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# Operating Instruction for HKS Fabric Compensators

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Because of their highly flexible materials, HKS fabric compensators are susceptible to damage of all types and adverse loads in operation. For reliable operation of a compensator and, thus, the complete system, 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 compensators 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 compensator.
- 1.2 Compensators that have been stored at temperatures of less than +5 °C before installation, should be heated to temperature of approx. +20°C before installation.
- 1.3 For lifting transport, the compensator must be hooked into the flange holes of the steel flanges on both sides and lifted at the same time.
- 1.4 As far as possible, transportation locks must also be removed after installation.

## 2 Assembly/installation instructions, commissioning

- 2.1 HKS fabric compensators 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 fabric compensators for any damage during transportation and/or storage. When cleaning the fabric bellows, use neither a solvent nor sharp-edged equipment, such as wire brushes or similar. Only fully serviceable compensators must be installed! If in doubt, consult HKS!
- 2.3 For ambient temperatures of less than +5 °C, installation of fabric compensators is only possible with restrictions and should always be agreed with us.
- 2.4 Before installing the fabric compensator, the pipeline system must be correctly prepared, i.e. the ends of the pipeline are aligned, the fixed flange is welded and the supports are installed. The floating bearing must be fully serviceable. Furthermore, make sure that the holes in the flange align and the installation space in the pipeline conforms to the installation length of the fabric compensator.
- 2.5 During installation, make sure that fabric compensators are not damaged (e.g. by welding splatter, thermal load, mechanical damage, impact loads, objects falling, contamination etc.). If welding tasks are required, the compensators must be covered by a suitable means against the welding heat and sparks.
- 2.6 The fabric bellows must not be coated with paint.
- 2.7 From a gas velocity of 7 m/s and/or abrasive dusts in the medium to be conveyed, internal deflectors (guide tubes) are required. The guide tubes must be designed so that there is no obstruction to the motion.
- 2.8 Fabric compensators are very sensitive towards the effect of sharp-edged objects. Therefore, it is imperative to make sure that all steel parts (flanges, steel parts for accepting the compensator, deflectors etc.) with which the compensator comes into contact are deburred or have a radius.
- 2.9 HKS fabric compensators are supplied with or without bolt holes (depending on the customer requirement). To stamp the bolt holes on site, we recommend the following procedure: The loose flange is used as a template in order to position the bolt holes to mark. Use a piece of hardwood or plastic as an underlay. The bolt holes are then stamped out using a hollow punch. Alternatively, the bolt holes can be drilled using a hand drill. Here, the compensator is clamped between the fixed and loose flange by clamps or screw clamps. Thereby, extreme caution is required so that the drill does not touch the surface of the compensator and, thereby, become damaged.

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- 2.10 Fabric compensators with a flange connection present particular requirements on the counter flange of the pipeline. The sealing surface of the counter flanges must be planar and clean. No sharp-edged ends of the pipe or flange must press on the fabric seal surface, because this could be cut.
- 2.11 For compensators with an internal guide tube, observe the direction of flow!
- 2.12 Unless specifically authorized by HKS, fabric compensators must never be heat insulated. In contrast, it is important that unobstructed air circulation is ensured around the compensator.
- 2.13 The compensator should be installed so that uninhibited visual inspection for integrity can be carried out at regular intervals. If defects are visible, e.g. bubble formation, surface cracks or irregular deformation, immediately inform HKS and/or replace the compensator.
- 2.14 The seam is the weakest point of the compensator. This should be at the thermally and mechanically least stressed point. In the event of condensate forming in horizontal lines and unobstructed heat dissipation, the compensator must be aligned so that the seam is at the top.
- 2.15 If only fabric bellows are ordered with flange connection, but without flange, before installation, the fabric bellows must be mounted at the flange provided in the pipeline on site.
- 2.16 For compensators with a flange connection, the length of the bolts must be selected so that the bellows are not touched or even damaged. The risk of damage through excessively long bolts is increased if the fabric bellows expand under pressure whilst operating!
- 2.17 In order to prevent the risk of fire during commissioning, during installation, do not spray the bolt connections with penetrating agent.
- 2.18 HKS recommends the use of flange bolts, quality class 5.6 and 8.8. The bolts must be fully tightened uniformly, crosswise in 3 steps. In the first step, all bolts are uniformly tightened by hand (make sure that sealing surface is parallel!). In the second step, all bolts are more firmly tightened crosswise and, in the third step, the bolts are also tightened crosswise using a torque wrench. Thereby, as tightening torque for the bolts, HKS recommends to use the values stated in the Technical Information TI-007 (published by the Güteausschuss der Gütegemeinschaft Weichstoff-Kompensatoren (Quality Commission of the Quality Association for Fabric Expansion Joints) e.V., refer to <http://www.qafej.org/> tab "Technical Information").
- 2.19 No sharp-edged tools must be used, so that the fabric bellow is not damaged if the tool slips.
- 2.20 Because the flexible fabric "sets" after commissioning and this can result in the bolts loosening, the bolts must be retightened once or twice.
- 2.21 If the same fabric compensator must be removed and installed, e.g. for inspection, the sealing effect can be thereby reduced, in particular in the flange area.
- 2.22 It is imperative to observe the general valid and relevant safety and accident prevention regulations!

### 3 Operation

- 3.1 HKS fabric compensators must only be operated within the limits of the design conditions in accordance with the data from the manufacturer.
- 3.2 Fabric compensators 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 Fabric compensators 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 elongation to be absorbed may not exceed the specified axial elongation or the specified lateral elongation. A combination is only permitted with appropriate reduction factors after prior written approval from HKS!

- 3.6 The specified number of load changes must not be exceeded.
- 3.7 The compensator 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 air.
- 3.8 The operator is responsible for the compatibility between the medium and the container or sealing material.
- 3.9 For safe operation of the compensator and, thus the whole system, it is imperative to observe and adhere to all of the information and instructions.

## **4 Maintenance**

- 4.1 HKS fabric compensators 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, 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, elutions, cracks).
- 4.2 If non-permissible substances come into contact with the bellows from outside or inside, they must be cleaned immediately and completely using copious amounts of clear water. Further operation only in consultation with HKS.
- 4.3 For all inquiries and spare parts orders, please be sure to state the type and factory number of the product (embossed or printed on the nameplate).

## **5 Repair**

- 5.1 If repair of a fabric compensator is required in an exceptional case, the tasks or modifications to the fabric and connecting parts of the compensator (e.g. flange, guide pipe or safety parts) must only be carried out by staff from HKS, or companies authorized by HKS. In this 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 inquiries and spare parts orders, please be sure to state the type and factory number of the product (embossed or printed on the nameplate).

## **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.