

EagleBurgmann[®]
expansion joint solutions

KE[®] Fabric Expansion Joints

For air and flue gas duct systems



eagleburgmann-ej.com

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 worlds 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

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 approved to:

- European Pressure Equipment Directive (PED) 97/23/EC
- ASME, Section VIII, Div. 1, U2
- UOP recommended manufacturer
- ISO 3834-2:2006
- ISO 9001:2008 by Bureau Veritas
- Environmental, Health & Safety ISO 14001:2004 and OHSAS 18001:2008 by Bureau Veritas
- AD 2000-Merkblatt

EagleBurgmann Expansion Joint Solutions is a respected member of:

- The European Sealing Association (ESA)
- Fluid Sealing Association (FSA)
- Expansion Joint Manufacturers Association (EJMA)
- Euro-Qualiflex

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-ej.com



- P4.** KE® Fabric Expansion Joints introduction
- P5.** Conventional power plant – Illustration
- P6.** Conventional power plant – Coal Mill
- P7.** Conventional power plant – Air intake
- P10.** Conventional power plant – HRSG boilers
- P11.** Flue Gas Applications
- P12.** Gas Turbine – Illustration
- P13.** Gas Turbine – Air Intake
- P14.** Gas Turbine – Exhaust Duct System
- P15.** KE® Expansion Joints for Pipe Penetration
- P16.** KE® Expansion Joints for other applications
- P17.** KE® Expansion Joints Product Range
- P18.** Installation, Service and Preventative Maintenance
- P19.** Complete Line of Expansion Joint Solutions

KE® Fabric Expansion Joints Introduction

KE® Fabric Expansion Joint

are installed as flexible connections in air, duct and flue gas piping systems to take up or compensate for thermal expansion, vibrations and misalignments.

KE® Fabric Expansion Joint advantages:

- Compensate for movements in several directions simultaneously
- Almost no reactive forces

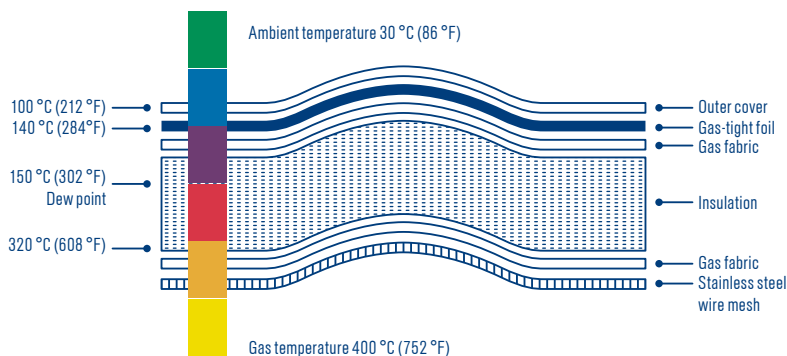
- Requires little space for installation
- Easily adapts to existing physical conditions
- Easy to transport
- Minimum heat loss due to good insulation
- Cold on the outer layer during operation to protect employees on site
- Proven technology

By combining different materials and taking into consideration the thermal, chemical and mechanical

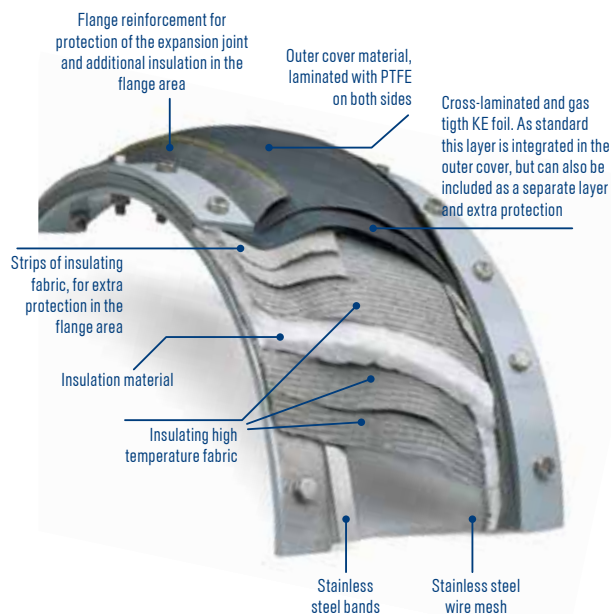
resistance as well as the fatigue properties of the materials, our designers provide the optimum solution both in technical and economical respect. KE® Fabric Expansion Joint are used in conventional power plants fired with coal, oil and gas turbine systems.

In the following pages, we will introduce a variety of KE® Fabric Expansion Joint products designed for power plants, gas turbine systems, and other related applications.

Temperature gradient and flow in a multi-layer expansion joint



Multi-layer KE® Fabric Expansion Joint





Conventional Power Plant General Illustration

Heat
Movement
Dust

All power plants

are faced with the challenge to fulfill the high expectations of maintaining peak operating performance while meeting environmental, legal and safety requirements. Operating reliability and a long service life of expansion joints are therefore crucial as unexpected plant shut-downs can be disruptive and costly.

A power plant

is divided into a "hot" and a "cold" area. In the "hot" area, the temperature load and the loading of the

flue gas with fly ash is decisive. In the "cold" area the expansion joint is affected by the formation of aggressive condensate, due to the temperature falling below the dew point.

KE® Fabric Expansion Joints

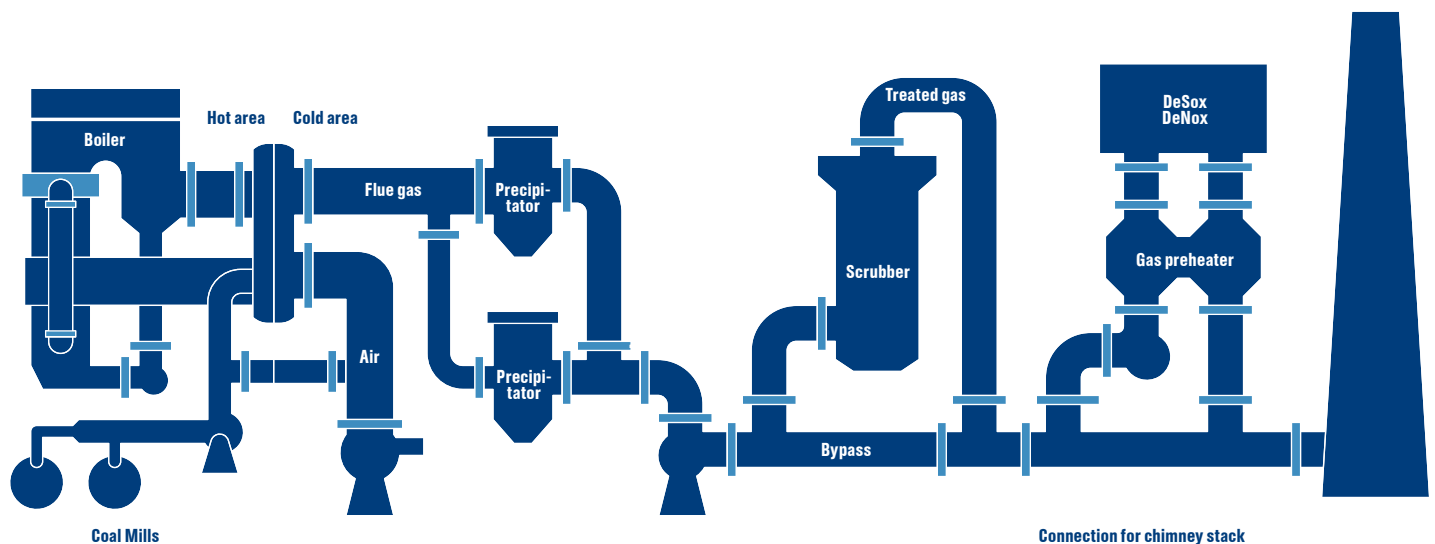
are installed in coal-fired power plants, including the coal mill inlet and outlet:

- Coal dust lines
- Secondary lines
- Return suction ducts

Coal dust lines and the expansion joints installed here require a special design to prevent the coal dust from settling and possibly igniting within the lines.

EagleBurgmann Expansion Joint Solutions

has proved that the high quality standard for maintaining reliable expansion joints is dependent on selecting the right design and the best materials for the existing operating conditions.





EagleBurgmann
expansion joint solutions

Vibration
Abrasion
Pressure

Conventional Power Plant Coal Mill

VIBROFLEX® Expansion Joints

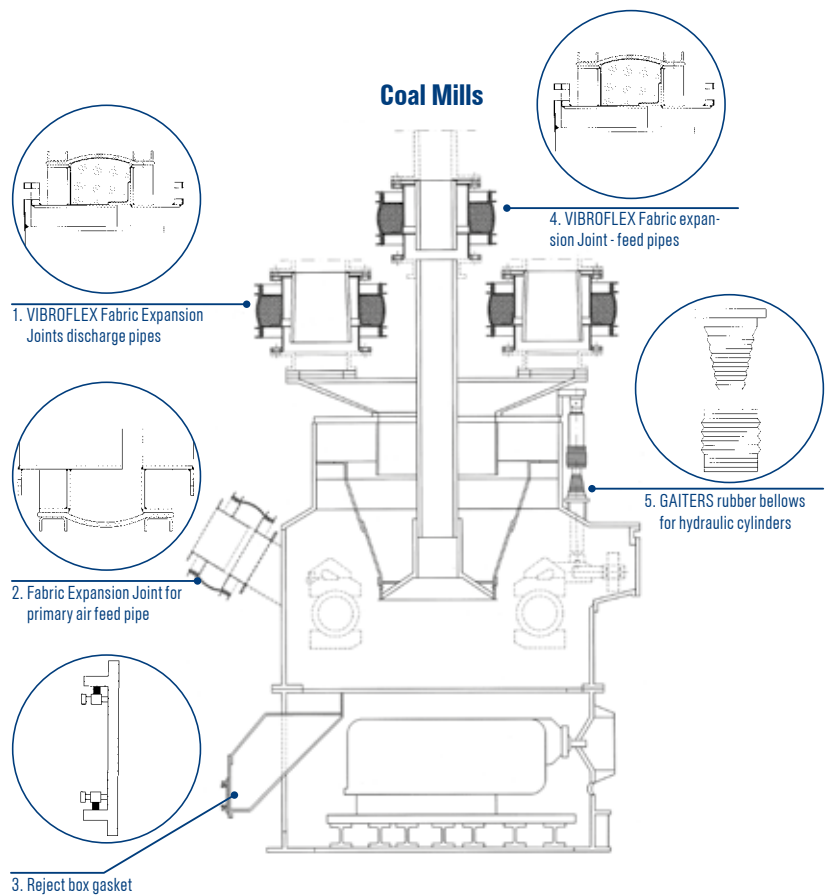
are specially constructed to prevent stress cracks in the ducting caused by vibration from the coal mills. The expansion joint's secondary function is to compensate for thermal expansion within the ducting and to prevent the escape of dust.



Discharge pipes - position 1.



Primary air intake - position 2.





EagleBurgmann.
expansion joint solutions

Conventional Power Plant Air Intake

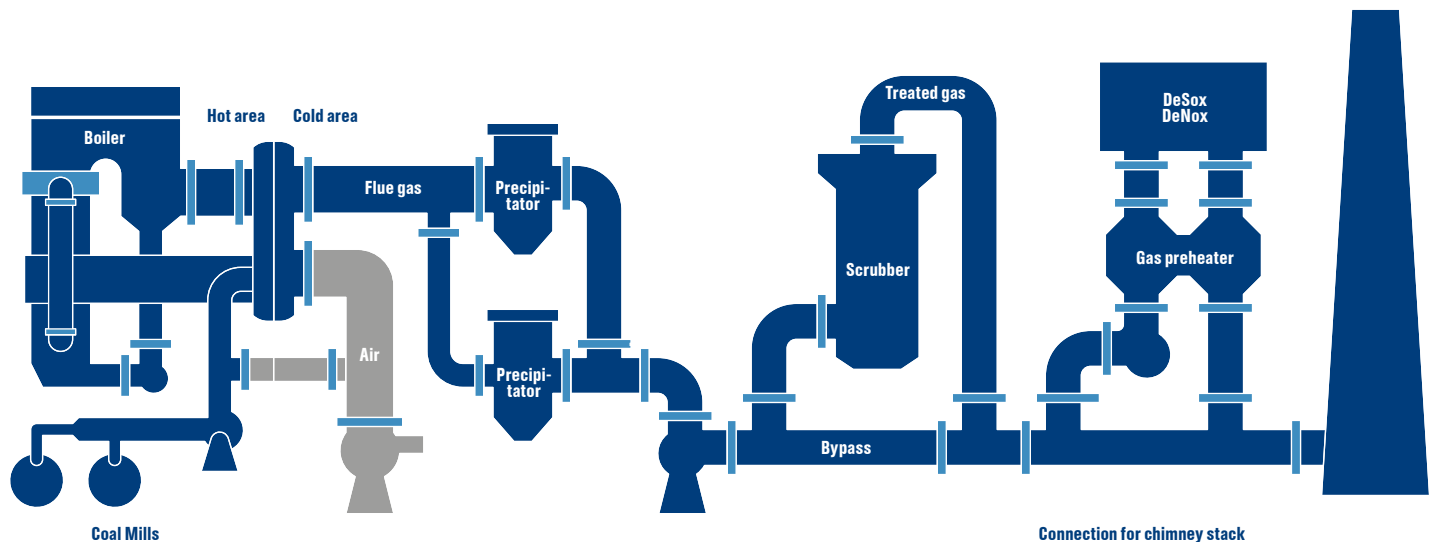
Sound reduction
Vacuum
Vibration

In the air intake

of a power plant (see the grey area) you can use KE® Fabric Expansion Joint, type KE-Flex®:

KE-Flex®

Fabric Expansion Joints are recommended for applications where temperatures do not exceed above 200°C (392°F) and the media is not aggressive. KE-Flex® are used in heating and ventilation (HVAC) systems, separators, vibrating conveyor systems etc. KE® Fabric Expansion Joint are available in different versions from fabrics, plastics and elastomers.





EagleBurgmann®

expansion joint solutions

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 worlds pipe expansion needs





EagleBurgmann
expansion joint solutions

Increase efficiency
Reduce maintenance cost
Minimal gas and heat loss

Conventional Power Plant HRSG boilers

In the HRSG boiler

of a power plant (see the grey area) you can use some of the following KE® Fabric Expansion Joint (marked with light blue colour):

Fluaflex®

is used in air and flue gas systems, e.g. in conventional power plants, gas turbine plants, incinerator plants, cement works, petrochemical plants, pulp and paper

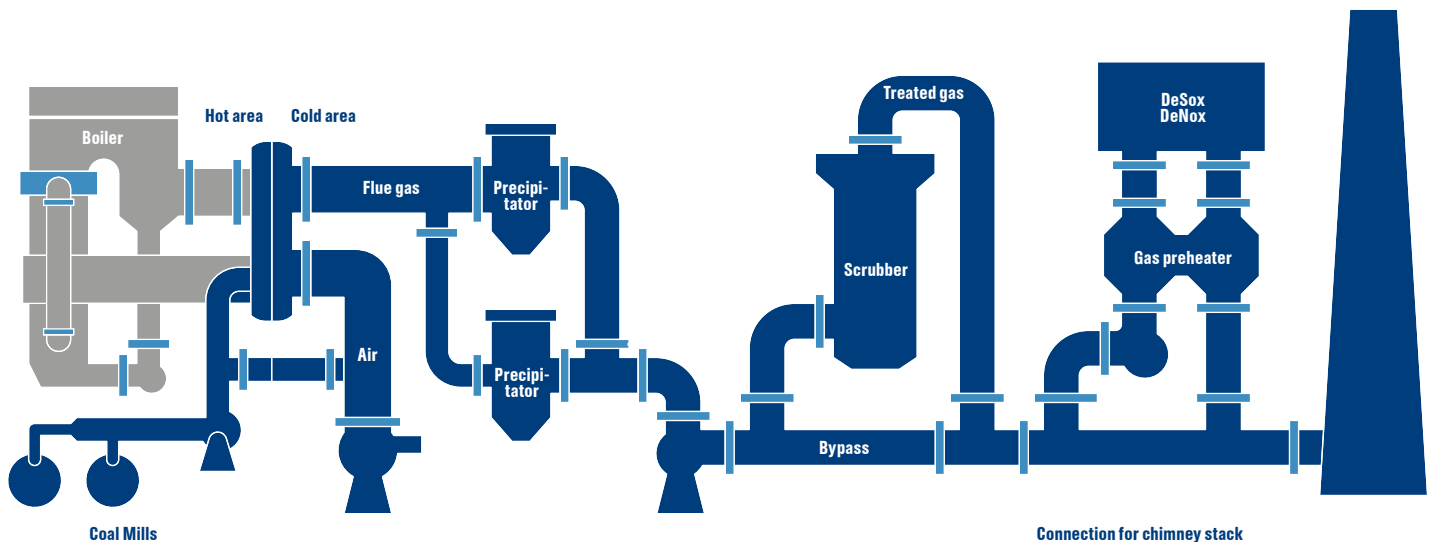
plants etc., where temperatures do not exceed 575°C (1,067°F). Also suitable for flue gas in dry operations.

Flexgen®

with unique thermal, chemical and mechanical properties. Flex-Gen® is reinforced PTFE-based laminates. A glass fabric is coated and laminated on one or both sides with one or more layers of PTFE foil. Suited for a wide variety of applications.

Fluastal®

is designed with stainless steel wire mesh and bands on the gas side to ensure high form stability and temperature resistance. For demanding applications in gas turbine system, smelting works, cement plants, petrochemical plants etc. Designed to meet individual requirements. KE® Fabric Expansion Joint retain excellent form stability and are easy to install.





EagleBurgmann
expansion joint solutions

Flue Gas Applications

Acid
Pulsation
Movement

Filter precipitator

KE[®] Fabric Expansion Joints are used in electrostatic precipitator (ESP), and electrostatic air cleaner, a particulate collection device that removes particles from a flowing gas (such as air).

Flue Gas Desulphurization (FGD)

Particular care should be considered when designing expansion joints for FGD systems as they can be exposed to extreme operating conditions: high temperatures and highly corrosive gases. Leaks from the expansion joint may cause damage to the insulation and/or other nearby equipment within the power plant. Basically, expansion joints for FGD can be subdivided into two groups:

- Expansion joints before the scrubber (untreated gas side)
- Expansion joints after the scrubber (treated gas side). Medium: wet treated gas with a very high acid concentration (pH <1)

SNOX

Finding the most suitable method to reduce nitrogen oxides (DeNox) is critical for environmental protection. Primary measures provide for the use of expansion joints in the burner area. Secondary measures are required to meet the emission standards which pose highly differentiated demands on expansion joints.

Chimney connection

This flexible expansion joint with its specially-developed fastening system is used between the flue gas duct and the acid-proof brick lining of the chimney. It ensures excellent tightness and is easy to install. With this system, it is possible to eliminate expensive connecting frames which would be in contact with the flue gas.

Lining joint sealing in chimneys

Chimneys consisting of a concrete casing and one

or more internal pipes are exposed to considerable chemical loads of acid condensate as a result of the low flue gas temperatures after the flue gas cleaning system. The lining joints are sealed flexibly and acid-proof with Fluachem[®] fluoro-elastomer expansion joints (FKM), to avoid any leakage of condensate.

Fluachem[®] Expansion Joints

are used for flue gas applications. Where acid loads are very high (sulphuric acid plants, heat recovery plants, absorption of acid vapours etc.)

- Flue gas ducts
- Hot air lines of burner feeders
- Rotary kilns of special waste incinerators
- Flue gas cleaning systems with aggressive media
- Flue Gas Desulphurization (FGD) plants and in other chemical processes.

Millions of hours of faultless operation under extreme operating conditions in FGD are a convincing proof of Fluachem[®] Expansion Joints.



Lining Joint Sealings in Chimneys.



Lining Joint Sealings in Chimneys.



Expansion Joint for Chimney Connections.



EagleBurgmann
expansion joint solutions

**Innovation
Technology
Customized solutions**

Gas Turbine General Illustration

Steel design, steel quality

gas sealing, heat transmission, convection, bolster, duct insulation, clamping arrangements, duct washing, turbine cycles etc. – are just some of the very important parameters that must be considered before deciding on the correct expansion joint construction for a gas turbine or combined cycle system.

Our many years of research

and development, vast experience with nearly all pos-

sible industrial applications combined with our technical expertise produces expansion joints that offer the best operating reliability for your application. In order to provide the best solution, both technically and economically, we encourage you to contact us at the earliest possible stage of the project.

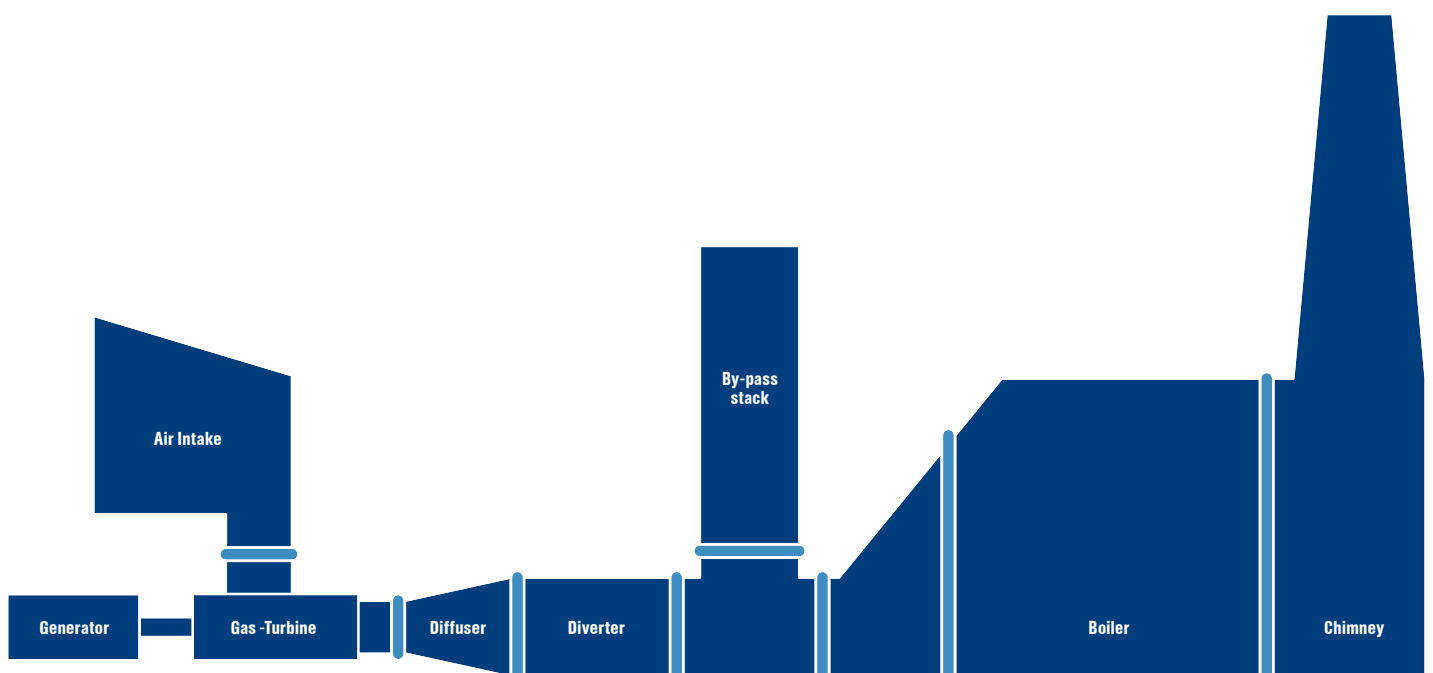
Add to this our worldwide service

for a comprehensive package from R&D, technical support, value engineering (incl. CAU) design calcu-

lation (FEM/FEA) of steel components to measurements, installation and inspection services including post installation troubleshooting support. The right installation can save hundreds of man-hours by a correct and safe installation.

In the gas turbine

you can use KE® Fabric Expansion Joint (marked with light blue) in the illustration below:

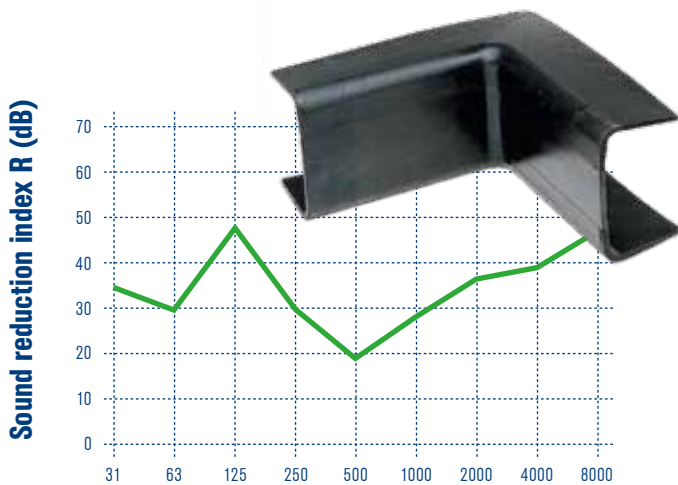




EagleBurgmann.
expansion joint solutions

Gas Turbine Air Intake

Sound insulator
Vibration damper
Improved service life



1/1 octave	31	63	125	250	500	1000	2000	4000	31.5 - 8000
Centre									
Frequency (Hz)									
R	33.6	30.0	48.0	30.6	18.4	30.0	35.7	37.1	43.5

KE-Acouseal®

is an elastomer expansion joint, designed to insulate sound and damp vibration – see schedule left to this section. Installed in the air intake side of the gas turbine, between the filter and the gas turbine compressor. EagleBurgmann Expansion Joint Solutions has designed the KE-Acouseal® in cooperation with General Electric.



KE® Fabric Expansion Joint is installed in gas turbines.



Replacement of KE® Fabric Expansion Joint.



Gas Turbine System.

Great flexibility
High temperatures
Excellent lifetime

Gas Turbine Exhaust Duct System

Combine-X®

Fabric Expansion Joint is designed for gas turbine applications and is installed in a variety of locations; diffusers, exhaust plenum, damper inlets, damper outlets, by-pass stacks and boilers. The design must be customised to accommodate the operating conditions applicable.

The use of a expansion joint unit

i.e. a Combine-X® Fabric Expansion Joint pre-assembly

bled on steel components, offers many advantages:

- Steel work can be designed and engineered by us for delivery under our scope
- All pre-assembly is carried out in our workshop
- Installation into the duct is simple and quick

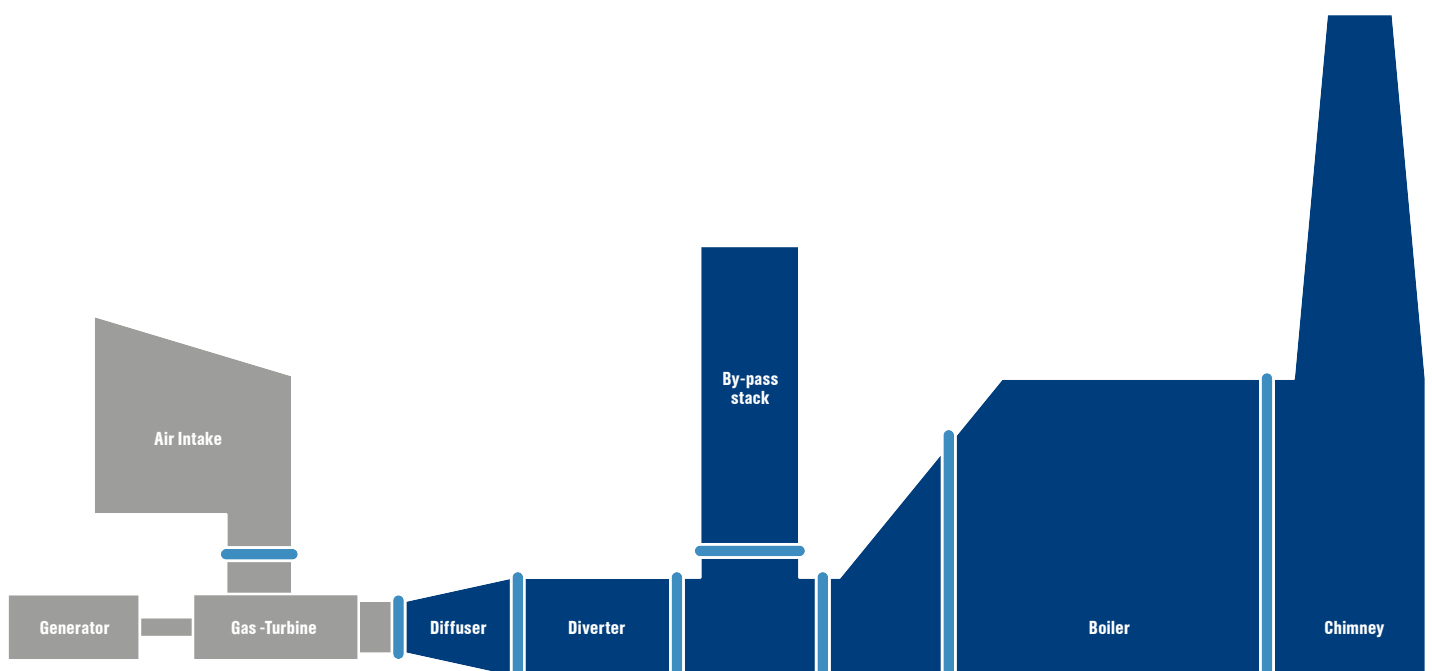
Fluachem®

Elastomer and Fluoropolymer Expansion Joints are used where acid load is very high in flue gas ducts, in hot air lines of burner feeders, in rotary kilns of special

waste incinerators, in flue gas cleaning systems with aggressive media, in FGD plants and in other chemical processes.

In the exhaust of the gas turbine

you can use KE® Fabric Expansion Joint (marked with light blue color) in the blue area:





EagleBurgmann
expansion joint solutions

KE[®] Fabric Expansion Joints Pipe penetration

Movement
Temperature
Service

Whenever boilers are used

in power generating plants, they need to be sealed in some way to avoid hot flue gases escaping from the boiler where the steam pipes penetrate the boiler wall. Other important factors to consider to maintain efficiency are:

- Limited space
- Heat
- Small diameters
- Installation
- Insulation
- Ventilation
- Movements

Steam pipes between boiler house and 'penthouse', or between boiler pipe and boiler stay, must also be sealed. In these applications, compensating for movement is a secondary function.

It is important to use skilled fitters

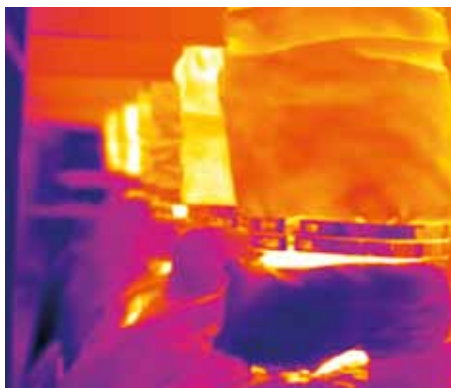
when installing penetration seals. Our fitters and supervisors undergo routine internal training in safety and continuously updating onsite and internal safety courses as well as customer required certification classes to ensure that each team member observes current site specific safety policies and procedures.

Penetration seal expansion joints

penetration seal expansion joints can be designed to meet most customer specifications.

EagleBurgmann Expansion Joint Solutions

offer technical expertise and progressive manufacturing capabilities that increase overall service life, reduce costs and decrease operational downtime.



Pipe Penetrations with high temperature.



KE[®] Fabric Expansion Joints installed in a Pipe Penetration System.



Pipe Penetration with external Insulation.



EagleBurgmann.
expansion joint solutions

**Innovation
Technology
Customized solutions**

KE® Fabric Expansion Joints Other Applications

Incineration plant

Due to the high percentage of corrosive content in flue gas, careful material selection and establishing a tight seal is essential for the expansion joints used for this application.

Rotary Kilns

Used for thermal treatment in connection with the sealing system and compensate for movements in the ducts.

Pulp and Paper Industry

Used in processes which are heat intensive as well as chemically demanding.

“Gas Domes” on LPG Ships

Fluachem® Fabric Expansion Joints of Neoprene with double fabric reinforcement act as elastic seals between the gas tanks, stored on deck on flexible

bearings, and the deck itself. Available as round or rectangular expansion joints with vertical flanges.

Fire Skirts

Combine-X® Fire Skirt Expansion Joints are used as flexible, fire-proof elements of the ducting in gas turbine exhaust systems on board cruise ships or other types of vessels. Combine-X® Fire Skirt Expansion Joints are approved by the necessary approving bodies, such as Norske Veritas and Lloyds Register of Shipping and fulfill requirements for protection classes such as Jet Fire and Pool Fire.

Ventilators

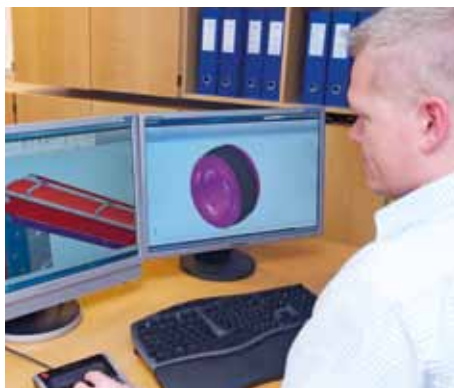
In connection with fans and ventilators, expansion joints are installed on both suction and pressure sides of the ventilator to prevent vibrations being conveyed to the ducts, and static offset to occur between the ventilator and the duct.

Cement Industry

Due to high content of cement dust in the flue gases, KE® Fabric Expansion Joints are designed with a sleeve (baffle) as protection from the abrasive particles. A special material made from natural hides ensure a long operating life.

Chemical Industry

requires expansion joints where temperature and acid loads are very high (sulphuric acid plants, heat recovery plants, absorption of acid vapours etc.). Fluachem® Expansion Joints of fluoroelastomer and fluoropolymer have excellent chemical resistance. Further applications are in flue gas ducts, in the hot air lines of burner feeders, and in rotary kilns of special waste incinerators.



3D Engineering of KE® Fabric Expansion Joint.



Installation of KE® Fabric Expansion Joint in a pulp and paper mill.



The piper feed unit equipped with Fluastal® Fabric Joints on the gas turbine exhaust.



EagleBurgmann
expansion joint solutions

**Innovation
Technology
Customized solutions**

KE® Fabric Expansion Joints Product range

KE-Flex®

are fabric expansion joints for temperatures below 200°C (392°F), where the media is not aggressive. KE-Flex® are used in heating and ventilation (HVAC) systems, separators, vibrating conveyor systems etc.

Fluaflex®

is used in air and flue gas systems, e.g. in conventional power plants, gas turbine plants, incinerator plants, cement works, petrochemical plants, pulp and paper plants etc., where temperatures do not exceed 575°C (1,067°F). Also suitable for abrasive media.

Fluastal®

is designed with stainless steel wire mesh and bands on the gas side to ensure high form stability and temperature resistance. For demanding applications in

gas turbine system, smelting works, cement plants, petrochemical plants etc. Designed to meet individual requirements.

Combine-X®

is designed for gas turbine applications and is installed in a variety of locations; diffusers, exhaust plenum, damper inlets, damper outlets, by-pass stacks and boilers. The design must be customised to accommodate the operating conditions applicable.

KE-Acouseal®

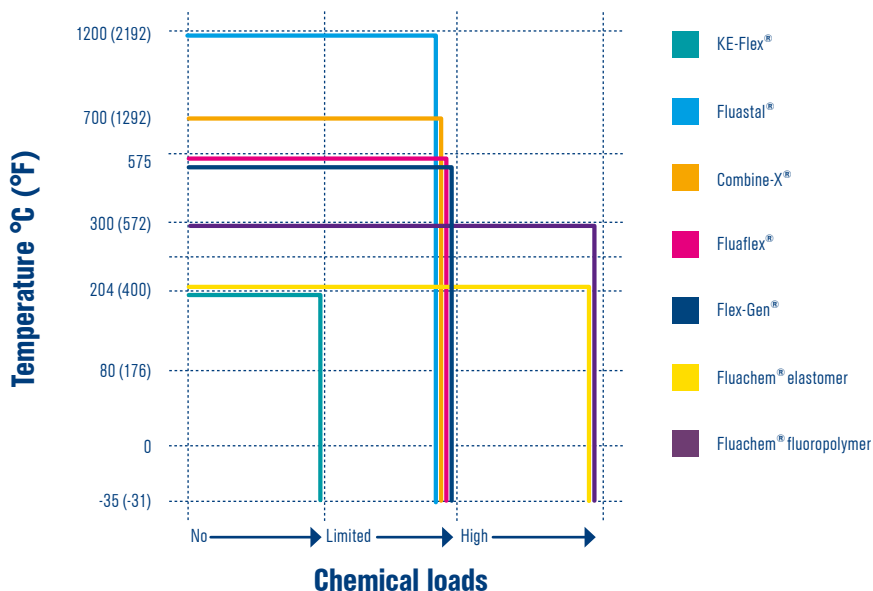
is an elastomer expansion joint, designed to insulate sound and damp vibration. Installed in the air intake side of the gas turbine, between the filter and the gas turbine compressor.

Flexgen®

with unique thermal, chemical and mechanical properties. Flex-Gen® is reinforced PTFE-based laminates. A glass fabric is coated and laminated on one or both sides with one or more layers of PTFE foil. Suited for a wide variety of applications.

Fluachem®

Elastomer and Fluoropolymer Expansion Joints are used where acid load is very high (sulphuric acid plants, heat recovery plants, absorption of acid vapours etc.) in flue gas ducts, in hot air lines of burner feeders, in rotary kilns of special waste incinerators, in flue gas cleaning systems with aggressive media, in Flue Gas Desulphurization (FGD) plants and in other chemical processes.





EagleBurgmann.
expansion joint solutions

**Improve reliability
Increase service life
Worldwide service teams**

Installation, Service and Preventive Maintenance

Servicing our customers is vital

Operational reliability: the long service life of an 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.

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

EagleBurgmann Expansion Joint Solutions comprehensive service includes:

- Evaluations and troubleshooting
- Initial dimensional measurements
- Pipe stress analysis
- Installation and refurbishment
- Supervision and training
- Onsite Repair – online and offline
- Emergency services

- Final Inspection
- Experienced Service Engineers
- Final Inspection and experience Service Engineers

24 hours hotline:

Fabric, Metal and Rubber Expansion Joints:

Tel. +45 2124 6632

Fabric Expansion Joints (USA):

Tel. +1(859) 746 0091

Metal Expansion Joints (USA):

Tel. +1(619) 562 6083



KE® Fabric Expansion Joint installed over the manifold.



One-stop-shopping: KE® Fabric Expansion Joint are installed in gas turbines.



Installation of KE® Fabric Expansion Joint.



EagleBurgmann
expansion joint solutions

Complete Line of Expansion Joint Solutions

Fabric
Rubber
Metal



 KE® Fabric Expansion Joints.



 KE® Rubber Expansion Joints.

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® Metal Expansion Joints.



 EJS® Metal Expansion Joints.

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.

Technology that expands with you

Argentina · Australia · Austria · Bahrain · Belarus · Belgium · Bulgaria · Brazil · Canada · Chile · China · Colombia · Cyprus · Czech Republic · Denmark · Ecuador
Egypt · Estonia · Finland · France · Germany · Great Britain · Greece · Hungary · India · Indonesia · Iraq · Israel · Italy · Japan · Jordan · Kazakhstan · Korea · Kuwait
Latvia · Libya · Lithuania · Malaysia · Mauritius · Mexico · Morocco · Myanmar · Netherlands · New Zealand · Nigeria · Norway · Oman · Pakistan · Paraguay · Peru
Philippines · Poland · Qatar · Romania · Russia · Saudi Arabia · Singapore · Slovenia · Slovakian Republic · South Africa · Spain · Sweden · Switzerland · Syria
Taiwan · Thailand · Trinidad and Tobago · Tunisia · Turkey · Turkmenistan · Ukraine · United Arab Emirates · Uruguay · USA · Uzbekistan · Venezuela · Vietnam

www.eagleburgmann-ej.com



Scan the code – find your local partner



EagleBurgmann®

expansion joint solutions

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 on 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.



EagleBurgmann KE A/S
Park Allé 34

6600 Vejen, Denmark

Tel: +45 7536 1811

Fax: +45 7536 1532

Mail: info@ke-burgmann.dk

Web: www.eagleburgmann-ej.com