Elbow pressure balanced expansion joints or corner relief expansion joints are the types of pressure balanced expansion joints which are used where pressure thrust forces on equipment or piping is unacceptable and the direction of the pipe system also changes. In order to understand the primary advantage of an elbow pressure balanced expansion joint, it’s important to understand how an ordinary expansion joint influences the pipe system, in which it is installed.

When a pipe system with an ordinary axial expansion joint installed is pressurised, the pressure reaction force as well as the force needed to move the expansion joint is transmitted to the pipe system. The pressure thrust force can be considerable, generating high demands and stresses on the guides and fix points used for supporting/fixing the pipe system.

By installing a pressure balanced expansion joint, the pressure thrust force is balanced internally within the expansion joint and only the spring rate force, which is needed to move the expansion joint, is transmitted to the pipe system. This reduces the load acting on the guides/fix points, which further reduces the need for supporting structures. This enables the use of lighter guides that can deliver significant savings, especially where structural and foundation work is impractical. This feature makes the elbow pressure balanced expansion joint the preferred choice for pipe systems, where pressure thrust loads acting on flanges and/or connected equipment such as turbines is avoided.

How does it work?
Elbow pressure balanced expansion joints can be designed for absorption of axial and lateral movement. If only axial movement is required, the expansion joint is designed with only one flow bellow and one balancing bellow after the bend. If lateral movement occurs the unit generally is designed with two flow bellows, similar to a tied universal unit. The balancing bellows are connected to the flow bellows and pipe system through tie rods so the balancing bellows are compressed axially and thereby creates a constant volume. That is why pressure balanced expansion joints are also known as constant volume expansion joints.

The pressure thrust force is absorbed as a pulling force in the tie rods, whereby the section between the tie rods including the bend acts as a balancing chamber. The balancing bellows and the flow bellows have inside the chamber exactly the same cross-sectional area and this creates a balance in the pressure thrust forces. Thereby the bend/pipe system corner is freed from any stresses. This type of expansion joint is used when there is a change in the direction of the pipe system and is considered the ideal solution on cross over piping on turbines.

Advantages
- Reduces / eliminates costs for fix points
- Balance the system
- Reduces piping costs
- Reduces external loads on connected equipment

PRODUCT RANGE
The corner relief expansion joints are customised solutions designed to fit the application. They are available in all designs, all sizes and all materials.