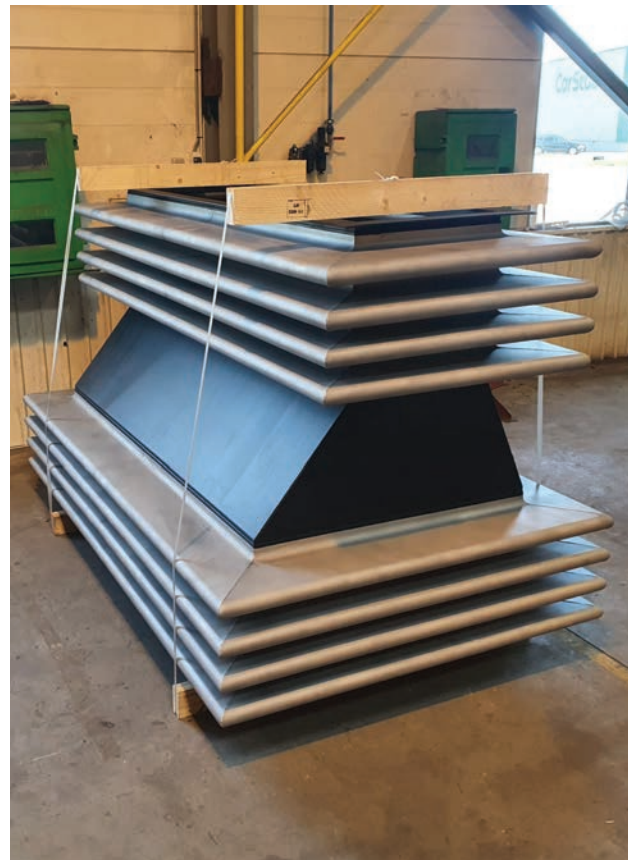


Product

brochure

Fabric and metal
expansion joints



Introduction

Pentamet LLC is a family owned company, which was established already in 1989. We are dedicated to 4 core values: quality, commitment, responsibility and fairness. Company is certified according to ISO 9001:2015, EN 3834-2, PED module H1, EN 1090-1 EXC3.

Pentamet main products are fabric and metallic expansion joints. First expansion joints were manufactured in 1995. Since then, we have had the honor of working with some of the worlds most experienced and innovative expansion joints customers. Pentamet designs and

manufactures expansion joints to the whole energy sector, where there is a high demand for excellent design and manufacturing. We offer a complete range of fabric and metal expansion joints, from round to rectangular. Our expansion joints are designed, manufactured and tested according to E.J.M.A (Expansion Joints Manufacturers Association, Inc.), ESA and FSA standards. Other design codes are available by request.



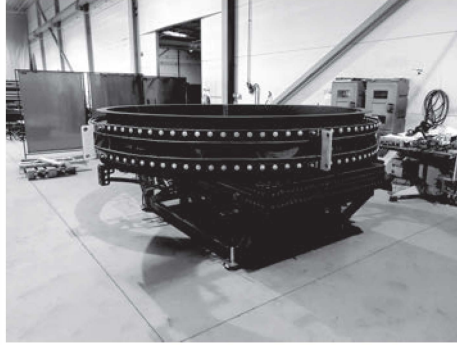
Our products



Pentamet Expansion Joint Solutions delivers a safe and reliable performance for many applications including:

- Catalytic cracking
- Gas turbine exhaust
- HRSG boiler penetration
- Flue gas cleaning
- Boiler
- Steam Turbine
- Heat Exchanger
- Air Inlet & Ducting
- Reactors
- Engines

We design expansion joints that can withstand a wide range of media, varying pressures and temperatures to provide unique solutions and services for your plant or refinery. Each application has its own special requirements and our goal is to design the best expansion joint for your equipment's specifications.



Fabric Expansion Joints are able to compensate for movements in several directions simultaneously and have almost no reactive force. They require little space for installation and are easy to adapt to physical conditions. Selection of the right fabric expansion joint depends on a variety of factors which vary from application to application.

By combining different materials and taking thermal, chemical and mechanical resistance into consideration, as well as the fatigue properties of the materials, our engineers develop optimal solutions that provide long-term reliability to customers in various industries.

Dimensions:

According to customer specifications

Temperature Range:*

-35 °C ... 1.000 °C

For higher temperature, on request.

Pressure:*

-0,20 bar ... 0,20 bar



Metal Expansion Joints are flexible connections installed in piping and ducting systems to accommodate expansion and vibration caused by changes in temperature, pressure and media. Pentamet offer a full range of metal expansion joints from rectangular and round ducting joints to highly engineered designs for critical applications.

The company has a long history of welding and forming special materials including a wide range of nickel alloys. Pentamet Expansion Joint Solutions offer complete documentation packages in accordance to current industry standard.

Dimensions*:

Circular: DN100 mm and up

Rectangular: According to customer specifications

Temperature Range:*

-198 °C ... 1.371 °C

Pressure:*

Full vacuum up to 172 bar

**Dimension, temperature and pressure range depends on design, material selection, type of expansion joint and duct insulation.*

Solutions for Maritime

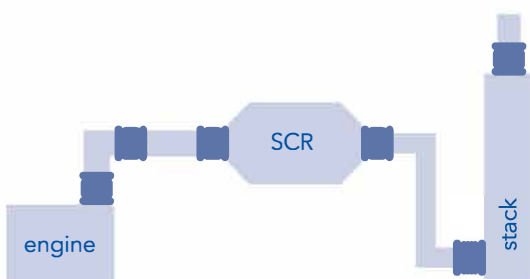
Pentamet has decades of expertise in designing and manufacturing expansion joints for smooth functioning in power plants engines worldwide.

Expansion joints used in power industries are designed according to EJMA latest version or other standards on request. The expansion joints design accommodate our customers flexibility requirements and key design aspects are:

- flexibility requirements (movements)
- high temperature and stress distribution
- spring rate
- bellows frequency response
- build in length

When designing metal expansion joints to be installed in power plants, application challenges are: goal is to design the best expansion joint for your equipment's specifications.

- high temperature
- pressure pulses
- Engine vibrations
- high cycle life expectations,
- high temp corrosion resistance of materials



Our prime focus is to work closely with the customer and provide solutions that cater exactly to their needs. Our expansion joints are designed for specific engines' operating conditions, depending on before mentioned parameters.

Pentamet has the experience and competence to solve your power application expansion joint needs.

Application areas

- Turbocharger Exhaust gas Inlet & outlet
- Exhaust receiver and manifold
- Engine Exhaust Line
- Cleaning oil Unit
- Air Inlet Unit

Technical properties

- Absorbs thermal expansion due to high temperature
- Handles engine displacement
- Minimize loads on the turbocharger and other critical components
- Knowledge of material selection for different applications

Customer benefits

- Piping flexibility for optimum plant space optimization
- Reliable, durable & free from leakage
- Economic & innovative designs with FEA capability
- Option for emergency onsite delivery and installation
- Troubleshooting team for customer support
- Profound experience



Criteria for Applications & Design

Which type of expansion joint to use and its design is based on some fundamental considerations.

It is necessary to state operating data and other conditions as detailed as possible to ensure maximum operating reliability.

Place and conditions of installation must be considered before choosing the expansion joint design. Is the place of installation easily accessible, or is scaffolding, a crane or other equipment required to install the expansion joint?

Movements alone or in combinations, are taken up by fabric expansion joints:

- Axial compression
- Axial elongation
- Lateral offset
- Angular offset
- Torsion

The size and frequency of movements will affect the choice of expansion joint. For large movements, convoluted and expansion joints with scissor control guides are recommended. They ensure controlled movements and prevent damage to the fabric or heat pockets from occurring.

Mechanical loads

Fabric expansion joints are also able to take up:

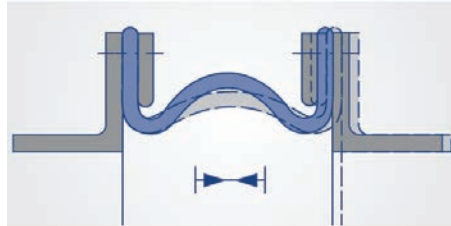
- Vibrations
- Structural-borne noise

Essentially, the following should be considered:

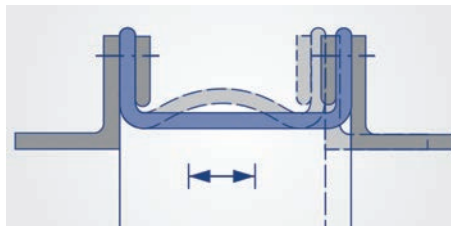
- Overstretching
- Friction along the sleeve
- Presetting
- Combination of movements

Pressure will affect the design (type of fabric and number of layers). The following distinctions are made:

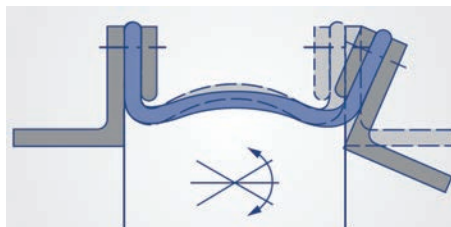
- Positive pressure (normal, peak)
- Negative pressure (normal, peak)
- Variations of pressure (pulsations)
- Pressure surges
- Design/operating pressure



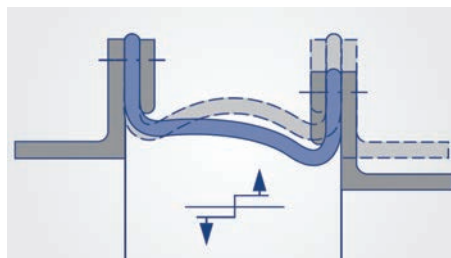
Axial compression



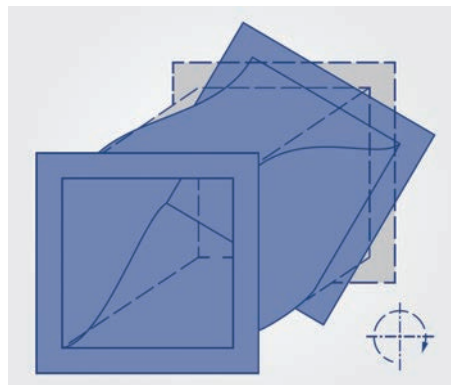
Axial elongation



Angular offset



Lateral offset



Torsion

Flow rates determine if a sleeve may be recommended. For higher flow rates an insertion of a sleeve is necessary for the functionality of the expansion joint.

Medium represents an important decision factor in choosing the type of expansion joint and the configuration. Typical media that fabric expansion joints will get subjected to are:

Air

- Clean
- Dust content
- Chemical load by acids, solvents, etc.

Flue gases

- From coal, oil, gas firing etc.
- Analysis of the flue gas
- Humidity
- Contents of soot or fly ashes
- Flushing/washing of ducts

Leakage requirements may be necessary, according to the application area and the medium. In principle, a distinction is made between the tightness of the expansion joint and the tightness of the flange area. Single-layer expansion joint can be made 100% gas tight with appropriate sealing, but multi-layer expansion joint will always have a certain leakage through the flange area. Pressure and temperature will also affect the leakage as both high temperature and high pressure will result in higher leakage in the flange area for multilayer expansion joints.

The following requirements can be made:

- Nekal tightness
- Flue gas tightness

Solid matter


might contaminate the medium which will influence both the design and the construction. In principle, the expansion joint should be protected from abrasive media. The main considerations concerning solid matters are:

- Content (mg/Nm^3)
- Grain size (μm)
- Arrangement of duct (horizontal, vertical, diagonal)
- Direction of flow (upwards, downwards)
- Flow rate

Solutions for Power Plants


Power generation

- Steam & gas turbine
- Diesel engine
- Boiler area
- FVB
- HRSG
- FGD systems
- Chimney ducting
- Heat exchanger
- Coal ash ducts
- Air ducts



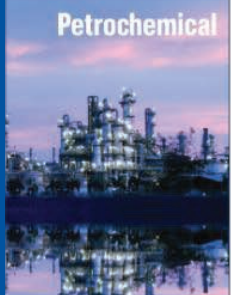
Refining

- FCCU
- CCR
- Silencer
- Tank farms
- Cooling systems
- Steam lines
- Process media lines
- Flue gas lines
- Reagtors and vessels
- Air ducts



Petrochemical

- Cracking
- Vessels
- Columns
- Process piping
- Storage
- Transportation lines
- Post processing lines
- Post processing equipment



And many others ...



Oil & Gas



Pipelines



Refineries



Petrochemical / Chemical



Energy



Engine building



Pulp and Paper



Water / Sewage



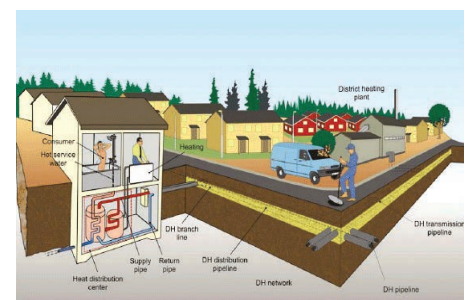
Shipbuilding



Mining



Off shore



District Heating



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