



# Refinery and FCCU Expansion Joints

**REFCOMM**<sup>®</sup>  
GALVESTON  
MAY 2-6 2016

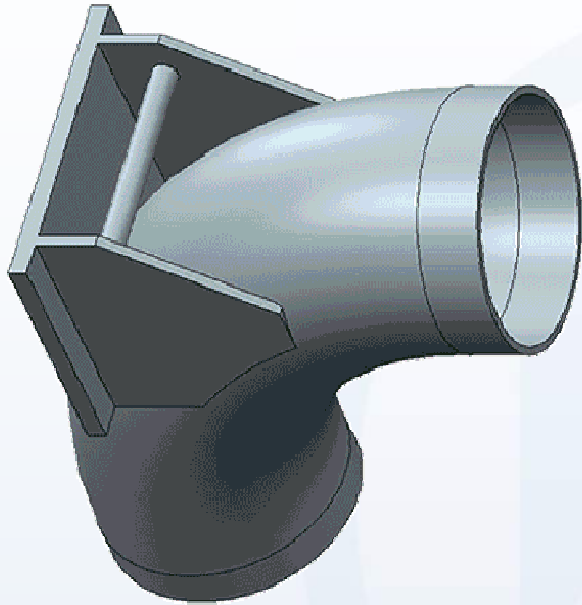
# Valtech Fabrication New Construction



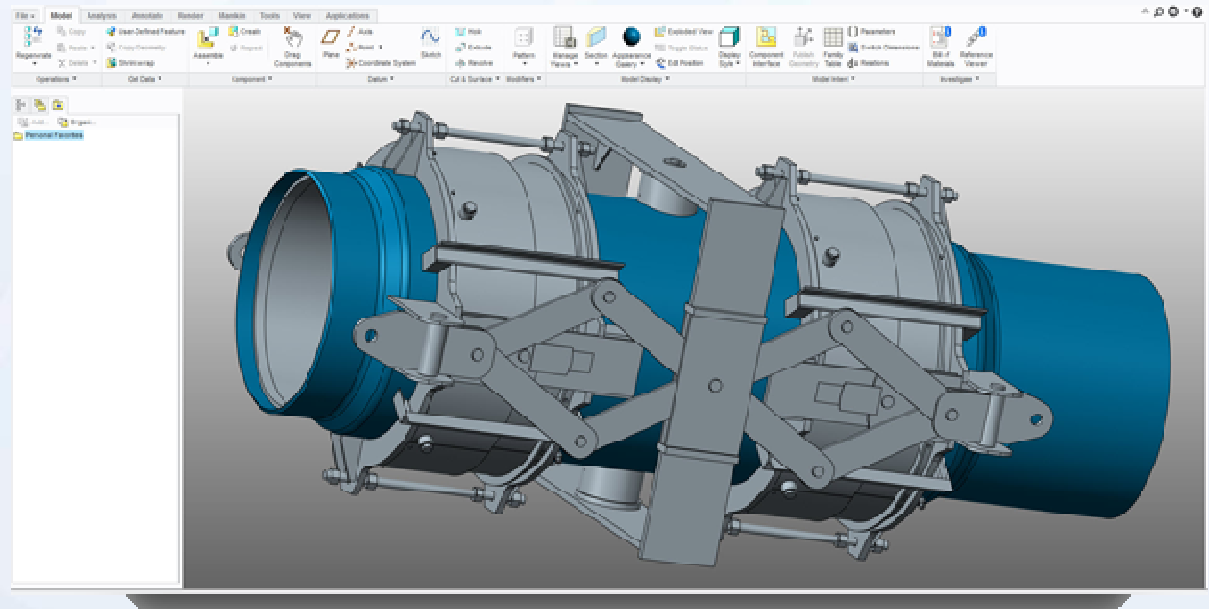
- 106,000 square feet  
(9800 square meters)
- Crane capacity 300,000 lbs  
(136 metric tons)
- 60ft (18.3m) under hook
- Refractory shop
- Heat cure / PWHT
- Paint shop

# Valtech Engineering

## Design and Engineering



- Solid Modeling (Creo 2.0)
- FEA
- Custom Software



# Valtech Engineering

## Design and Engineering

- EJMA
- ASME B31.1, B31.3, Sec VIII, Div 1 U stamp (R pending)
- PED Module G
- API 5L, 582, 620, 650, 934 A and E, 936

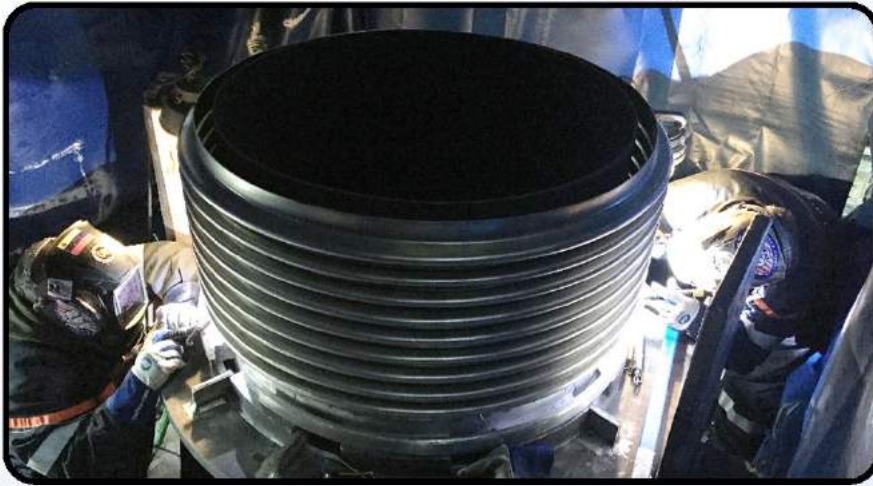


**Expansion Joint  
Manufacturers Association, Inc.**





# Valtech Engineering Field Service

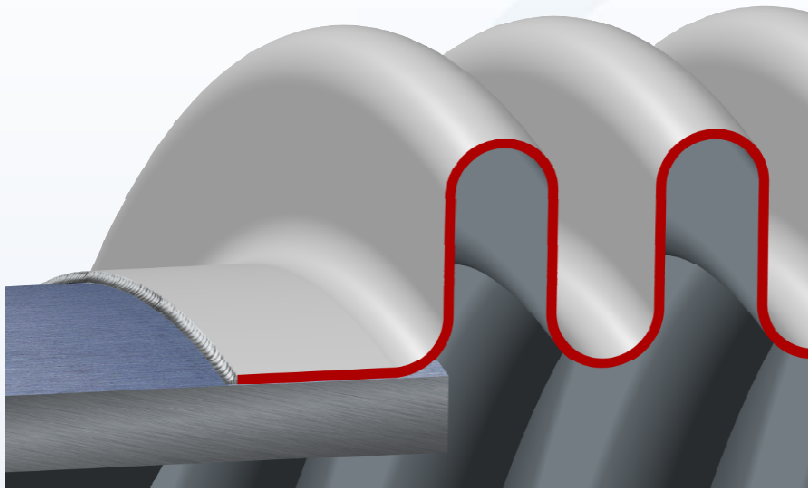


- 24/7 Emergencies
- Inspections
- Online Repair
- Offline Repair



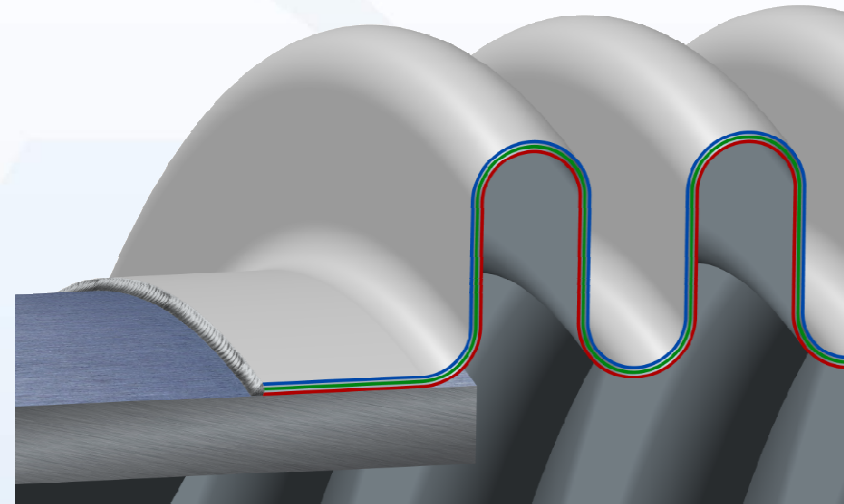
# How to Make a Bellows

## Multi Ply Bellows



### Advantages

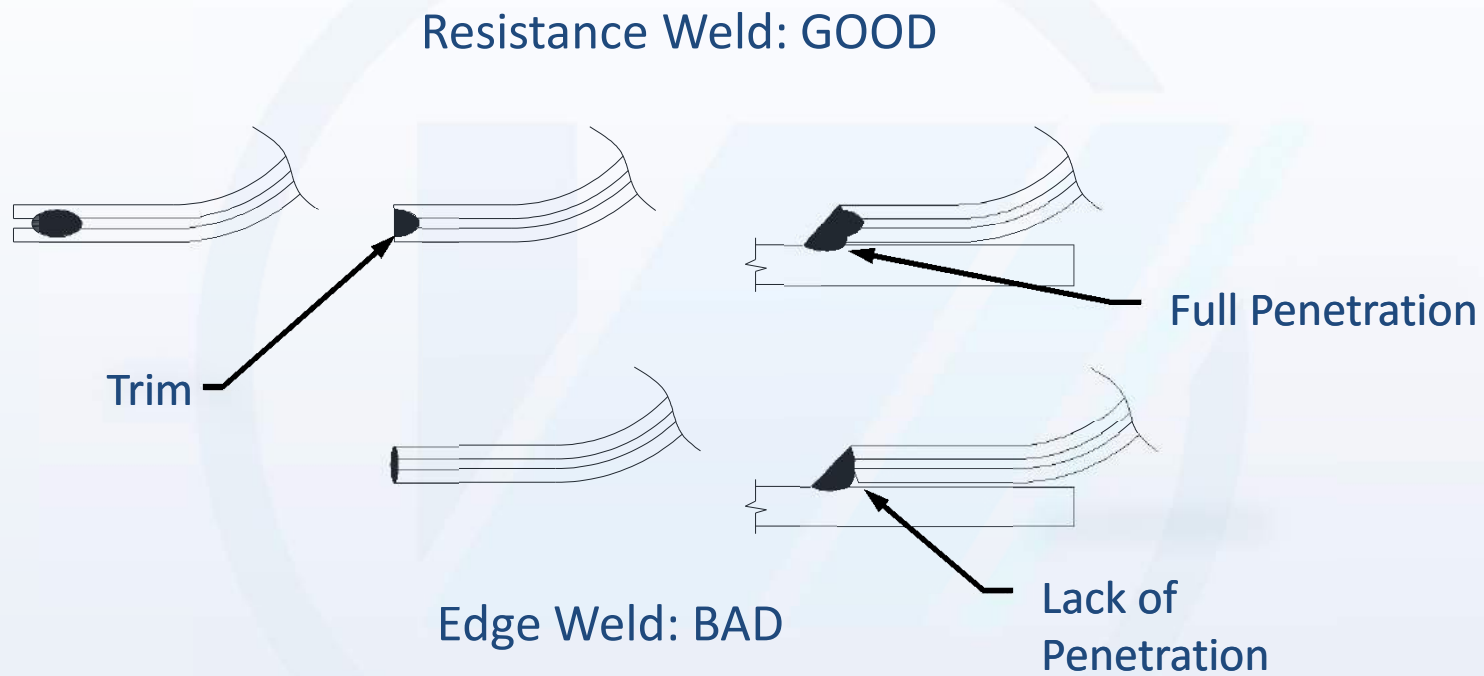
- Low Spring Rate
- High Cycles



### Disadvantages

- Lower Squirm Pressure
- More cost

# How to Make a Bellows Resistance Weld



# How to Design Bellows



- STP and 3M's
- Size
- Temperature
- Pressure
- Materials
- Medium
- Movements
- Weld ends or flanged



# How to Design Bellows

## Bellows Materials



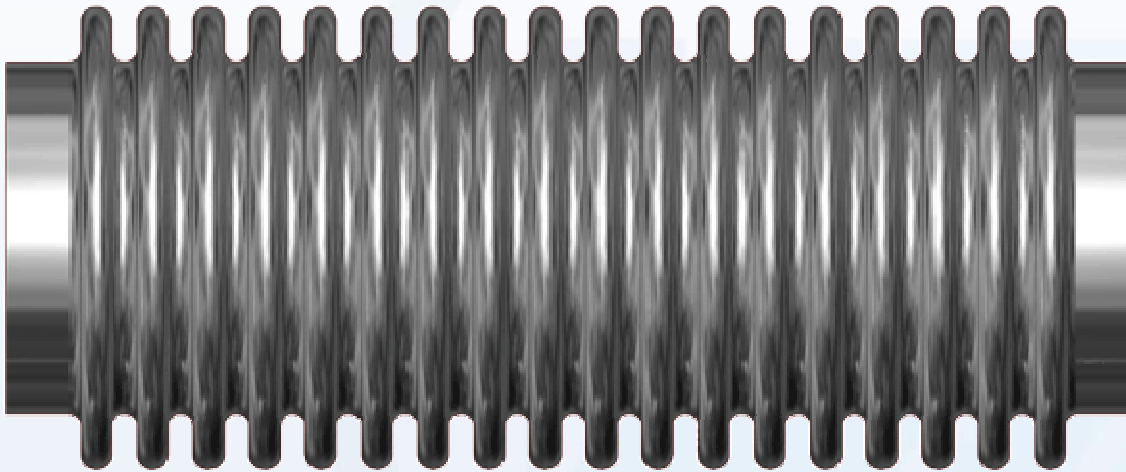
- 300 series stainless steels, L and H grades
- Hastelloy C-22, C-276
- Incoloy 800, 800H, 800HT, 825
- Inconel 600, 625



# Movements

## Axial

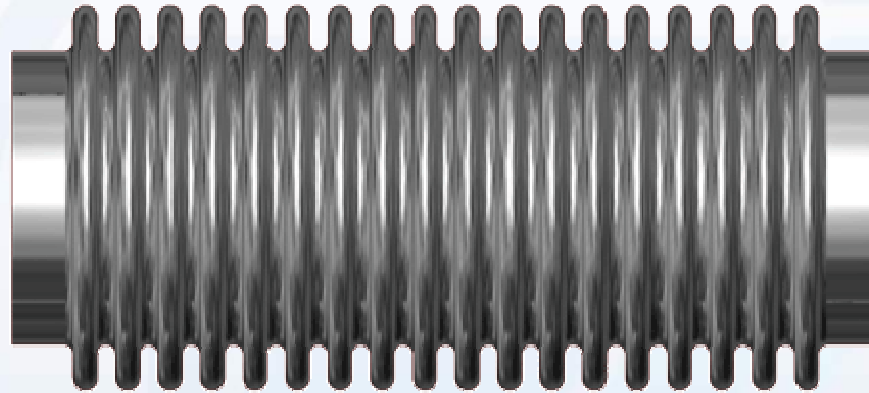
Compression - ← → + Extension





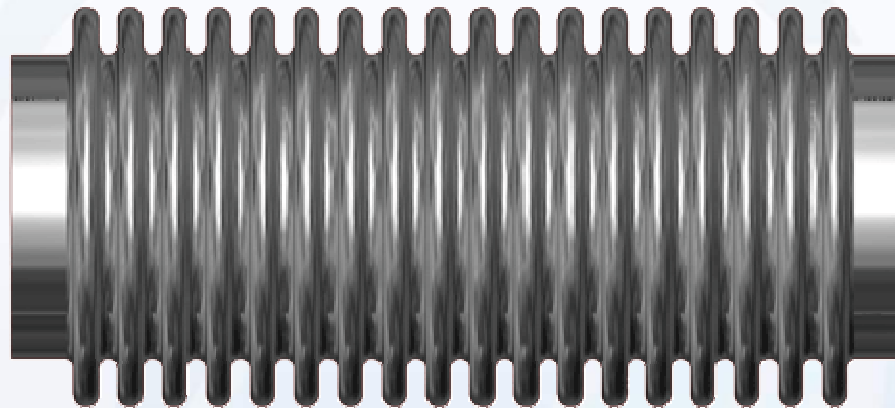
# Movements

## Lateral (For Single Bellows)



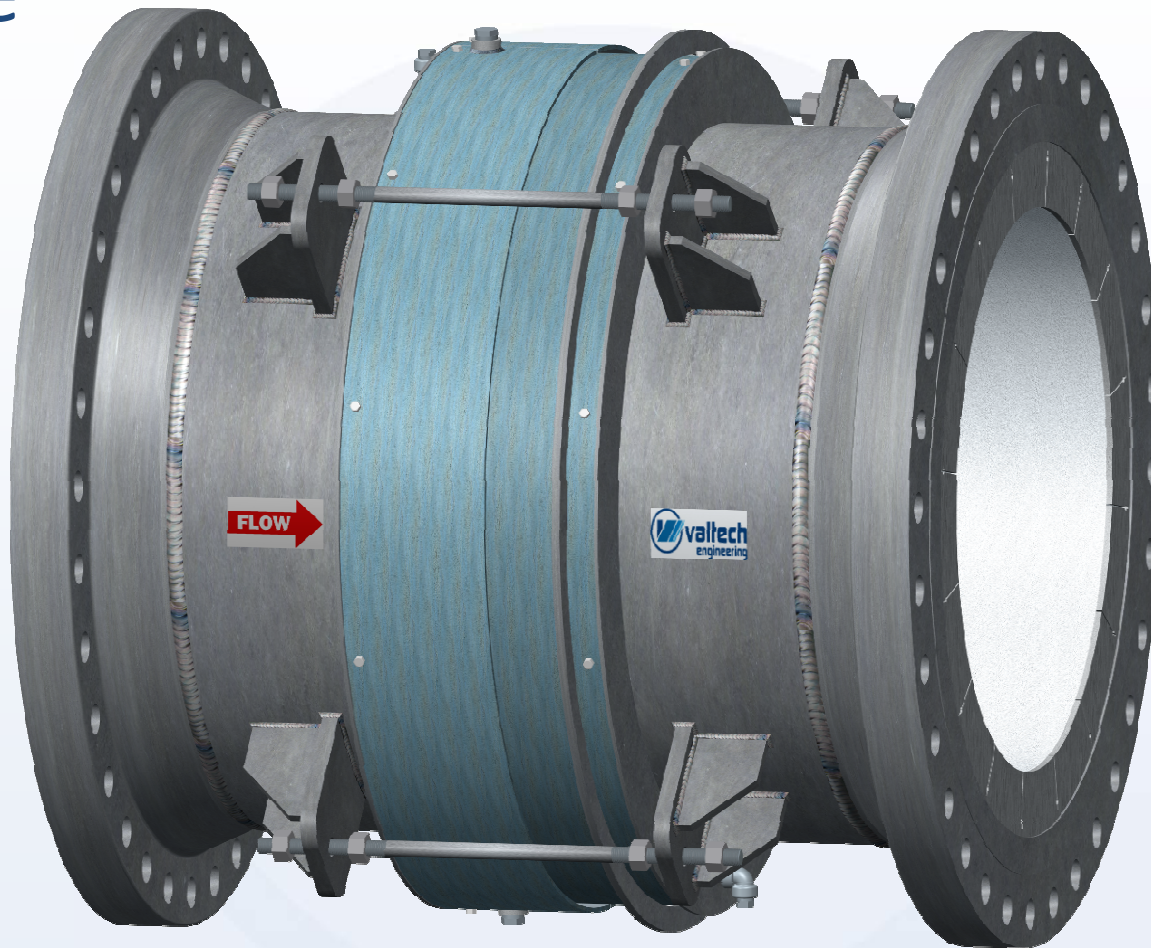
# Movements

## Angular



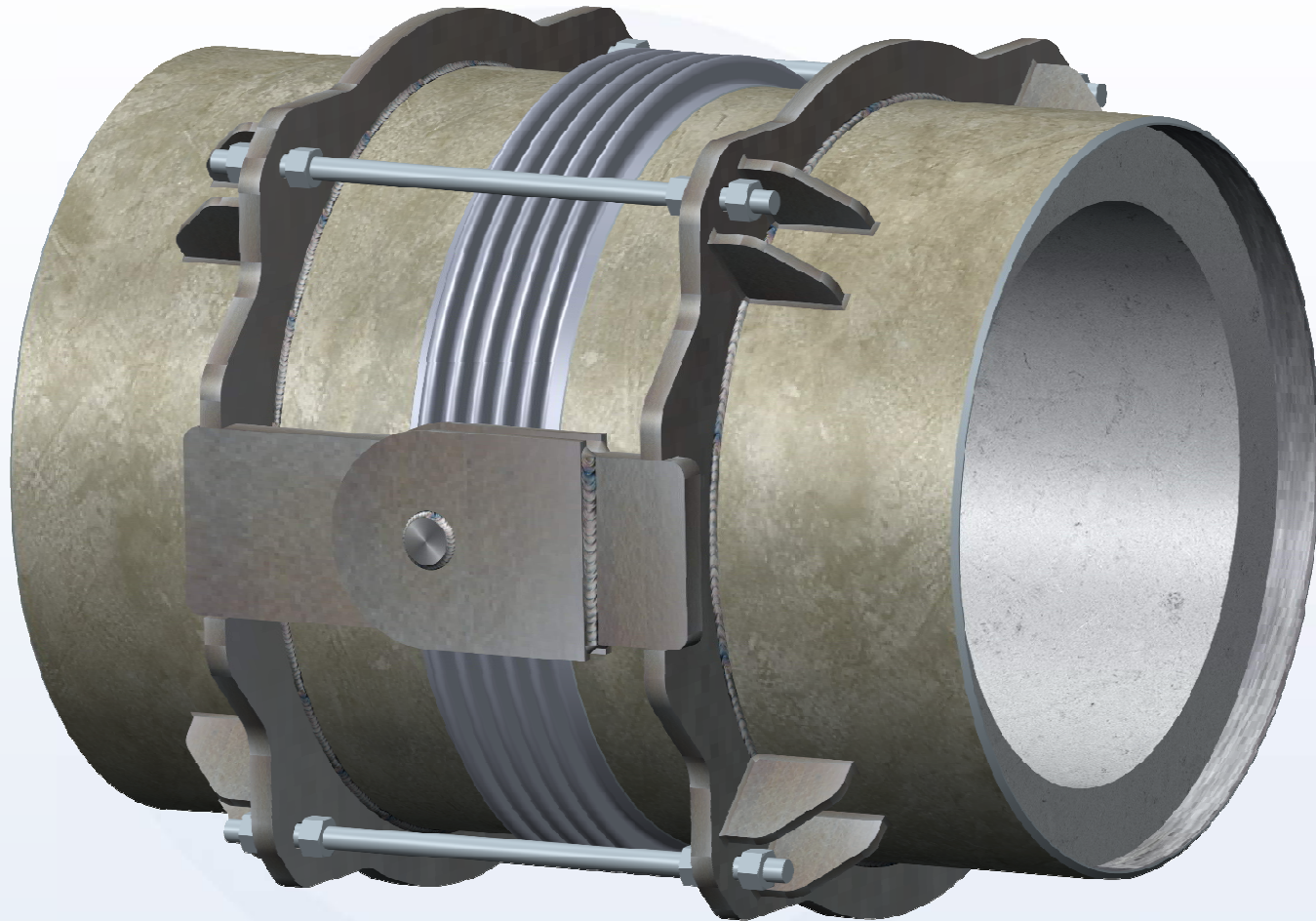
# Types of Expansion Joints

## Single



# Types of Expansion Joints

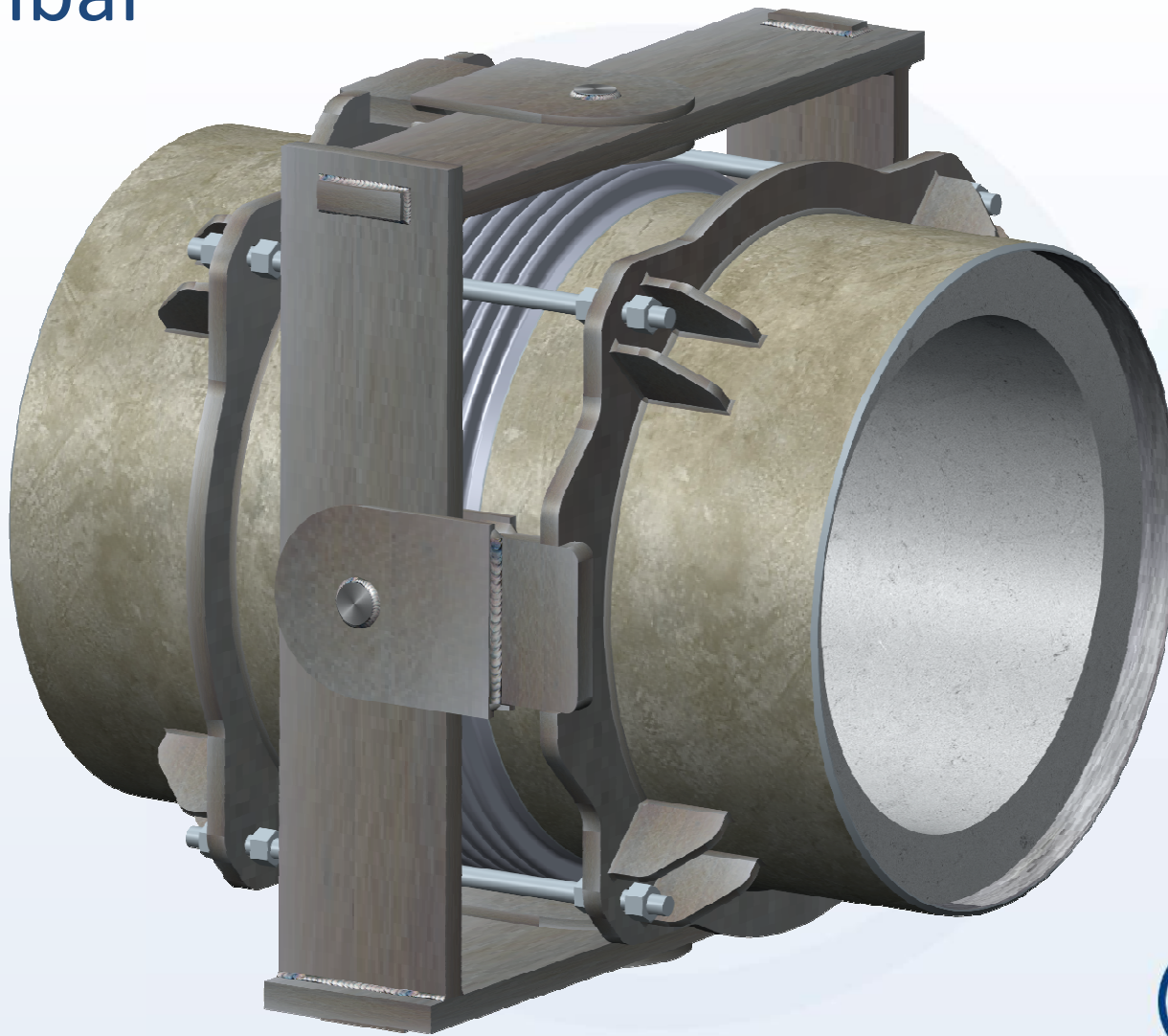
## Hinge





# Types of Expansion Joints

## Gimbal



# Types of Expansion Joints

## Universal



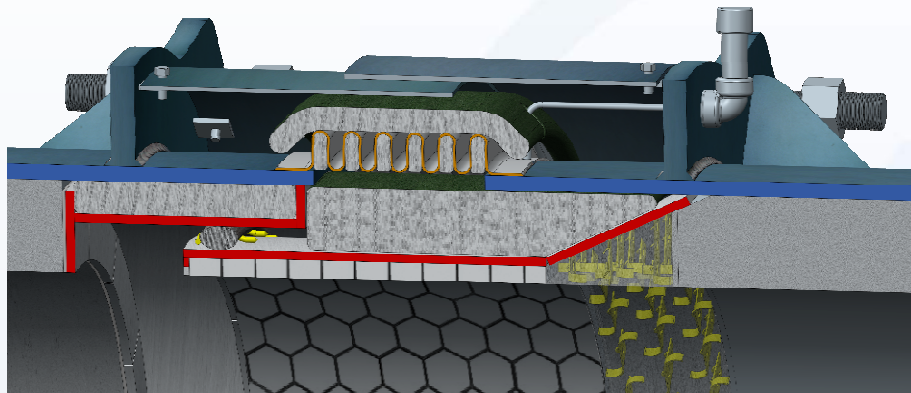


# Types of Expansion Joints

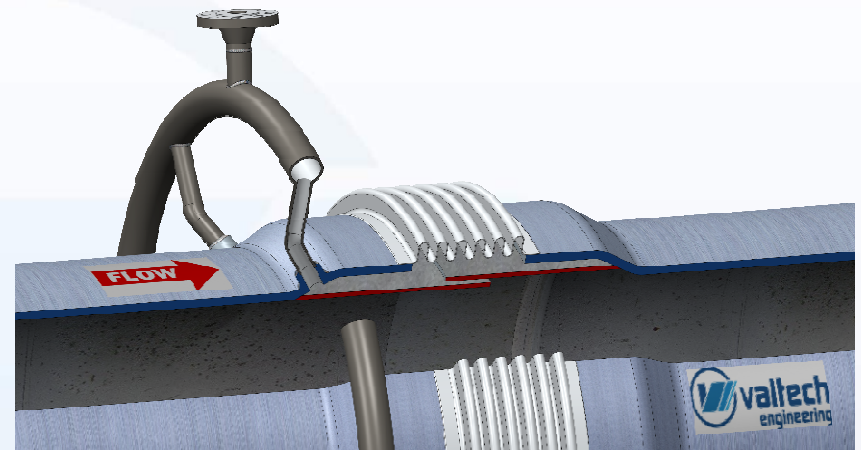
## Tied Elbow Universal Crossover



# Packed vs. Purged



Packed



Purged

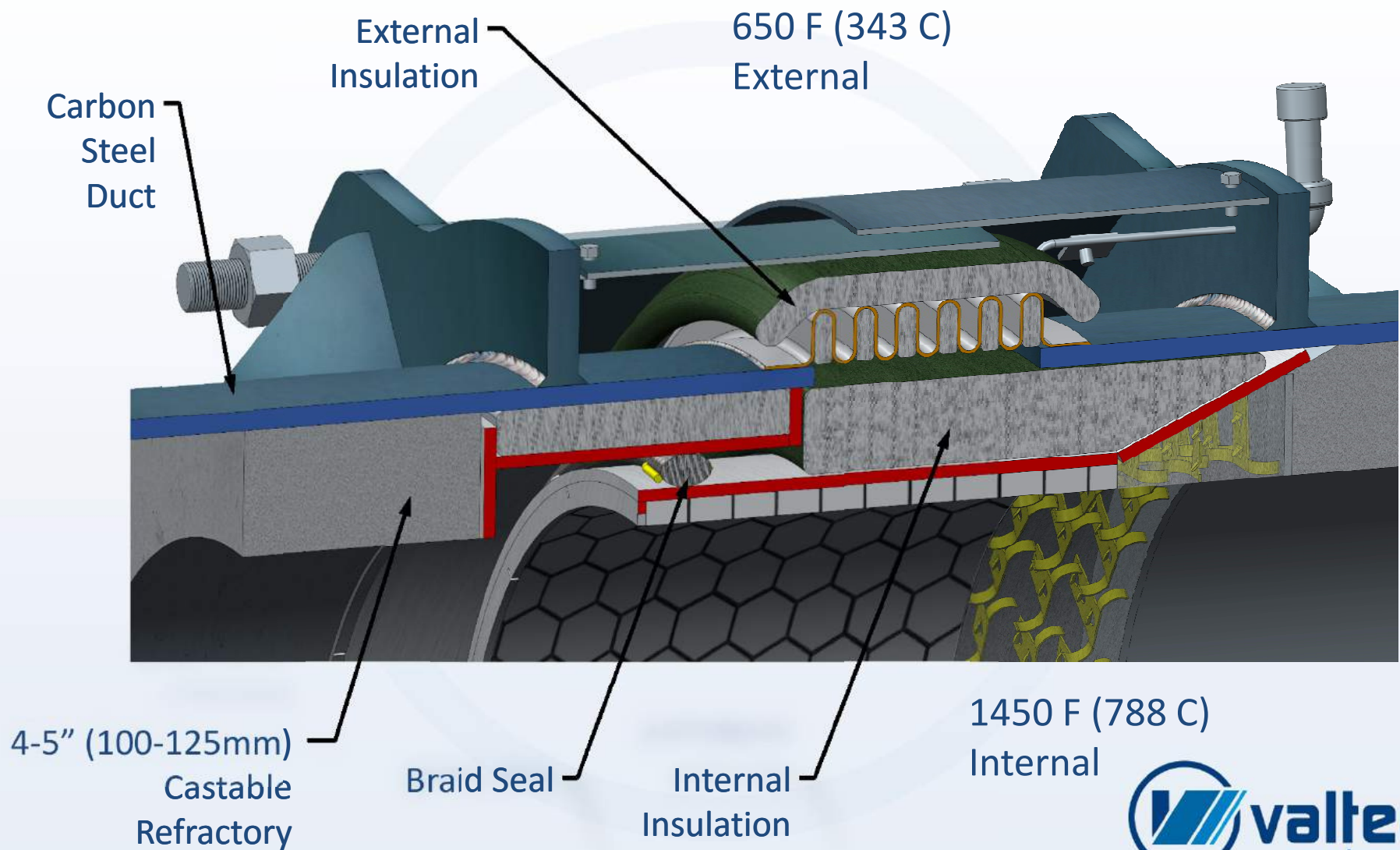
- Purged requires maintenance
- Packed does not

# Internal Liner Styles

- Cold Wall with Refractory
- Hot Wall with Refractory
- Hot Wall without Refractory
- Internal Reactor Riser Termination



# Cold Wall with Refractory

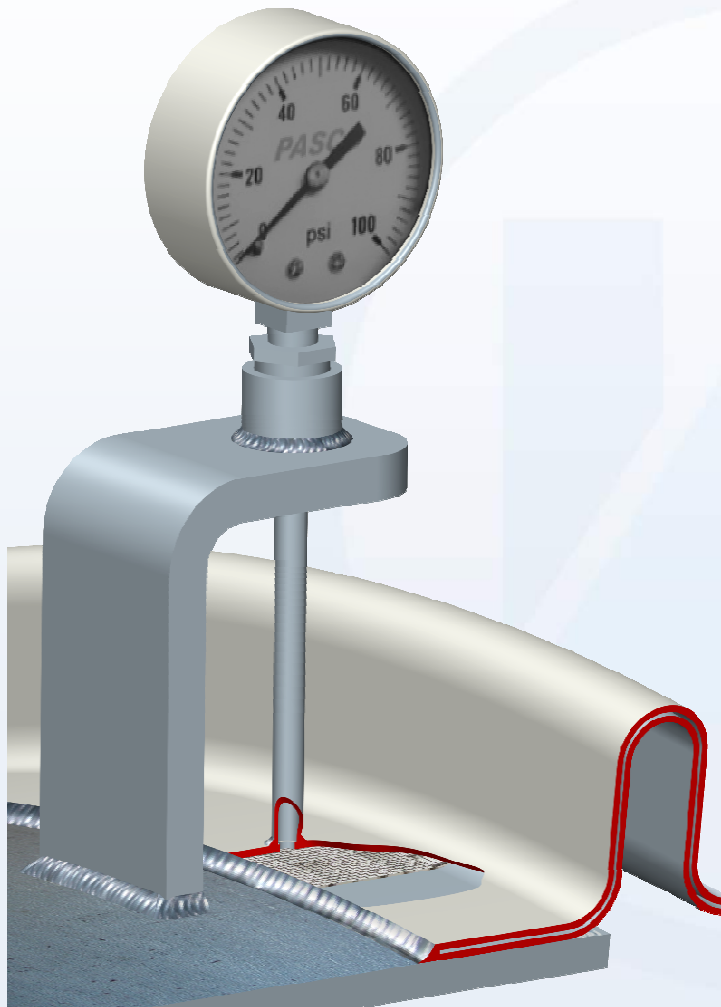


# Options

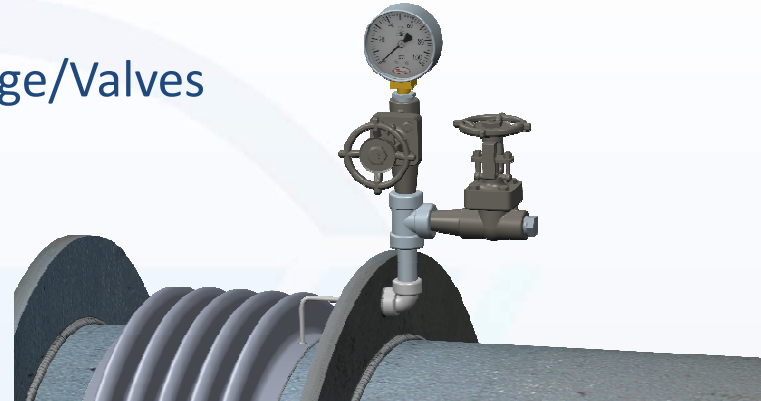


# Options

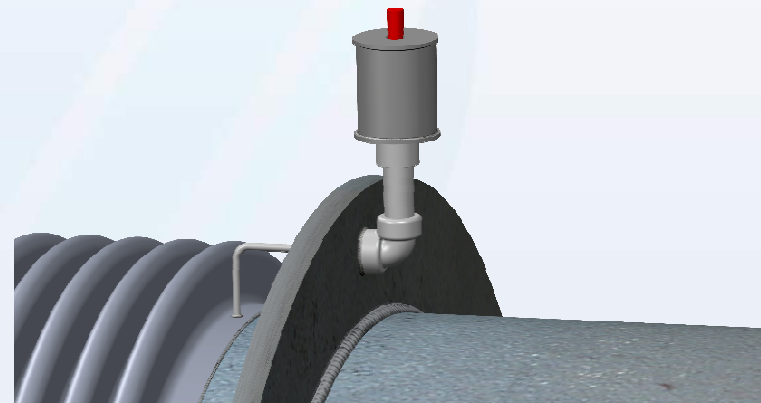
## 2 Ply Testable



Gage/Valves



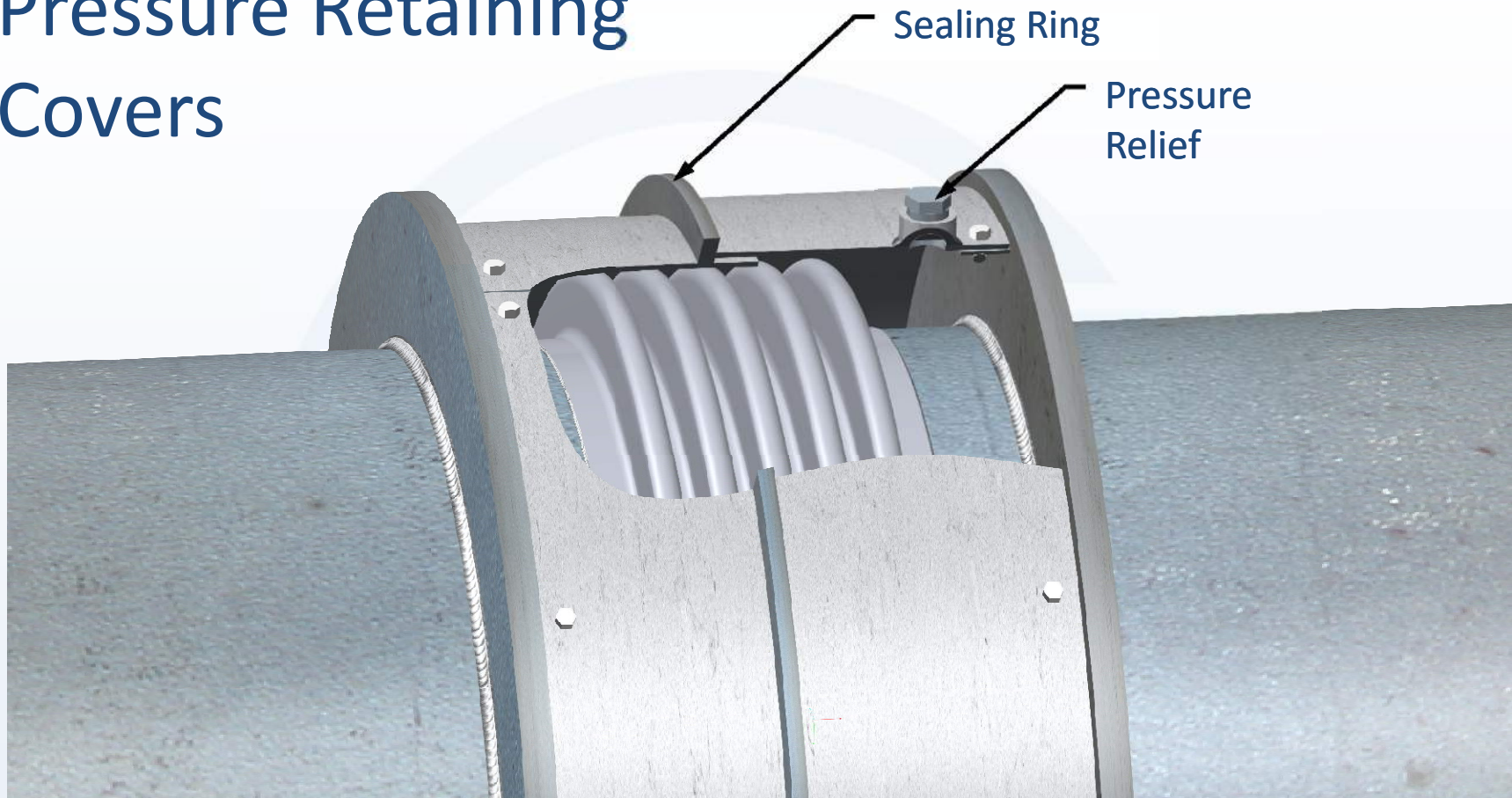
Go/No Go Leak Detector





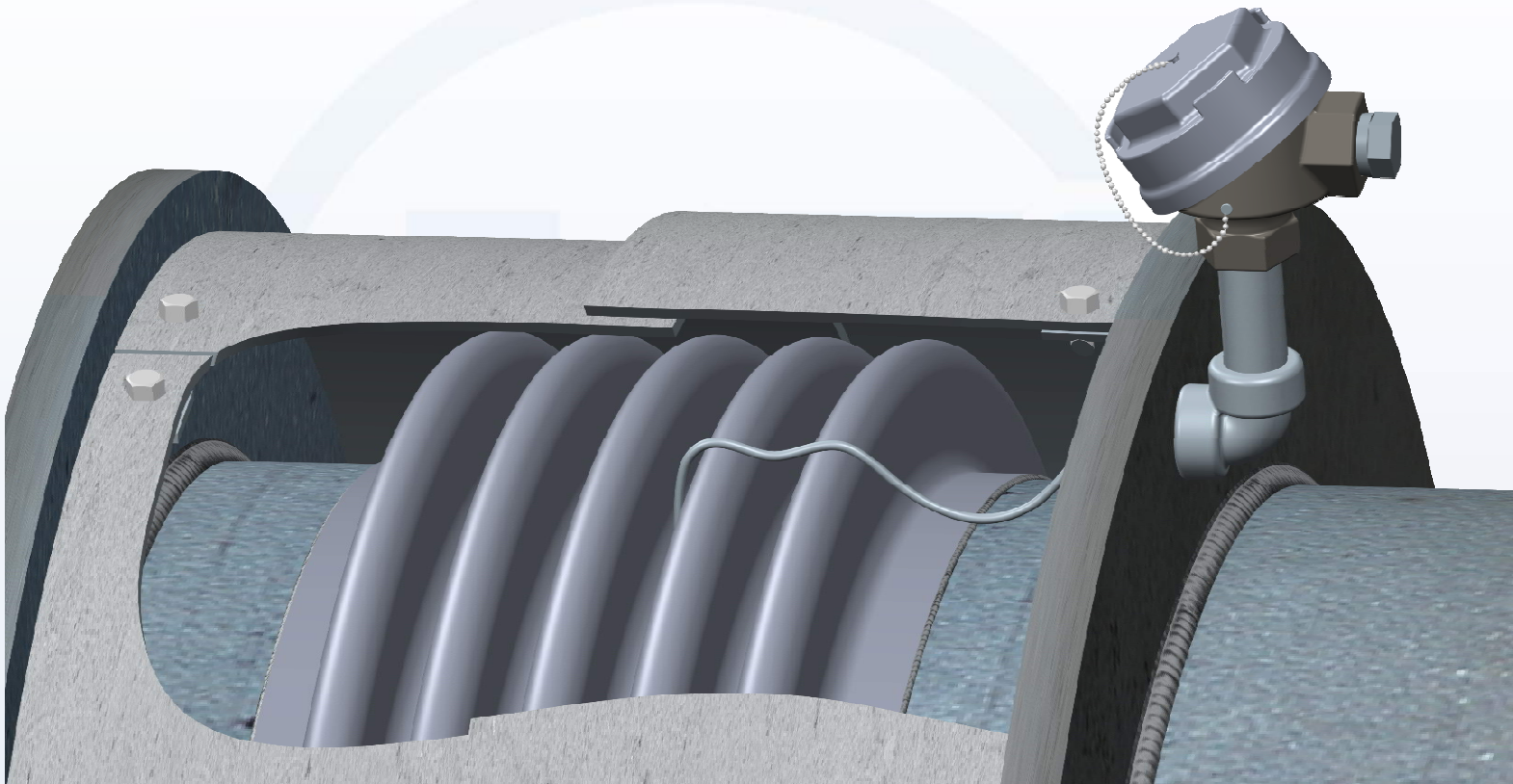
Options

## Pressure Retaining Covers



Options

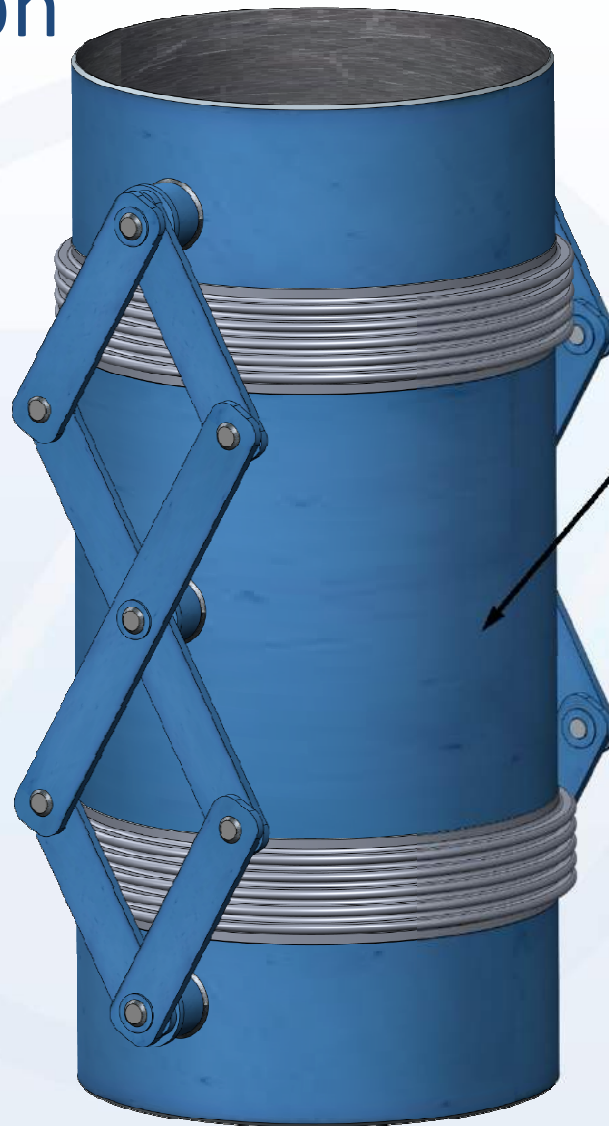
## Thermocouples



# Options

## Single Pantograph

- Support spool in vertical orientation
- Only allows lateral in-plane

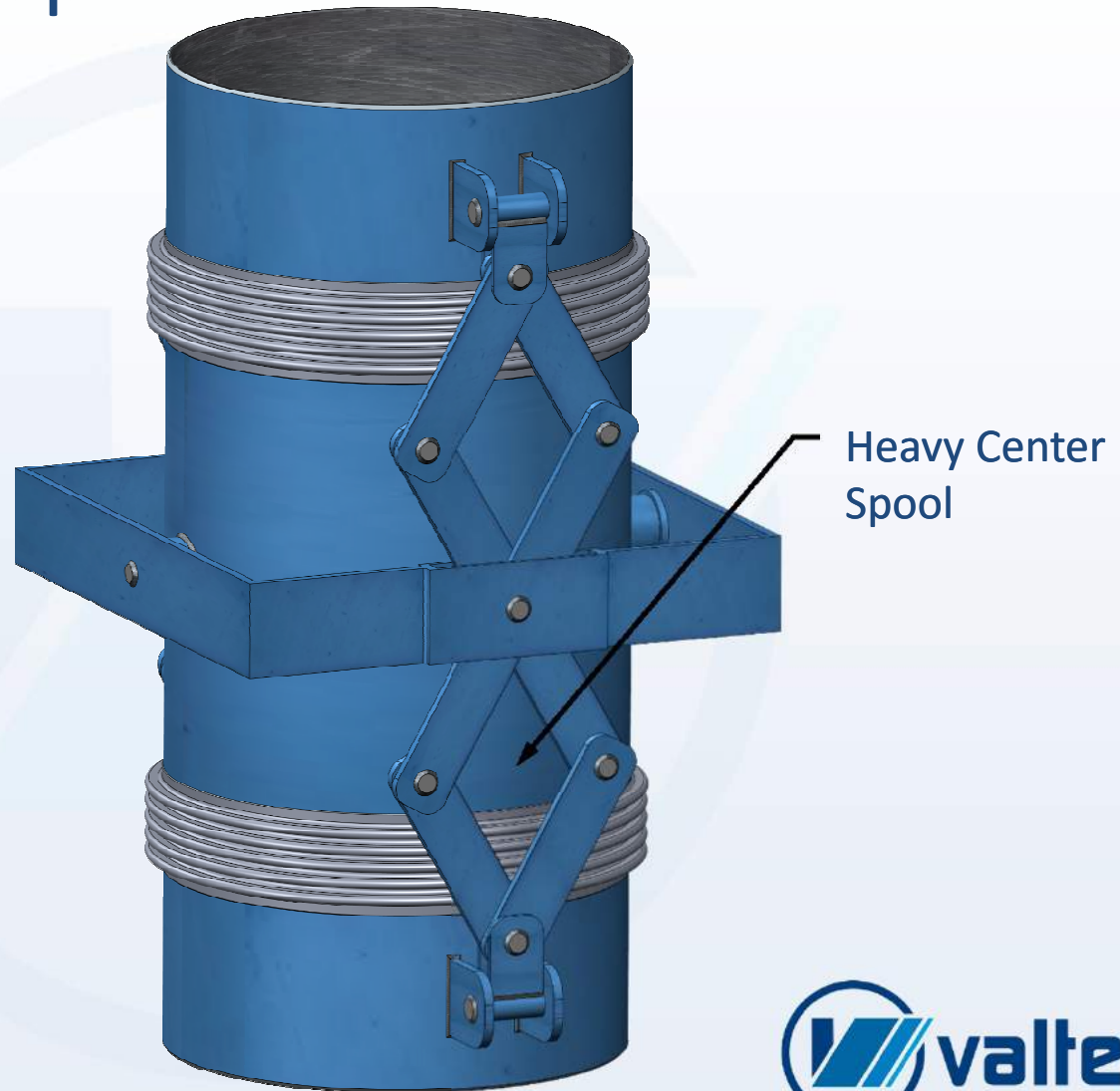


Heavy Center  
Spool

# Options

## Gimbal Pantograph

- Support spool in vertical orientation
- Allows lateral in and out of plane





# Damage

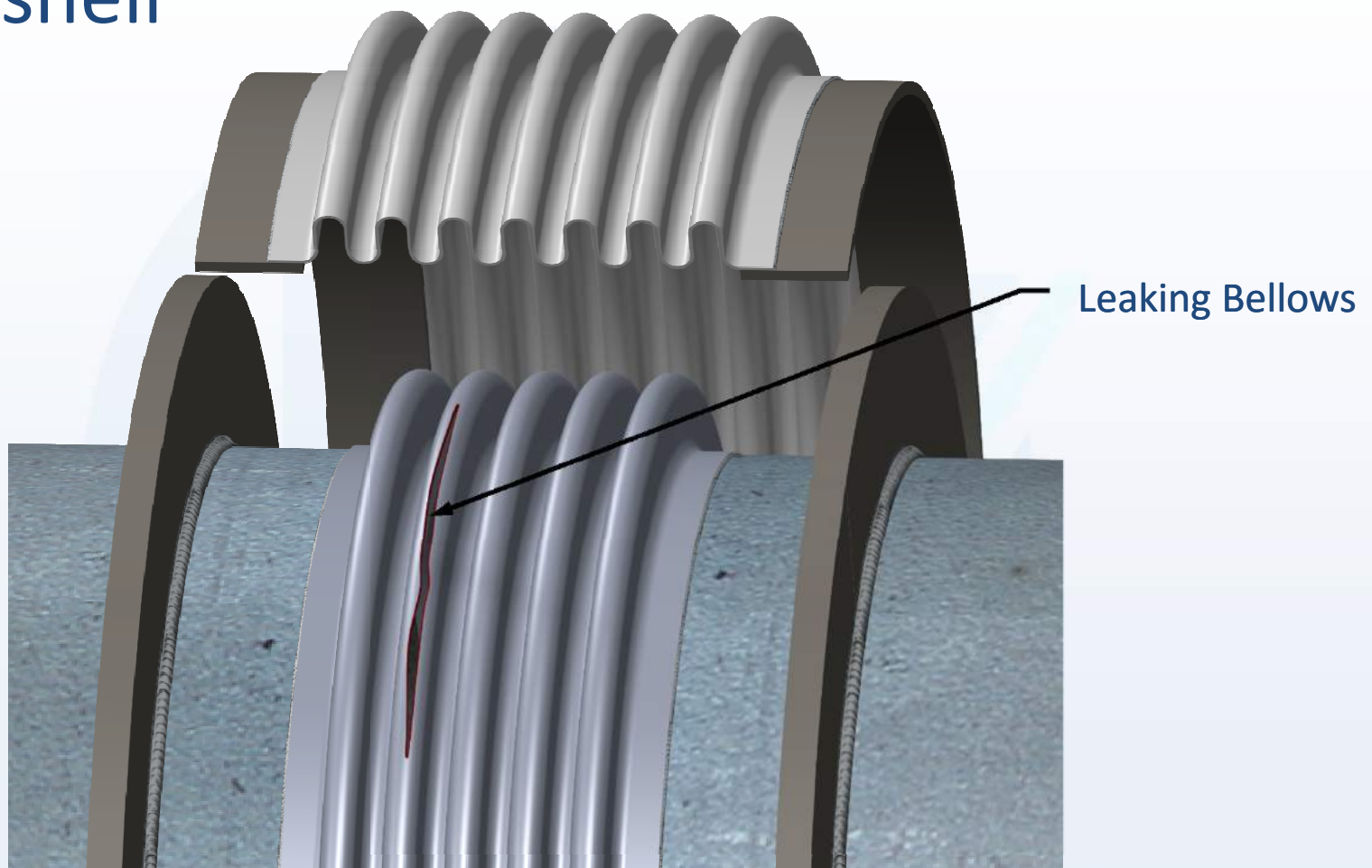
## Bellows Damage



Small Crack

Repair

## Clamshell





# Repair

## Cartridge

### Advantages

- No seam weld in field
- Can use 2 ply testable



Repair

## Refurb In Shop



6 Day Turnaround