Safety notes

Safe installation, operation and maintenance procedures must be established for this equipment based on the procedures of the site and environment in which it operates. These procedures must be in place before installation, operation and maintenance occurs.

Prior to starting any procedure check health and safety requirements with the person responsible for the area and ensure all required precautions, PPE and permissions are in place.

The following list of potential risks is not exhaustive; all those working with the equipment must take the necessary steps and advice to ensure safety.

- Pressurised equipment
- Hazardous fluids
- High temperatures
- Unrestrained piping and equipment
- Handling and lifting

General

Resolve pipe misalignment and flange hole orientation before installation.

Union end and untied expansion joints will exert a pressure force on the piping and equipment they are connected to.

Inspect the entire system to insure that anchors, guides and pipe supports are installed in strict accordance with piping system drawings.

Anchors must be designed for the test pressure thrust loads.

Expansion joints exert a force equal to the test pressure times the effective area of the bellows during hydro test. Hydrostatic test pressure should not exceed 1.5 times the rated working pressure unless the expansion joint was specifically designed for this test pressure.

Care in operation

Do not paint rubber bellows. The paint will attack the rubber. (This also applies to paint splatter).

Protect the rubber from weld spatter. When welding, always ensure that the bellows is bridged using a continuity strap.

Do not lag rubber bellows on heating systems. The increased temperature will reduce the life of the bellows.

Once the system is filled but not under pressure, check that the tie bars, if fitted, are still tight. Re-tighten the bars if slack. Note: tie bars should never be slackened off to reduce noise or vibration transmission, major damage to equipment may occur.

Most bellows use an EPDM inner liner. EPDM is a proven material in heating and chilled water systems. It is resistant to glycol and to most chemicals used in water treatment, when used in normal concentrations. As suppliers of water treatment chemicals are reluctant to give information about their formulations, we cannot approve any specific chemical or additive.

Always check with the chemical supplier that the additives are suitable for use with EPDM rubber or any other rubber quality supplied (Butyl, Perbunan). For other mediums check with FlexEJ for compatibility.

Installation: Union End Bellows

Prior to installation, check that you have the right bellows for the particular duty. Rubber bellows have temperature and pressure limitations. Maximum allowable pressures need to be derated at temperatures above 50°C. See FlexEJ data sheets for allowable pressures and temperatures.

All rubber bellows will extend under pressure. These pressure thrust forces can be very substantial at pressures above 2 bar and 65mm N.B. size. Unless the pipe work can be sufficiently anchored a flanged tied bellows should be fitted.

Check the vacuum rating of the product when bellows are fitted to suction side of pumps and where vacuum conditions could occur.

Take care when installing the bellow to ensure no torsion (end to end twist) is applied.

These expansion joints require the pipe work to be suitably anchored and guided for correct operation.

These expansion joints are untied and will exert a pressure force on the piping and equipment they are connected to.

Installation: Flanged Bellows

Prior to installation, check that you have the right bellows for the particular duty. Rubber bellows have temperature and pressure limitations. Maximum allowable pressures need to be derated at temperatures above 50°C. See FlexEJ data sheets for allowable pressures and temperatures.

All rubber bellows will extend under pressure. These pressure thrust forces can be very substantial at pressures above 2 bar and 65mm N.B. size. Unless the pipe work can be sufficiently anchored a tied bellows should be fitted (see Fig.2). Vacuum support rings may be required when bellows are fitted to suction side of pumps and where vacuum conditions could occur.

We recommend that the rubber bellows are mated up against full-bore weld neck flanges (see Fig.3). If installed in this manner no additional gaskets are required. We advise against using slip on or screwed flanges as mating flanges as these can damage the rubber bellows. Once the sealing face has been damaged medium will penetrate the reinforcement layers and destroy the integrity of the bellows.

If it is unavoidable to use this type of mating flange, a gasket must be used (this should be a hard gasket such as Klingerite and be at least 3mm thick. The gasket should reach the internal bore of the rubber bellows see fig.4). Another option is to fill the gap of the slip on flange with weld and grind it flush (see Fig.5).

Check that the two mating flanges are parallel and that they are in line (maximum allowed offset is 5mm in any direction). The gap between flanges should be within +/- 5mm of the bellows neutral length (see Fig.6). Ensure that the pipework is adequately supported. The bellows must not support pipes or plant.

Note: 106mm long expansion joints have threaded bolt holes in the flange.

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Typical bolt torques

Nominal bore	Torque setting Nm
<=80	60 (max)
>80	80 (max)

Bolts should be inserted from the bellows side (see Fig.3). On some larger sizes this may not be possible. In that case a bolt of the exact length needs to be selected. An alternative is to use studding cut to length and fitted with a nut at both sides (see Fig.7).

This is important as the bellows will increase in diameter under pressure. Even if there is space between the bolt and the bellows in an unpressurised state, they may foul when pressurised. Bolts of the right diameter must be used to ensure correct alignment.

Take care when inserting the bellows into the gap between the two mating flanges. Sharp edges can damage the sealing face of the rubber bellows. Before tightening the bolts, ensure that the bellows sits evenly in its flange groove and does not get pinched between flanges. The sealing face of the bellows must be concentric with the sealing face of the mating flanges.

Great care has to be taken with the tightening of the flange bolts. Remember that you are tightening against a rubber face and as with gaskets, over tightening will cause the joints to leak and it will damage the bellows. Tighter is definitely not better!

Tighten opposite bolts to get an even pressure all round (check the gap between the flanges). Use a torque wrench to tighten the bolts, in increments, initially to around two thirds of the maximum values listed in the table. Torque the nuts and not the bolts.

The rubber will take on a set and the bolts will need to be checked and retightened after 24 hours. The values given in the table are for new bellows only. The maximum torque settings should not be exceeded, values are without pressure in the system.

Once the bellows is fitted, ensure that the tie bars are tight. If necessary, adjust nuts at either end. All tie bars should be at equal length. When three or more tie bars are fitted it may be necessary to remove one tie bar to install the bellows. Ensure that washers are re-assembled in the right order and orientation. A lock nut must be re-fitted.

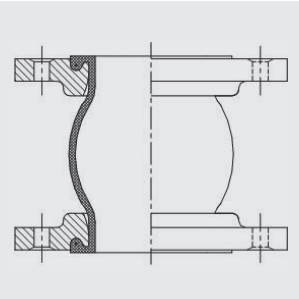

Fig 1: Untied Bellows

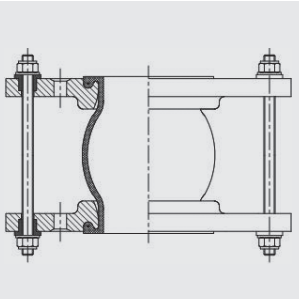

Fig 2: Tied Bellows

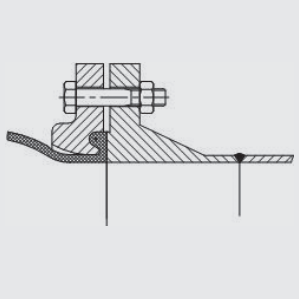

Fig 3: Full bore weld neck flanges

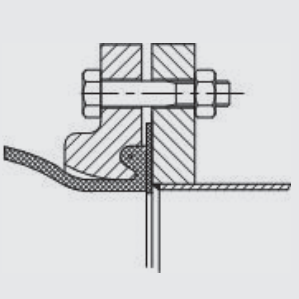

Fig 4: Slip on mating flanges

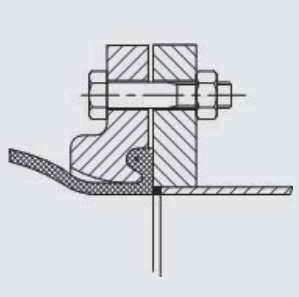

Fig 5: Gap filled with weld then ground flush

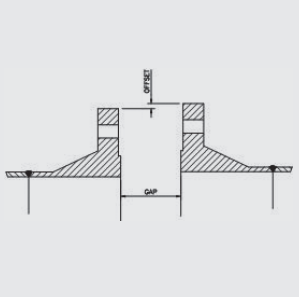

Fig 6: Offset

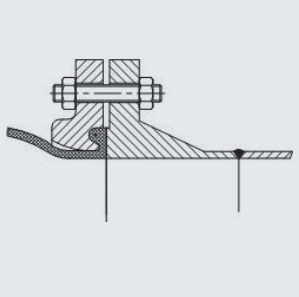

Fig 7: Use of studding

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