



INSTALLATION INSTRUCTION

ALL FLANGED RUBBER EXPANSION JOINTS

Rubber expansion joints are available in two ready to fit versions with standard connections according to DIN, ASA, BS, etc.

- **Rotatable steel flanges**

These should fit precisely and burr-free in the fitting area of the rubber bellow, whereby the sealing surface can protrude about 1 – 10 mm depending on the nominal diameter. The mating flange sealing surfaces can be smooth (Form A) or with seal (Form B) according to EN 1092 - 1: 2001.

- **Pressure-resistant solid rubber flanges**

These flanges are delivered including single-piece steel backing flanges. The mating flanges should have a smooth sealing surface according to EN 1092 - 1: 2001 (Form A).

Both types of expansion joints are self-sealing; additional seals are unnecessary.

1. PLANNING INSTRUCTIONS

Expansion joints must be arranged in pipes in such a way that regular maintenance and any necessary replacement can take place easily.

It must be ensured that the expansion joints do not rub against adjacent components also when expanded to the maximum permissible limits.

The expansion joints must also not be exposed to high externally radiated or accumulated heat.

Universal expansion joints (without tie rods) for absorbing axial, lateral and angular movements.

For an expansion joint to absorb the axial or lateral movements (expansion or compression) of a pipe, it must be arranged between two fixed points. In addition, plain bearings must be

included for pipe routing/support. The reaction forces, adjusting forces and friction forces must be taken into account in the dimensioning of the fixed points and plain bearings.

Reaction force (N) = Effective area (mm²) x working pressure (N/mm²).

$$F = A \times P$$

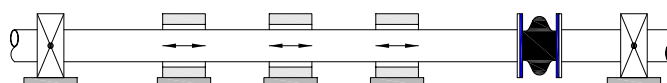
(Adjusting forces according to type data sheet)

Fitting example 1 (EB 1)

Compensation of axial expansion with expansion joints without tie rods.

The reaction forces of the expansion joint are absorbed by the fixed bearing.

EB 1



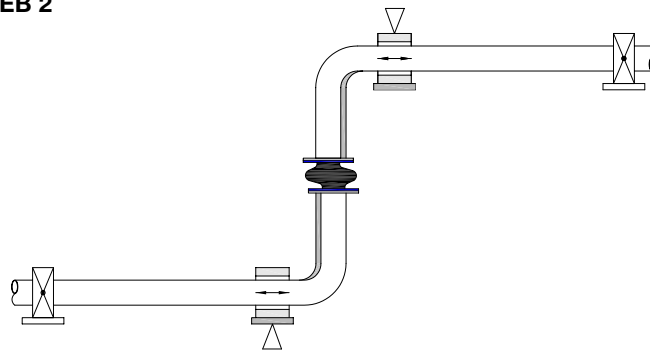
Fitting example 2 (EB2)

Compensation of lateral and axial expansion with an expansion

joint without tie rods. The reaction forces of the expansion joint are absorbed by the fixed bearings and plain bearings. The plain

bearings must be appropriately supported! Adjusting forces must be absorbed by the fixed points.

EB 2



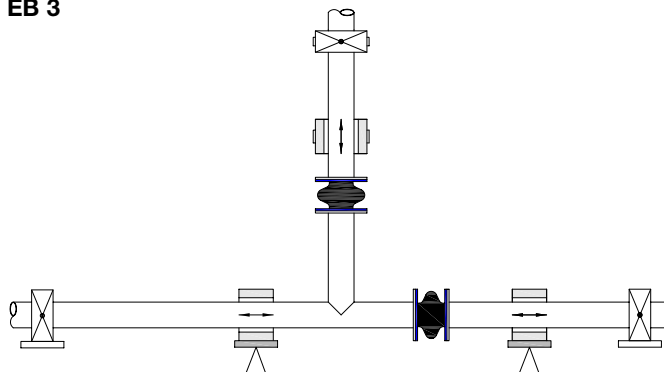
Fitting example 3 (EB 3)

Compensation of lateral and axial

expansion with expansion joints without tie rods arranged in a pipe outlet. The reaction forces of the expansion joint

are absorbed by the fixed bearings and plain bearings. The plain bearings must be appropriately supported!

EB 3



Lateral expansion joints (with tie rods) for absorbing lateral movements.

If an expansion joint for absorbing axial movements cannot be fitted

between two fixed points, the axial movement must be converted into a lateral movement. This makes it possible to use an expansion joint with tie rods, which neutralises the occurring reaction forces (inside area of the

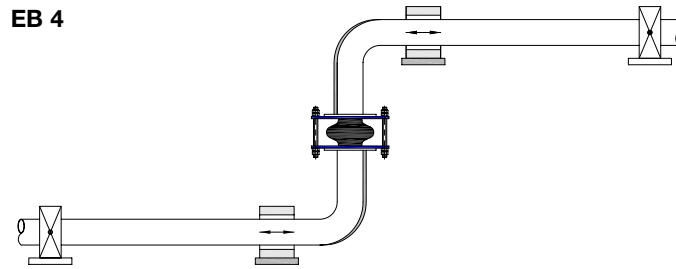
expansion joint x working pressure). With this arrangement, only appropriate plain bearings may be used for correct initiation of expansion. A large selection of rubber expansion joint tie rods can be found in our catalogue.

Fitting example (EB 4)

Compensation of axial expansion by deflection into a lateral movement with expansion joints with tie rods.

Compensation of axial expansion by deflection into a lateral movement with expansion joints with tie rods. The adjusting forces of the expansion joint are absorbed by the fixed bearings. The

plain bearings serve only for correct initiation of movement in the expansion joint! In contrast to fitting example 2, axial movement of the vertical pipe arm is disregarded.



Angular expansion joints (with joint tie rods) for absorbing angular movements.

In order to absorb significant axial movements with low adjusting forces, a

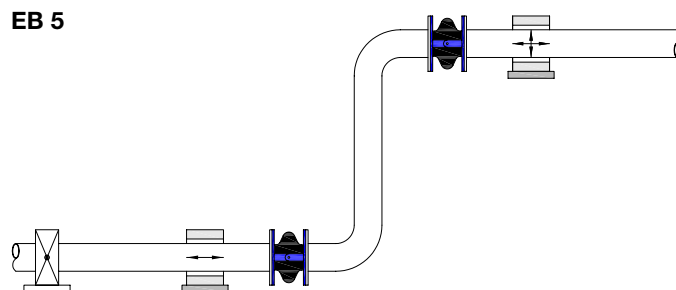
combination of angular expansion joints with tie rods can be used.

Fitting example 5 (EB 5)

Compensation of axial expansion by deflection to angular movement using

expansion joints with tie rods. Advantage: Significant axial expansion can be absorbed by only two expansion joints. The reaction forces of the expansion

joint are absorbed by the joint tie rods. The plain bearings serve only for correct initiation of movement in the expansion joint!

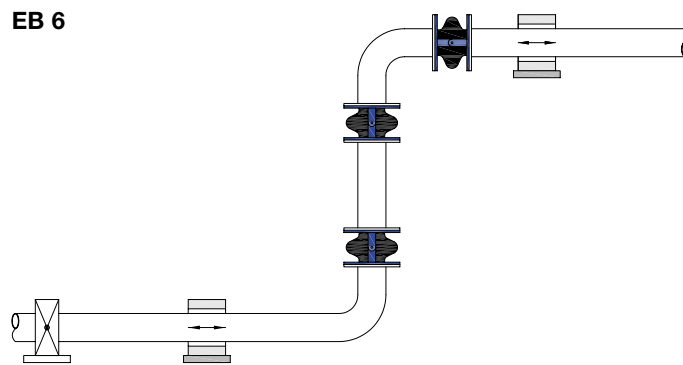


Fitting example 6 (EB 6)

Arrangement of pipe joint expansion joints in three joint systems for compen-

sating expansion in two directions. Advantage: High expansion compensation, low adjusting forces, soft corner. The reaction forces of the

expansion joint are absorbed by the joint tie rods. The plain bearings serve only for correct initiation of movement in the expansion joint!



Expansion joints for pump connection (with/without tie rods) for absorbing vibrations.

Where rubber expansion joints are used on pumps, these should prevent the transmission of forces,

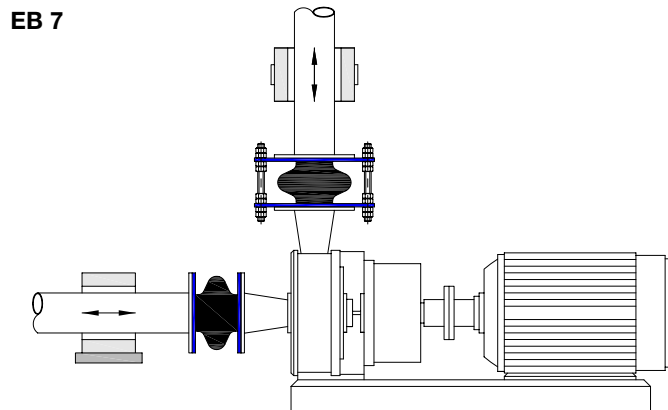
stresses and vibrations in order to decouple the pipe system from the pump.

Fitting example 7 (EB 7)

Expansion joints with tie rods should

always be used for arrangement in pressure pipes to prevent the pump support from being overloaded due to

the reaction forces. A vacuum support ring should be used on the suction side if possible.



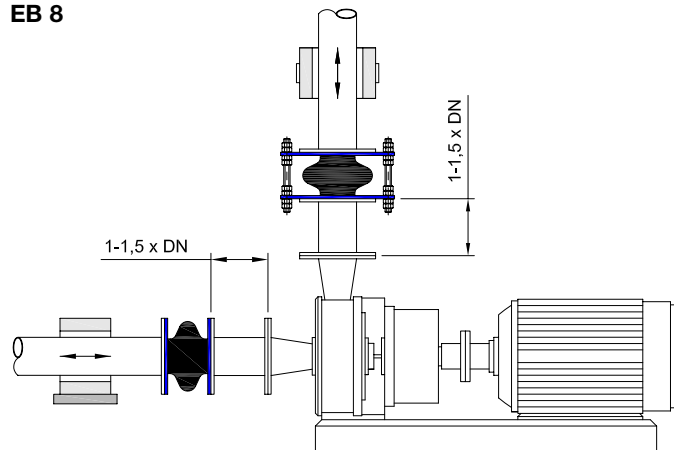
Fitting example 8 (EB 8)
- IMPORTANT!!

For the transport of abrasive media (liquids containing solids such as water/sand), the expansion joints must not be arranged directly on the pump support (suction/pressure side,

as there is a risk of the expansion joints being damaged due to relatively high velocities from swirl and vertebration on the pump support. This applies similarly to elbows and outlets. The fitting distance from

the pump support to the expansion joint/elbow must be 1 to 1.5 x DN. Pump operation against a fully or partly closed gate or flap valve must be avoided. Cavitation must also be avoided as this can quickly damage the expansion joint.

EB 8



Expansion joints with pressure relief for absorbing axial and lateral movement. Pressure-relieved

expansion joints can be used to prevent the transmission of reaction forces resulting

from excess or low pressure to adjacent fixed bearings, apparatus or machines.

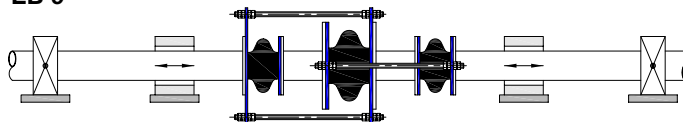
Fitting example 9 (EB 9)

Expansion joints for absorbing axial expansion without

the transmission of reaction forces resulting from excess or low pressure to adjacent

fixed bearings, apparatus or machines (observe adjusting forces).

EB 9

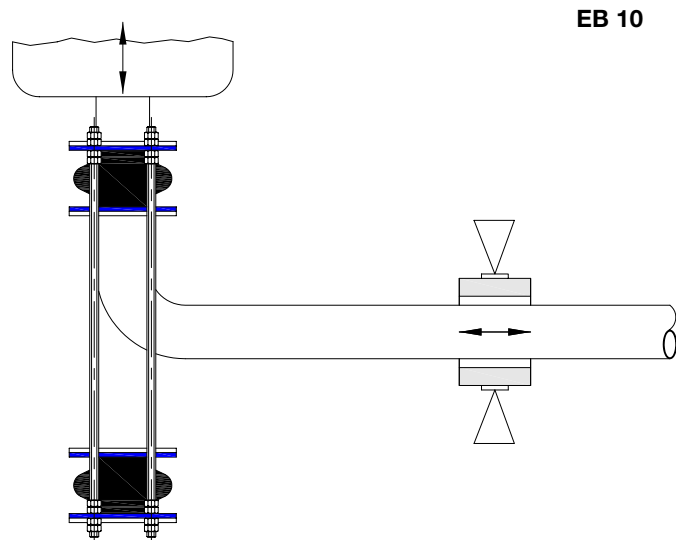


Fitting example 10 (EB 10)

Expansion joints for absorbing axial and lateral expansion

on an elbow without the transmission of reaction forces resulting from

excess or low pressure to adjacent fixed bearings (adjusting forces).



Expansion joints (with tie rods) for fitting/removal

To compensate for fitting inaccuracies or for easy fitting or removal, an

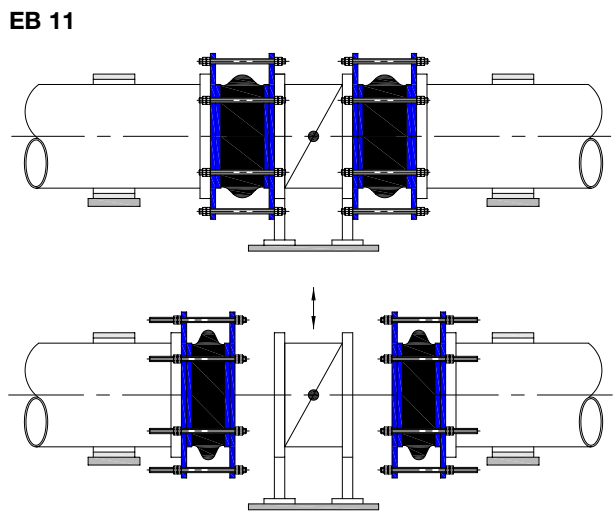
expansion joint with tie rods can also be mounted directly on a valve.

Fitting example 11 (EB 11)

Expansion joint with tie rods for fitting/removal.

Tie rods prevent the transmission of reaction forces to a connected valve and by loosening the flange connection with the aid

of the tie rod flange, the rubber bellow can be compressed to its maximum axial limits to enable removal of the valve.

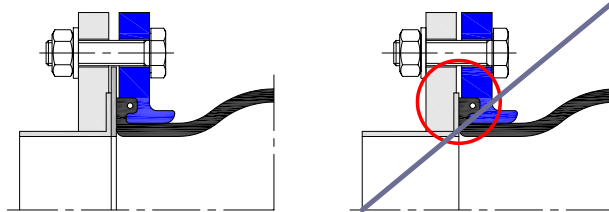


Fitting example 12 (EB 12)

For rubberised pipes or valves, a blank gasket must

be used to prevent a rubber-on-rubber seal.

EB 12



2. BUILT PLANNING

Arrangement of pipe supports

The fixed points of the guide bearings must be arranged in such a way that:

- the expansion joint is not loaded by the weight of the pipe
- bending due to the arrangement of

fixed or loose bearings is prevented

- suspension in self-aligning bearings is avoided; plain or roller bearings must be used as guide bearings

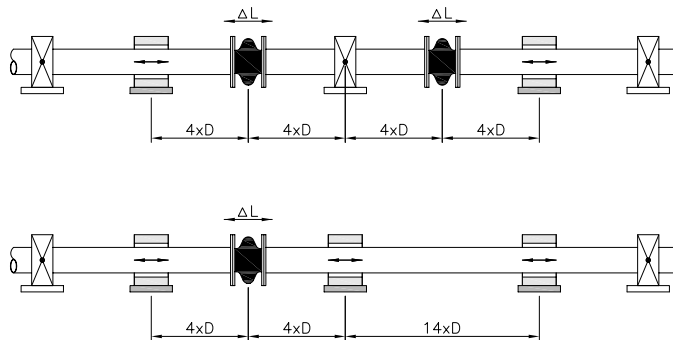
Arrangement of floating bearings

The distance between the expansion joint and first bearing can be max. 4 x

the pipe diameter.

- The distance between the first and second bearing can be max. 14 x the pipe diameter
- The distance between the remaining pipe bearings can be max. 21 x the pipe diameter. This distance must be reduced if necessary due to the inherent stability of the pipe

EB 13



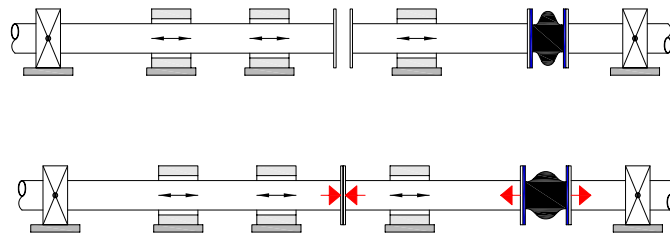
Initial tension of expansion joints

If an expansion joint is fitted with an initial tension greater than 10 mm axially or 5 mm laterally, the expansion joint must be fitted first and then the appropriate initial tension generated

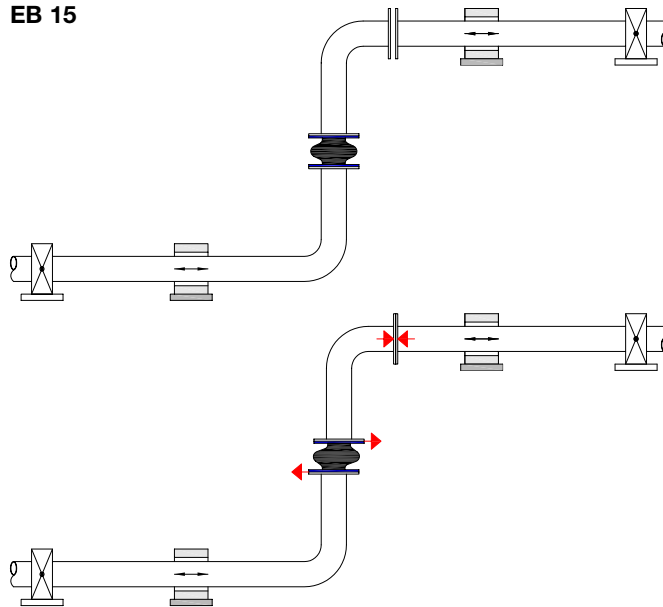
with the permanently fitted expansion joint at an open point in the pipe. (Fitting example EB 14 + 15)
Reason: A not yet fitted expansion joint with a higher initial tension will cause the sealing bead to

spring out of the groove of the steel flange and this could damage the sealing bead or cause a leak. For planning purposes, it must be ensured that the pipe can be opened!

EB 14



EB 15



3. SAFETY MEASURES

Excess pressure, temperature rise, vacuum

Protect pipes against inadmissible excess pressure, excessive temperature rise and uncontrolled vacuum. The limiting values are shown in the data sheets of our catalogue.

Water hammer and vacuum drop

Draining and venting options are provided to prevent water hammer and vacuum drop.

Resistance

The inner material of the bellow coming into contact with the medium must be suitable for the medium transported in the pipe.

If the list does not contain a specific medium, we must be provided with appropriate data from the safety data sheet for chemical substances and preparations according to DIN 52900, clauses 1 to 2.13 in order to enable us to determine whether the inner liner of the expansion joint is suitable.

Flow rate

For high flow rates, it must be clarified whether the expansion joints must be used with or without guide tube in order to prevent wear due to excessive vibration.

Vacuum support spiral/ring

If the expected vacuum is higher than 0.8 bar absolute, a vacuum support spiral or vacuum support ring must be provided.

These prevent the bellow from collapsing. For use directly downstream of a pump, flap valve or elbow, a check must be made to ensure correct positioning after fitting – see Fitting instructions + Fitting example (EB 16)!

External influences

Extreme external influences make it necessary to protect the expansion joints via special measures:

- Ground protection cover: Protects against damage to bellows, fouling and earth pressure on buried pipes.

- UV protection cover: Protects against UV radiation and influences of weather in regions exposed to extreme sunlight.
- Flame-retardant protective cover: Protects against fire up to 800°C for 30 minutes.

Dangerous media

The expansion joints must be provided with suitable splash protection for pipes used for transporting dangerous or environmentally harmful media.

Mating flanges/Flange connection

Mating flanges and flange connections must be as described in the following Fitting example 16 (EB 16) to ensure a reliable seal and to prevent damage to the rubber expansion joints.

Mating flanges with and without projection according to EN 1092-1:2001 Form A or B must be used for expansion joints with rotatable flanges. Only smooth mating flanges should be used for expansion joints with solid flanges. Other types are available on request.

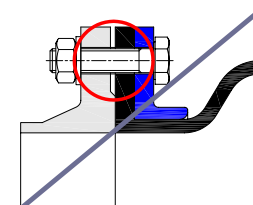
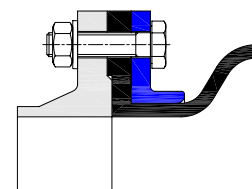
Fitting example 16 (A - E)

If a smooth flange cannot be used for

expansion joints with solid rubber flanges, the recess of the mating flange must be compensated with a

seal with an appropriately thick ring or taken into account in rubber flange fabrication.

EB 16 A

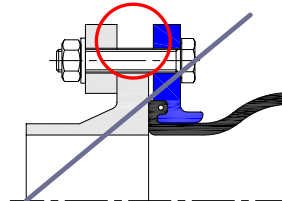
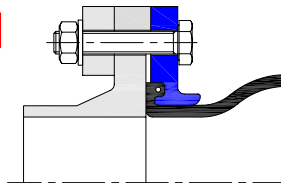


When using backing flanges with thick bead, the gap above the bolts between

both flanges must be filled with an appropriate ring. This stops the backing

flange from tilting and thus avoids incorrect contact with the sealing surface!

EB 16 B

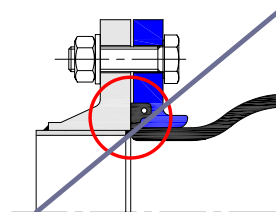
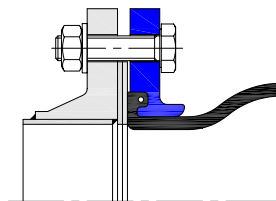
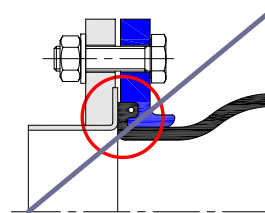
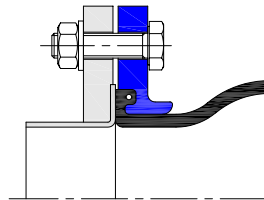


When using flare flanges and slip-on flanges, it must be ensured that the internal diameter of the sealing surface

of the mating flange corresponds to the internal diameter of the bellow. If this is not the case and the internal

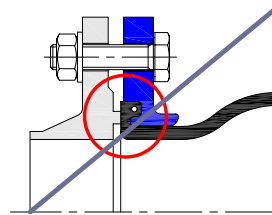
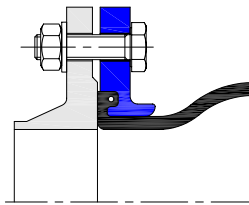
diameter of the mating flange is larger, a blank metal gasket and an additional seal must be used!

EB 16 C



Mating flanges with groove or tongue must not be used.

EB 16 D

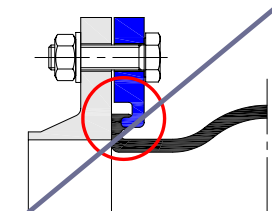
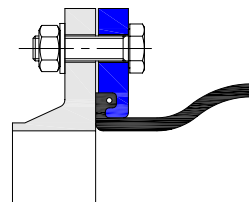


It must be ensured during fitting that the rubber bead is located correctly in

the groove of the expansion joint flange, otherwise the sealing

surface may be damaged and leaks can occur!

EB 16 E



4. PACKAGING

- Check the packaging for external damage
- Check the contents against the delivery note or packing list
- If possible, do not unpack the expansion joints prior to assembly
- Only open the packaging with a blunt object
- Ensure that nails or staples in wooden crates do not come into contact with the rubber bellow

5. STORAGE

- See DIN 7716 - Guidelines for the storage of rubber parts. Rubber expansion joints must be stored

without being subject to stress, deformation and kinking

- Rubber expansion joints with steel flanges must be stored upright on the flanges (risk of crushing)
- Store in a cool, dry, dust-free and moderately ventilated room
- Protect rubber parts against draughts and cover if necessary. Ozone-generating equipment such as electric motors, fluorescent light sources, etc., must not be used at the place of storage
- Do not store any solvents, fuels, chemicals or similar together with the expansion joints

6. TRANSPORT

- Leave the parts packed

- Note „TOP“ at the top and „cable or lifting hook“
- Steel backing rings (with bracing) and the rubber expansion joint flanges must remain fastened until final fitting to avoid excessive loads on the rubber part!
- Do not use any sharp-edged tools, wire ropes, chains or lifting hooks (risk of damage to rubber)
- Always lift both steel flanges simultaneously. Shackle at both sides or place padded tie-bars through the expansion joint
- For ground level transportation without means of transport, roll the expansion joint on the flanges

7. FITTING

Rubber expansion joints are intended for absorbing movements under certain pressure and temperature conditions to be determined in advance. To ensure that the maximum service life is reached, the following must be observed for fitting.

Prior to fitting

- Check the packaging of the rubber expansion joints and after unpacking also the expansion joint itself for damage. Damaged expansion joints must not be fitted
- Check the pipe run to ensure that it is straight in the area in which the expansion joint is to be fitted and that the pipe is limited by appropriate fixed points

IMPORTANT

Welding in the vicinity of expansion joints must be avoided. If this cannot be avoided, the expansion joint must be covered with a flame-retardant and heat resistant material to protect it against welding heat and flying sparks. When welding the complete

Only one expansion joint or several expansion joints coupled to form a unit may be fitted between two fixed points

- Check the size of the fitting gap. The mating flanges should be fitted in alignment with each other. The maximum deviation between the fitting gap and expansion joint can be +/-10 mm axially and +/-5 mm laterally
- Note: If the aforementioned tolerances cannot be maintained, the procedure is as described in the section "Initial tension of expansion joints" Fitting example 8 (EB 8)
- The pipe flanges must not be twisted towards each other when fitting an expansion joint with solid rubber flanges, as the expansion joint will be subject to torsion – this must be avoided as torsion can

pipe system, steel wire expansion joints can be damaged by stray currents or electrical earth conduction. The anode and cathode of the electric welding connection must always be located on the same line section. (Not separated by the rubber expansion joint!) The rubber bellow must not be painted after fitting in the pipe.

damage the expansion joint

- The pipe flanges must be clean, grease-free, smooth, flat and burr-free
- It must be ensured that the flange connections are as described in the section "Mating flanges/flange connections – A-E" under "Safety"
- If an expansion joint is to be provided with a guide tube, this must be inserted into the expansion joint prior to fitting in the pipe (do not forget seal between guide tube and mating flange)
- If the use of a vacuum support spiral or vacuum support ring is necessary due to low pressure, these same must be fitted in advance. For a vacuum support ring, the section "Vacuum support ring" in the following must be observed (EB 17)!

It is also important to note that the expansion joint must not be insulated at temperatures above 50°C, as this will cause the rubber bellow to heat up and harden as a result of the accumulated heat.

The bellow must not be painted.

Fitting an expansion joint with flange connection

- Centring mandrels, rubber hammer and torque wrench are required for fitting. Do not use any sharp-edged tools!
- Carefully push the expansion joint into the fitting gap. Take care not to damage the sealing surfaces
- No additional seals are required. The rubber bead or rubber flange seals directly against the pipe flange
Attention: Exceptions for rubber

ised pipe flanges, valves or blank gaskets – see corresponding section above!

- Fix the expansion joint at both flanges using at least two bolts or threaded rods. If necessary, the lifting device can be detached/ removed
- When fitting expansion joints with tie rods, it must be ensured that the tie rods are loosened so that the expansion joint is able to adjust itself to the fitting gap when tight-

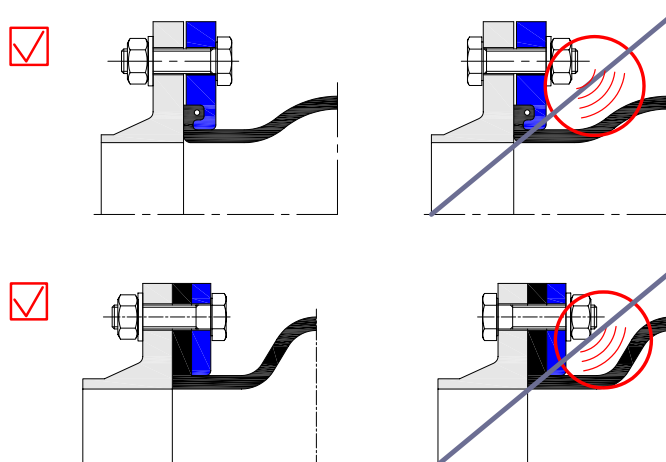
ned. Readjustment of the tie rods subsequently takes place after fitting the expansion joint – see following description “Fitting the tie rods”

- The remaining fixing bolts can now be inserted and tightened hand-tight
- For the bolted flange connection, bolts with the strength class 8.8 should be used
- Do not use a washer on the expansion joint flange

The following must be noted when inserting the bolts:

- See Flange bolt torque (table 1 and 2, page 20 and 21)
- For expansion joints with through holes, all bolts must

be inserted with the bolt head towards the bellow to prevent damage to the bellow under pressure.

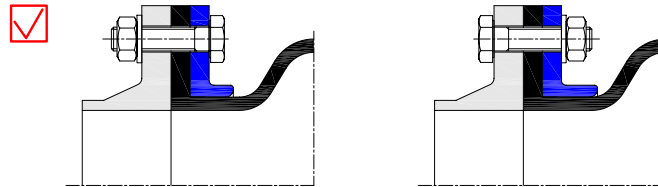


Exception

If the expansion joint has a long collar

(supporting shoulder), the bolt can also be inserted the other

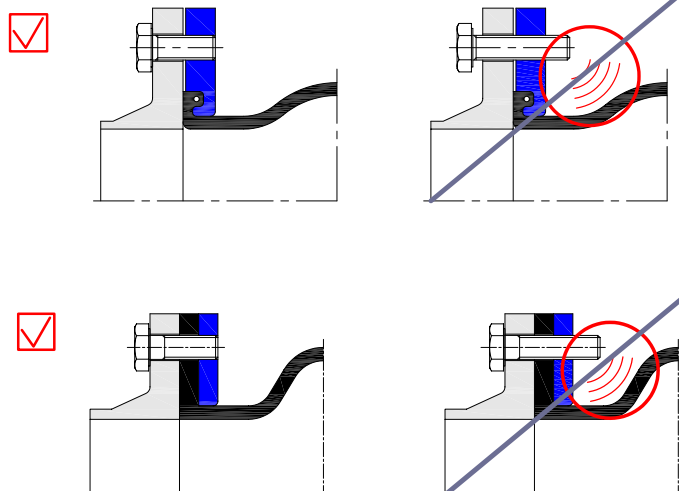
way round – however the bolt must not be longer than the collar!



● **For expansion joints with tapped holes in the flange,**

the bolts should be flush towards the bellow side with the flange, as

protruding bolts are liable to damage the bellow under pressure.



● **The bolted flange connections must be tightened as follows:**

Step 1:

- Tighten all bolts by hand
- Apply torque evenly according to Step 1 crosswise
- Check gap width on outer edge of flange
- Settling time \geq 30 minutes

Step 2:

- Tighten all bolts crosswise according to Step 2
- Check gap width

Step 3:

- Apply final torque according to Step 3 in two passes crosswise
- The bolts do not require further tightening as this would ultimately damage the sealing surface
- Throughout the entire fitting process, it must be ensured that the sealing bead does not tilt. The protruding sealing surface should be compressed evenly on all sides
- When fitting silicone rubber expansion joints, the specified tightening torques must be reduced by 30%.

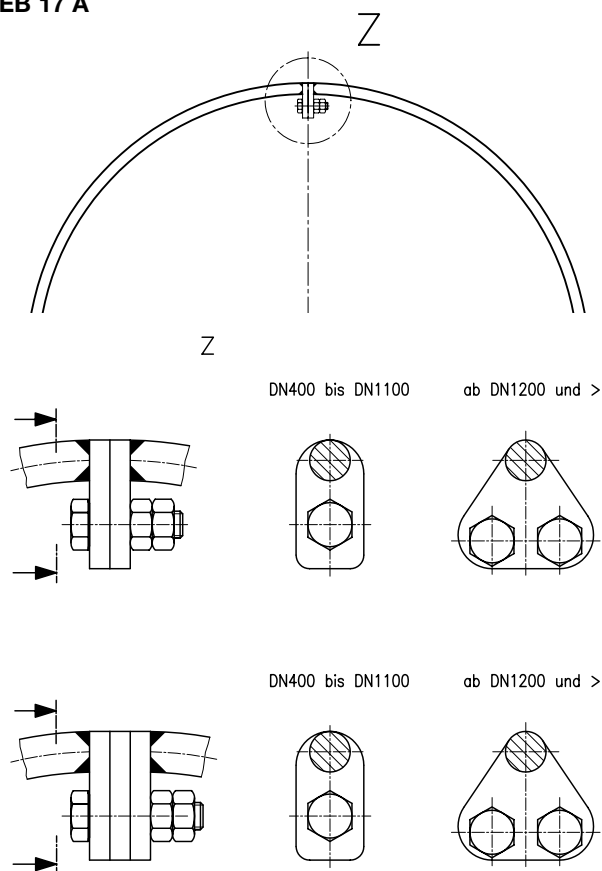
- If a leak should occur during the subsequent pressure test, the bolts must be tightened with the torque according to Step 3. If the bolted flange connection is still leaky, the tightening torque must be increased slightly. Before retightening the bolts, the pressure in the expansion joint must be reduced.
- Throughout the entire fitting process, it must be ensured that the expansion joint is not overexpanded or crushed.

Vacuum support ring (EB 17)

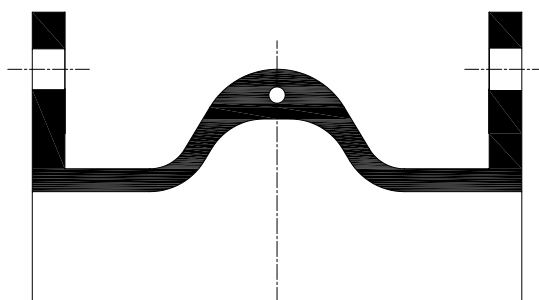
For vacuum support rings arranged directly downstream of a pump, flap valve or elbow the vacuum support rings must be checked for correct positioning after fitting as follows (EB 17 A):

- Firm seating (max. 10 - 15 mm clearance between bellow and ring on one side)
- If necessary, adapter plates should be used to obtain the permissible seat clearance
- The connection lock should always be in the lower flow area (6°)
- At high flow rates, a check must be made to determine whether an expansion joint with vulcanised support ring should be used in order to avoid fatigue failures due to strong turbulence (EB 17 B)
- After fitting, check that the hexagon bolts and nuts are securely locked to prevent loosening

EB 17 A



EB 17 B



8. FINAL FITTING CHECK

- Check the expansion joints on all sides for any visible damage and in particular clean the gap between the steel backing flange and rubber bellow (remove foreign bodies, sand, etc.)
- After being fitted, the expansion joints should be provided with suitable protection against damage, which must only be removed directly prior to commissioning
- The rubber parts must not be painted. Solvents and chemicals attack the surface and damage the bellow
- The expansion joints must not be insulated as this can cause the bellow to overheat and dry out and ultimately lead to damage of the bellow
- The best results are obtained when the expansion joint is able to function stress-free under operating conditions (initial tension must be taken into account when fitting)
- For expansion joints with tie rods, check the tie rods. They should be able to be turned hand-tight. The lock nuts must be tightened
- If possible, check the support spirals/rings, if present, for correct seating and locking

9. MEASURES PRIOR TO PRESSURE TEST AND COMMISSIONING

- Remove the protective covers and

clean the expansion joint

- Check the expansion joint for damage
- Check that all supports, fixed and plain bearings are fitted and functional
- Check the tie rods for even loading and if necessary adjust them to the prevailing conditions

10. PRESSURE TEST

The rubber expansion joint is not a proper pressure vessel, but is classified according to the Pressure Equipment Directive as a "pipe accessory" (pipe component). When fitting the expansion joint in piping, sealing does not take place via a separate seal, but directly on the sealing surface of the integrated rubber bellow.

A one hundred per cent pressure test of the rubber expansion joint at the manufacturer can adversely influence the integrated rubber sealing surface.

Pressure testing of the rubber expansion joints at the manufacturer therefore takes place only at the special request of the customer with the utmost care.

The pressure test normally takes place only after the rubber expansion joints have been fully installed in the pipe system.

All of the instructions contained in these fitting instructions should be observed prior to the pressure test.

If leaks should occur in the area of the flange connection during the pressure test, the bolted flange connection must be retightened according to the tightening table Step 3.

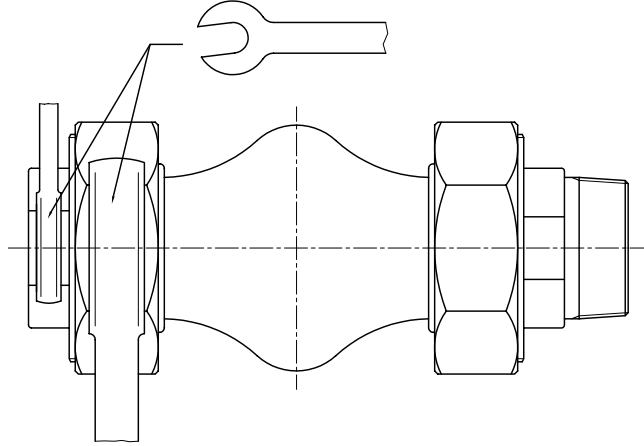
11. SUPPLEMENTARY ASSEMBLY AND FITTINGS INSTRUCTIONS FOR TYPE 45 - 46

Rubber expansion joints type 46 must be fitted stress-free. The bolted connections should always be made using two wrenches to avoid torsion on the expansion joint (EB 18).

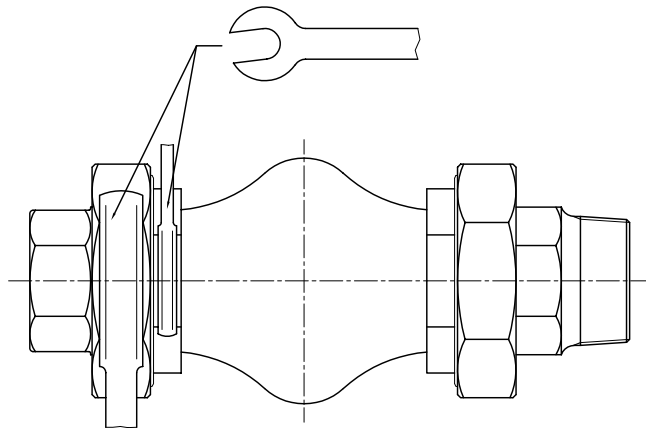
- Mount the bolting parts on the pipe and check the fitting gap! The fitting gap should have the same length as the expansion joint bellow (e.g. 130 mm +/- 5 mm type 46 and 120, 130, 140 or 155 mm depending on the nominal diameter for type 45)
- Insert the expansion joint and tighten using two wrenches as follows:
 - **DN 20/25 type 46 and DN 20-50 type 45**
The front threaded part must be used as a counter support and the sleeve nut tightened (to avoid torsion on the bellow)
 - **DN 32-50 Type 46**
The rear threaded part must be used as a counter support and the sleeve nut tightened (to avoid torsion on the bellow)

EB 18 A

DN 20/25 Typ 46 und DN 20 – 50 Typ 45

**EB 18 B**

DN 32 – 50 Typ 46



All other fitting positions are as described in our main fitting instructions.

Tightening torques for all types 100 Nm.

12. SUPPLEMENTARY ASSEMBLY AND FITTING INSTRUCTIONS FOR TYPE 60 - WRG

- The rubber-metal pipe connector type 60 WRG must be fitted stress-free
- The fitting gap must be 70 mm
- The pipe connector must not be

subjected to tension, torsion or bending

- No additional seals are required
- Only hexagon head bolts according to DIN 933 with washer should be used
- The bolt tightening torque is 30 Nm

All other fitting positions are as described in our main fitting instructions.

SCREW MEASURES FOR

DN	Flange PN 6	Flange PN 10
20	4 x M10 x 25	4 x M12 x 30
25	4 x M10 X 25	4 x M12 x 30
32	4 x M12 x 30	4 x M16 x 30
40	4 x M12 x 30	4 x M16 x 30
50	4 x M12 x 30	4 x M16 x 30
65	4 x M12 x 30	4 x M16 x 30
80	4 x M16 x 35	8 x M16 x 35
100	4 x M16 x 35	8 x M16 x 35
125	8 x M16 x 35	8 x M16 x 40
150	8 x M16 x 35	8 x M20 x 40
200	-	8 x M20 x 45

13. SUPPLEMENTARY ASSEMBLY AND FITTING INSTRUCTIONS FOR TYPE 61

- Type 61 is fitted as part of the pipe installation. Installation in the fitting gap is only difficult in the case of very large nominal diameters
- The pipe ends must be long enough to reach the beginning of the shaft on both sides
- Only use wide GBS clamps for fixing the expansion joint (min. 20 x 1 mm)
- At an operating pressure of up to 2 bar, one clamp is adequate per side. Above 2 bar, two clamps should be used

All other fitting positions are as described in our main fitting instructions.

14. SUPPLEMENTARY ASSEMBLY AND FITTING INSTRUCTIONS FOR TYPE 64

The expansion joint must not be fitted before all work on the pipes and flanges has been completed and all anchors and supports mounted.

This is intended to prevent the expansion joint from being damaged by welding sparks, sharp-edged objects, etc.

Since the expansion joints type 64 are made from highly flexible materials, the durability depends on careful and correct fitting.

- Avoid sharp edges and folds.
- Ducting flanges, backing flanges

or other steel parts included in the delivery should be checked and correspond to the drawings. The bolt holes must be arranged symmetrical in each flange.

- For lifting the expansion joint, it is recommended to use a support plate or inner frame. Preferably, the expansion joint should be pre-assembled with backing flanges and internal sleeve (if included in the delivery) on the ground before lifting.

All other fitting positions are as described in our main fitting instructions.

TIGHTENING TORQUES FOR TYPE 64

Material	Backing flange / Bolts			
	40 x 10 / M10	50 x 10 / M12	60 x 10 / M12	60 x 12 / M16
NBR	60 Nm	70 Nm	80 Nm	80 Nm
EPDM	60 Nm	80 Nm	80 Nm	80 Nm
Vion	-	80 Nm	80 Nm	80 Nm

15. SUPPLEMENTARY ASSEMBLY AND FITTING INSTRUCTIONS FOR TYPE 80

- The expansion joints are delivered with protective covers. These covers must only be removed directly prior to assembly. If these covers need to be removed in advance for the purpose of inspection, they must be screwed back into place in any event
- Welding, soldering and brazing on the PTFE bellow is forbidden as the bellow can be damaged and highly toxic gases can develop
- The use of seals between PTFE/PTFE sealing surfaces is unnecessary. It is recommended to use a 5 mm thick PTFE seal for connections to glass, enamel and other components
- The flange connection bolts must be tightened according to the

torque table 3, page 21)

- The limiting bolts (tie rods) must be adjusted to the maximum permissible expansion after assembly of the expansion joint. The limiting bolts must not be removed
- In the course of commissioning, the flange connections should be retightened with the specified torque after reaching operating temperature
- If leaks occur, the flange connections must be checked for parallelism of the flanges, fouling or damage to the sealing surfaces

Minor indentations or damage can be removed with emery cloth.

16. MAINTENANCE AND MONITORING

- Prior to final commissioning, the flange connection tightening torque must be

checked a single time

- First inspection 1 week after commissioning. Further inspections after 1, 4 and 12 months and then yearly. The following must be checked:
 - External damage of rubber bellow, flange and tie rods
 - Deformations of the rubber flange between the bolts (displacement of flange surfaces)
 - Changes to the rubber bellow (bubbles, brittleness, cracks, hairline cracks)
 - Check of the tie rods for impermissible displacement and misalignment
 - Assessment of corrosion and wear on the entire component.
- The expansion joints can be cleaned with a weak soap solution and clear water. Do not use sharp-edged objects, wire brushes or emery cloth.

TABLE 1: FLANGE BOLT TORQUE FOR TYPE 40, 42, 58 AND 59

DN	Step 1				Step 2				Step 3			
	PN 6 Nm	PN 10 Nm	PN 16 Nm	ASA 150 Nm	PN 6 Nm	PN 10 Nm	PN 16 Nm	ASA 150 Nm	PN 6 Nm	PN 10 Nm	PN 16 Nm	ASA 150 Nm
200	34	54	37	57	67	107	74	114	100	160	110	170
250	30	44	57	50	61	87	114	101	90	130	170	150
300	47	50	70	74	94	101	141	147	140	150	210	220
350	57	47	64	97	114	94	127	194	170	140	190	290
400	47	67	87	87	94	134	174	174	140	200	260	260
450	54	60	84	100	107	121	167	201	160	180	250	300
500	47	67	117	94	94	134	234	187	140	200	350	280
550				114				227				340
600	70	97	174	134	141	194	347	267	210	290	520	400
650				124				247				370
700	67	104	134	117	134	207	267	234	200	310	400	350
750				134				267				400
800	97	144	180	200	194	287	361	401	290	430	540	600
850				190				381				570
900	110	137	170	204	221	274	341	407	330	410	510	610
950				240				481				720
1000	104	180	240	220	207	361	481	441	310	540	720	660
1050				244				487				730
1100	137	187	320	230	274	374	641	461	410	560	960	690
1150				244				487				730
1200	144	230	324	234	287	461	647	467	430	690	970	700
1250				284				567				850
1300	190	284	307	297	381	567	614	594	570	850	920	890
1350				324				647				970
1400	190	280	330	317	381	561	661	634	570	840	990	950
1450				350				701				1050
1500	204	384	450	320	407	767	901	641	610	1150	1350	960
1600	194	400	467		387	801	934		580	1200	1400	
1650				400				801				1200
1700	234	384	450		467	767	901		700	1150	1350	
1800	230	400	467	384	461	801	934	767	690	1200	1400	1150
1900	277	384	584		554	767	1167		830	1150	1750	
1950				467				934				1400
2000	280	417	567		561	834	1134		840	1250	1700	
2100	307	517	0	534	614	1034		1067	920	1550		1600
2200	297	517	600		594	1034	1201		890	1550	1800	
2250				517				1034				1550
2400	314	550	634	667	627	1101	1267	1334	940	1650	1900	2000
2500	384	567	600		767	1134	1201		1150	1700	1800	
2550				800				1601				2400
2600	400	550	634		801	1101	1267		1200	1650	1900	
2700				884				1767				2650
2800	417	600			834	1201			1250	1800		
2850				1034				2067				3100
3000	567	934		1367	1134	1867		2734	1700	2800		4100

TABLE 2 FLANGE BOLT TORQUE FOR TYPE 48, 49, 50, 51, 53, 55, 56 AND 65

DN	Step 1	Step 2		Step 3			
	for all Nm	for all Nm	PN 6 Nm	PN 10 Nm	PN 16 Nm	PN 25 Nm	ASA 150 Nm
25	by hand	50	60	80	80	80	80
32	by hand	50	60	80	80	80	80
40	by hand	50	60	80	80	80	80
50	by hand	50	60	80	80	80	80
65	by hand	50	60	80	80	80	80
80	by hand	50	60	80	80	80	80
100	by hand	50	80	100	100	100	100
125	by hand	50	80	100	100	100	100
150	by hand	50	80	100	100	100	100
175	by hand	50	90	100	100	100	100
200	by hand	50	90	100	100	100	100
250	by hand	50	90	100	100	110	100
300	by hand	50	100	110	110	110	100
350	by hand	50	120	130	135	165	110
400	by hand	50	120	140	155	200	140
450	by hand	50	140	145	165	200	145
500	by hand	50	120	145	170	200	145
600	by hand	100	185	210	255	280	210
700	by hand	100	200	225	300	300	230
800	by hand	100	235	300	360	410	300
900	by hand	100	235	300	360	415	300
1000	by hand	100	300	360	425	525	360

TABLE 3: FLANGE CONNECTION DIMENSIONS ACCORDING TO DIN 2501

DN	PN 10			PN 25		
	Screws		Bolt torque	Screws		Bolt torque
	Quantity	Thread	Nm	Quantity	Thread	Nm
20	4	M12	10	4	M12	10
25	4	M12	20	4	M12	20
32	4	M16	30	4	M16	30
40	4	M16	40	4	M16	40
50	4	M16	50	4	M16	50
65	8	M16	70	8	M16	40
80	8	M16	40	8	M16	40
100	8	M16	40	8	M20	50
125	8	M16	50	8	M24	80
150	8	M20	60	8	M24	90
200	8	M20	90	12	M24	100
250	12	M20	60	12	M27	120
300	12	M20	70	-	-	-
350	16	M20	110	-	-	-
400	16	M24	160	-	-	-
500	20	M24	180	-	-	-
600	20	M27	240	-	-	-
700	24	M27	260	-	-	-