

# **Montagevejledning Installation instruction Montageanleitung**



***-Stålkompensatorer!  
-Steelcompensators!  
-Stahlkompensatoren!***



Stainless steel expansion joints are designed for the absorption of previously specified movements under specific pressure and temperature conditions. To achieve the maximum service life, resistance towards corrosion and reliability caution during handling, storage and installation must be exercised. This caution is exercised when the advice below is strictly followed:

## STORAGE AND TRANSPORTATION

Storage and transportation can only be carried out so that the compensator is not damaged.

- The compensator **must not** be damaged mechanically or from moisture, water, earth, sand, chemicals or the like.
- Transport devices, tie rods, hinges and gimbal can not be used for lifting hooks. Likewise the compensator must not be lifted directly in the bellow or in a way that mechanically depress the bellow.
- Enclosed with the compensator is this installation instruction, which the installation contractor might need. This installation instruction ought to follow the compensator all the way until installation is carried out.
- Storage must take place on a flat, firm timber base and under roof or another kind of rain-proof cover.
- Compensators **must not** be piled up on each other and must likewise not strike against each other.
- Bending due to heavy connections components must be prevented by timber supports (not in way of the bellows).
- Storage must only take place in clean and dry areas, where it will not be exposed to heavy traffic or damaging environment.

***Damages and deformations, the compensator can incur from incorrect handling, can with a degree of possibility influence the performance of the compensator!***

## INSTALLATION

Compensators from Belman Production A/S are designed for absorption of predefined expansions/movements from a pipeline under known temperatures/movements. The calculated service life of the compensator take it as read that the compensator at no time are exposed to mechanical or thermal loads aside from the design given. Accordingly the compensator must only be installed at predetermined positions in the pipeline. If the installation instruction is not followed – the

service life and the pressure capacity of the compensator can be reduced, and this can cause to mistakes and damages to the pipeline.

### Prior to installation

Prior to installation the pipe route must be inspected for inaccuracies, so the compensators are not subjected to equalizing inaccuracies. Check likewise that:

- The compensator has not been damaged during transport. Check for dents, damaged fittings, marks caused by water on the steel (incipient corrosion) etc.
- The distance gap between the adjacent pipe ends are according to the predefined.
- The route of pipe is straight.
- The pipeline is fixed by fix points (anchors) and guides.
- The fix points are dimensioned so that they can absorb the reaction forces and stiffness rate that arise during use.
- Only one compensator may be fitted between 2 fix points (anchors).
- The expansion is in conformity with that of the chosen compensator.
- The compensator is not subjected to torsion.

### During installation

#### Pipe route

Fix points and guides must be located so that:

- The compensator is not subjected to the weight of the pipeline.
- Hanging of the pipeline is avoided by making sure that the distance between bearings is not too large.
- Suspension in self-aligning bearings is avoided. Plain or roller bearings are to be used as the guide bearings.

#### Location of the guide bearings

- The distance between the compensator and the 1st bearing may be a maximum of 4 times the pipe.
- The distance between the 1st and the 2nd bearing may be a maximum of 14 times the pipe diameter.
- The distance between the remaining pipe bearings may be a maximum of 21 times the diameter. This distance may have to be reduced, where this is required for the inherent stability of the pipe.

## **REMEMBER!**

- The possible provided protective cover and pre-tensioning devices may only be removed after installation and fixation of the pipeline.
- Pre-tensioning devices are marked with yellow and is removed before test and use.
- Limit rods; are components like tie rods, hinges and gimbal can not be removed. These are all part of the function of the compensator.
- On compensators fitted with an arrow, check that the direction of the arrow, matches the direction of flow.
- The bellows must be protected from welding, plaster and mortar splatter.
- During handling, ensure that the bellows do not come into contact with tools or lifting equipment. All lifting must take place by means of the eyes, welded ends or flanges.
- The installation length must agree with the installation gap.
- Any handling, hooking, storage etc. must not take place directly on the bellow – only in lifting bars, pipe ends and protection covers.
- Any welding-in or bolting at the place of installation must be done in such a way that the bellow is not damaged.
- A compensator without an external protection casing, which is required re-insulated, must be installed with an external protection casing around the bellow. This protection casing has the purpose of preventing the insulation material from working itself in between the bulges of the bellows and over time prevents the bellow from operating as intended.

## **AVOID!**

- Avoid use of cleaning agents that contain chlorides.
- Avoid use of steel wool or wire brushes on bellows.
- Do not force-rotate one end of the compensator for alignment of the bolt holes. Ordinary bellows are not capable of absorbing torque.
- Pipe hangers are not adequate guides, correctly dimensioned fix points or guides are a better solution.
- Avoid exceeding a pressure of  $\frac{1}{2}$  times the rated working pressure of the compensator. Unless this is apparent from the drawing or confirmation of order.
- Avoid using shipping bars or pre-tensioning devices to retain thrust if tested prior to installation.
- Avoid drop and bruise of the bellow.

## **After installation**

Before the completed pipeline is put into service visual inspection is to be carried out – also the technical details. Several years of experience have shown that it is a good idea to answer following questions before pressure test and starting up the system containing compensators. Through this procedure a successful installation and performance will be achieved:

## **Prior to pressure test**

### **CHECK!**

- Has the compensator been damaged during handling or installation?
- It must be ensured that the system is installed correct as per the enclosures and especially that anchors, fix points, slide guides and the compensator are installed as presupposed?
- Is the compensator installed at the proper location in the system?
- Are the flow direction and the positioning correct?
- Is the delivered compensator as specified and is it installed correctly into the system (not angled or the like)?
- Are the bellows and other movable parts of the compensator removed from foreign materials?
- Are all shipping devices, packaging- and protection devices and pre-tensioning devices removed from the compensator?
- Are all guides, pipe supports and the compensator free, so that movements are allowed in the system?
- If the system has been designed for a light medium (e.g. gas) and is to be tested with a heavier medium (e.g. water), have provisions been made for proper support of the additional dead weight load on the piping and the compensator? Some water may remain in the bellows after the test. If this is damaging to the bellows and/or to the system operation, a good idea is to remove the water.

## **After pressure test**

### **CHECK!**

Inspection during and after pressure test.  
Check if following is indicated:

- Leakage and gradual loss of pressure.
- Distortion or movement in components.
- Every expected movement in the pipeline because of pressure.
- Torsion or imbalance in the bellows.
- Fatigue failure due to unforeseen vibrations.
- Fatigue failure due to unintended movements, especially lateral ones, or due to bigger movements than predetermined.
- Damage due to accumulation of fixed pollution between the convolutions – internally and externally.
- Torsion.
- Pressure overload in the pipeline.

## **MAINTENANCE OF THE COMPENSATOR**

A well-dimensioned and correctly installed compensator does not require special maintenance beyond the normal maintenance usually carried out for the rest of the pipeline, where the compensator is mounted.

However continuous inspection of the pipeline during its service life is a good idea. These inspections are intended to inspect for corrosion, for if any parts have worked loose etc. The frequency of these inspections is evaluated according to the function of the system, load, unexpected vibrations etc. This is no guaranty that damages will not occur, but it can minimize the risk significantly.

It can be useful to be aware of the frequent reasons for failure on compensators. General maintenance directions are difficult to outline, because compensators have a wide field of application and many compensators are designed for a specific purpose. We recommend that you are aware of the most frequent reasons for failure:

### **Transportation and handling damages**

- Dents, scratches and marks from incorrect handling.
- Unexpected harmful influences from surroundings such as salt, chemicals etc.

### **Installation damages and errors**

- Installing the compensator at some other place than presupposed.
- Settling inaccuracies in the pipe over the compensator.
- Premature or no dismounting of any mounting fittings.
- Damage due to welding splatter because of poor protection of the bellows during mounting.
- Installing the compensator with inner sleeve in the wrong flow direction.

### **Operation damage**

- Corrosion damage from medium or surroundings (chlorides in particular).

***We draw attention to the fact that if this installation instruction is not followed, the guarantee no longer applies!***

***We furthermore refer to the installation instructions from EJMA.***



**MONTAGEEEKSEMPLE for...**  
**MONTAGEBEISPIELE für...**  
**INSTALLATION EXAMPLES for...**

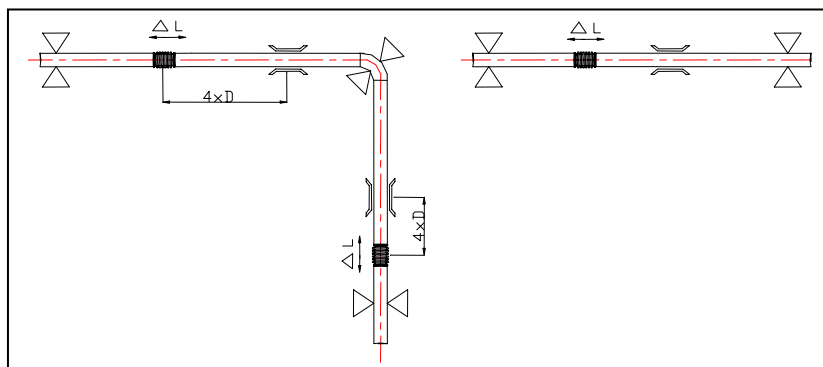
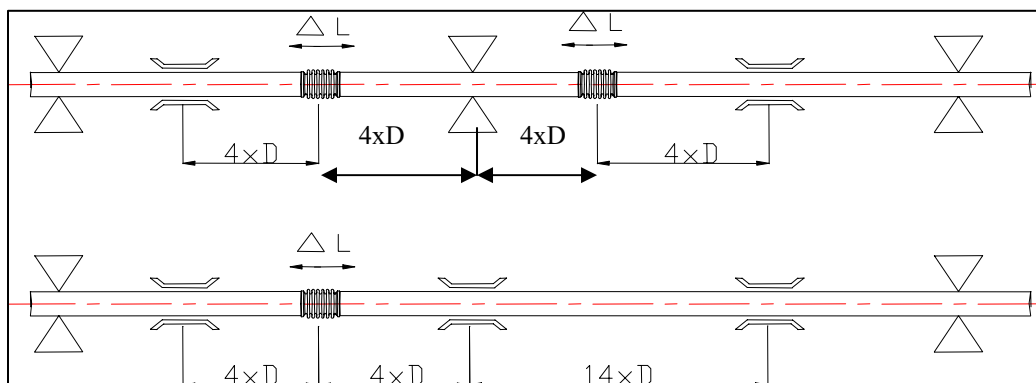
# Axiale kompensatorer

## Axial compensators

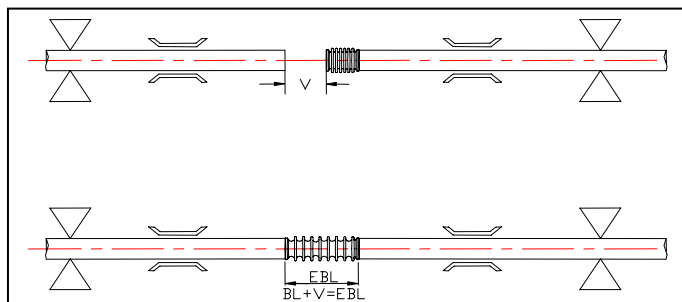
### Axialkompensatoren

Afstand mellem kompensator og leje  
Distance between compensator and bearing  
Abstand zwischen Kompensator und Lager

1. Leje/ Bearing/ Lager 4 x Diameter/Durchmesser
2. Leje/ Bearing/ Lager 14 x Diameter/Durchmesser



Forspænding ved montage  
Preset installation  
Vorspannung bei Montage




#### Definition

**BL** = Byggelængde/ Length/ Baulänge

**EBL** = Indbygningslængde/ Installation length/ Einbaulänge

**V** = Forspændt/ Prestressing / Vorspannung

 = Fixpunkt/ Fix point/ Festpunkt

 = Styre leje/ Guide bearings / Loslager

 **ΔL** = Bevægelse/ Movement /Bewegung

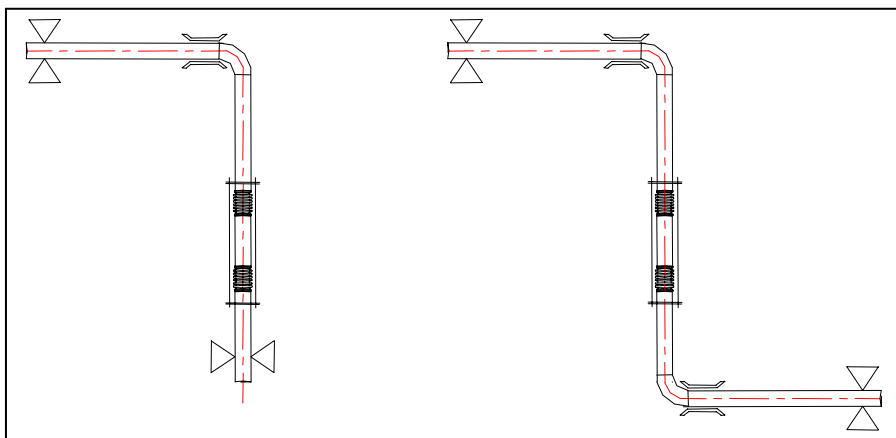
# Laterale kompensatorer

## Lateral compensators

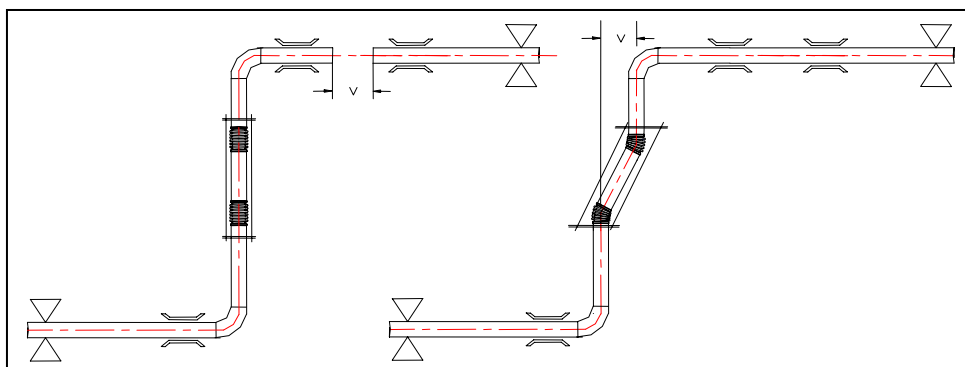
### Lateralkompensatoren

Afstand mellem kompensator og leje  
Distance between compensator and bearing  
Abstand zwischen Kompensator und Lager

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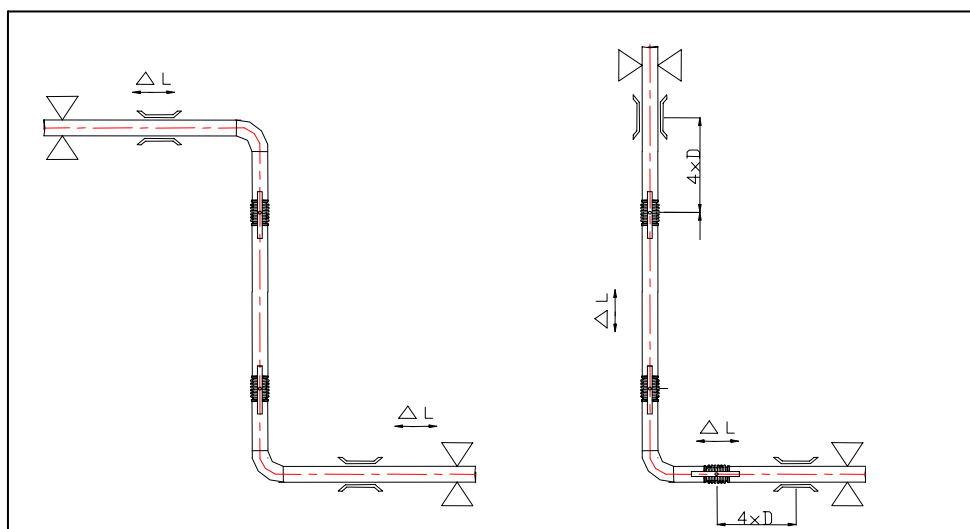
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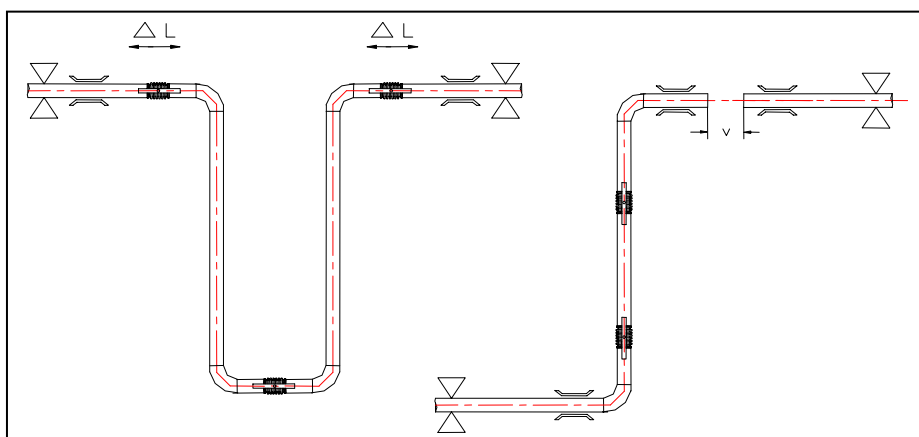
# Angulare kompensatorer Angular compensators Angularkompensatoren

Afstand mellem kompensator og leje  
Distance between the compensator and the bearing  
Abstand zwischen Kompensator und Lager

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Forspændning ved montage  
Preset installation  
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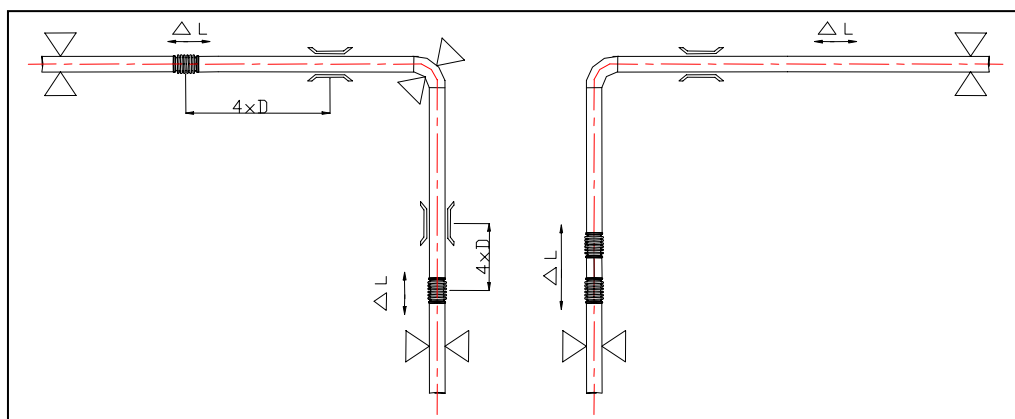
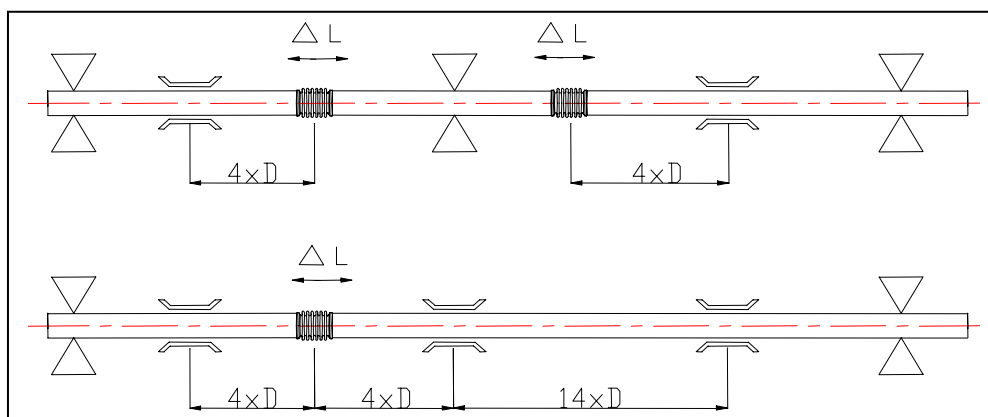
# Udstødningskompensatorer

## Exhaust compensators

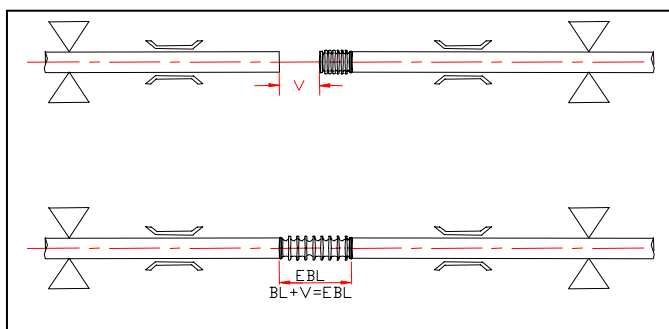
### Abgaskompensatoren

Afstand mellem kompensator og leje  
Distance between the compensator and the bearing  
Abstand zwischen Kompensator und Lager



1. Leje/ Bearing/ Lager 4 x Diameter/Durchmesser
2. Leje/ Bearing/ Lager 14 x Diameter/Durchmesser



Forspænding ved montage.  
Preset installation.  
Vorspannung bei Montage.



#### Definition

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