	220	8	26	174.0	184.0	242.0	59.0	I
125	25	UFS25-20	±33	±58	506	24.3	270	28	220	8	26	174.0	184.0	242.0	25.0	II
150	6	UFS6-11	±38	±35	366	13.0	265	20	225	8	18	200.8	262.0	114.0	41.0	I
150	6	UFS6-20	±38	±76	576	19.1	265	20	225	8	18	200.8	262.0	114.0	11.0	II
150	10	UFS10-11	±38	±35	366	17.8	285	24	240	8	22	200.8	262.0	114.0	41.0	I
150	10	UFS10-20	±38	±76	576	23.9	285	24	240	8	22	200.8	262.0	114.0	11.0	II
150	16	UFS16-11	±36	±31	362	19.7	285	24	240	8	22	203.0	262.0	186.0	71.0	I
150	16	UFS16-20	±36	±59	512	24.4	285	24	240	8	22	203.0	262.0	186.0	25.0	II
150	25	UFS25-11	±35	±29	390	29.0	300	30	250	8	26	205.0	262.0	288.0	110.0	I
150	25	UFS25-20	±35	±53	540	32.6	300	30	250	8	26	205.0	262.0	288.0	40.0	II
200	6	UFS6-11	±46	±25	336	20.1	320	22	280	8	18	256.0	434.0	147.0	130.0	I
200	6	UFS6-20	±46	±77	606	28.2	320	22	280	8	18	256.0	434.0	147.0	20.0	II
200	10	UFS10-11	±46	±25	338	26.0	340	26	295	8	22	256.0	434.0	147.0	130.0	I
200	10	UFS10-20	±46	±73	608	34.1	340	26	295	8	22	256.0	434.0	147.0	20.0	II
200	16	UFS16-11	±33	±23	368	27.5	340	26	295	12	22	257.8	434.0	285.0	183.0	I
200	16	UFS16-20	±33	±52	588	35.5	340	26	295	12	22	257.8	434.0	285.0	44.0	II
200	25	UFS25-11	±32	±22	372	37.3	360	32	310	12	26	258.0	434.0	285.0	182.0	I

		Type	Nominal expansion capacity[1)]				Flange					Bellows				
DN	PN	**UFS**	Axial	Lateral	Overall length unrestrained	Weight (without inner sleeve)	Outside Ø	Thickness	Hole circle Ø	Number of holes	Hole Ø	Outside Ø	Effective area of bellows	Spring rate ± 30%	Spring rate ± 30%	Design
			$\pm\Delta_{ax}$	$\pm\Delta_{lat}$	Bl.	m	D	b	k	n	d	Ø Da	A_B	C_{ax}	C_{lat}	
-	-	-	mm	mm	mm	kg	mm	mm	mm	-	mm	mm	cm^2	N/mm	N/mm	-
200	25	UFS25-20	±32	±50	592	47.3	360	32	310	12	26	258.0	434.0	285.0	44.0	II
250	6	UFS6-11	±39	±22	356	23.8	375	24	335	12	18	311.0	660.0	132.0	133.0	I
250	6	UFS6-20	±39	±53	616	36.6	375	24	335	12	18	311.0	660.0	132.0	29.0	II
250	10	UFS10-11	±39	±22	360	31.3	395	28	350	12	22	311.0	660.0	132.0	133.0	I
250	10	UFS10-20	±39	±53	620	44.1	395	28	350	12	22	311.0	660.0	132.0	29.0	II
250	16	UFS16-11	±37	±21	396	45.1	405	32	355	12	26	315.2	660.0	332.0	302.0	I
250	16	UFS16-20	±37	±52	656	57.8	405	32	355	12	26	315.2	660.0	332.0	65.0	II
250	25	UFS25-11	±36	±20	404	55.3	425	36	370	12	30	315.0	660.0	332.0	302.0	I
250	25	UFS25-20	±36	±50	664	69.4	425	36	370	12	30	315.0	660.0	332.0	65.0	II
300	6	UFS6-11	±42	±20	364	32.9	440	24	395	12	22	393.6	911.0	162.0	217.0	I
300	6	UFS6-20	±42	±51	654	51.2	440	24	395	12	22	363.6	911.0	162.0	37.0	II
300	10	UFS10-11	±42	±20	368	37.8	445	28	400	12	22	363.6	911.0	162.0	217.0	I
300	10	UFS10-20	±42	±52	658	56.1	445	28	400	12	22	363.6	911.0	162.0	44.0	II
300	16	UFS16-11	±40	±18.5	392	54.5	460	32	410	12	26	367.2	911.0	336.0	452.0	I
300	16	UFS16-20	±40	±52	690	72.5	460	32	410	12	26	367.2	911.0	336.0	78.0	II
300	25	UFS25-11	±38	±18	396	73.0	485	40	430	16	30	368.0	911.0	336.0	452.0	I
300	25	UFS25-20	±38	±50	696	93.8	485	40	430	16	30	368.0	911.0	336.0	78.0	II
350	6	UFS6-11	±55	±35	496	48.0	490	26	445	12	22	397.2	1093.0	144.5	107.8	II
350	6	UFS6-20	±75	±75	682	63.0	490	26	445	12	22	400.8	1093.0	160.8	53.2	II
350	10	UFS10-10	±55	±33	500	62.0	505	30	460	16	22	398.0	1103.0	181.9	141.1	II
350	10	UFS10-20	±60	±75	752	89.0	505	30	460	16	22	401.6	1103.0	226.6	55.2	II
350	16	UFS16-11	±45	±33	522	83.0	520	36	470	16	26	401.6	1094.0	283.3	184.1	II
350	16	UFS16-20	±50	±50	650	104.0	520	36	470	16	26	402.4	1094.0	326.0	110.7	II
400	6	UFS6-11	±55	±28	476	57.0	540	28	495	16	22	449.2	1421.0	143.7	164.1	II
400	6	UFS6-20	±65	±50	618	80.0	540	28	495	16	22	452.0	1421.0	159.5	83.3	II
400	10	UFS10-11	±60	±28	490	80.0	565	32	515	16	26	450.8	1420.0	218.4	252.9	II
400	10	UFS10-20	±65	±50	646	103.0	565	32	515	16	26	452.6	1420.0	240.8	119.1	II
400	16	UFS16-11	±50	±30	518	105.0	580	38	525	16	30	454.4	1420.0	325.5	296.5	II
400	16	UFS16-20	±50	±50	700	130.0	580	38	525	16	30	454.4	1420.0	325.5	119.1	II
450	6	UFS6-11	±60	±25	740	65.0	595	28	550	16	22	503.6	1806.0	147.9	224.6	II
450	6	UFS6-20	±70	±50	652	92.0	595	28	550	16	22	506.4	1806.0	164.7	94.6	II
450	10	UFS10-11	±60	±25	484	88.0	615	32	565	20	26	505.2	1797.0	224.7	345.6	II
450	10	UFS10-20	±65	±50	666	114.0	615	32	565	20	26	506.6	1797.0	254.3	147.4	II
450	16	UFS16-11	±50	±27.5	534	133.0	640	42	585	20	30	508.2	1801.0	414.0	460.5	II
450	16	UFS16-20	±55	±50	728	158.0	640	42	585	20	30	508.2	1801.0	335.9	144.8	II
500	6	UFS6-11	±60	±22.5	460	75.0	645	30	600	20	22	555.2	2204.0	148.0	310.6	II
500	6	UFS6-20	±70	±50	686	107.0	645	30	600	20	22	558.0	2204.0	165.5	103.5	II
500	10	UFS10-11	±55	±22.5	510	108.0	670	34	620	20	26	557.6	2202.0	330.0	484.2	II
500	10	UFS10-20	±75	±50	710	143.0	670	34	620	20	26	560.2	2202.0	323.9	203.4	II
500	16	UFS16-11	±55	±20	508	173.0	715	44	650	20	33	561.0	2195.0	560.4	1145.7	II
500	16	UFS16-20	±60	±50	750	201.0	715	44	650	20	33	561.2	2195.0	381.8	193.0	II
600	6	UFS6-11	±45	±18	506	97.0	755	30	705	20	26	660.0	3133.0	361.2	718.2	II
600	6	UFS6-20	±75	±50	728	144.0	755	30	705	20	26	662.0	3133.0	166.2	126.5	II
600	10	UFS10-11	±45	±18	524	141.0	780	36	725	20	30	662.0	3141.0	548.9	1105.6	II
600	10	UFS10-20	±75	±50	738	193.0	780	36	725	20	30	663.2	3141.0	342.8	299.0	II

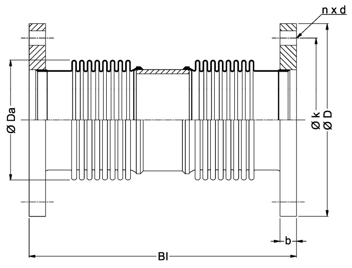
DN	PN	Type UFS	Nominal expansion capacity[1)] Axial	 Lateral	Overall length unrestrained	Weight (without inner sleeve)	Flange Outside Ø	 Thickness	 Hole circle Ø	 Number of holes	 Hole Ø	Bellows Outside Ø	 Effective area of bellows	 Spring rate ± 30%	 Spring rate ± 30%	Design
			$\pm\Delta_{ax}$	$\pm\Delta_{lat}$	Bl.	m	D	b	k	n	d	Ø Da	A_B	C_{ax}	C_{lat}	
-	-	-	mm	mm	mm	kg	mm	mm	mm	-	mm	mm	cm^2	N/mm	N/mm	-
600	16	UFS16-11	±60	±16.5	516	246.0	840	48	770	20	36	665.0	3141.0	671.4	2079.2	II
600	16	UFS16-20	±60	±50	822	304.0	840	48	770	20	36	665.2	3141.0	383.2	221.0	II
700	6	UFS6-10	±80	±25	530	133.0	860	24	810	24	26	765.2	4222.0	215.6	597.5	II
700	6	UFS6-20	±80	±50	772	167.0	860	24	810	24	26	765.2	4222.0	215.6	192.8	II
700	10	UFS10-10	±90	±25	498	187.0	895	30	840	24	30	767.2	4243.0	239.8	804.6	II
700	10	UFS10-20	±90	±50	718	217.0	895	30	840	24	30	767.2	4243.0	239.8	259.8	II
700	16	UFS16-10	±65	±25	582	236.0	910	36	840	24	36	767.4	4229.0	485.3	1005.8	II
700	16	UFS16-20	±65	±50	872	286.0	910	36	840	24	36	767.4	4229.0	485.3	313.7	II
800	6	UFS6-10	±70	±25	576	166.0	975	24	920	24	30	870.0	5519.0	210.9	508.1	II
800	6	UFS6-20	±70	±50	886	216.0	975	24	920	24	30	870.0	5519.0	210.9	156.0	II
800	10	UFS10-10	±100	±25	514	235.0	1015	32	950	24	33	871.2	5511.0	245.5	991.7	II
800	10	UFS10-20	±100	±50	744	272.0	1015	32	950	24	33	871.2	5511.0	245.5	318.2	II
800	16	UFS16-10	±70	±25	608	296.0	1025	38	950	24	39	872.8	5519.0	531.9	1313.3	II
800	16	UFS16-20	±70	±50	912	356.0	1025	38	950	24	39	872.8	5519.0	531.9	408.5	II
900	6	UFS6-10	±70	±25	604	197.0	1075	26	1020	24	30	973.0	6915.0	214.0	578.0	II
900	6	UFS6-20	±70	±50	936	257.0	1075	26	1020	24	30	973.0	6915.0	214.0	176.0	II
900	10	UFS10-10	±105	±25	530	276.0	1115	34	1050	28	33	975.2	6915.0	237.0	1131.0	II
900	10	UFS10-20	±105	±50	766	329.0	1115	34	1050	28	33	975.2	6915.0	237.0	364.0	II
900	16	UFS16-10	±75	±25	634	335.0	1125	40	1050	28	39	976.8	6910.0	512.0	1428.0	II
900	16	UFS16-20	±75	±50	948	405.0	1125	40	1050	28	39	976.8	6910.0	512.0	452.0	II
1000	6	UFS6-10	±75	±25	642	223.0	1175	26	1120	28	30	1077.0	8539.0	215.4	609.3	II
1000	6	UFS6-20	±75	±50	982	291.0	1175	26	1120	28	30	1077.0	8539.0	215.4	194.6	II
1000	10	UFS10-10	±105	±25	562	335.0	1230	34	1160	28	36	1078.2	8536.0	249.0	1217.1	II
1000	10	UFS10-20	±105	±50	818	398.0	1230	34	1160	28	36	1078.2	8536.0	249.0	395.1	II
1000	16	UFS16-10	±80	±25	664	432.0	1255	42	1170	28	42	1080.6	8536.0	591.6	1847.0	II
1000	16	UFS16-20	±80	±50	1004	516.0	1255	42	1170	28	42	1080.6	8536.0	591.6	568.6	II

Overall length unrestrained
Consider the reaction force of the expansion joint: 10x cross section area = reaction force in [N/bar]
[1)] Nominal expansion capacity: these indications are meant for 1000 full load cycles SL=1 at 20°C either axial or lateral
Type designation: L = with inner sleeve; B = without inner sleeve; * = optionally with/without inner sleeve
If an inner guide sleeve is required by the customer, the construction length can be different from the data table.

Type UFS Design I
Universal expansion joint with integrated intermediate tube



Type UFS Design II
Universal expansion joint with attached intermediate tube

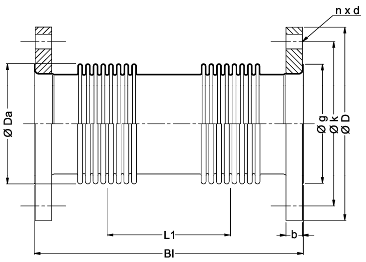


Subject to changes; latest specifications on www.boagroup.com

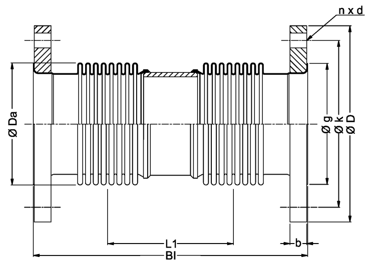
4.1.2 **Type UFB** (with movable, collared flanges)

- Expansion joints of type UFB are equipped **with movable, collared flanges**. The inside medium is only in contact with the austenitic bellows material.
- As a standard, expansion joints of type UFB are manufactured in nominal diameters from DN 40 until DN 300 mm and in pressure ranges of PN 6, 10, 16 and 25.
- As a standard, flanges are made of carbon steel and are primer coated.
- The variant with particularly large lateral movement (Design II) is equipped with an intermediate tube made of carbon steel.
- The design type I or II is indicated in the last column of the standard tables (see fig.).

Design I
Universal expansion joint with integrated intermediate tube



Design II
Universal expansion joint with attached intermediate tube



Overall length unrestrained
Consider the reaction force of the expansion joint: 10x cross section area = reaction force in [N/bar]
[1] Nominal expansion capacity: these indications are meant for 1000 full load cycles SL=1 at 20°C either axial or lateral
Type designation: L = with inner sleeve; B = without inner sleeve; * = optionally with/without inner sleeve
If an inner guide sleeve is required by the customer, the construction length can be different from the data table below.

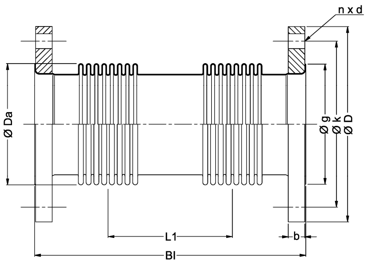
DN	PN	Type	Nominal expansion capacity 1)		Center-to-center distance of the bellows	Overall length unrestrained	Weight (without inner sleeve)	Flange					Bellows					Design
		UFB	Axial	Lateral				Outside Ø	Thickness	Hole circle Ø	Number of holes	Hole Ø	Outside Ø	Male face Ø	Effective area of bellows he	Spring rate ± 30%	Spring rate ± 30%	
			$\pm\Delta_{ax}$	$\pm\Delta_{lat}$	L_1	Bl.	m	D	b	k	n	d	Ø Da	g	A_B	C_{ax}	C_{lat}	
-	-	-	mm	mm	mm	mm	kg	mm	mm	mm	-	mm	mm	mm	cm^2	N/mm	N/mm	-
40	6	UFB6-11	±20	±48	175	258	2.9	130	14	100	4	14	68.0	68.0	27	45	2.4	I
40	6	UFB6-12	±20	±125	415	498	3.0	130	14	100	4	14	68.0	68.0	27	45	0.4	I
40	10	UFB16-11	±16	±50	232	316	4.8	150	16	110	4	18	69.0	68.0	27	127	5	I
40	10	UFB16-12	±16	±110	492	576	5.0	150	16	110	4	18	69.0	68.0	27	127	1	I
40	16	UFB16-11	±16	±50	232	316	4.8	150	16	110	4	18	69.0	68.0	27	127	5	I
40	16	UFB16-12	±16	±110	492	576	5.0	150	16	110	4	18	69.0	68.0	27	127	1	I
40	25	UFB25-11	±12	±25	153	232	5.1	150	18	110	4	18	69.0	68.0	27	159	12	I
40	25	UFB25-12	±12	±50	283	362	5.3	150	18	110	4	18	69.0	68.0	27	159	4	I
40	25	UFB25-13	±12	±90	483	562	5.5	150	18	110	4	18	69.0	68.0	27	159	2	I
50	6	UFB6-11	±21	±48	191	270	3.2	140	14	110	4	14	80.0	81.0	39	42	2.7	I
50	6	UFB6-12	±21	±120	441	520	3.4	140	14	110	4	14	80.0	81.0	39	42	0.5	I
50	10	UFB16-11	±17	±50	261	344	6.3	165	18	125	4	18	82.0	81.0	39	120	4.5	I
50	10	UFB16-12	±17	±100	506	590	6.6	165	18	125	4	18	82.0	81.0	39	120	1.2	I
50	16	UFB16-11	±17	±50	261	344	6.3	165	18	125	4	18	82.0	81.0	39	120	4.5	I
50	16	UFB16-12	±17	±100	506	590	6.6	165	18	125	4	18	82.0	81.0	39	120	1.2	I
50	25	UFB25-11	±15	±24	143	233	6.9	165	20	125	4	18	82.0	81.0	39	162	19	I
50	25	UFB25-12	±15	±48	258	348	7.1	165	20	125	4	18	82.0	81.0	39	162	7	I
50	25	UFB25-13	±15	±90	458	548	7.5	165	20	125	4	18	82.0	81.0	39	162	2	I
65	6	UFB6-11	±24	±48	217	292	4.0	160	14	130	4	14	104.0	105.0	66	381	3.4	I
65	6	UFB6-12	±24	±110	457	532	4.2	160	14	130	4	14	104.0	105.0	66	38	0.8	I
65	10	UFB16-11	±20	±25	148	234	7.2	185	18	145	4	18	104.0	105.0	66	113	21	I
65	10	UFB16-12	±20	±50	276	360	7.6	185	18	145	4	18	104.0	105.0	66	113	7	I

DN	PN	Type	Nominal expansion capacity [1]		Center-to-center distance of the bellows	Overall length unrestrained	Weight (without inner sleeve)	Flange					Bellows					Design
		UFB	Axial	Lateral				Outside Ø	Thickness	Hole circle Ø	Number of holes	Hole Ø	Outside Ø	Male face Ø	Effective area of bellows he	Spring rate ± 30%	Spring rate ± 30%	
			$\pm\Delta_{ax}$	$\pm\Delta_{lat}$	L_1	Bl.	m	D	b	k	n	d	Ø Da	g	A_B	C_{ax}	C_{lat}	
-	-	-	mm	mm	mm	mm	kg	mm	mm	mm	-	mm	mm	mm	cm^2	N/mm	N/mm	-
65	10	UFB16-13	±20	±85	458	544	7.9	185	18	145	4	18	104.0	105.0	66	113	2.5	I
65	16	UFB16-11	±20	±25	148	234	7.2	185	18	145	4	18	104.0	105.0	66	113	21	I
65	16	UFB16-12	±20	±50	276	360	7.6	185	18	145	4	18	104.0	105.0	66	113	7	I
65	16	UFB16-13	±20	±85	458	544	7.9	185	18	145	4	18	104.0	105.0	66	113	2.5	I
65	25	UFB25-11	±20	±24	140	244	9.9	185	24	145	8	18	105.0	105.0	66	192	41	I
65	25	UFB25-12	±20	±48	274	379	10.4	185	24	145	8	18	105.0	105.0	66	192	11	I
65	25	UFB25-13	±20	±85	464	568	11.0	185	24	145	8	18	105.0	105.0	66	192	4	I
80	6	UFB6-11	±27	±46	213	295	6.5	190	16	150	4	18	116.0	120.0	84	34	3.8	I
80	6	UFB6-12	±27	±100	420	502	6.7	190	16	150	4	18	116.0	120.0	84	34	1	I
80	10	UFB16-11	±24	±24	136	234	9.4	200	20	160	8	18	117.5	120.0	84	119	33	I
80	10	UFB16-12	±24	±50	266	364	9.9	200	20	160	8	18	117.5	120.0	84	119	9	I
80	10	UFB16-13	±24	±85	426	524	10.3	200	20	160	8	18	117.5	120.0	84	119	4	I
80	16	UFB16-11	±24	±24	136	234	9.4	200	20	160	8	18	117.5	120.0	84	119	33	I
80	16	UFB16-12	±24	±50	266	364	9.9	200	20	160	8	18	117.5	120.0	84	119	9	I
80	16	UFB16-13	±24	±85	426	524	10.3	200	20	160	8	18	117.5	120.0	84	119	4	I
80	25	UFB25-11	±24	±24	141	256	12.7	200	26	160	8	18	118.5	120.0	84	182	48	I
80	25	UFB25-12	±24	±50	271	386	13.2	200	26	160	8	18	118.5	120.0	84	182	14	I
80	25	UFB25-13	±24	±85	441	556	13.9	200	26	160	8	18	118.5	120.0	84	182	6	I
100	6	UFB6-11	±33	±24	122	216	7.5	210	16	170	4	18	138.0	142.0	127	44	21	I
100	6	UFB6-12	±33	±48	222	316	7.6	210	16	170	4	18	138.0	142.0	127	44	7	I
100	6	UFB6-13	±33	±85	372	466	7.9	240	18	200	8	18	138.0	142.0	127	44	2.5	I
100	10	UFB16-11	±29	±28	158	264	12.4	220	22	180	8	18	141.0	144.0	127	126	39	I
100	10	UFB16-12	±29	±50	268	372	12.9	220	22	180	8	18	141.0	144.0	127	126	14	I
100	10	UFB16-13	±29	±75	388	492	13.4	220	22	180	8	18	141.0	144.0	127	126	7	I
100	16	UFB16-11	±29	±28	158	264	12.4	220	22	180	8	18	141.0	144.0	127	126	39	I
100	16	UFB16-12	±29	±50	268	372	12.9	220	22	180	8	18	141.0	144.0	127	126	14	I
100	16	UFB16-13	±29	±75	388	492	13.4	220	22	180	8	18	141.0	144.0	127	126	7	I
100	25	UFB25-11	±23	±24	173	285	16.9	235	26	190	8	22	141.0	142.0	127	238	58	I
100	25	UFB25-12	±23	±48	318	430	17.5	235	26	190	8	22	141.0	142.0	127	238	19	I
100	25	UFB25-13	±23	±70	438	550	18.0	235	26	190	8	22	141.0	142.0	127	238	11	I
125	6	UFB6-11	±34	±25	150	246	10.1	240	18	200	8	18	168.5	174.0	184	47	23	I
125	6	UFB6-12	±34	±48	260	355	10.3	240	18	200	8	18	168.5	174.0	184	47	8	I
125	6	UFB6-13	±34	±80	400	496	10.7	240	18	200	8	18	168.5	174.0	184	47	3.4	I
125	10	UFB16-11	±32	±25	164	298	16.8	250	24	210	8	18	170.0	174.0	184	197	80	I
125	10	UFB16-12	±32	±50	304	438	17.6	250	24	210	8	18	170.0	174.0	184	197	25	I
125	10	UFB16-20	±32	±75	424	558	21.3	250	24	210	8	18	170.0	174.0	184	197	13	II
125	16	UFB16-11	±32	±25	164	298	16.8	250	24	210	8	18	170.0	174.0	184	197	80	I
125	16	UFB16-12	±32	±50	304	438	17.6	250	24	210	8	18	170.0	174.0	184	197	25	I
125	16	UFB16-20	±32	±75	424	558	21.3	250	24	210	8	18	170.0	174.0	184	197	13	II
125	25	UFB25-11	±27	±24	178	304	23.4	270	28	220	8	26	171.0	174.0	184	310	108	I
125	25	UFB25-12	±27	±50	351	480	24.6	270	28	220	8	26	171.0	174.0	184	310	29	I
125	25	UFB25-20	±27	±75	503	630	28.8	270	28	220	8	26	171.0	174.0	184	310	15	II
150	6	UFB6-11	±45	±28	145	286	13.6	265	20	225	8	18	195.0	196.0	262	57	39	I
150	6	UFB6-12	±45	±48	240	381	14.0	265	20	225	8	18	195.0	196.0	262	57	15	I
150	6	UFB6-13	±45	±75	355	496	14.5	265	20	225	8	18	195.0	196.0	262	57	7	I

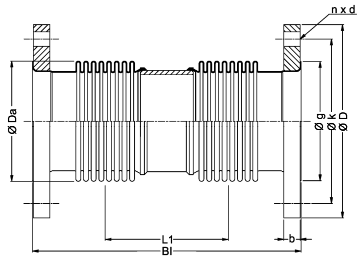
DN	PN	Type UFB	Nominal expansion capacity [1] Axial	Nominal expansion capacity [1] Lateral	Center-to-center distance of the bellows	Overall length unrestrained	Weight (without inner sleeve)	Flange Outside Ø	Flange Thickness	Flange Hole circle Ø	Flange Number of holes	Flange Hole Ø	Bellows Outside Ø	Bellows Male face Ø	Bellows Effective area of bellows he	Bellows Spring rate ± 30%	Bellows Spring rate ± 30%	Design
			$\pm\Delta_{ax}$	$\pm\Delta_{lat}$	L_1	Bl.	m	D	b	k	n	d	Ø Da	g	A_B	C_{ax}	C_{lat}	
-	-	-	mm	mm	mm	mm	kg	mm	mm	mm	-	mm	mm	mm	cm^2	N/mm	N/mm	-
150	10	UFB16-11	±33	±25	173	306	21.1	285	24	240	8	22	195.0	200.0	262	198	98	I
150	10	UFB16-12	±33	±50	323	456	22.2	285	24	240	8	22	195.0	200.0	262	198	30	I
150	10	UFB16-20	±33	±75	473	606	28.8	285	24	240	8	22	195.0	200.0	262	198	15	II
150	16	UFB16-11	±33	±25	173	306	21.1	285	24	240	8	22	195.0	200.0	262	198	98	I
150	16	UFB16-12	±33	±50	323	456	22.2	285	24	240	8	22	195.0	200.0	262	198	30	I
150	16	UFB16-20	±33	±75	473	606	28.8	285	24	240	8	22	195.0	200.0	262	198	15	II
150	25	UFB25-11	±35	±24	171	325	30.9	300	30	250	8	26	197.0	200.0	262	303	154	I
150	25	UFB25-12	±35	±48	304	458	32.2	300	30	250	8	26	197.0	200.0	262	303	53	I
150	25	UFB25-20	±35	±75	464	618	38.3	300	30	250	8	26	197.0	200.0	262	303	23	II
200	6	UFB6-11	±41	±23	163	310	19.2	320	22	280	8	18	252.0	254.0	434	72	67	I
200	6	UFB6-12	±41	±45	303	450	19.8	320	22	280	8	18	252.0	254.0	434	72	21	I
200	6	UFB6-20	±41	±75	488	634	31.5	320	22	280	8	18	252.0	254.0	434	72	8	II
200	10	UFB10-11	±40	±23	177	310	27.9	340	26	295	8	22	251.5	254.0	434	123	98	I
200	10	UFB10-12	±40	±40	307	414	28.8	340	26	295	8	22	251.5	254.0	434	123	41	I
200	10	UFB10-20	±41	±75	522	654	38.2	340	26	295	8	22	251.5	254.0	434	123	13	II
200	16	UFB16-11	±41	±25	180	326	30.9	340	26	295	12	22	253.0	254.0	434	208	160	I
200	16	UFB16-12	±33	±40	333	460	31.7	340	26	295	12	22	253.0	254.0	434	260	64	I
200	16	UFB16-20	±41	±75	500	644	40.4	340	26	295	12	22	253.0	254.0	434	208	23	II
200	25	UFB25-11	±35	±24	213	359	44.5	360	32	310	12	26	255.0	254.0	434	370	204	I
200	25	UFB25-12	±35	±40	328	474	46.3	360	32	310	12	26	255.0	254.0	434	370	93	I
200	25	UFB25-20	±35	±75	595	758	60.5	360	32	310	12	26	254.0	254.0	434	408	32	II
250	6	UFB6-11	±50	±25	190	354	28.1	375	24	335	12	18	306.5	308.0	660	102	105	I
250	6	UFB6-12	±50	±42	300	464	28.9	375	24	335	12	18	306.5	308.0	660	102	45	I
250	6	UFB6-20	±50	±75	500	664	41.2	375	24	335	12	18	306.5	308.0	660	102	17	II
250	10	UFB10-11	±48	±23	182	354	39.1	395	28	350	12	22	306.0	308.0	660	147	163	I
250	10	UFB10-12	±48	±40	294	466	40.3	395	28	350	12	22	306.0	308.0	660	147	67	I
250	10	UFB10-20	±48	±75	534	708	53.5	395	26	350	12	22	306.0	310.0	660	147	21	II
250	16	UFB16-11	±41	±22	191	340	49.7	405	32	355	12	26	309.5	308.0	660	250	261	I
250	16	UFB16-12	±41	±33	271	420	51.1	405	32	355	12	26	309.5	308.0	660	250	135	I
250	16	UFB16-20	±48	±75	522	692	64.4	405	32	355	12	26	308.0	308.0	660	224	34	II
250	25	UFB25-11	±42	±23	212	402	69.6	425	36	370	12	30	310.0	308.0	660	516	429	I
250	25	UFB25-12	±40	±50	438	622	79.8	425	36	370	12	30	309.0	308.0	660	439	93	II
250	25	UFB25-20	±40	±75	628	812	88.1	425	36	370	12	30	309.0	308.0	660	439	46	II
300	6	UFB6-11	±52	±22	192	371	36.9	440	24	395	12	22	358.5	361.0	911	104	151	I
300	6	UFB6-12	±52	±33	267	446	37.6	440	24	395	12	22	358.5	361.0	911	104	78	I
300	6	UFB6-20	±52	±75	557	736	59.1	440	24	395	12	22	358.5	362.0	911	104	19	II
300	10	UFB10-11	±43	±22	211	378	45.0	445	28	400	12	22	360.0	361.0	911	163	196	I
300	10	UFB10-12	±43	±35	321	490	46.5	445	28	400	12	22	360.0	361.0	911	163	88	I
300	10	UFB10-20	±51	±75	591	780	67.1	445	28	400	12	22	358.0	361.0	911	150	24	II
300	16	UFB16-11	±42	±25	250	408	63.0	460	32	410	12	26	361.0	363.0	911	334	290	I
300	16	UFB16-12	±53	±50	392	572	75.6	460	32	410	12	26	361.0	363.0	911	268	96	II
300	16	UFB16-20	±53	±75	572	752	83.9	460	32	410	12	26	361.0	363.0	911	268	46	II
300	25	UFB25-11	±45	±24	254	459	98.7	485	40	430	16	30	362.0	363.0	911	524	413	II
300	25	UFB25-12	±45	±48	499	664	110.7	485	40	430	16	30	362.0	363.0	911	524	140	II
300	25	UFB25-20	±45	±75	659	864	122.4	485	40	430	16	30	362.0	363.0	911	524	69	II

Overall length unrestrained
Consider the reaction force of the expansion joint: 10x cross section area = reaction force in [N/bar]
1) Nominal expansion capacity: these indications are meant for 1000 full load cycles SL=1 at 20°C either axial or lateral
Type designation: L = with inner sleeve; B = without inner sleeve; * = optionally with/without inner sleeve
If an inner guide sleeve is required by the customer, the construction length can be different from the data table.

Type UFB Design I
Universal expansion joint with integrated intermediate tube



Type UFB Design II
Universal expansion joint with attached intermediate tube



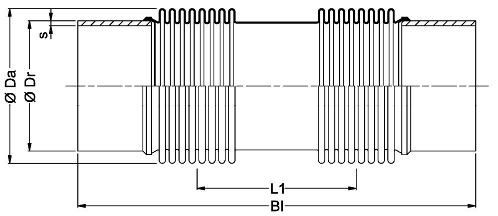
Subject to changes; latest specifications on www.boagroup.com

4.2 Universal expansion joints with weld ends

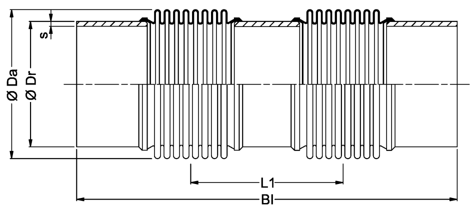
4.2.1 **Type UW** (bellows and weld ends tightly welded)

- **The bellows and weld ends** of expansion joints of type UW are **tightly welded**.
- As a standard, expansion joints of type UW are manufactured in nominal diameters from DN 40 until DN 1000 mm and in pressure ranges of PN 6, 10, 16 and 25.
- As a standard, weld ends are made of carbon steel and are primer coated.
- The variant with particularly large lateral movement (Design II) is equipped with an intermediate tube made of carbon steel.
- The design type I or II is indicated in the last column of the standard tables (see fig.).

Design I
Universal expansion joint with integrated intermediate tube



Design II
Universal expansion joint with attached intermediate tube



Overall length unrestrained
Consider the reaction force of the expansion joint: 10x cross section area = reaction force in [N/bar]
[1)] Nominal expansion capacity: these indications are meant for 1000 full load cycles SL=1 at 20°C either axial or lateral
Type designation: L = with inner sleeve; B = without inner sleeve; * = optionally with/without inner sleeve
If an inner guide sleeve is required by the customer, the construction length can be different from the data table below.

		Type	Nominal expansion capacity[1)]					Weld end		Bellows				
DN	PN	**UW**	Axial	Lateral	Center-to-center distance of the bellows	Overall length unrestrained	Weight (without inner sleeve)	Outside Ø	Thickness	Outside Ø	Effective area of bellows	Spring rate ± 30%	Spring rate ± 30%	Design
			$\pm\Delta_{ax}$	$\pm\Delta_{lat}$	L_1	Bl.	m	Ø Dr	s	Ø Da	A_B	C_{ax}	C_{lat}	
-	-	-	mm	mm	mm	mm	kg	mm	mm	mm	cm^2	N/mm	N/mm	-
40	6	UW 6-11	±30	±49	141	426	1.9	48.3	2.9	69.8	27	87.3	7.6	I
40	6	UW 6-20	±30	±114	291	576	2.5	48.3	2.9	69.8	27	87.3	2.2	II
40	10	UW 16-11	±22	±36	141	426	2.1	48.3	2.9	70.0	27	184	16.1	I
40	10	UW 16-20	±22	±85	291	576	2.8	48.3	2.9	70.0	27	184	4.1	II
40	16	UW 16-11	±22	±36	141	426	2.1	48.3	2.9	70.0	27	184	16.1	I
40	16	UW 16-20	±22	±85	291	576	2.8	48.3	2.9	70.0	27	184	4.1	II
40	25	UW 25-11	±16	±50	239	512	2.1	48.3	2.9	69.0	27	232	8	I
40	25	UW 25-20	±16	±79	359	632	2.9	48.3	2.9	69.0	27	232	4	II
50	6	UW 6-11	±32	±44	141	426	2.3	60.3	3.2	82.8	39	102.1	12.5	I
50	6	UW 6-20	±32	±106	301	586	2.9	60.3	3.2	82.8	39	102.1	3.1	II
50	10	UW 16-11	±26	±35	141	426	2.6	60.3	3.2	84.0	39	173	22	I
50	10	UW 16-20	±26	±85	301	586	3.2	60.3	3.2	84.0	39	173	5.1	II
50	16	UW 16-11	±26	±35	141	426	2.6	60.3	3.2	84.0	39	173	22	I
50	16	UW 16-20	±26	±85	301	586	3.2	60.3	3.2	84.0	39	173	5.1	II
50	25	UW 25-11	±18	±46	236	506	2.6	60.3	3.2	83.0	38	231	11	I
50	25	UW 25-20	±18	±75	356	626	3.2	60.3	3.2	83.0	38	231	5	II
65	6	UW 6-11	±35	±37	141	426	3	76.1	3.2	105.0	66	109.6	22.2	I
65	6	UW 6-20	±35	±100	331	616	4.4	76.1	3.2	105.0	66	109.6	4.3	II
65	10	UW 16-11	±30	±32	141	426	3.4	76.1	3.2	107.0	66	165	35	I
65	10	UW 16-20	±30	±86	331	616	4.7	76.1	3.2	107.0	66	165	7.2	II
65	16	UW 16-11	±30	±32	141	426	3.4	76.1	3.2	107.0	66	165	35	I

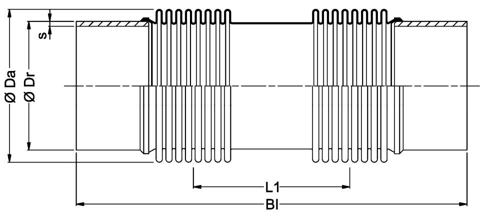
DN	PN	Type UW	Nominal expansion capacity[1)] Axial	Lateral	Center-to-center distance of the bellows	Overall length unresrained	Weight (without inner sleeve)	Weld end Outside Ø	Thickness	Bellows Outside Ø	Effective area of bellows	Spring rate ± 30%	Spring rate ± 30%	Design
			$\pm\Delta_{ax}$	$\pm\Delta_{lat}$	L_1	Bl.	m	Ø Dr	s	Ø Da	A_B	C_{ax}	C_{lat}	
-	-	-	mm	mm	mm	mm	kg	mm	mm	mm	cm^2	N/mm	N/mm	-
65	16	UW 16-20	±30	±86	331	616	4.7	76.1	3.2	107.0	66	165	7.2	II
65	25	UW 25-11	±23	±46	244	522	3.5	76.1	3.2	106.0	65	232	18	I
65	25	UW 25-20	±23	±75	364	642	5	76.1	3.2	106.0	65	232	8	II
80	6	UW 6-11	±38	±37	141	426	3.5	88.9	3.6	117.4	83	73.2	18.6	I
80	6	UW 6-20	±38	±100	331	616	5.3	88.9	3.6	117.4	83	73.2	3.6	II
80	10	UW 16-11	±32	±32	141	426	4.2	88.9	3.6	120.0	83	166	44	I
80	10	UW 16-20	±34	±87	331	616	5.9	88.9	3.6	120.0	83	166	9	II
80	16	UW 16-11	±32	±32	141	426	4.2	88.9	3.6	120.0	83	166	44	I
80	16	UW 16-20	±34	±87	331	616	5.9	88.9	3.6	120.0	83	166	9	II
80	25	UW 25-11	±23	±40	232	498	4.2	88.9	3.6	118.5	83	182	20	I
80	25	UW 25-20	±23	±75	402	668	5.9	88.9	3.6	118.5	83	182	7	II
100	6	UW 6-11	±42	±33	141	488	5.8	114.3	4.0	143.2	126	107.5	40.6	I
100	6	UW 6-20	±42	±100	371	718	8.3	114.3	4.0	143.2	126	107.5	6.4	II
100	10	UW 16-11	±35	±27	141	488	6.6	114.3	4.0	145.5	126	158	65	I
100	10	UW 16-20	±35	±76	341	688	9.2	114.3	4.0	145.5	126	158	11.7	II
100	16	UW 16-11	±35	±27	141	488	6.6	114.3	4.0	145.5	126	158	65	I
100	16	UW 16-20	±35	±76	341	688	9.2	114.3	4.0	145.5	126	158	11.7	II
100	25	UW 25-11	±27	±35	221	558	6.6	114.3	4.0	145.0	125	220	40	I
100	25	UW 25-20	±27	±56	331	668	9.2	114.3	4.0	145.0	125	220	20	II
125	6	UW 6-11	±48	±30	138	482	6.4	139.7	4.0	171.0	183	64.5	38.3	I
125	6	UW 6-20	±48	±78	308	652	9.2	139.7	4.0	171.0	183	64.5	8.1	II
125	10	UW 10-11	±43	±27	140	486	7.7	139.7	4.0	172.0	183	132	71	I
125	10	UW 10-20	±43	±78	350	696	11	139.7	4.0	172.0	183	132	13	II
125	16	UW 16-11	±41	±26	144	494	8.9	139.7	4.0	173.0	183	173	95	I
125	16	UW 16-20	±41	±76	354	704	12.2	139.7	4.0	173.0	183	173	17	II
125	25	UW 25-11	±33	±36	230	576	9	139.7	4.0	174.0	183	242	59	I
125	25	UW 25-20	±33	±58	350	696	12.3	139.7	4.0	174.0	183	242	25	II
150	6	UW 10-11	±38	±35	221	566	8.4	168.3	4.5	201.0	260	114	41	I
150	6	UW 10-20	±38	±76	431	776	14.4	168.3	4.5	201.0	260	114	11	II
150	10	UW 10-11	±38	±35	221	566	8.4	168.3	4.5	201.0	260	114	41	I
150	10	UW 10-20	±38	±76	431	776	14.4	168.3	4.5	201.0	260	114	11	II
150	16	UW 16-11	±36	±31	209	562	10.7	168.3	4.5	203.0	260	186	71	I
150	16	UW 16-20	±36	±59	359	712	15.3	168.3	4.5	203.0	260	186	25	II
150	25	UW 25-11	±35	±29	218	580	13.6	168.3	4.5	205.0	260	288	110	I
150	25	UW 25-20	±35	±53	368	730	17.2	168.3	4.5	205.0	260	288	40	II
200	6	UW 10-11	±46	±25	181	432	10.6	219.1	4.5	256.0	430	147	130	I
200	6	UW 10-20	±46	±73	451	702	18.7	219.1	4.5	256.0	430	147	20	II
200	10	UW 10-11	±46	±25	181	432	10.6	219.1	4.5	256.0	430	147	130	I
200	10	UW 10-20	±46	±73	471	702	18.7	219.1	4.5	256.0	430	147	20	II
200	16	UW 16-11	±33	±23	217	454	13.5	219.1	4.5	258.0	430	285	182	I
200	16	UW 16-20	±33	±52	437	674	21.5	219.1	4.5	258.0	430	285	44	II
200	25	UW 25-11	±32	±22	217	454	15	219.1	6.3	258.0	430	285	182	I
200	25	UW 25-20	±32	±50	439	676	25.6	219.1	6.3	258.0	430	285	44	II
250	6	UW 10-11	±39	±22	211	442	11.3	273	5.0	311.0	660	132	133	I
250	6	UW 10-20	±39	±53	471	702	23.4	273	5.0	311.0	660	132	29	II
250	10	UW 10-11	±39	±22	211	442	11.3	273	5.0	311.0	660	132	133	I

		Type	Nominal expansion capacity[1)]		Center-to-center distance of the bellows	Overall length unresrained	Weight (without inner sleeve)	Weld end		Bellows				Design
DN	PN	UW	Axial	Lateral				Outside Ø	Thickness	Outside Ø	Effective area of bellows	Spring rate ± 30%	Spring rate ± 30%	
			$\pm\Delta_{ax}$	$\pm\Delta_{lat}$	L_1	Bl.	m	Ø Dr	s	Ø Da	A_B	C_{ax}	C_{lat}	
-	-	-	mm	mm	mm	mm	kg	mm	mm	mm	cm^2	N/mm	N/mm	-
250	10	UW 10-20	±39	±53	471	702	23.4	273	5.0	311.0	660	132	29	II
250	16	UW 16-11	±37	±21	224	468	20	273	5.0	315.0	660	332	302	I
250	16	UW 16-20	±37	±52	484	728	32.5	273	5.0	315.0	660	332	65	II
250	25	UW 25-11	±36	±20	224	468	22	273	6.3	315.0	660	332	302	I
250	25	UW 25-20	±36	±50	484	728	36.1	273	6.3	315.0	660	332	65	II
300	6	UW 10-11	±42	±20	216	452	15.7	323.9	5.6	364.0	910	162	217	I
300	6	UW 10-20	±42	±52	506	742	33.7	323.9	5.6	364.0	910	162	44	II
300	10	UW 10-11	±42	±20	216	452	15.7	323.9	5.6	364.0	910	162	217	I
300	10	UW 10-20	±42	±52	506	742	33.7	323.9	5.6	364.0	910	162	44	II
300	16	UW 16-11	±40	±18.5	217	464	24.4	323.9	5.6	367.0	910	336	452	I
300	16	UW 16-20	±40	±52	517	764	42.5	323.9	5.6	367.0	910	336	78	II
300	25	UW 25-11	±38	±18	217	464	26	323.9	7.1	367.0	910	336	452	I
300	25	UW 25-20	±38	±50	517	764	46.8	323.9	7.1	367.0	910	336	78	II
350	6	UW 6-11	±55	±35	301	584	21	355.6	5.6	397.2	1103	144.5	107.8	I
350	6	UW 6-20	±75	±75	458	772	36	355.6	5.6	400.8	1103	160.8	53.2	II
350	10	UW 10-11	±55	±33	295	578	25	355.6	5.6	398.0	1103	181.9	141.1	I
350	10	UW 10-20	±60	±75	539	758	52	355.6	5.6	401.6	1103	226.6	55.2	II
350	16	UW 16-11	±45	±33	330	602	31	355.6	5.6	401.6	1094	283.3	184.1	I
350	16	UW 16-20	±50	±50	457	731	52	355.6	5.6	402.4	1094	326	110.7	II
400	6	UW 6-11	±55	±28	275	562	26	406.4	6.3	449.2	1420	143.7	164.1	I
400	6	UW 6-20	±65	±50	414	704	49	406.4	6.3	452.0	1420	159.5	83.3	II
400	10	UW 10-11	±78	±36	275	590	33	406.4	6.3	455.0	1420	240	266	I
400	10	UW 10-20	±65	±50	426	770	56	406.4	6.3	452.6	1420	240.8	119.1	II
400	16	UW 16-11	±50	±30	316	594	41	406.4	6.3	454.4	1420	325.5	296.5	I
400	16	UW 16-20	±50	±50	500	776	66	406.4	6.3	454.4	1420	325.5	119.1	II
450	6	UW 6-11	±60	±25	267	556	29	457	6.3	503.6	1797	147.9	224.6	I
450	6	UW 6-20	±70	±50	445	738	56	457	6.3	506.4	1797	164.7	94.6	II
450	10	UW 10-11	±60	±25	265	602	38	457	6.3	505.2	1797	224.7	345.6	I
450	10	UW 10-20	±65	±50	443	782	64	457	6.3	506.6	1797	254.3	147.4	II
450	16	UW 16-11	±50	±27.5	320	602	50	457	6.3	508.2	1801	414	460.5	I
450	16	UW 16-20	±55	±50	518	797	75	457	6.3	508.2	1801	335.9	144.8	II
500	6	UW 6-11	±60	±22.5	250	541	32	508	6.3	555.2	2202	148	310.6	I
500	6	UW 6-20	±70	±50	472	767	64	508	6.3	558.0	2202	165.5	103.5	II
500	10	UW 10-11	±55	±22.5	305	584	46	508	6.3	557.6	2202	330	484.2	I
500	10	UW 10-20	±75	±50	472	764	81	508	6.3	560.2	2202	323.9	203.4	II
500	16	UW 16-11	±55	±20	255	572	60	508	6.3	561.0	2195	560.4	1145.7	I
500	16	UW 16-20	±60	±50	530	814	88	508	6.3	561.2	2195	381.8	193	II
600	6	UW 6-11	±45	±18	312	587	48	611.4	6.3	660.0	3141	361.2	718.2	I
600	6	UW 6-20	±75	±50	510	810	94	611.4	6.3	662.0	3141	166.2	126.5	II
600	10	UW 10-11	±45	±18	310	608	62	611.4	8.0	662.0	3141	548.9	1105.6	I
600	10	UW 10-20	±75	±50	512	788	118	611.4	8.0	663.2	3141	342.8	559.4	II
600	16	UW 16-11	±60	±16.5	245	572	87	609.6	8.0	665.0	3141	671.4	2079.2	I
600	16	UW 16-20	±60	±50	591	878	145	609.6	8.0	665.2	3141	383.2	221	II
700	6	UW 6-10	±80	±25	305	613	90	713	8.0	765.2	4243	215.6	597.5	II
700	6	UW 6-20	±80	±50	547	855	124	713	8.0	765.2	4243	215.6	192.8	II

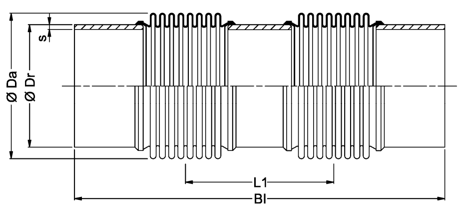
		Type	Nominal expansion capacity[1)]					Weld end		Bellows				
DN	PN	UW	Axial	Lateral	Center-to-center distance of the bellows	Overall length unrestrained	Weight (without inner sleeve)	Outside Ø	Thickness	Outside Ø	Effective area of bellows	Spring rate ± 30%	Spring rate ± 30%	Design
			$\pm\Delta_{ax}$	$\pm\Delta_{lat}$	L_1	Bl.	m	Ø Dr	s	Ø Da	A_B	C_{ax}	C_{lat}	
-	-	-	mm	mm	mm	mm	kg	mm	mm	mm	cm^2	N/mm	N/mm	-
700	10	UW 10-10	±90	±25	279	550	104	711.2	8.0	767.2	4243	239.8	804.6	II
700	10	UW 10-20	±90	±50	499	730	129	711.2	8.0	767.2	4243	239.8	259.8	II
700	16	UW 16-10	±65	±25	358	652	138	713.6	10.0	767.4	4229	485.3	1005.8	II
700	16	UW 16-20	±65	±50	648	942	188	713.6	10.0	767.4	4229	485.3	313.7	II
800	6	UW 6-10	±70	±25	379	659	112	814.6	8.0	870.0	5511	210.9	508.1	II
800	6	UW 6-20	±70	±50	689	969	161	814.6	8.0	870.0	5511	210.9	156	II
800	10	UW 10-10	±100	±25	289	562	127	812.8	8.0	871.2	5511	245.5	991.7	II
800	10	UW 10-20	±100	±50	519	742	155	812.8	8.0	871.2	5511	245.5	318.2	II
800	16	UW 16-10	±70	±25	374	674	167	815.2	10.0	872.8	5519	531.9	1313.3	II
800	16	UW 16-20	±70	±50	678	978	227	815.2	10.0	872.8	5519	531.9	408.5	II
900	6	UW 6-10	±70	±25	401	684	130	915.8	8.0	973.0	6915	214	578	II
900	6	UW 6-20	±70	±50	733	1016	190	915.8	8.0	973.0	6915	214	176	II
900	10	UW 10-10	±105	±25	298	594	155	914	10.0	975.2	6915	236.1	1130.6	II
900	10	UW 10-20	±105	±50	534	830	208	914	10.0	975.2	6915	236.1	364	II
900	16	UW 16-10	±75	±25	394	696	192	914	10.0	976.8	6910	512	1428	II
900	16	UW 16-20	±75	±50	708	1010	262	914	10.0	976.8	6910	512	452	II
1000	6	UW 6-10	±75	±25	436	721	151	1017.8	8.0	1077.0	8536	215.4	609.3	II
1000	6	UW 6-20	±75	±50	776	1061	219	1017.8	8.0	1077.0	8536	215.4	194.6	II
1000	10	UW 10-10	±105	±25	328	556	159	1016	10.0	1078.2	8536	249	1217.1	II
1000	10	UW 10-20	±105	±50	584	736	204	1016	10.0	1078.2	8536	249	395.1	II
1000	16	UW 16-10	±80	±25	414	722	226	1018	12.0	1080.6	8536	591.6	1847	II
1000	16	UW 16-20	±80	±50	754	1062	310	1018	12.0	1080.6	8536	591.6	568.6	II

Overall length unrestrained
Consider the reaction force of the expansion joint: 10x cross section area = reaction force in [N/bar]
1) Nominal expansion capacity: these indications are meant for 1000 full load cycles SL=1 at 20°C either axial or lateral
Type designation: L = with inner sleeve; B = without inner sleeve; * = optionally with/without inner sleeve
If an inner guide sleeve is required by the customer, the construction length can be different from the data table.

Type UW Design I
Universal expansion joint with integrated intermediate tube



Type UW Design II
Universal expansion joint with attached intermediate tube



Subject to changes; latest specifications on www.boagroup.com