Operating Instructions for HKS rubber expansion joints

Because of their flexible elements and mechanisms, HKS rubber expansion joints are susceptible to damage of all types and adverse loads in operation. For reliable operation of an expansion joint and, thus, the complete system and pressure device, carefully and completely read the following instructions and regulations and strictly observe. If these should appear to be doubtful or incomplete, consult HKS in any case.

1. Packaging / storage / transportation

1.1 Up to starting installation, the expansion joints must be stored in the transportation packaging in a dry, cool, dust-free room protected from light and reasonably ventilated. It is not permitted to store in the open protected from the weather. The rubber parts must be protected against draught. No equipment generating ozone must be operated, such as electric motors, fluorescent sources of light etc. in the storeroom. No solvent, fuels, chemicals or similar must simultaneously be stored. In particular, make sure that no condensation forms on the expansion joint.

1.2 For transportation by lifting, the expansion joint must be attached in the flange bores of the steel flange on both sides and uniformly raised.

1.3 As far as possible, transportation locks must also be removed after installation.

2. Assembly/installation instructions, commissioning

2.1 HKS rubber expansion joints must only be installed and commissioned by trained, skilled installation personnel. Prerequisite for safe operation is the correct and professional installation!

2.2 Before installation, completely remove the packaging and check the rubber expansion joints for any damage during transportation and /or storage, in particular clean the gap between the rear steel flange and rubber bellows. When cleaning the rubber bellows, use neither a solvent nor sharp-edged equipment, such as wire brushes or similar. Cleaning can be carried out using a mild soap and warm water. Only fully serviceable expansion joints must be installed! If in doubt, consult HKS!

2.3 The installation space in the pipeline conforms to the installation length of the rubber expansion joint. The connecting pipelines must exactly align and be safely carried out unless, due to planned pretension, lateral or angular offset is required for the same type of compensation when installed.

2.4 Expansion joints must not be torsionally loaded. The bolt holes must align when installed.

2.5 Only 1 (one) expansion joint may be installed between 2 fixed points. The expansion of the section between these two points must be less than the maximum possible expansion acceptance of the expansion joint according to the associated drawing.

2.6 Install the expansion joint as close as possible to a fixed point, because then only one friction bearing is required on the other side of the expansion joint; otherwise a friction bearing is required on both sides. Clearance of the bearing points to the expansion joint must always be approx. 2 x the nominal diameter (DN). An external protection tube or internal guide tube for the expansion joint does not replace a friction bearing and fixed point!

2.7 The fixed points and friction bearing must be designed and measured by a specialist engineer or stress analyst for the maximum forces and torques occurring. The friction bearing in the guiding section must be constructed long enough to prevent jamming. If no fixed points can be provided or the stability of other fittings is insufficient, the reaction forces occurring must be absorbed by additional length limiters.

2.8 Fundamentally, when installing all types of expansion joint, make sure that no tube torsional stresses act on the expansion joints.

2.9 For expansion joints with an internal guide tube, observe the direction of flow!

2.10 Only carry out a pressure and leak test of the system when the fixed points and guides are correctly installed.

2.11 HKS lateral expansion joints whose tension rod braces are fitted with additional internal bracing (convex washer, concave washer or locknuts) to absorb vacuum or external pressure are pre-set ex-works such that the tension rod bracing permits limited lateral deflection. A minimal gap between the bracing components guarantees this. Under no circumstances, must the locknuts be bolted tight at a later time; rather, they must stay turned back from the fixed setting by about a quarter rotation.

2.12 During installation, make sure that bellows of the expansion joints are not damaged (e.g. by welding splatter, thermal load, mechanical damage, impact loads, objects falling, contamination etc.). If welding tasks are required, the expansion joints must be covered by a suitable means against the welding heat and sparks. ATTENTION: If carrying out electric welding tasks on the pipeline in the vicinity of the expansion joint, this must be bridged by earthing wires.

2.13 Pre-tensioning devices must only be removed after installation of the expansion joint is complete.

2.14 Insulation must not be installed on the expansion joint bellow.

2.15 The rubber bellows must not be coated with paint.

2.16 The expansion joint should be installed so that uninhibited visual inspection for integrity can be carried out at regular intervals and, ideally, the manufacturer date must be visible. If defects are visible, e.g. bubble formation, surface cracks or irregular deformation, immediately inform HKS and/or replace the expansion joint.

2.17 For expansion joints with a flange connection, the bolts must be inserted from the bellow side (refer to installation type 1, Figure 1). If this is not possible, for installation type 2, the length of the bolts must be selected so that the bellows are not touched or even damaged. If the flange of the expansion joint has threaded holes, in particular make sure that the threaded bolt makes contact with the flange (installation type 3). The risk of damage through excessively long bolts is increased if the rubber bellows expand under pressure whilst operating (installation type 4).

2.18

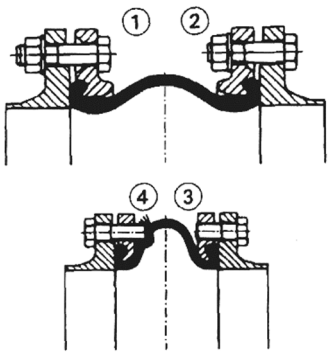


Figure 1 Flange fittings on a rubber expansion joint

2.19 For HKS rubber expansion joints with a flange connection, the rubber bellows is usually also used as a seal to the pipeline counter flange. Seals are not required if the sealing surfaces of the counter flanges of the pipeline are designed in accordance with the figures below. Flat seals (refer to Figure 2) should only be used to protect rubber sealing surfaces if the counter flanges have a bore that is too large, sharp internal edges or irregularities, e.g. welding beads. If the diameters of the flanges are greatly different, a ring washer is additionally installed between the seal and bellows sealing surface. The flange fitting must not be excessively tightened here.

Appropriate bolt tightening torques are listed under Point 2.21.

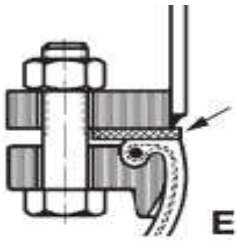


Figure 2 Flat seal between rubber bellows and counter flange

2.20 Rubber expansion joints with a flange connection present particular requirements on the counter flange of the pipeline. The sealing surface of the counter flanges must by planar and clean. Flanges with groove and spring not permitted. No sharp-edged ends of the pipe or flange must press on the rubber seal surface; because this could be cut (refer to Figure 3 left).

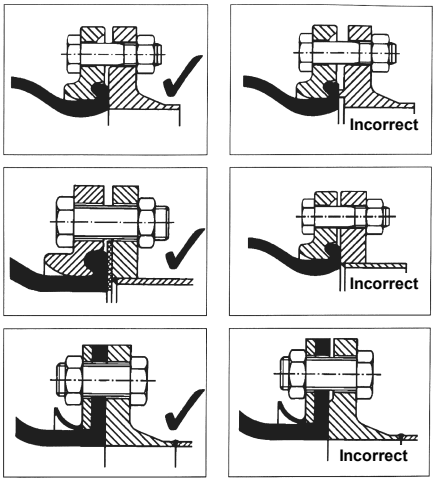


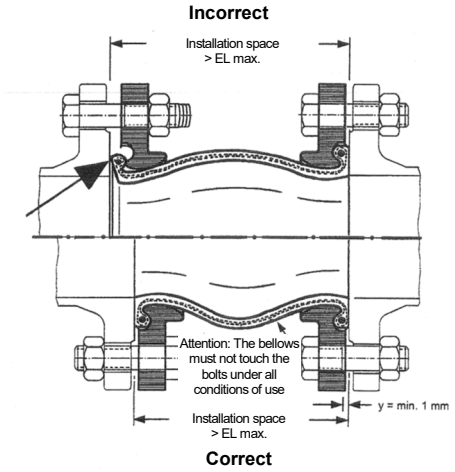
Figure 3 Pipeline counter flange for rubber expansion joints

2.21 HKS recommends the use of flange bolts, quality class 8.8. The bolts must be fully tightened uniformly, crosswise in three steps. Don´t use sharp-edged tools, so that the rubber bellow is not damaged if the tool slips.

1. Step: Uniformly tighten all bolts by hand (make sure that sealing surface is parallel!)
2. Step: Tighten crosswise to a torque of 50 Nm.
3. Step: Tighten crosswise.

up to	DN	80	max.	80	Nm
up to	DN	300	max.	100	Nm
up to	DN	500	max.	130	Nm
	DN	700		250	Nm
	DN	800		300	Nm
	DN	900		310	Nm

The bolts must only be tightened until a gap “y” of approx. 1 mm remains between the metal flanges (refer to Figure).



2.22 It is imperative to observe the general valid and relevant safety and accident prevention regulations!

3. Operation

3.1 HKS rubber expansion joints must only be operated within the limits of the design conditions in accordance with the data from the manufacturer.

3.2 Rubber expansion joints must only be operated within the permitted pressure range. For the upper and lower limit of the permitted pressure range (minimum operating pressure, maximum operating pressure PS), refer to the HKS order documents. If no lower operating pressure limit is stated in the order documents, this is 0 bar as standard.

3.3 Prevent impacts within the system.

3.4 Rubber expansion joints must only be operated within the permitted temperature range. For the upper and lower limit of the permitted temperature range (minimum operating temperature, maximum operating temperature TS), refer to the HKS order documents. If no lower operating temperature limit is stated in the order documents, this is -10 °C as standard.

3.5 The assimilated expansion must only be as great as the axial or lateral expansion stated. A combination is only permitted with the corresponding reduction factors after previous written release by HKS!

3.6 The number of load cycles must not be exceeded.

3.7 The expansion joint must only be exposed to media for which it has been intended and designed. If no information is given, it is only suitable for the medium of air or H_2O for vertical installation.

3.8 For safe operation of the expansion joint and, thus the whole system, it is imperative to observe and adhere to all of the information and instructions.

4. Maintenance

4.1 HKS rubber expansion joints are maintenance-free components that, however, must be considered as expendable parts. It is important that the parts installed are externally examined at regular intervals for any signs of ageing (embrittlement, leakage, and formation of bubbles). For larger maintenance tasks on the system at an interval of 1-2 years, the condition of the internal cladding should also be evaluated (swelling, hardening, elution, cracks).

4.2 If substances not approved should come into contact with the bellows, externally or internally, these must be immediately and thoroughly cleaned using a copious quantity of clean water. Continued operation only after consultation with HKS.

4.3 For all questions and ordering of spare parts, it is imperative to state the type and works number of the product (stamped on the type plate).

5. Repair

5.1 If repair of an expansion joint is required in an exceptional case, the tasks or modifications (such as, e.g. welding, cutting or soldering tasks) must only be carried out by staff from HKS, or companies authorized by HKS. Usually it is possible for HKS to rectify the damage at short notice by installing a new rubber bellows, stored by HKS as a standard part. In such a case, HKS detailed information should be given to HKS about how the damage occurred and operating conditions, so that it is perhaps possible for HKS to suggest improvement procedures.

5.2 For all questions and ordering of spare parts, it is imperative to state the type and works number of the product (stamped on the type plate).

5. Warranty

5.1 HKS assumes the warranty for their products in accordance with the statutory provisions of the Federal Republic of Germany (verification by the delivery note and invoice). Damage that occurs through natural degeneration (wear), overload or incorrect handling, are excluded from the warranty.

6. Environmental Protection

6.1 Product, accessories and packaging should be environmentally-friendly recycled.