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### **Manufacturers of Expansion Joints & Flexible Metal Hose Assemblies**

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## **Introduction to Bellows**

### **Why bellows are used in Piping System?**

#### **PIPING FLEXIBILITY:**

In any piping system, there is a degree of flexibility inherent in the design. This flexibility results from change in direction of the pipe system as it connects the various components to each other. This inherent flexibility may be insufficient, in which case it becomes necessary to develop additional flexibility. This can be achieved by locating Expansion joints at strategic points in the system. Expansion joints help in reducing stresses in the pipe or force at the anchors, to accommodate the strains of thermal growth in a restricted space.

The previous method of achieving flexibility, by creating pipe loops or direction change, is more costly than the use of Expansion joints, because of piping material, space problems, pressure drop, increased power requirements, for fans, blowers, etc. This can be eliminated by the use of "Bellows Expansion Joints".

#### **AN EXPANSION JOINT**

A bellows with end connection designed to absorb all movements of the piping system in which it is installed. An expansion joint can consist of one or more bellows united by common connectors.



## TYPES OF EXPANSION JOINTS

### 1. SINGLE EXPANSION JOINT

Mainly single expansion joint is designed to absorb axial & small amount of lateral & angular movements of the piping system in which it is installed. A DOUBLE expansion joint is consist of two or more bellows joined by common connectors.

#### SINGLE EXPANSION JOINT



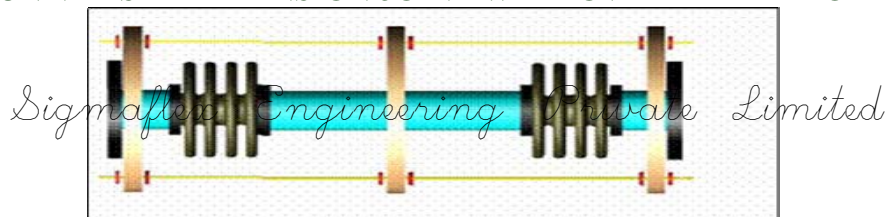
#### DOUBLE EXPANSION JOINT WITH INTERMEDIATE ANCHOR



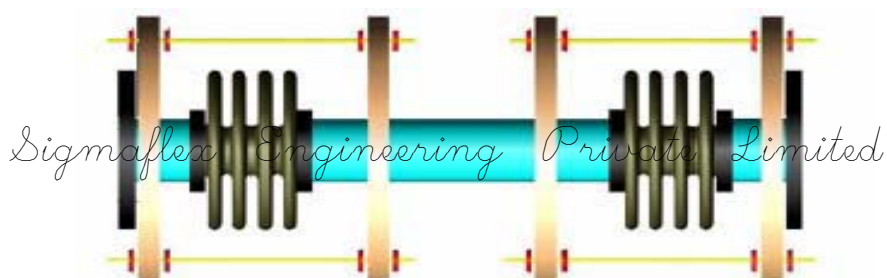
### 2. UNIVERSAL EXPANSION JOINT

A Universal Expansion joint is an assembly containing two bellows connected by a centre pipe and equipped with tie rods. Universal Expansion joints are mainly used to absorb any combination of the three basic movements in the piping system. (Axial, Lateral, Angular)

#### UNIVERSAL EXPANSION JOINT WITH OVERALL TIE ROD



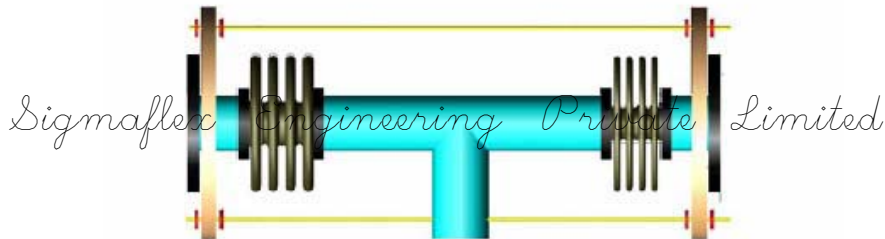
#### UNIVERSAL EXPANSION JOINT WITH SHORT TIE ROD



### 3. PRESSURE BALANCED EXPANSION JOINT

A pressure balanced Single or Double Expansion joint is an assembly designed to absorb axial movement and /or lateral deflection while the pressure thrust is balanced by means of an additional bellows and tie rods. This type of Expansion joint can usually be used only where change of direction occurs in the piping system.

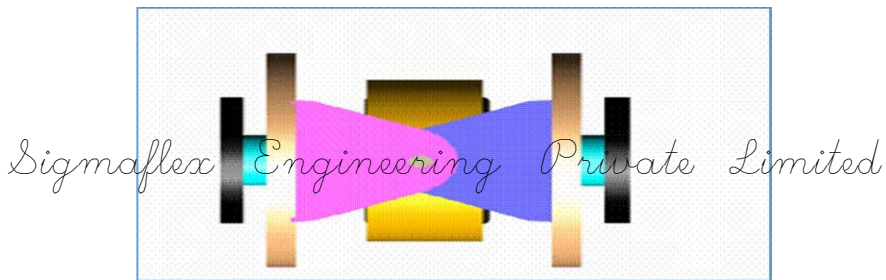
#### PRESSURE BALANCED EXPANSION JOINT



### 4. HINGED EXPANSION JOINT

A hinged Expansion joint is an assembly designed to absorb angular rotation in the plane perpendicular to the hinge pins. The hardware consists of two hinged plates 180° apart and joined to the end connection. The hinged hardware is designed to absorb the pressure thrust of the Expansion joint assembly. A pair of Hinged Expansion Joints shall absorb lateral deflection.

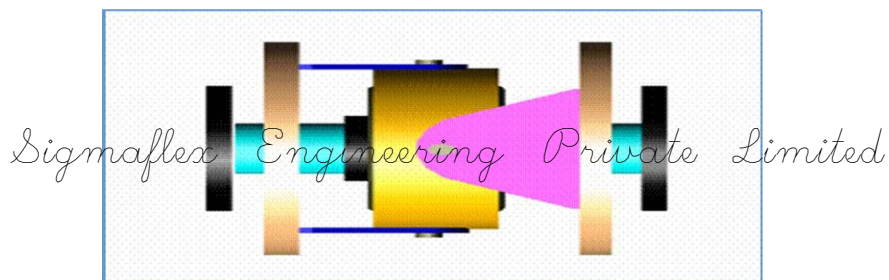
#### HINGED EXPANSION JOINT



### 5. GIMBAL EXPANSION JOINT

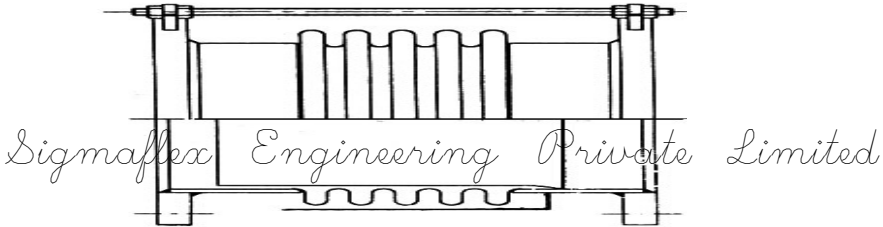
A Gimbal Expansion joint is an assembly designed to absorb angular movement in any plane. The Gimbal hardware consists of two sets of hinges, connected to a common floating Gimbal ring, which is designed to absorb the pressure thrust of the Expansion joint assembly.

#### GIMBAL EXPANSION JOINT



**TYPES OF MOVEMENTS**

**1. Expansion joint is defined as an assembly containing one or more bellows used to absorb dimensional changes caused by thermal or mechanical movement in a pipe line or duct.**



Expansion joints assembly consist of Bellow (Flexible Element) and end connections (Pipe, Flange or any special as per requirements). As per design requirements Limit Rods (Tie Rods), Internal Sleeve (Liner), Shroud (External Cover) are also provided.

**2. Three basic types of movements absorbed by Expansion Joints.**

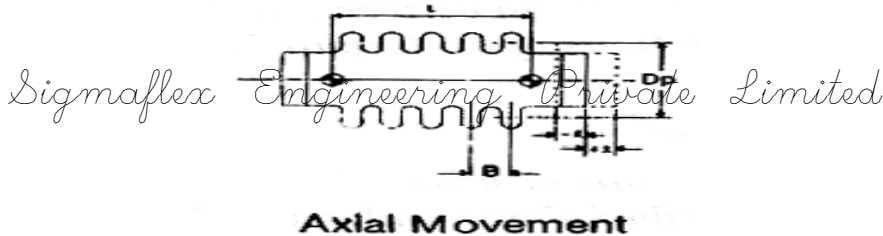
**A AXIAL**

**A-1 Axial Extension**

A Lengthening of an expansion joint parallel to its longitudinal axis.

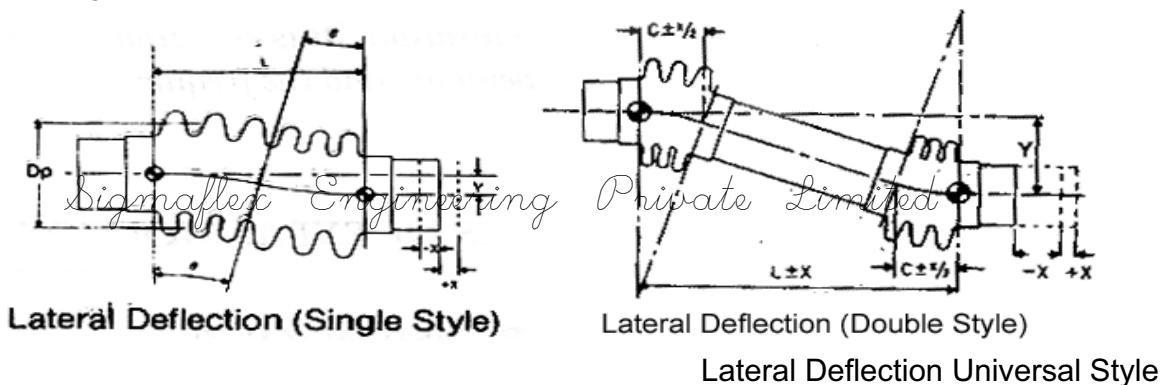
**A-2 Axial Compression**

A Shortening of an Expansion joint parallel to its longitudinal axis.



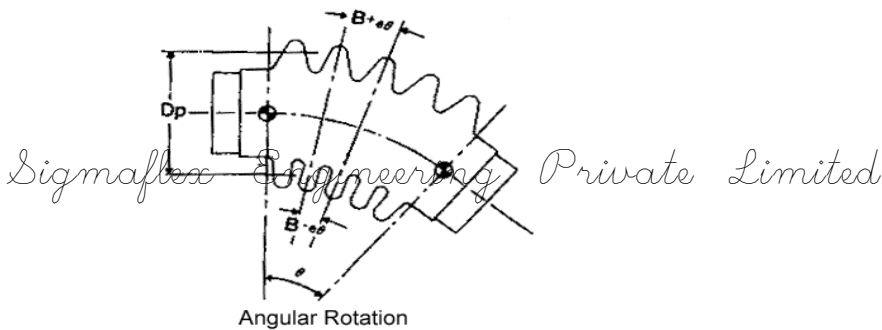
**B Lateral Deflection**

The relative displacement of the end connections of an Expansion joint perpendicular to its longitudinal axis. This movement has also been referred to as lateral offset, lateral movement or parallel misalignment.



### C Angular Rotation

The angular displacement between longitudinal axis of the end connections of an expansion joint.

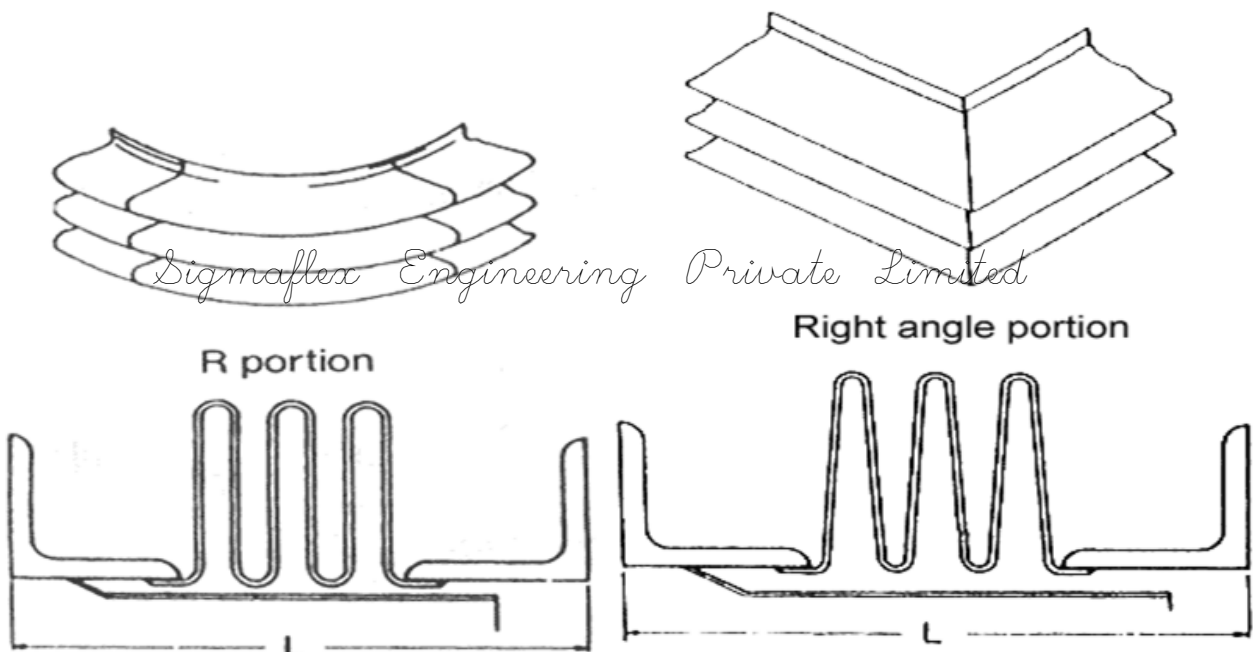


### 3. Vibration

Vibration is always undesirable in a piping system and often bellows type Expansion joints are used to dampen vibration. It is essential to know the magnitude of movements and the frequency of the vibration in the system.

### RECTANGULAR/SQUARE BELLOWS

As the name specifies, this type of Expansion joint is used for Rectangular Piping lines for gas duct for ventilation, blower etc. It can be manufactured up to 8 Meter x 4 Meter size.



Please contact us for any requirement of Bellows.

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