Metal Expansion Joints

For thermal and pressure equipment

EagleBurgmann
expansion joint solutions
Value Engineering raised on global experience

Over 45 years of challenges in the expansion joint industry proves that EagleBurgmann Expansion Joint Solutions is one of the world’s most experienced and innovative expansion joint manufacturers.

Experience is sourced from all continents and various market sectors to provide our customers with the latest technologies and solutions.

Metal, fabric and rubber expansion joints are flexible connections, installed in piping and ducting systems to accommodate expansion and vibration caused by changes in temperature, pressure and media comprise.

EagleBurgmann Expansion Joint Solutions major focuses:
- Value engineering to decrease operational downtime
- Lean manufacturing to reduce costs
- 3D smart design to maximize overall service life
- Evaluations and troubleshooting
- Initial dimensional measurements
- Installation and refurbishment
- Supervision and training
- Plant surveys
- Emergency services
- Final inspection by experienced Service Engineers

EagleBurgmann Expansion Joint Solutions comprehensive service:
- Evaluations and troubleshooting
- Initial dimensional measurements
- Installation and refurbishment
- Supervision and training
- Plant surveys
- Emergency services
- Final inspection by experienced Service Engineers

EagleBurgmann Expansion Joint Solutions is a respected member of:
- The European Sealing Association (ESA)
- Fluid Sealing Association (FSA)
- Expansion Joint Manufacturers Association (EJMA)
- EuroQualiflex

EagleBurgmann Expansion Joint Solutions is proud of the appreciation given from hundreds of customers around the world.

EagleBurgmann Expansion Joint Solutions has global production in:
- Europe
- Americas
- Asia Pacific

We have a worldwide sales network supported by EagleBurgmann and Freudenberg offices.

www.eagleburgmann.com
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Metal expansion joints are flexible connections, installed in piping and ducting systems to accommodate expansion and vibration caused by changes in temperature, pressure and/or media.

EagleBurgmann Expansion Joint Solutions offers reliable and innovative expansion joints solutions for many applications worldwide:

- Power Plants / Power Generation
- Ship power and ship building
- Diesel & Gas Engines
- District Heating
- Steel Mills
- Water Treatment
- Wind Power
- Pulp and Paper Plants
- Mining
- Desulphurization plants
- Boiler Manufacturers
- Cement Plants
- Off shore
- Refineries
- Chemical and Petrochemical Plants
- FCCU, CCR and Turbo Expander Units

EagleBurgmann Expansion Joint Solutions offers a complete product range of metal expansion joints ranging from low pressure exhaust bellows to sophisticated engineered solutions for Fluid Catalytic Cracking Units.

Whether it is an engine a flue gas system, a rectangular ducting or any ducting or piping system with a high temperature or a closed system with high pressure, where vibrations and pressure need to be accommodated, metal expansion joints are installed as flexible solutions.

EagleBurgmann Expansion Joint Solutions has the experience and competence to solve all metal expansion joint needs.
Bredan Metal Expansion Joints

**UM-Types are designed**

for diesel and gas engines to absorb vibrations, axial, lateral and angular movements or any combination of these.

UM-Types are placed on the engine before the turbo charger where high temperatures, vibrations and pressure impulses occur. UM-Types can be designed with service temperature up to 800 °C (1472 °F) and/or pressure up to 12 Barg (174 PSIG).

The bellows, the flexible part of the expansion joint, is a multi-layer construction with thin layers of heat resistant stainless steel.

**Bellows materials:**

- Austenitic Steel
- Incoloy
- Inconel
- Hastelloy
- Titanium
- Other formable materials

The expansion joint provides superior flexibility and is corrosion resistant in the aggressive exhaust gas applications.

The expansion joints are designed with fixed or swivel flanges, pipe weld ends, “V” flanges or other flange constructions made of stainless or carbon steel or other alloy materials. At high temperatures and flow velocities, sleeves are recommended. The sleeves protect the bellows from impact of particles.

**Bredan Metal Expansion Joints for engines are installed in:**

- Turbocharger Exhaust Inlet
- Turbo Charger Air Outlet
- Exhaust Receiver
- Turbocharger By-pass
- Single Pipe or Pulae
- Exhaust Manifold
- Engine Exhaust Line
- Vehicles Exhaust Line
- Generator Sets Exhaust Line

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Metal expansion joints for engines UM-Types are designed to be placed on the engine before the turbo charger.

UM-Types are particularly well suited for absorption of a combination of axial and lateral movements as well as vibration.

Metal expansion joints can be manufactured in large scale production.
Bredan Flue Gas Expansion Joints
US-Types are designed for high temperatures and low temperature to absorb movements and vibrations from boilers, silencers, turbines and other exhaust systems.

US-Types provide the ultimate flexibility in piping system after turbocharger. US-Types are required to absorb the thermal expansion of the piping.

US-Types are installed in the flue gas/exhaust system, where the vibrations are small and where a compensation of large axial or lateral expansions or a combination is needed.

US-Types can be designed with service temperature up to 800 °C (1472 °F) and/or pressure up to 2.5 Barg (36.2 PSIG). The expansion joints are designed with fixed or swivel flanges, pipe weld ends, 'V' flanges or other flange constructions made of stainless or carbon steel or other alloy materials.

At high temperatures and flow velocities, sleeves are recommended. The sleeves protect the bellows from impact of particles.

A casing serves to protect the bellows against dirt and knocks, also during assembly. Bredan metal bellows are made of one or multiple plies of stainless steel in austenitic steel, Incolloys, Inconels or other formable materials.

EagleBurgmann Exhaust Expansion Joint Solutions for flue gas system are installed in:

- Diesel / Gas Engines Power Plant
- Marine Exhaust line
- District Heating Power Plant
- Coal / Gas / Biomass / Power Plant
- Gas Turbines
- Heat and Ventilation Systems
- Heat Recovery Boiler and Silencers
Pipe penetration seals are used to allow tubes or pipes to expand thermally by penetrating the shell or pressure casing typically at boilers. It eliminates the leakage of heat and other emissions, reduces noise and protects maintenance personnel.

These seals are designed to accept axial, lateral and angular movements and lowering the stress on tubes and pipes to which they are attached.

Pipe penetration seals can accommodate most applications from original manufacturer to retrofits of existing installations. High operating temperatures typically keep the temperature in the bellows warm enough to prevent media from condensing. Corrosion can occur if the media condenses and collects in the lower end of the seal during operation. Metal expansion joints provide good insulation between the boiler wall and the attachment ring.

Penetration seal expansion joints advantages:
- Reduces pipe stress
- Increased boiler efficiency
- Noise reduction
- No maintenance
- With insulation on request

Our slider seal, the PS Seal uses a floating ring design with patented stainless steel flow reducing seals in contact with the penetration pipe outside diameter and lateral movement plates. The seals are compressed on assembly to provide minimal gas leakage during operation.

As particulates build up in the seal and further restricts the passage of gas, any gas leakage in the seal increasingly reduces over time. The stainless steel wire mesh seal can be replaced easily during shutdowns eliminating the need to replace the entire unit.

PS Seals used in heat recovery steam generators for boilers is an easy way to capture more value from the fuel budget. PS Seals can significantly lower energy loss, while reducing the maintenance load and risk of unplanned outage.

PS Seals makes it easy to replace metal and fabric type bellows seals without the need for trained welders.

Installation of pipe penetration seals.

PS Seal offers an increasingly effective boiler seal with easy installation and lower maintenance costs.
We can take the heat and the pressure
From major water distribution pipelines spanning the high desert to specially designed pressure balanced units in cooling systems, EagleBurgmann Expansion Joint Solutions are installed in thousands of applications worldwide. Whether it is air, gas, petrochemicals or water, our expansion joints are designed to provide maximum reliability and safety. Our technical expertise and progressive manufacturing capabilities enable us to offer our customers solutions that increase overall service life, reduce costs and decrease operational downtime.
EagleBurgmann Expansion Joint Solutions – making business sense!
Innovative expansion joints solutions – to meet the world’s pipe expansion needs
Rectangular metal expansion joints are designed to compensate for axial and lateral movements over a broad cross section of operating conditions. Rectangular expansion joints can be manufactured with convolutions more than 200mm (8") of depth.

Rectangular metal expansion joints are used in:

- Power Generations
- Steelwork
- Petrochemical Plants
- Refineries
- Chemical Industries
- Other industries

Rectangular bellows are installed in:

- Gas turbine exhaust systems
- Steam turbine/condenser connections
- Boiler breaching
- Forced draft fans
- Flue gas ducts
- Regenerations
- Precipitators
- Other hot gas, large volume ducting systems

The rectangular design involves evaluation of parameters as:

- Temperature capability
- Pressure capability
- Instability
- Stresses due to deflection
- Fatigue life
- Spring rate and forces

EagleBurgmann Expansion Joint Solutions offers a varied range of rectangular expansion joints:

- Single-ply types with mitered or rounded corners
- Multi-ply types with radius corners

EagleBurgmann Expansion Joint Solutions calculate expansion joints according to the latest edition of EJMA.

A varied range of convolutions shapes:

- Round corner
- Single miter corner
- Camera corner
- Double miter corner
Metal expansion joints can be used in closed piping systems with movements in any direction: axial, lateral, angular or a combination of the three types.

Axial Types are used in pipeline systems for absorption of movements along the longitudinal axis of the pipeline. With weld ends, plate flanges, welded neck flanges or a combination of connections.

Lateral expansion joint types are available in two designs:
One type with tie rods allowing lateral movement between the bolt and flange. Lateral expansion joints with tie rods are available in a design with minimum two tie rods. No axial movements are allowed in the system. Another type with flat iron hinges which are fitted through the flanges and welded on the outside. Tie rods and hinges absorb the loads arising from the operating pressure. Hinges prevent axial expansions. Lateral expansion joints are ideal for installation in pipe systems with bends.

Angular Types are designed with only one bellows; however more angular expansion joints can be mounted in a pipeline without a fix point between.

Angular Expansion Joints are divided into two types:
• One plane angular; a hinged type
• Multi plane; a cardan ring/gimbal type

Hinged Types
The fittings absorb the tensile forces from the operating pressure and makes axial expansion impossible. Angular expansion joint can only absorb bending forces and are suitable where sturdy fixing points are not possible and in pipe systems where bendings occur.

Gimbal Types with a single or double membrane and overall length restrained by a gimbal hardware assembly is designed to accommodate the full pressure thrust and any additional loadings from external sources. The gimbal assembly is a hinge arrangement jointed together by a floating “gimbal” ring and allows for angular rotation in all planes.

Metal expansion joints can be designed with a leak monitor. The bellows is here with two plies, where each ply is independently designed for the full system design conditions. The test ports are used to detect any leakage.
Pressure balanced expansion joints are designed to absorb axial, lateral and angular deflections or combinations and restrain thrust developed by the use of tie-rods or similar devices.

Pressure balanced metal expansion joints are manufactured as an in-line or elbow type pressure balanced assembly. Where there is no possibility of making fixed corners or elbows in the piping system, a pressure balanced expansion joint is recommended. The pressure balanced joint eliminates pressure thrust. Pressure thrust is the force created by pressure acting on a bellows. Pressure thrust must be contained with either main anchors or restrained expansion joints designed to carry pressure thrust loads.

**In-line pressure balanced expansion joints** absorb axial movement and/or lateral deflection while restraining the pressure thrust on the system used where the location of expansion joint prohibits or makes it very costly to install main anchors.

Pressure balanced elbow expansion joints are often placed next to a pump or turbine.
Danmuff Expansion Joints have been designed specially for installation in district heating pipe systems. Constructed in such a way that when the bellows is fully compressed the axial compressive forces in the pipeline can be transferred directly through the adjoining end surfaces of the media pipes without the bellows being overloaded.

If the temperature in the pipe network drops to such an extent that tensile stresses occur, the maximum tensile stresses in the media pipe will be transferred to the stop ring through the outer casing pipe and the contact faces of the slide guide. Danmuff is also protected against torsion.

This design means that the number of fastenings in the pipe system can be reduced, as the expansion joint can be installed in series in sections of pipe without intermediate fastenings.

The expansion joint will trigger each other individually. Together with the media pipe, the guide pipe forms a telescopic union in the expansion joint with regard to direction of flow. This telescopic union also forms a guide, allowing lengths of pipe to be welded together, including the expansion joints, and then laid in the trench without the expansion joint being damaged.

The expansion joint is pre-stressed 100% at the factory using explosive bolts, which are fitted through the stop ring and into the slide guide. When the installation is put into operation, the explosive bolts are activated, triggering the movements of the expansion joint. The DanOne is an axial one cycle or startup expansion joint. This expansion joint is used in pipe systems where variations in temperature around a desired mean temperature are not to be absorbed as expansion movements, but as tensile and compressive stresses in the pipe system.

DanOne Expansion Joints is used to make installation without heating up the system before operation. By locking the expansion facility (by welding) when the pipe system is heated up to this temperature for the first time, future expansions in the pipe system caused by variations in temperature will be absorbed as tensile and compressive stresses when the system cools down and heats up respectively in relation to the mean temperature.
Petrochemical and styrene process lines require expansion joints to handle extreme pressures and operating temperatures up to 926 °C/1700 °F. Typically this application uses a combination of hinge and gimbal expansion joints that are designed to accommodate these extreme conditions. These expansion joints are commonly equipped with testing ports to detect leakage in between two plies bellows and/or have a refractory lining to eliminate erosion from catalyst. The refractory lining is made to protect the steel parts from the high service temperature and from any erosion particles in the media. The lining is added to the expansion joint by welding in special stainless anchors. A form is made and liquidized concrete is added between the form and the steel parts.

The refractory lining is often used at:
- Steel Plants
- Refineries
- Copper and Aluminum Smelters
- Cement Plants
- Galvanizing Furnaces
- Chemical Plants

78” universal metal expansion joints for styrene processing from EJS.
78” gimbal metal expansion joints for styrene processing from EJS.
Pantograph metal expansion joint 3D modelling.
Metallic expansion joints are an integral component of complex refinery processes and their reliability can be significant to the refinery’s productivity and performance. An unexpected joint failure can be costly.

Expansion joints used in FCCU service are some of the most critical and complex expansion joints manufactured. Fluid Catalytic Cracking Units (FCCU) operate at very high pressures and temperatures, consequently resulting in large thermal movements that must be absorbed by the expansion joint.

Introduction of abrasive media (catalyst) requires additional protection to avoid gradual deterioration and premature failure of the expansion joint. The bellows membrane is the most critical element of the expansion joint assembly. Its relatively thin wall construction is designed for maximum flexibility, but must be protected against erosive catalyst and other corrosive media. Expansion Joints for FCC Service fall into these major categories, cold wall, hot wall lined and hot wall unlined.

Turbo Expander is another important system within a refinery with significant effect on production profits. The losses are extremely high to a refinery that must shutdown for major repairs to any equipment related to the expander such as the universal (double) hinged or gimbaled expansion joints installed within the turbo expander piping system.

This system requires experienced professionals to provide expansion joint designs to ensure long term safety, reliability and maintainability.

Various types of expansion joints and hardware (accessories) used in FCC applications including:
- Gimbaled
- Hinged
- Pressure balanced
- Pantographic linkages
- Restrained universals

Continuous Catalytic Reforming (CCR) requires an unlined thin-wall, high alloy expansion joints to accommodate high temperatures and movements. With a great need to achieve higher performance and profitability, these expansion joints are critical to the overall success of the refinery.
EagleBurgmann Expansion Joint Solutions offer innovation customized solutions developed in cooperation with Original Equipment Manufacturers and end user customers worldwide; optimal solutions for piping systems in engines, flues gas systems and any pipeline worldwide. Through experience and proven technology, EagleBurgmann Expansion Joint Solutions add Value Engineering to metal expansion joint solutions. In house design and engineering including Finite Element Analysis together with a modern, automated production technology and welding equipment, EagleBurgmann Expansion Joint Solutions offer superior performance for optimal productivity and welding quality. On time delivery is a very important parameter in the successful installations of metal expansion joints worldwide.

EagleBurgmann Expansion Joint Solutions is specialized in metal expansion joint design for a varied range of applications. Some of the special applications are:
- Train sets
- Vacuum pumps
- Gearboxes
- Food Industry (Edible Oils)
- Tank farms

EagleBurgman Expansion Joint Solutions offers a full range of Bredan and EJS Metal Expansion Joints from round and rectangular ducting expansion joints to highly engineered and complex FCCU assemblies with a long history of welding and forming of special materials including a wide range of nickel alloys. Documentation is offered according to the latest industry standards.
EagleBurgmann Expansion Joint Solutions holds Type Approval Certificates from:

- Bureau Veritas
- Germanischer Lloyds
- American Bureau of Shipping
- Lloyds Register of Shipping
- Russian Maritime Register of Shipping

EagleBurgmann Expansion Joint Solutions is approved to:

- European Pressure Equipment Directive (PED) 97/23/EC
- ASME U Stamp
- ASME R Stamp
- ISO 9001
- ISO 14001
- OHSAS 18001
- Other approvals is available upon customer request

EagleBurgmann Expansion Joint Solutions is designing according to:

- EN 13445
- EN 13480
- EN 14917
- AD 2000-Merkblatt
- EJMA
- ASME VIII, Div. 1
- ASME B31.1
- ASME B31.3

EagleBurgmann Expansion Joint Solutions offers non-destructive testing (NDT) to ensure welding integrity and product quality:

- Dye Penetrant test
- Magnetic Particle test
- Radiography
- Ultra sonic test
- Pressure test
- Helium leak test
- Complete documentation packages including certificates and NDT reports
- Other product testing is available upon customer request

Certificates and Tests

Welding integrity tests  
Type approvals  
Quality standards
Servicing customers is vital
Operational reliability: long service life of expansion joint is crucial as unplanned shut downs are not only troublesome – but also expensive. The right installation can save hundreds of man-hours by a correct and safe installation. EagleBurgmann Expansion Joint Solutions offers field service: 24/7/365.

Safety has the highest priority
of EagleBurgmann Expansion Joint Solutions – both for our manufacturing and installation personnel, but also for users of our products. The safety of all employees and personnel working on your plant or refinery is our greatest concern. Our service teams complete routine internal training in safety and certification training to ensure that each team member observes current industry safety practices as well as site specific policies and procedures.

Clamshell Solution
EagleBurgmann Expansion Joint Solutions offers clamshell expansion joints – a solution if replacement of a leaking expansion joint is not possible immediately or to prevent unexpected shutdown. A clamshell provides a temporary elimination of the leak allowing the plant to continue operating until a planned shutdown. Available in a single ply metal bellows supplied in two or more parts, the clamshell design allows for fitting around the installed unit and minimizes impact on connecting parts.

The key to long-term life and reliable expansion joints is dependent on a professional installation team. EagleBurgmann Expansion Joint Solutions has extensive installation and supervision experience all over the world.

EagleBurgmann Expansion Joint Solutions comprehensive service includes:
• Evaluations and Troubleshooting
• Initial Dimensional Measurements
• Installation and Refurbishment
• Supervision and Training
• Plant Surveys
• Emergency Services
• Final Inspection and Experience Service Engineers

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Complete Line of Expansion Joint Solutions

**KE Fabric Expansion Joints**
are installed as flexible connections in air and flue gas pipe and duct systems to take up or compensate for thermal expansion, vibrations and misalignments. KE Fabric Expansion Joints take up movements in several directions simultaneously, have almost no reactive forces, need little space for installation, are easy to adapt to existing physical conditions, and they are easy to transport and install.

**KE Rubber Expansion Joints**
KE Rubber Expansion Joints are flexible connectors made from natural or synthetic elastomers in which special fabrics are embedded to provide physical reinforcement. A proven and flexible solution to accommodate many types of movements and requirements of industrial plant and equipment. Used in systems transporting fluids, slurries or gases under pressure, at ambient pressure or under vacuum over a wide range of temperatures.

**Bredan and EJS Metal Expansion Joints**
EagleBurgmann Expansion Joint Solutions offers a full range of Bredan and EJS metal expansion joints from round and rectangular ducting expansion joints to highly engineered expansion joints to serve customers in the power generation, oil and petrochemical, pulp and paper, industrial and heavy equipment suppliers and a variety of OEM markets.

EagleBurgmann Expansion Joint Solutions is a world leader in the industry with installations found in thousands of plants worldwide with a long history of welding and forming of special materials including a wide range of nickel alloys. EagleBurgmann Expansion Joint Solutions offers complete documentation packages to the latest industry standards.
EagleBurgmann Expansion Joint Solutions is a leading global organization in the development of expansion joint technology; working to meet the challenges of today’s ever-changing environmental, quality and productivity demands. Our flexible products are installed in thousands of plants, refineries and equipment worldwide where reliability and safety are key factors for operating success. As part of the international organization EagleBurgmann Group, more than 5000 employees contribute their ideas, solutions and commitment to ensure our customers worldwide can rely on our products and services. For more information – visit eagleburgmann-ej.com and eagleburgmann.com.