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# Operating Instructions

## for HKS Lens Expansion joints

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Because of their flexible elements and mechanisms, HKS lens 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

- 1.2 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. No solvent, fuels, chemicals or similar must simultaneously be stored. In particular, make sure that no condensation forms on the expansion joint.
- 1.1 As far as possible, transportation locks must also be removed after installation.

### 2. Assembly/installation instructions, commissioning

- 2.1 HKS lens 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 expansion joint for any damage during transportation and /or storage, in particular for corrosion caused by damage to the surfaces. Also the voids between the corrugations of the bellows – inside and outside - must be free from all substances or material. Only serviceable expansion joints must be installed! If in doubt, consult HKS!
- 2.3 The connecting pipelines must fully align and be safely routed, so that no bending of the expansion joint can occur.
- 2.4 If the expansion joint has fixed flanges, their bolt holes must align with the connection flange on the pipeline.
- 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 should always be approx. 2 x the nominal diameter (DN). An external protection tube on the expansion joint or internal guide tube 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.
- 2.8 The installation length (EL) is dependent on the operating conditions. If pre-tensioning required in a negative or positive direction, the installation length (EL) is greater or less than the overall length (BL).
- 2.9 Expansion joints must not be torsionally loaded. This must be observed particularly by the installation of expansion joints with fixed flanges and with a bolted fitting. Fundamentally, when installing all types of expansion joint, make sure that no torsional stresses act on the expansion joint.
- 2.10 If the expansion joint is used as a vibration damper, this must be installed with no pretension. In this case, the installation length (EL) is the same as the overall length (BL).
- 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 For expansion joints with an internal guide tube, observe the direction of flow!
- 2.13 If hoisting devices are used to install the expansion joint, these must not be attached to the sensitive parts, e.g. the expansion joint bellow.

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- 2.14 Only carry out a pressure and leak test when the fixed points and guides are correctly installed.
- 2.15 When installing, make sure that the bellows of the expansion joints are not damaged (e.g. by weld spatter, thermal stress, mechanical damage, dents, scratches, impacts, falling objects, contamination etc.) and that no foreign objects get between the corrugation. The corrugation must be clear internally and externally, so that the expansion joint can function correctly.
- 2.16 Pre-tensioning devices must only be removed after installation of the expansion joint is complete.
- 2.17 Insulation must only be installed after previous consultation with HKS and not on the bellow of the expansion joint.
- 2.18 No electrical current, e.g. from welding tasks must be conducted through the expansion joint, otherwise destruction of the metal bellows can occur.
- 2.19 The expansion joint should be installed so that uninhibited visual inspection for integrity can be carried out at regular intervals. If defects are visible, e.g. dents, cracks, corrosion, discolouration or irregular deformation, immediately inform HKS and/or replace the expansion joint.
- 2.20 It is imperative to observe the general valid and relevant safety and accident prevention regulations!

### 3. Operation

- 3.1 HKS lens expansion joints must only be operated within the limits of the design conditions in accordance with the data from the manufacturer.
- 3.2 HKS lens 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 HKS order documents, this is 0 bar as standard.
- 3.3 Prevent impacts within the system.
- 3.4 HKS lens 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 HKS temperature, this is -10 °C as standard.
- 3.5 The assimilated expansion must only be as great as the axial, lateral or angular 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 given in the HKS temperature must not be exceeded. If no maximum number of load cycles is given, the expansion joint is designed for a max. 1000 load cycles.
- 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<sub>2</sub>O for vertical installation.
- 3.8 The formation of condensate on the external surfaces of the expansion joint must be prevented by the appropriate actions, unless it is not specially designed for this.
- 3.9 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.

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### 4. Maintenance

- 4.1 HKS – lens expansion joints do not usually require any special maintenance. However, carry out thorough visual inspections at regular intervals. If contamination can ingress between the corrugations, carry out cleaning periodically. Cleaning must be carried out considering the material of the expansion joint and the environment, using agents and tools approved for steel.
- 4.2 If aggressive substances should come into contact with the bellows, externally or internally, these must be immediately and thoroughly cleaned using a copious quantity of clean water.
- 4.3 For lens expansion joints operated outside, the joint bushes must be lubricated using a tenacious, water-resistant bearing grease, at appropriate maintenance intervals according to the environmental conditions. In order to prevent fretting, the ball-joint expansion joints should also be occasionally lubricated.
- 4.4 For all questions and ordering of spare parts, it is imperative to state the type and serial number of the product (stamped on the type plate).

### 5. Repair

- 5.1 If repair of a expansion joint is required in an exceptional case, the tasks or modifications to the metal bellows and connecting parts of the expansion joint (such as, e.g. welding, cutting or soldering tasks) must only be carried out by staff from HKS, or companies authorized by HKS.
- 5.2 If a repair is not possible, it is possible for HKS to supply a replacement expansion joint at short notice. 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.
- 5.3 For all questions and ordering of spare parts, it is imperative to state the type and serial number of the product (stamped on the type plate).

### 6. Warranty

- 6.1 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.

### 7. Environmental Protection

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