G1 Planning, storage, installation and maintenance instructions for fabric expansion joints

Planning

Depending on the operating temperature, we differentiate between flange expansion joints and belt expansion joints. **(Figure 1)**
Pipelines need to be determined by fixed and sliding points.
The dimensioning of the installation gap is dependent on the movements to be accommodated.
Installation gap (L_E) is at least 100 mm and

- axial compression = approx. 0.20 x installation gap
- axial extension= approx. 0.20 x installation gap
- lateral displacement = approx. 0.15 x installation gap

In the event of simultaneous axial/lateral movement, use the larger value.
For large lateral movements, the line should be presetted against the direction of movement.

Security measures:
Depending on the classification of media which are dangerous or harmful to the environment, certain preventive measures need to be taken in order to avoid harm to people or the environment when an expansion joint collapses. This can, for example, be accomplished by mounting a splash protection cover and installing a control basin. The operator is responsible for implementing the required safety precautions.

Storage

Storage instructions:

- Store the expansion joints in a stress-relieved state without deformations or lasting kinks.
- Store expansion joints with mounted steel flanges upright and resting on the flanges.
- Protect the rubber parts from drafts and direct sunlight--cover them as needed.
- Pay attention to the use-by date on the glue included in the delivery.

Storage space requirements:

- The storage room should be cool (10 to 20°C), dry and free of dust.
- Do not operate any ozone-generating engines or fluorescent light sources in the storage room.
- Do not store any volatile solvents, fuels or other chemicals simultaneously in the same space.
- In the event of temporary outdoor storage, protect the expansion joints against the weather using a foil.

Packaging

- Inspect the packaging for external damage.
- Take into account any labels or packing lists that detail the contents of the packaging.
- Do not unpack expansion joints before installation.
- Only use blunt objects to unpack the expansion joints.
- If the product is packaged in wood crates, make sure that nails and clamps do not come into contact with the expansion joints.

Transport to installation location

- Take into account the labels on how to use hoisting devices.
- Do not use any sharp tools, wires or load hooks.
- When transporting with chains or cords, do not allow them to come into direct contact with the expansion joint. Transport on a palette if needed.
- Transport steel parts separately from the expansion joint.

Labelling

- The expansion joints are labelled with the factory number, position number and delivery date.
- If requested, power station designation system numbers, drawing numbers or other identifiers can be added to the factory plate.
- For belt expansion joints, pay attention to the bellows label reading "Inside" (meaning the side in contact with media) and the location of the corners.

Installation of expansion joint

Steps before installation:

- Check the dimensions of the installation gaps. Do not allow the total of the assembly tolerances and the movements to be accommodated to exceed the maximum allowable movement.
- If nothing to the contrary is specified, permissible tolerances axially and laterally are max. ± 10 mm.
- Review the dimensions and boring against the information on the design drawing.
- Clean connection areas and remove any unevenness as needed.
- The pipe flanges must be smooth, flat and free of burrs.
- The edges of the backing flanges touching the expansion joint must be free of burrs.
- Seam areas in splitted backing flanges should be bridged using stainless 1 mm thick shims.
- The screw holes of the pipe flanges must align. The expansion joint must not be subject to torsion.
- Inspect the expansion joint for damage.

Installation of pre-insulation:
Delivery as single layers

- Lay the wire mesh on the flow liner and raise the pre-buckled sides to the construction angles. Fold the joint area.
- Add the insulating felt and mineral wool layers. For the outermost mineral wool layer with stitched wire mesh, embed the wire mesh toward the inside away from the expansion joint.
- For large vertical duct faces, the insulation should be secured against bunching together using holding pins welded to the construction angles.
- If available, refer to the installation drawing. **(Figure 2)**

For delivery as a pre-fabricated pillow

- Refer to the installation drawing or additional installation drawing. **(Figure 3)**

Installing an expansion joint with a backing flange or clamp bar:

- Tools required: Torque wrench, centring pin. Do not use any tools with sharp edges.
- Support large expansion joints during installation, using a crane if needed. Do not allow lumped loading to develop and avoid sharp folds and deformations.
- When sliding flange expansion joints into the installation gap, or when sliding belt expansion joints onto the construction angle, avoid damage to the sealing areas at all costs.
- Only install additional seals between the expansion joint flange and pipe flange if they were included in the delivery, e. g. PTFE cord.
- Shield the expansion joint against damage from sharp objects, as well as from weld spatter.
- Place the unpunched belt expansion joint tautly and precisely in the circumferential direction, and clamp it firmly in place using the clamp bars and vices. Bore through the expansion joint, allowing the clamp bar and duct flange to form the jig. **(Figure 4)**
- Slide the unpunched flange expansion joint into the installation gap, clamp in place using backing flanges and vices, and transfer the boring. Then punch using a punch. **(Figure 5)**

- Insert the fixing screws and tighten by hand.
- For clearance holes, insert screws with the head toward the expansion joint bellows, preferably using round head screws. Otherwise, select a screw excess length short enough that the screw bolt will not damage the expansion joint bellows, even under pressure and in the event of movements.
- For threaded holes in backing flanges, the screw ends should end flush with the backing flange.
- The sealing surface of the expansion joint should be pinched together evenly all around.
- For round expansion joints, apply the required clamping torque for the flange screwing connection once, crosswise, and for rectangular expansion joints, apply the torque starting from the corners with a torque wrench.
- Only apply the torque once all fixing elements have been mounted.

Clamping torque:
For a surface pressure of 5 N/mm², the following screw clamping torques apply:

Clamping torques for fabric expansion joints [Nm]			
Screws	Clamping surface per screw		
	4,000 mm²	5,000 mm²	6,000 mm²
M 10	35	45	55
M 12	45	55	65
M 16	60	75	90
M 20	75	90	110
M 24	90	110	130
M 30	110	140	165

(Clamping surface = backing flange width x screw distance)

Installation of an expansion joint with clamped fixing:
- Do not use any tools with sharp edges.
- Carefully push the expansion joint into the installation gap. Avoid damaging the sealing surfaces at all costs.
- Do not install any additional seals between the expansion joint and the connection surface.
- Fix the expansion joint with pre-fabricated small clamps (for small nominal diameters) or an endless clamp belt.

¾" endless clamp belt
To increase the clamping force, double the ¾" clamp belt. If needed, attach 2 clamps side by side for each sleeve. The fixing material consists of a stainless steel belt, screw lugs and bridge plates. The stainless steel belt is usually delivered in 30 m spools.
When trimming the belt from the spool for the inner and outer overhang, take an allowance of at least 250 mm into account.
Proceed as follows during installation:
- Push the screw lug onto the belt and fold the inner belt end approx. 50 mm under the lug. In the event of great loads on the clamp, double the belt and pull twice through the lug. Apply a lubricant (e. g. acid-free oil, Teflon spray or silicon oil) between the overlapping belts. **(Figure 6)**
- Put the belt sideways into the chuck tool and centre the bridge plate under the screw lug.
- Apply ex-centre lever and tighten the clamp by turning the crank.
- After reaching the required tension, firmly tighten the grub screws, loosen the crank and cut the belt to the desired dimensions using the cutting lever (approx. 100 mm). **(Figure 7)**
- Finally, fold the belt end inwards. **(Figure 8)**

½" endless screw thread belt
The fixing material consists of ½" stainless steel clamping belt and a screw housing. The screw thread belt is usually delivered in 30 m spools. When trimming the belt from the spool for the inner and outer overhang, take an allowance of at least 250 mm into account.
Proceed as follows during installation:
- Push the screw housing onto the clamp belt and fold the inner belt end approx. 50 mm under the screw housing. Make sure that the direction of the thread slit is maintained as depicted.
- Insert the other end of the clamp belt into the screw housing, then screw it over the clamping screw and tighten.
- To protect it from damage, bend the belt end inward toward the tightener. **(Figure 9)**

Actions before start-up:
- Remove protective covers and clean any dirt off the expansion joint bellows.
- Inspect the expansion joint for damage.
- Check whether all brackets and fixed and sliding points are mounted and functional.
- In case of leaks during the pressure test, re-tighten the screws with the torque indicated in the table.

General tips:
- Do not paint the expansion joints: solvents will attack the surface and destroy the bellows.
- When welding or cutting, cover the expansion joints and shield against heat. The anodes and cathodes of the e-welding connection must always be on the same pipe cross-section and may not be separated by an expansion joint.

Flow liner

- For abrasive media and for flow rates of more than 30 m/s, use flow liners.
- Install the flow liners along with the expansion joint.
- A special sealing is always required between the flow liner flange and the pipe flange.
- Take the direction of flow into account upon installation.

External insulation

- If nothing to the contrary has been specified, at media temperatures of over 220 °C, expansion joints may not be insulated from the outside in.
- At lower temperatures, external insulation can make sense in order to avoid condensation.
- At media temperatures of more than 350 °C, the thickness of the external insulation in the area of the construction angle may be no greater than ⅔ the construction angle height. At lower temperatures, the insulation can be added up to the area underneath the fixing flange. **(Figure 10)**
- To protect against the weather and interference, we recommend that a protective cover be installed at a distance appropriate to ensure air circulation.

Expansion joint maintenance

- After start-up, re-tighten the screws once using the necessary torque as listed in the table, since the expansion joint material settles as a result of heat.
- Perform inspections one week after operational start and then annually.
- Inspect for:
  - external damage and changes to the bellows such as blisters, brittleness, tears or discolourations.
  - leaks.
  - impermissible movements, displacements and installation lengths.
  - corrosion and wear on the entire component.
  - position of pre-insulation.
  - remove ash buildup from the pre-insulation.

- Shore hardness on expansion joint bellows. All rubber grades are subject to natural aging that reduces elasticity and raises Shore hardness. Under normal conditions, one can assume that the Shore hardness increases on average by 1° Shore A per year. This value may rise at higher temperatures. For this reason, we recommend that you inspect the Shore hardness at regular intervals and replace the expansion joints when the value reaches approximately 80° Shore A. Assuming a Shore hardness of approximately 60° Shore A, the component lifetime will be 15 to 20 years. Wear and external influences such as UV radiation and ozone damage are also involved here.

- Clean the expansion joints with dilute soap suds and then with clean water. Do not use sharp objects, wire brushes or emery paper.

Expansion joints with installation seams

- Expansion joints with installation seams can be closed by our supervisor. In this case, install the expansion joint on both sides up to approx. 1 m before the joint area.
- Alternately, we can supply an installation kit with the accessories and instructions needed to close the expansion joint (limited warranty).

Expansion joints as an installation unit

- An installation unit pre-fabricated at the plant usually consists of an expansion joint, pre-insulation and flow liner to be screwed or welded into the duct.
- Installation is performed in a fashion similar to that for duct components or baffles. Seals are needed between the flange connections.
- The transport safety devices are applied to the installation gaps and need to be removed after installation.

These assembly instructions are not subject to mandatory audits. If necessary please download the most recent version from the internet at http://www.ditec-kt.de/downloads.en

Please also read the technical information in our product catalogue.

Fig. 1

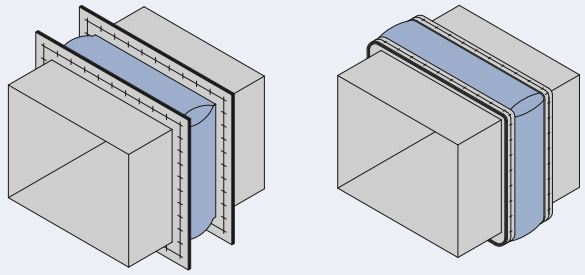

Fig. 2

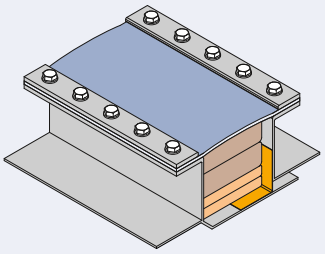

Fig. 3

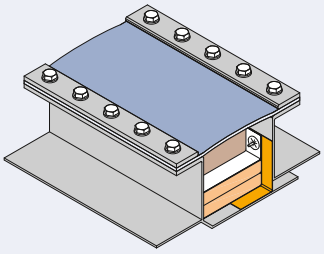

Fig. 4

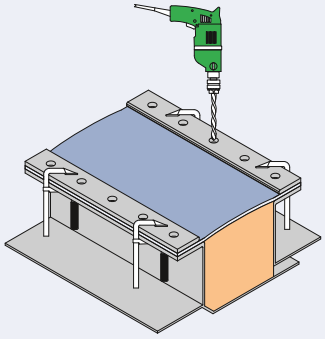

Fig. 5

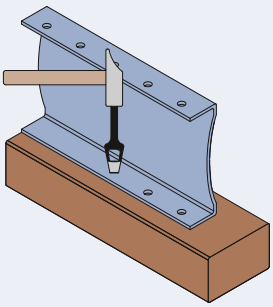

Fig. 6

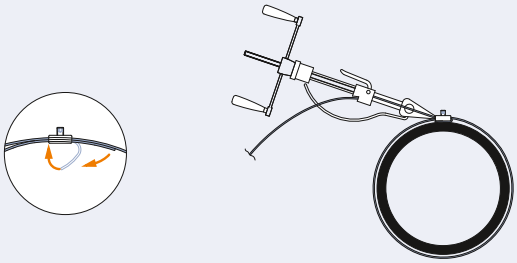

Fig. 7

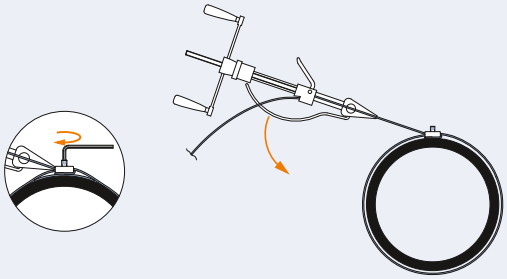

Fig. 8

Fig. 9

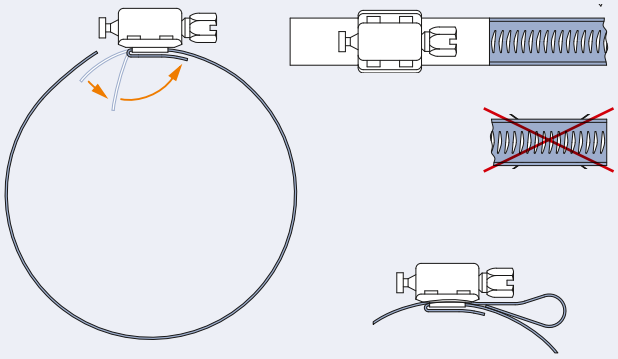

Fig. 10