



DOCUMENTATION SHEET

Rubber Bellows

Installation instruction

INSTALLATION INSTRUCTION

Precautions prior to installation

- Install the rubber bellows at a visible and easy accessible position for inspection and replacement.
- The bellows diameter should match with the size of the pipe inside/outside diameter and in case of rubber bellows with clamps only very small differences are acceptable to secure a good sealing.
- Check all data of the bellows like type of fluid, temperature and pressure, compared with the system where it will be used for, before starting installation.
- For a safe operation it is important to use correct counter flanges. The sealing face of the flange needs to be machined smooth and must cover the rubber sealing face for at least 60% of the rubber bellows. We recommend to use welding neck flanges as those assure a proper sealing of the bellows.
- In case of an enlarged inner diameter of the flange loose rings of at least 4 mm need to be applied to secure a correct sealing.

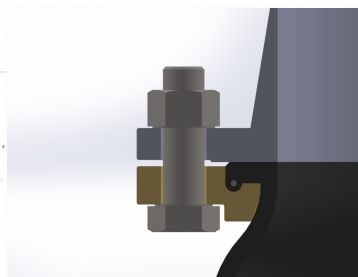


Fig. 2 Flange provided with smooth sealing surface.

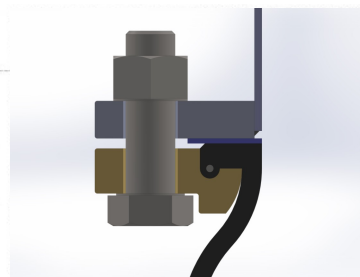


Fig. 4 Flange provided with flat sealing gasket to protect the rubber surface.

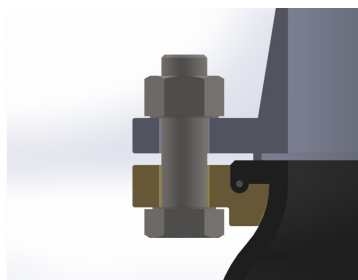


Fig. 3 Do not use flange with tongue or groove which will damage the rubber.

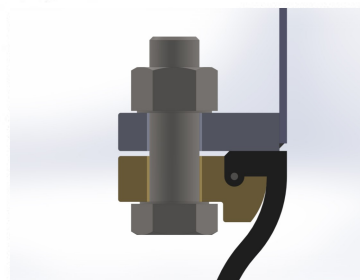
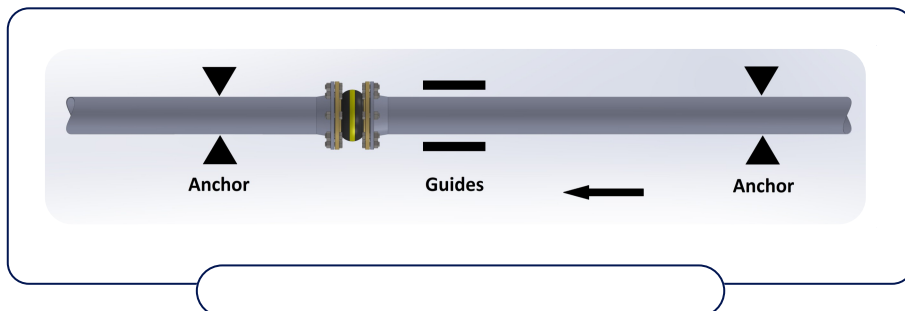


Fig. 5 Sharp edge pipe ends will damage the rubber face.

- In case there will be vacuum in the system the use of a vacuum ring is recommended and can be installed in the bellows easily before installation if it is not included already.
- Rubber bellows produce reaction forces as a result of the pressure in the pipe work and these forces can be absorbed by using adequate fixed points.
- Use bellows with extension limiters if there are no fixed points.



- Rubber bellows acts as a piston by the forces arising from the internal pressure. To prevent the pipes from damage they are to be properly anchored in order to take care of these reactions forces (Fr). The reaction force of the bellows can be calculated by the formula as follows.

$$Fr = A \times P \times 0,01$$

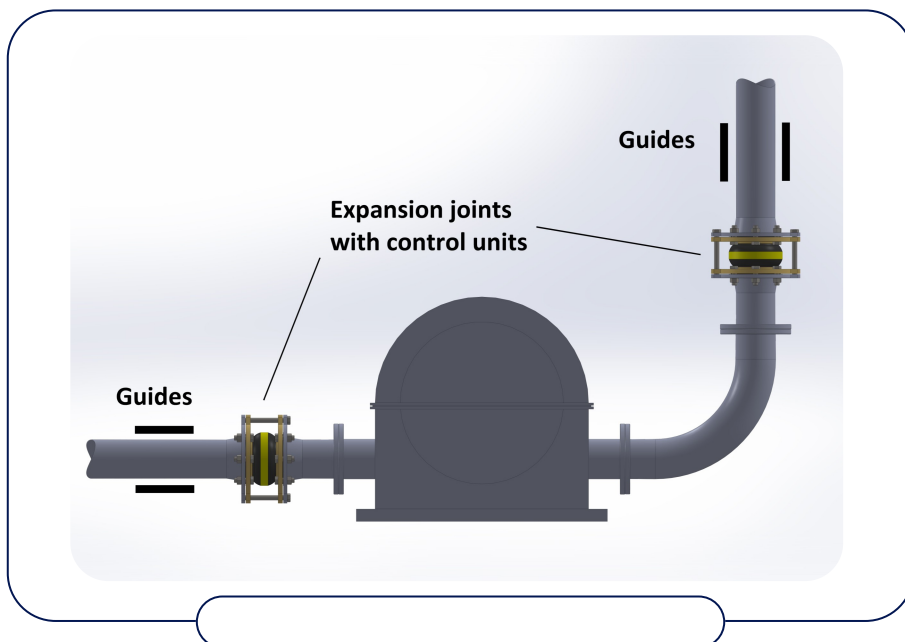
Fr = reaction force in kN

A = effective cross sectional area in cm^2 – see relevant table of bellows

P = (actual pressure in Bar or kp/cm^2) $\times 0.01$

- The distance from the bellow to the first fixed point or pipe guide should not be larger than 4x pipe diameter ($L1$)
- The distance between pipe guides and fixed points in horizontal pipe work should not be bigger than 14x pipe diameter ($L2$)
- The distance between pipe guides and fixed points in vertical pipe work should not be bigger than 20x pipe diameter ($L3$)

- Use bellows with extension limiters if there are no fixed points.



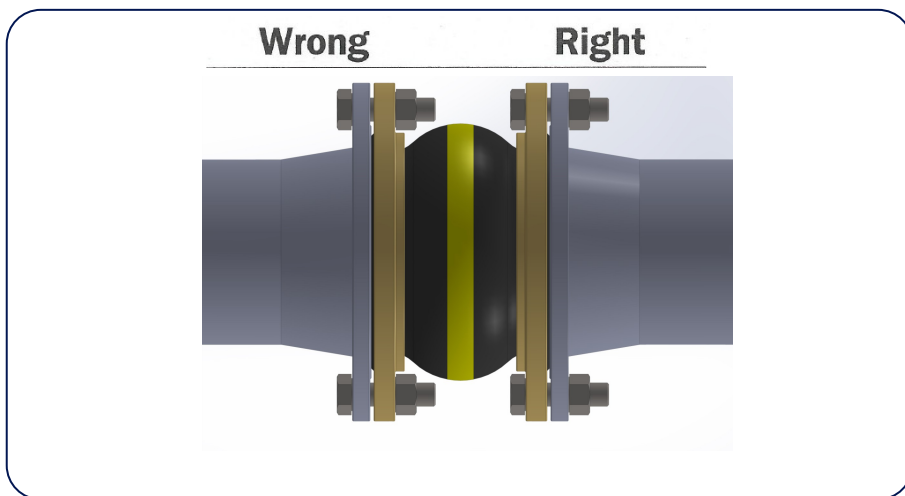
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- During installation the rubber bellows might be compressed or stretched slightly to eliminate misalignments of the system however the allowable maximum values of the movements will change accordingly.
- If the rubber bellows needs to be stretched to install, please pay attention to the collar of the sealing ring of the bellows being kept in position and will not tear out of the groove of the flange.
- Load the rubber bellows to compression necessary for installation between the flanges to the allowable maximum according to the tables (values depend on type of bellows)
- If possible install the bellows in such a way that the production date is visible in order to make a better review for replacement.
- It is recommended to insert the bolts from the rubber bellows side of the flanges however if this is not possible the loose threaded end must not interfere with the maximum movements of the bellows.



- Do not use sharp tools which may damage the rubber.
- Install the bolts crosswise.
- Apply the torque crosswise (3 steps) by tightening the bolts by hand.
- Fasten all bolts crosswise with 50 Nm.
- Final torque to be applied crosswise according to the table.

Nominal Bore	Bolt torque PN10 flange in Nm.
NB 32 - NB 80	40 - 60
NB 100 - NB 200	60 - 80
NB 250 - NB 300	80 - 100



- If no torque wrench is available fasten the bolts with common sense and keep anyway distance between the connecting flanges of at least one (1) mm.

Precautions after installation

- In case of works the rubber bellows needs to be protected against heat, flames and sparks and in the event of these works protection of the bellows has to be made.
- Permanent radiation heat needs to be avoided or use a flame protection guard.
- Do not exceed maximum permissible temperature according to the tables to secure long life time of the product.
- If a test pressure will be applied on the system the maximum value is the maximum working pressure x 1,5.
- Do not paint the surface of the rubber and keep the part clean in order to allow adequate inspections.
- Bellows do not need maintenance however are subject to wear and need to be inspected every year at leakage, cracks and other deviations.

General

- Combined movements

If the installation length of the bellows is longer then its natural length the allowable lateral movements are limited.

Installation length	130 mm	140 mm	150 mm
Lateral permissible	20 mm	10 mm	5 mm

- Temperature versus movements and pressures

The values shown in the documentation are based on a temperature of max. 50°C. Exceeding this temperature will give a reduction of the max. movements and/or pressures according to the table.

Temperature	Reduction
50°C - 70°C	25%
70°C - 100°C	40%

- Calculated lifetime at various temperatures.

Working temperature	Intermittent use max. 300 hrs/year	Continuous use
0° - 30°C	12 years	6,0 years
30° - 50°C	9 years	4,5 years
50° - 70°C	7 years	3,5 years
70° - 90°C	5 years	2,5 years
90° - 100°C	2 years	1,2 years