

Metallic Expansion Joint

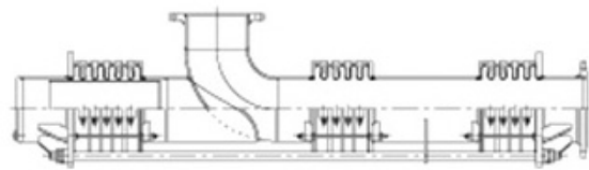
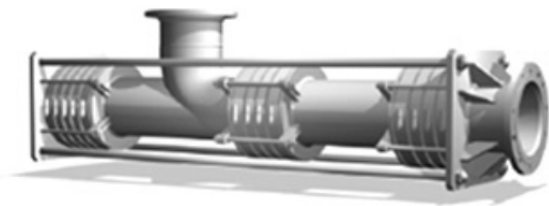
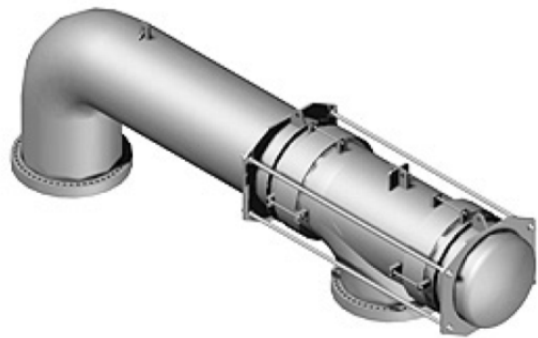
6. Pressure Balanced Expansion Joint (PEM-BS/BL)

Elbow Pressure Balanced Expansion Joint

The elbow pressure balanced expansion joint is really a combination of several types as like universal expansion joint and single expansion joint. The main function of this expansion joint is to retain and balance the pressure thrust so that main anchoring of the pipe or adjacent equipment is not required, and forces and movements on attachment flanges of delicate equipment, such as turbines, are kept to acceptably low levels.

The elbow pressure balanced expansion joints may be used where there are axial and lateral movements. This expansion joint has a universal expansion joint for lateral movement. In order to absorb the axial, a bellows is added after the elbow with the same cross-sectional area as the ones in the universal section. This balancing bellows is connected by the tie rods to the pipe beyond the universal section and the pressure thrust is contained as tension in the tie rods.

The nozzle of the expansion joint between the tie rods, which includes the elbow, is now free to move axially, with the only resistance being a function of the spring rates of the bellows. The spring rate of the entire expansion joint is the sum of the spring rates of the balancing and the universal bellows. This is a constant length system, in that when the universal end compresses, the balancing end extends the same amount. All of the lateral movement is absorbed by the universal end, and there is no lateral movement imposed on the balancing end. Therefore, the balancing bellows is almost always a single bellows type.



In-line Pressure Balanced Expansion Joint

The in-line pressure balanced expansion joint is very good way to solve a difficult design problem when axial deflections exist, and anchoring is impossible for structural or economic reasons, such as high in the air or short straight pipe runs between two large vessels/ equipment.

This expansion joint is more expensive than any other expansion joints. But this expansion joint may result in a lower overall system cost when the main anchoring is eliminated.

The principle of in-line pressure balanced expansion joint is basically same as the elbow pressure balanced expansion joint, in that the axial pressure thrust is reacted by the pressure acting on a cross-sectional area equal to the area of the working bellows.

The cross-sectional area needed to balance the pressure is placed around the outside of this expansion joint because this expansion joint is entirely axial, and there are no directional changes in the pipe, such as with the elbow in the elbow pressure balanced expansion joint. Since the pressure forces are generated by the pressure acting on the annular surface between the balancing bellows, the arrangement of the tie rods transfer and balance the pressure thrust created in the pipe on each end. And so the forces needed to compress or extend the expansion joint are only the result of the spring resistance of the bellows, and main anchoring of the pipe or vessels is not required.

