MEGA FLEXON

EXPANSION JOINT & FLEXIBLE PRODUCTS

ISO 9001 ISO 14001 ISO 45001

FABRIC EXPANSION JOINTS

TECHNICAL DESIGN CATALOG

www.megaflexon.com

MEGA FLEXON

EXPANSION JOINT & FLEXIBLE PRODUCTS

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INTRODUCTION
OF FABRIC EXPANSION JOINTS

Megaflexon fabric expansion joints are designed to provide thermal stress relief in duct line systems by absorbing movement caused by thermal changes and vibrations, misalignment of ducting and shock. Megaflexon fabric expansion joints are fabricated from a variety of non-metallic materials, including synthetic elastomers, fabrics, insulation materials, fluroplastics and fluroelastomers depending on the applications.
It solves problems caused by thermal and mechanical stresses generated in a complex systems by supplying various shapes and materials. In order to comply to any requirements and different conditions of special specifications, Megaflexon fabric expansion joints offer proper solutions by providing elevated quality.

As one of the leading manufacturer of fabric expansion joint, Megaflexon has capability of engineering, design and manufacturing technology as well as complying in accordance with FSA (Fluid Sealing Association) latest edition.

APPLICATIONS

Megaflexon has been dedicated to being the global industry leader for engineering and manufacturing expansion joints for

- Fossil Fired Power Plant
- Gas Turbine & Heat Recovery Steam Generators (HRSG)
- Circulating Fluid Bed Boilers (CFB)
- Fire Protection
- Energy And Environmental Technology
- Cogeneration Power Plant
- Nuclear Power Plant
- Petroleum Refinery
- Chemical Refinery
- Steel Mills
- Pulp And Paper Industry
- Smelters
- Refuse Incineration
- Cement Plant
- Heat/Dust Recovery
- Chemical Plant
- Marine
- Food Processing
- HVAC-Heating, Ventilating And Air Conditioning

ADVANTAGES

Non-metallic expansion joints are flexible connectors designed to provide stress relief and seal in gaseous media in ducting systems. They are fabricated from a wide variety of non-metallic materials, including synthetic elastomers, fabrics, insulation materials and fluoroplastics, depending on the designs.

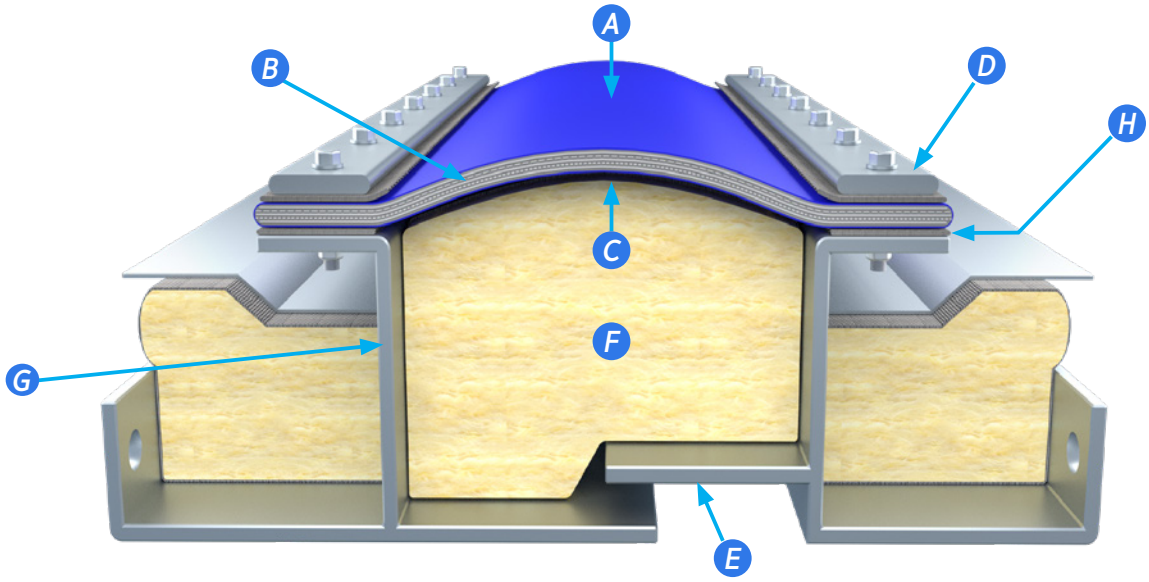
Advantages of non-metallic expansion joints include:

- **Large movements in a short length**
  Requires fewer expansion joints, reducing the overall number of units and providing additional economies.

- **Ability to absorb simultaneous movements easily in more than one plane**
  Allows the duct designer to accommodate composite movements in fewer and simpler expansion joints.

- **Very low forces required to move the expansion joint**
  The low spring rate enables their use to isolate stresses on large, relatively lightweight, equipment. A particular example is a gas turbine exhaust where it is crucial to minimize the forces from the duct expansion on the turbine frame.

FUNCTION
OF FABRIC EXPANSION JOINT COMPONENTS



A. GAS SEAL MEMBRANE
The gas seal membrane is intended to withstand system pressure and be resistant to chemical attack from the interior and the exterior. The gas seal must also have the flexibility to absorb thermal movements. Depending on system temperature, it may require additional thermal protection.

B. INSULATING LAYERS
The insulating layers provide a thermal barrier to ensure that the inside surface temperature of the gas seal membrane does not exceed its maximum service temperature. The insulating layer can also reduce condensation caused by the gas stream coming in contact with the "cool" surface of an uninsulated gas seal membrane.

C. INSULATING RETAINER LAYER
This layer is provided to keep the insulating layers in place in order to maintain thermal integrity. The retaining layer must be capable of withstanding gas stream temperatures and must be chemically compatible with system media.

D. BACK UP BARS
Back up bars, positioned at the flange attachment, use clamping pressure to create the fabric–to–duct seal and restrain the fabric when it is subjected to the system pressure. The thickness and width of the back up bars should be sufficient to perform this function with the bolt spacing being used. The edges of the back up bars should have a radius to preclude cutting of the fabric.

E. METAL LINER OR BAFFLE
A liner is designed to protect the gas seal membrane and insulating layers of the flexible element from abrasive particles which may be present in the gas stream. A liner is also used to reduce flutter of the fabric element caused by turbulence, to help control the accumulation of dust or ash in the expansion joint cavity, and to reduce the temperature of the flexible element.

F. ACCUMULATION BAG
An accumulation bag is intended to deter flyash from building up in the expansion joint cavity. It is typically used, in conjunction with a liner, in duct runs from boilers to air clean–up equipment such as precipitators, scrubbers and bag houses, or whenever high amounts of dust or ash are present in the gas. A flyash barrier must be capable of retaining its strength and flexibility while being exposed to maximum system temperatures and media.

G. FABRIC ATTACHMENT FLANGES
Fabric attachment flanges are required to connect the flexible element to the ductwork. Properly designed, they can be attached directly to the duct work and thus eliminate the necessity for an adjoining duct flange. Flanges can be designed with a "landing bar" duct attachment which allows some installation misalignment without affecting the flexible element. The flanges establish the stand off height of the fabric, which is necessary to achieve thermal integrity during all movement conditions. The edges of the flanges in contact with the gas seal membrane should also have a radius to prevent damage.

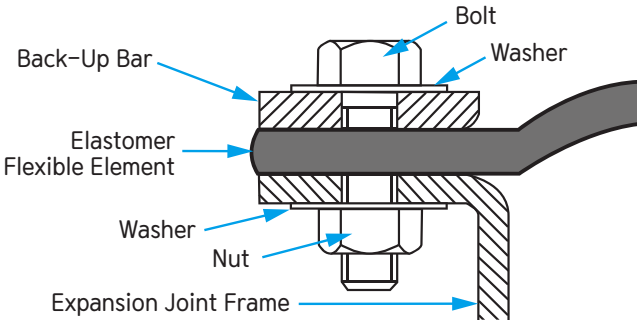
H. GASKET
Single ply fluoroplastic and fluoroelastoplastic belt designs such as Texfilm materials require flexible chemically inert gaskets.

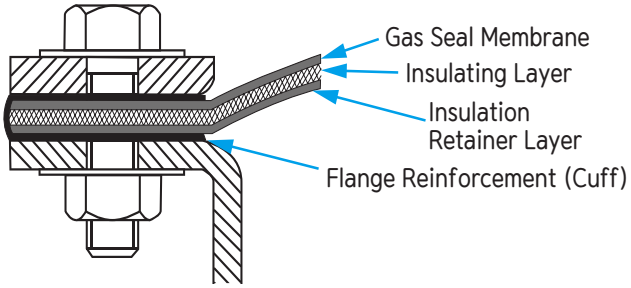
- **Single-Layer Construction**

  An expansion joint formed of one consolidated layer, often constructed from elastomers and reinforcement materials or fluoroplastics and reinforcement materials.

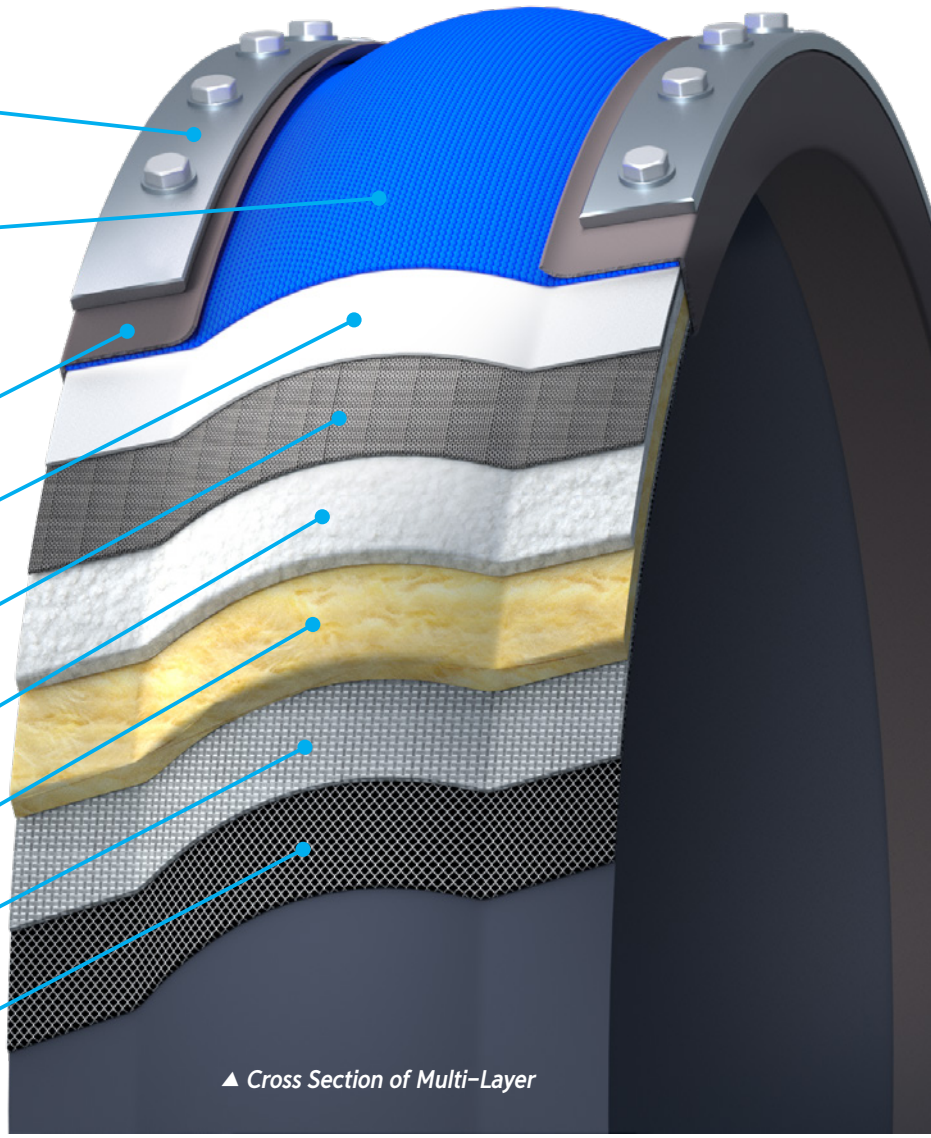
- **Multi-Layer Construction**

  An expansion joint in which the various plies are of different materials which are not integrally bonded together.





- *Back-Up Bar*
- *Outer Cover Material, Coated with PTFE or Various Elastomers*
- *Flange Reinforcement for Protection of Expansion Joint and additional Insulation in the Flange Area*
- *Gas Tight Foil (for Example PTFE)*
- *Insulating Fabric*
- *Insulation Material*
- *Insulation Material*
- *Insulating Fabric*
- *Stainless Steel Wire Mesh*



▲ *Cross Section of Multi-Layer*

MATERIALS
OF FABRIC EXPANSION JOINTS

The performance of fabric expansion joints for gas ducting systems is determined by the severity of the environment and by the selection of the materials for each component of the expansion joint. The selection of materials must be used on functional requirements as well as temperature and chemical capability. A corrosive atmosphere that might not have a noticeable effect at low temperature could have a disastrous effect at higher temperatures still within the basic heat resistance capability of the material.

Fabrics are used for the reinforcement of elastomers and other coatings to yield the mechanical properties necessary to withstand the movements and pressures exerted upon the expansion joint by the ducting system.

Insulating materials are used to reduce interface temperatures to a level that permits satisfactory performance and life of the elastomeric or coated materials in the gas seal layer. Fiberglass blankets perform very well to 1000deg, F(540deg, Celsius)and available ceramic blankets are rated above 1000deg, F but do have mechanical and chemical limitations.

Metal flanges are used to connect the flexible element to the ductwork. Metal flow liners or baffles are used to protect the gas seal membrane and insulation layers of the flexible element from abrasive particles which may be present in the gas stream. A liner also helps control fly ash accumulation in expansion joint cavity and reduce flutter of the flexible element caused by turbulence.

100% PTFE Corrosion Liners Engineered for Challenging Expansion Joint Applications

TEX-LFP™ expansion joint materials provide the non-metallic expansion joint industry with the only CrossFilm™ chemical barrier technology available in the market. Over 30,000 flue duct expansion joints have been manufactured from TEX-LFP™ expansion joint materials and their indestructible CrossFilm™ based chemical barriers.

Challenging flue gas conditions have reduced the time in service for many flue duct expansion joints in power plants. Many of the materials used in the flue duct expansion joints reveal serious limitations when exposed to:

- Corrosive chemical streams
- High mechanical stresses
- Elevated temperatures.

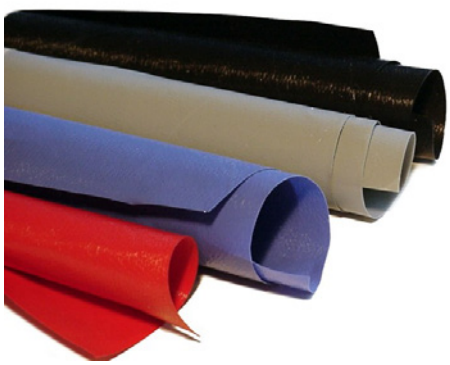
Fluoroelastomers are vulnerable to unpredictable chemical fluids and temperature excursions. Many expansion joint materials containing PTFE either lack the proper amount of polymer or rely on thin film barriers that are really not well suited for the industrial marketplace. The result is often a high plant expenditure to cover the many costs associated with unscheduled or frequent flue duct expansion joint replacement.

Why Do You Need CrossFilm™ Technology?

The CrossFilm™ process, a patented TCI invention, produces a PTFE material with exceptional 360 degree tear strength and durability. Because CrossFilm™ material consists solely of PTFE resins, the material is considered chemically inert and is capable of performing from -400˚F to 600˚F (- 240˚C to 316˚C).

Advantages of CrossFilm™ Technology

- CrossFilm™ barriers resist tearing and possess incredible flexing traits. Regardless of the chemical environment, the rugged high performance materials eliminate any concern for chemical attack. This has been proven in laboratory and industrial service where, in all cases and regardless of the thermo-chemical environment, CrossFilm™ technology product has retained all of its physical properties.
- Corrosion barriers made with CrossFilm™ technology permanently retain their zero porosity properties, even after being exposed to the most challenging expansion joint operating conditions.
- CrossFilm™ barriers can be produced as thick as 0.030" (0.76 mm) for flue duct service. Unlike CrossFilm™, conventional PTFE films, which are typically around 0.004" (0.10 mm), become even more prone to stress cracking with increased thickness.
- Standard heat sealing procedures can be used to readily fabricate and field splice all CrossFilm™ based laminates.
- Materials produced using CrossFilm™ technology will perform continuously between -400˚F and 600˚F (- 240˚C to 316˚C).



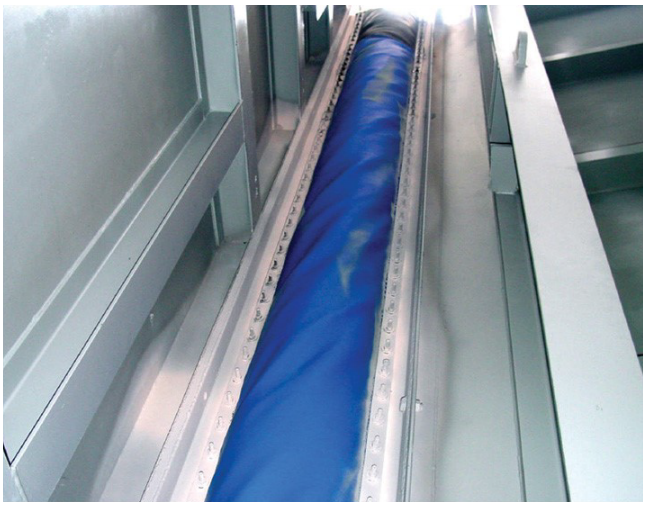
Flex Cycles to Failure for Thin Perfluoroplastic Products

Product	*Hours to Failure*
FEP and PFA Films	*107,000*
Cast PTFE Film and Cast Film Laminates	*122,500*
Skived PTFE Films	*199,000*
Chemical Barriers made from CrossFilm Technology	*1,102,000*

100% PTFE FGD–Service Material for Power Plants

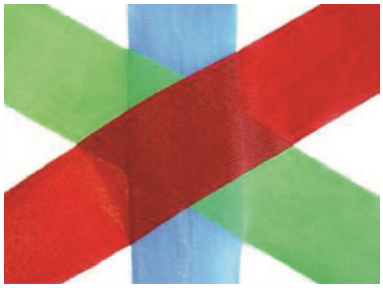
CrossFilm™ material is simply the ideal flue gas desulfurization (FGD) service material for flue duct expansion joints in power plants. Since the material is all–PTFE, it is guaranteed to be free from chemical attack. As past performance shows, not a single expansion joint made using CrossFilm™ has ever been chemically attacked. With thousands of trouble–free expansion joints produced since CrossFilm's creation in 1993, no other material in the marketplace can come close to matching the reliability and performance of the product.

The process used to produce CrossFilm™ results in a PTFE material with exceptional 360˚ tear strength and durability. No fiberglass reinforced material is able to rival the tremendous flexing properties of CrossFilm™. Flexing capability proves to be very beneficial in the corners of an expansion joint, where fiberglass is known to fail often.



Fluoroelastomers, which are vulnerable to unpredictable chemical environments and excursion temperatures above 400˚F (204˚C), can be unreliable. High plant expenditures to cover the many costs associated with unscheduled or frequent expansion joint failures can be the result. Because CrossFilm™ material consists solely of PTFE resins, it is considered chemically inert in expansion joint service and is capable of performing in temperatures ranging from –425˚F to 600˚F (–254˚C to 316˚C).

CrossFilm™ – the future for flue duct expansion joints in FGD service

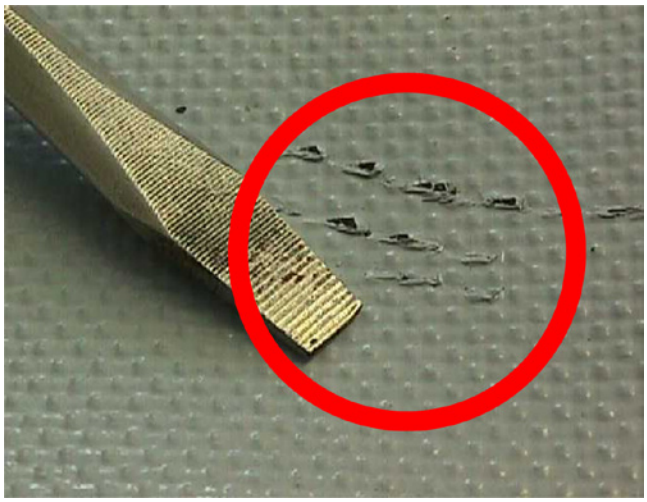


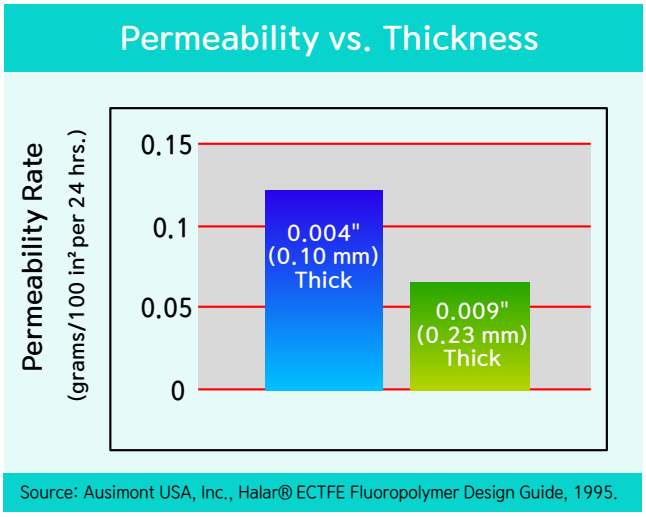
Product Features

- *All–PTFE*
- *Excellent flexing capability*
- *Easy to heat seal/repair*
- *Temperature range of –425˚F to 600˚F (–254˚C to 316˚C)*
- *Compatible with any chemical environment*
- *Exceptional durability*
- *Long life in expansion joint service*
- *Many variations are available upon request*

Why use CrossFilm™ expansion joint materials? Because thin and weak PTFE films are old technology.

Thin films can be easily damaged during handling.

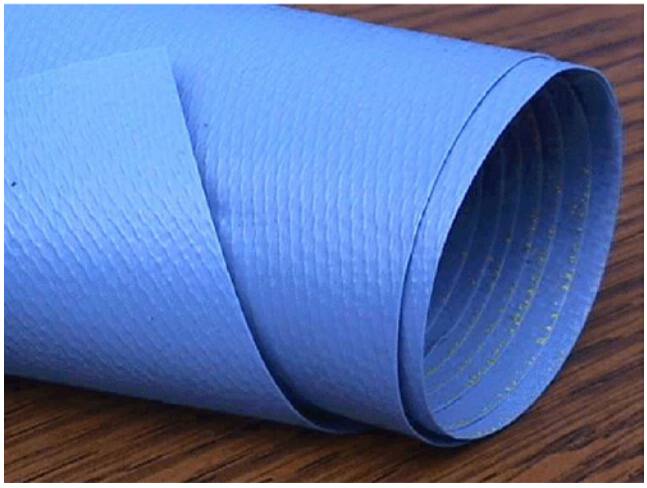




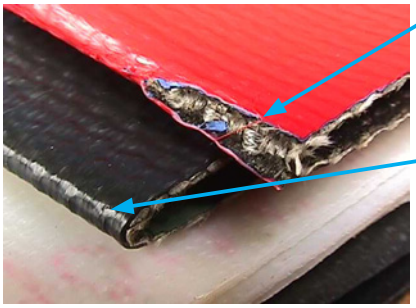
Source: Ausimont USA, Inc., Halar® ECTFE Fluoropolymer Design Guide, 1995.

Weak PTFE films are prone to stress cracking in severe temperatures or mechanical flexing.

CrossFilm™ is produced using cross-plies of proprietary PTFE films to prevent stress cracking. CrossFilm™ can be safely used in a wide range of thicknesses, while weak PTFE films are prone to cracking with an increase in thickness.



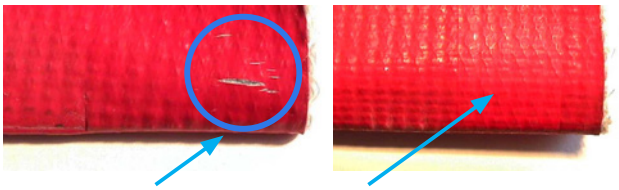
- **Cold Bend Test @ -90°F (-67.8°C)**



Unidirectional PTFE (0.009" laminate without multidirectional strength)

(0.009" laminate with multidirectional strength)

- ***Hot Bend Test @ Temperatures Above 600°F (316.5°C)***



Unidirectional PTFE (0.009" laminate without multidirectional strength)

(0.009" laminate with multidirectional strength)

** Source : Textiles Coated International (TCI)*

Expansion joint materials have a new standard: thick, safe, and affordable CrossFilm™. With all the money invested in metal and labor for an expansion joint, there's no reason to take chances with thin, weak films anymore.

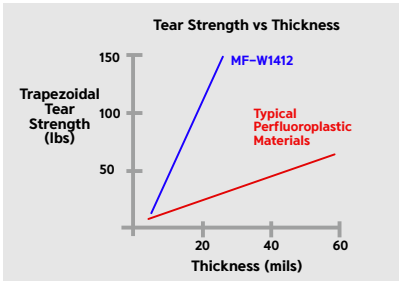
• WET CONDITION MATERIAL

A LAMINATED PTFE / FIBERGLASS COMPOSITE ENGINEERED FOR SEVERE, CORROSIVE, CONDITIONS

MF-W1412 Expansion Joint Material

MF-W1412 barrier is made up solely of PTFE resins. A number of high strength plies of proprietary PTFE film are cross-plied, then laminated, concluding in a chemical liner with multi-directional strength and exceptional durability. MF-W1412 Expansion Joint Product consists of a high strength fiberglass textile with a uniform, penetrating, PTFE coating.

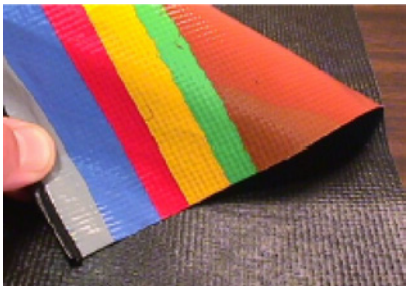
MF-W1412 PROPERTIES	
Materials of Construction	Woven Fiberglass; Fluoropolymer Resins
Upper Use Temperature	600˚F (316˚C) Continuous
Weight	66 oz/yd² (2679 g/m²)
Thickness	0.052" (1,3 mm)
Width	60" (1524 mm) Special Widths Available
Tensile Strength (Warp)	1200 lbs/in (10508 N/50 mm)
Tensile Strength (Fill)	1200 lbs/in (10508 N/50 mm)



MF-W1420 Expansion Joint Material

MF-W1420 barrier is made up solely of PTFE resins. A number of high strength plies of proprietary PTFE film are cross-plied, then laminated, concluding in a chemical liner with multi-directional strength and exceptional durability. MF-W1420 Expansion Joint Product consists of a high strength fiberglass textile with a uniform, penetrating, PTFE coating.

MF-W1420 PROPERTIES	
Materials of Construction	Woven Fiberglass; Fluoropolymer Resins
Upper Use Temperature	600˚F (316˚C) Continuous
Weight	79 oz/yd² (2679 g/m²)
Thickness	0.060" (1.52 mm)
Width	60" (1524 mm) Special Widths Available
Tensile Strength (Warp)	1200 lbs/in (10508 N/50 mm)
Tensile Strength (Fill)	1200 lbs/in (10508 N/50 mm)

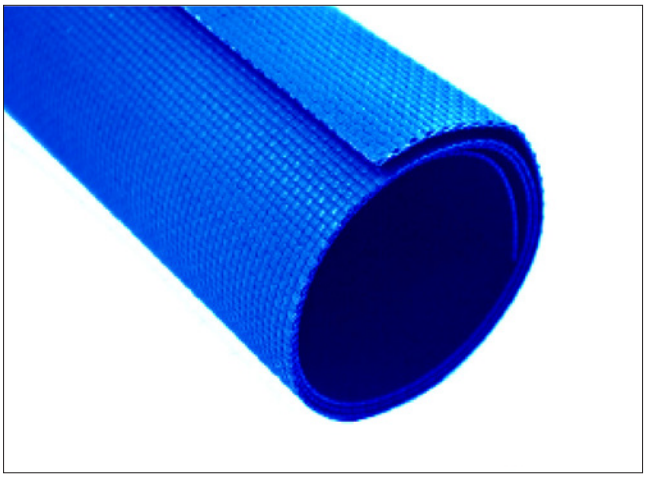


• DRY CONDITION MATERIAL

COATED PTFE / FIBERGLASS COMPOSITES ENGINEERED FOR DRY GAS SEAL SERVICE

MF-D1404 Expansion Joint Material

MF-D1404 is a non-porous composite consisting of a PTFE coated fiberglass fabric and barrier, which has been laminated to one side of the fabric.
Three high strength plies of PTFE film were laminated to produce barrier. The resulting 0.005 in. (0.13 mm) thick PTFE barrier is durable, flexible, and stress crack resistant.
This expansion joint material has been engineered for heavy-duty flue gas service.



- ***MF-D1404 has been successfully used in expansion joint service since 1990***
- ***Proven coating and lamination technology for industrial fabrication***
- ***Severe chemical and temperature exposure capabilities***
- ***Variations available upon request***

MF-D1404 PROPERTIES	
Upper Use Temperature:	600˚F (316˚C) Continuous Service
Weight:	55 oz/yd² (1870 g/m²)
Thickness:	0.040" (1.00 mm)
Width:	60" (1524 mm)
Tensile Strength (Warp):	1200 lbs/in (10507 N/50 mm)
Tensile Strength (Fill):	1200 lbs/in (10507 N/50 mm)

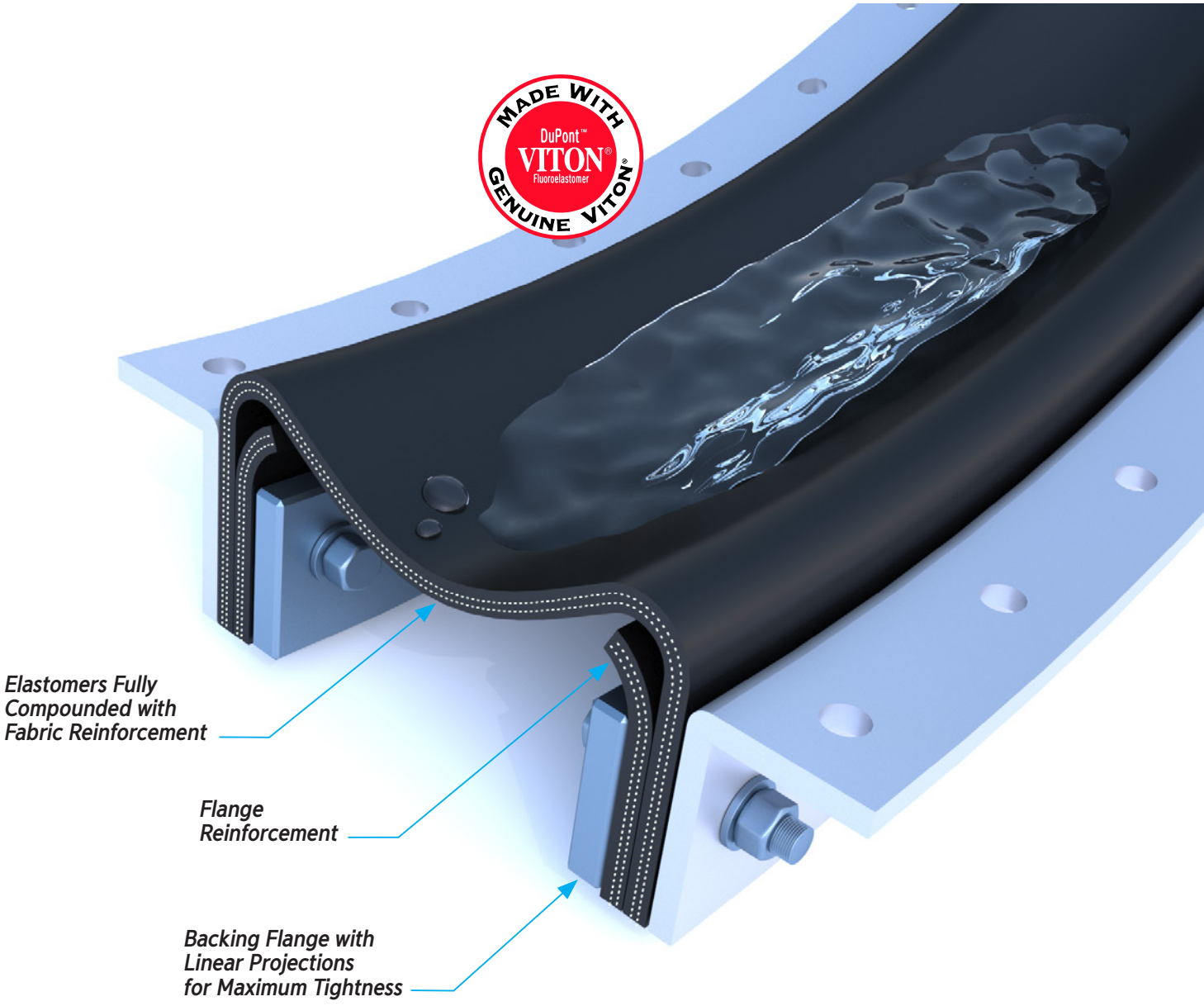
[ELASTOMERS]

- **EPDM (Ethylene propylene)**

Ethylene propylene(EPDM)–These low cost terpolymers have high tensile strength and elongation with excellent resistance to oxygen and ozone. They also have good flexing characteristics, low compression set and good head resistance. Conventional compounding produces formulations with very good chemical resistance. Reinforced EPDM expansion joints have been used in power generating stations and industrial plants.

- **FKM (Fluoroelastomers) / VITON–B**

Fluoroelastomers (FKM)–Manufactured in the U.S.A. by DuPont (Viton) and Dyneon (Fluorel) : these high performance elastomers have outstanding resistance to chemicals, oils and heat compared to any other elastomer. These elastomers are available as copolymers (vinylidene fluoride hexafluoropropylene) or terpolymers (vinylidene fluoride tetrafluoroethylene, hexafluoropropylene). Specifically compounded terpolymers are used in the expansion joint industry. The fluoroelastomers have excellent abrasion resistance and generally do not require protection from flue gas media. Reinforced fluoroelastomer expansion joints have been used in power generating stations and industrial plants since 1968.



• Properties of Elastomers and Fluoroplastics

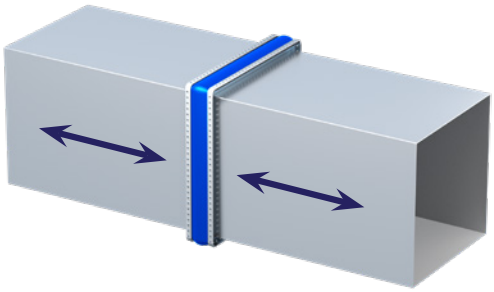
	Chloroprene	Chlorosulfonated Ploythylene	EPDM	Chlorobutyl	Fluoroelastomer	Silicone	PolyTetra Fluoro Ethylene
ASTM Designations	(CR)	(CSM)	(EPDM)	(CIIR)	(FKM)	(SL)	(PTFE)
Material Temperature: Minimum							
(Low Temperature Brittle Point)	-40°F(-40°C)	-40°F(-40°C)	-40°F(-40°C)	-40°F(-40°C)	-30°F(-34°C)	-60°F(-51°C)	-110°F(-79°C)
Continuous	225°F(107°C)	250°F(121°C)	300°F(149°C)	300°F(149°C)	400°F(204°C)	480°F(249°C)	500°F(260°C)
**Intermittent Operating Temperature/	250°F(121°C)	350°F(177°C)	350°F(177°C)/200	350°F(177°C)	550°F(288°C)/240	-	700°F(371°C)
(Accumulative Time in Hours)	/168	/70	325°F(163°C)/300 350°F(177°C)/150 375°F(191°C)/70	/150	600°F(316°C)/48 650°F(343°C)/16 * 700°F(371°C)/4 * 750°F(399°C)/2		/75
Chemical Resistance: H2S04 Acid							
Hot (+) Less Than 50% Concentration	B-C	A	A	A	A	C	A
H2S04 Acid Hot (+) over 50% Concentration	C	B	B-C	B-C	A	C	A
HCL Acid							
Hot (+) less than 20% Concentration	C	B	B	B	A	C	A
HCL Acid Hot (+) over 20% Concentration	C	C	C	C	A-B	C	A
Anhydrous Ammonia	A	B	A	A	C	C	-
NAOH Less than 20% concentration	A	A	A	A	A	A	A
Over 20% concentration	A	A	A	A	A	C	C
Abrasion Resistance	A	A	A	A	A	C	C
Environmental Resistance:							
Ozone	B	A	A	A	A	A	A
Oxidation	B	A	A	A	A	A	A
Sunlight	B	A	A	A	A	A	A
***Radiation	A	A	A	C	B	B	C

MOVEMENT
CAPABILITIES

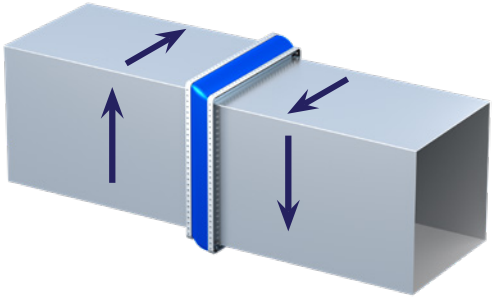
The system thermal expansions are the differential expansion/contraction of operating and/or excursion temperatures and the minimum ambient temperature during installation and shutdowns. The expansion joint engineer uses these movements and temperatures to select the proper material and design for each expansion joint. Megaflexon's nonmetallic expansion joints frequently can handle combined axial, lateral, angular and torsional movements in a single assembly.

The expansion joint locations can often be optimized, reducing the total number required. Consideration should be given for accessibility and belt replacement, for new ducting systems, it may be more economical for the duct fabricator to provide a portion of the expansion joint frame.

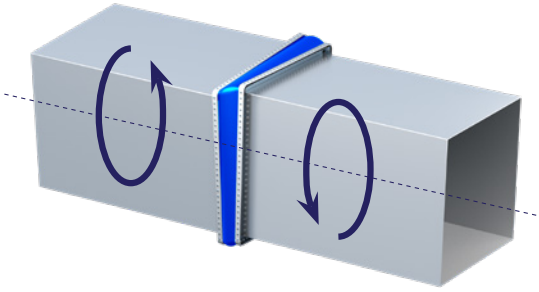
- **Axial Compressions / Extension**
  The dimensional shortening (compression) or lengthening (extension) of the expansion joint face-to-face dimension parallel to it's longitudinal axis.
- **Lateral Movement**
  The amount of duct movement occurring in either or both of the two perpendicular planes to the longitudinal axis of the duct, which moves the expansion joint flanges out of alignment.
- **Torsional Deflection**
  The amount of twisting movement (in degrees) occurring in the perpendicular planes to the longitudinal axis of the duct system.
- **Angular Deflection**
  The amount of rotation (in degrees) of the duct system which flexes the expansion joint flanges out of parallel position with each other.



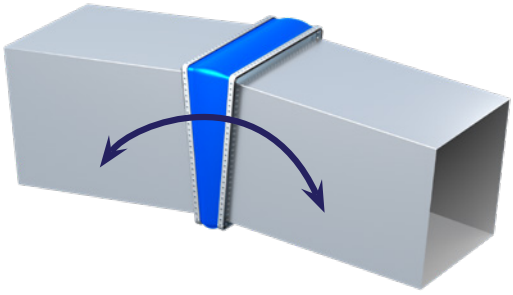
▲ *Axial Compressions / Extension*



▲ *Lateral Movement*

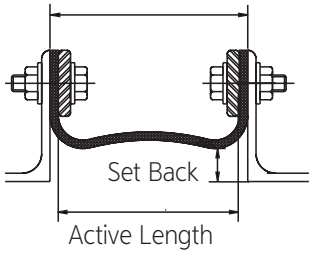


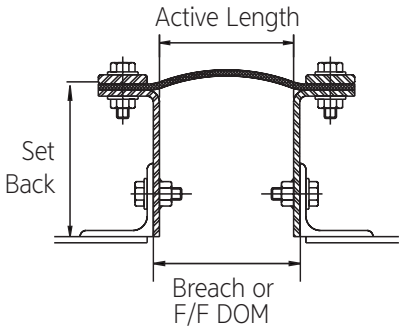
▲ *Torsional Deflection*

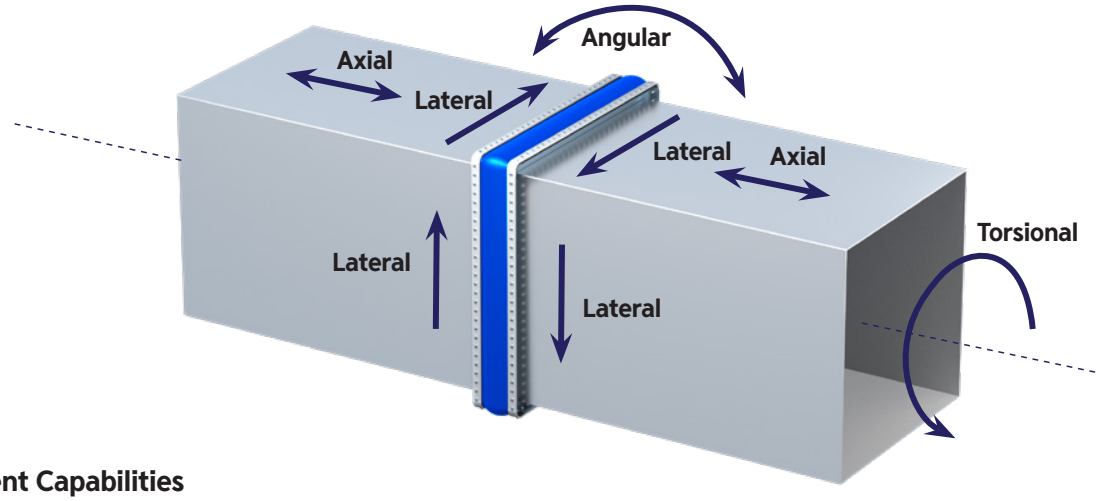


▲ *Angular Deflection*

BREACH OPENING
FACE-TO-FACE







Typical Movement Capabilities

Once the supporting structural steel and ducting system has been laid out, ducting anchor points should be located so that the ducting movements can be calculated at both the design and maximum excursion temperatures as well as any mechanical and structural drift, seismic and wind effects which affect the operation of the expansion joint assembly.

Expansion joints can handle combined axial, lateral, angular and torsional movements within one unit. The expansion joint locations should be carefully selected to keep the number of expansion joints in the system to a minimum and still absorb all of the duct movements. Should an expansion joint location have very large axial and/or lateral movements, consult manufacturers for a recommendation on how these large movements can best be handled.

When all movements and expansion joint locations have been determined, the expansion joint geometry (type) should be selected for the application. The breach opening required at each location depends on the movement criteria and the geometry (style) selected.

The active length of the flexible element is a major design consideration. In general, by increasing the active length of the expansion joint, greater movements can be accommodated (See Table A). The amount of "extra" material must be considered when figuring "expansion joint life". These movements are shown solely as an example and do not reflect concurrent movements. Contact expansion joint manufacturers for specific movement capabilities.

NOTE:

1. Manufacturers recommend that active length not exceed 16" (405 mm). For additional active length, consult an FSA member.
2. Breach Opening Tolerances:
   Axial: 1/4" (6m) extension, 1/2" (13mm) compression
   Lateral: 1/2" (13mm).
3. Lateral movement exceeding 3" (75mm). The ductwork and/or expansion joint frame should be pre-offset one half the expected movement. Review offset requirements with manufacturer.

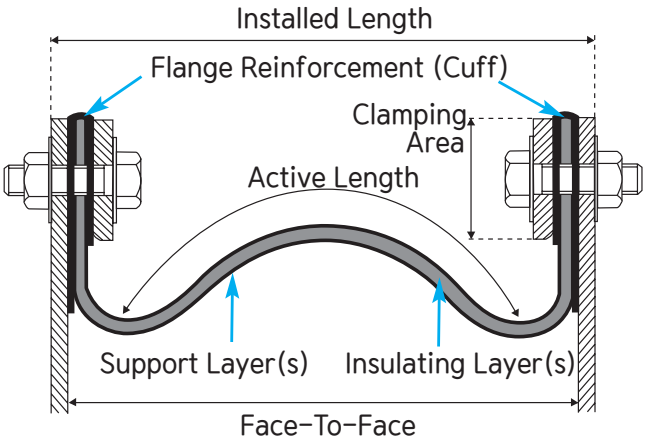


Table A : Typical Movement Chart

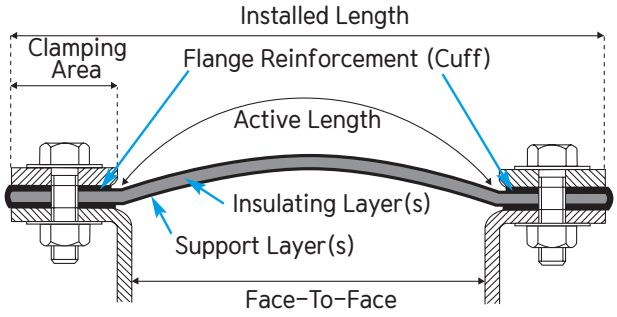
TYPE	FACE TO FACE		AXIAL COMPRESSION		AXIAL EXTENSION		LATERAL MOVEMENT	
Single Layer Elastomer or Fluoroplastic Flexible Element	6"	(150mm)	2"	(50mm)	1/2"	(13mm)	+/- 1"	(25mm)
	9"	(230mm)	3"	(75mm)	1/2"	(13mm)	+/- 1 1/2"	(38mm)
	12"	(305mm)	4"	(100mm)	1"	(25mm)	+/- 2"	(50mm)
	16"	(405mm)	5"	(125mm)	1"	(25mm)	+/- 2 1/2"	(63mm)
Composite Type Flexible Element	6"	(150mm)	1"	(25mm)	1/2"	(13mm)	+/- 1"	(13mm)
	9"	(230mm)	2"	(50mm)	1/2"	(13mm)	+/- 1 1/2"	(25mm)
	12"	(305mm)	3"	(75mm)	1"	(25mm)	+/- 2"	(38mm)
	16"	(405mm)	4"	(100mm)	1"	(25mm)	+/- 2 1/2"	(50mm)

** Active Length is based on movement requirements and is longer than the face to face dimension shown above.*

DESIGN CONSIDERATIONS

Active Length

The Active Length is the portion of the flexible part of the joint that is free to move. The flexible element consists of a gas seal membrane with optional insulating and support layer(s) and flange reinforcement.



The Gas Seal

The Gas Seal is the specific ply in the expansion joint which is designed to prevent gas penetration through the expansion joint body. It should be designed to cope with the internal system pressure and resist chemical attack. Gas seal flexibility is crucial in order to handle the movements of the ductwork. In some cases, the gas seal may be complemented by a chemical barrier to improve chemical resistance.

Outer Cover

The Outer Cover is the ply exposed to and providing protection from the external environment. In some cases, the outer cover may also be combined with the gas seal or act as a secondary seal.

Insulation

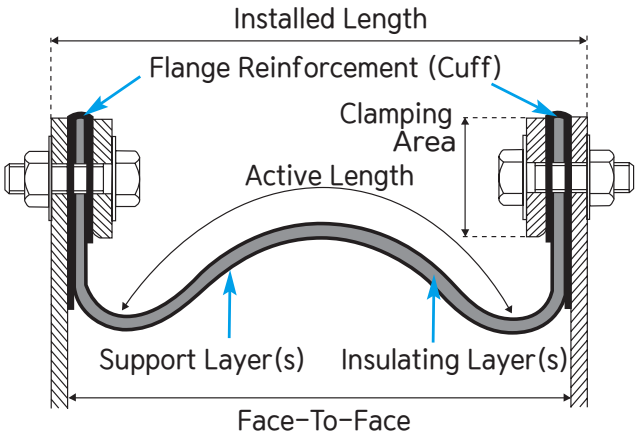
The Insulation (or insulating layers) provides a thermal barrier to ensure that the inside surface temperature of the gas seal does not exceed its maximum service temperature. Insulation can also help to reduce and/or eliminate condensate problems.

The Support Layers

The Support Layers keep the insulation in place and provide protection during handling and system operation. Careful selection of suitable materials (capable of with-standing system operating temperatures and chemical attack) is critical to successful design. Support layers can also be used to assist in creating arched or convoluted expansion joint configurations where a specific shape is required.

The Flange Reinforcement(cuff)

The Flange Reinforcement (cuff) is an additional sheath of fabric to protect the expansion joint from thermal and/or mechanical degradation.

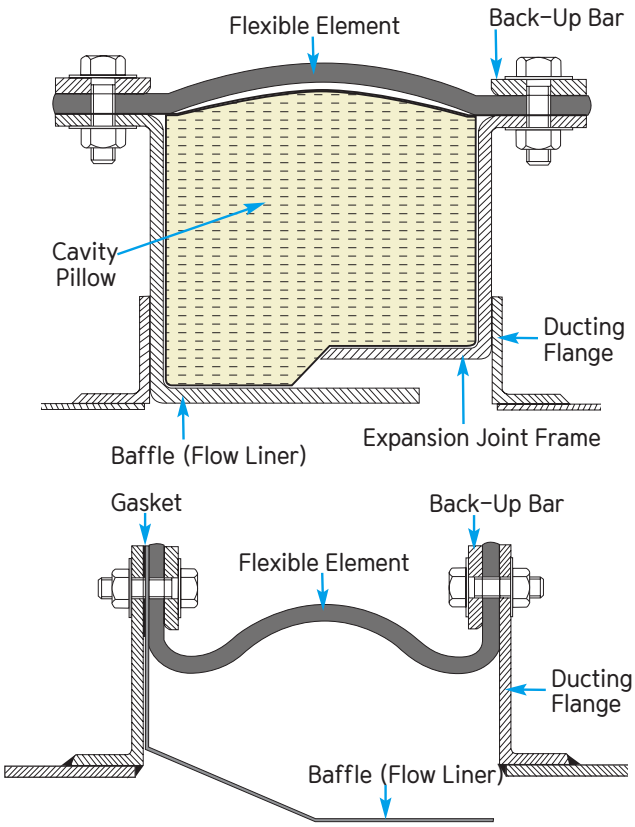


▲ *The diagram above represents the flexible element of a flanged expansion joint with multi-layer construction.*

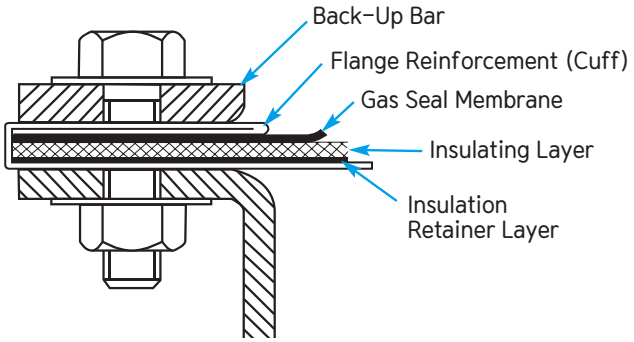
Table B: Bolt Loading Guide

Imperial (inches)								
Width of Clamp Bar	*1 ½"*		*2"*		*2 ½"*		*3"*	
Thickness of Clamp Bar	*1/4"*	*3/8"*	*1/4"*	*3/8"*	*3/8"*	*1/2"*	*3/8"*	*1/2"*
Bolt Spacing	*4"*		*4 – 6"*		*4 – 6"*		*4 – 6"*	
Bolts	*3/8"*	*1/2"*	*1/2"*	*5/8"*	*5/8"*	*3/4"*	*5/8"*	*3/4"*
Recommended Tightening Torque *(ft.lbs):*								
Loading for Fabric Expansion Joint	*36*	*59*	*74*	*88*	*85*	*103*	*96*	*118*
Loading for Elastomeric Expansion Joint	*31*	*44*	*55*	*66*	*66*	*81*	*74*	*92*
Metric (mm)								
Width of Clamp Bar	*50*		*60*		*70*		*80*	
Thickness of Clamp Bar	*8*	*10*	*10*	*12*	*10*	*12*	*12*	
Bolt Spacing	*100*		*100*		*120*		*120*	
Bolts	*M12*	*M16*	*M16*	*M20*	*M16*	*M20*	*M16*	*M20*
Recommended Tightening Torque *(ft.lbs):*								
Loading for Fabric Expansion Joint	*60*	*80*	*100*	*120*	*115*	*140*	*130*	*160*
Loading for Elastomeric Expansion Joint	*80*	*65*	*75*	*90*	*90*	*110*	*100*	*125*

Anatomy of a Typical Non-Metallic Expansion Joint



Function of Non-Metallic Expansion Joint Components



Flexible Element

Flexible Element is the portion of the expansion joint which absorbs vibration and the thermal movements of the ductwork. The flexible element should consist of a gas seal membrane with an optional insulating layer(s), insulation retainer layer(s) and flange gasket. The optional layers are required where the system temperature exceeds the temperature range of the gas seal membrane.

The Gas Seal Membrane

The Gas Seal Membrane should be designed to handle the internal system pressure and resist chemical attack. The gas seal membrane flexibility is crucial in order to handle the thermal movements of the ductwork. Since the present gas seal membranes used in flue duct applications have temperature limitations, additional thermal protection may be required.

The Insulating Layers

The Insulating Layers provide a thermal barrier to ensure that the inside surface temperature of the gas seal membrane does not exceed its maximum service temperature. Insulation can also help reduce and/or eliminate condensate problems.

The Insulation Retainer Layers

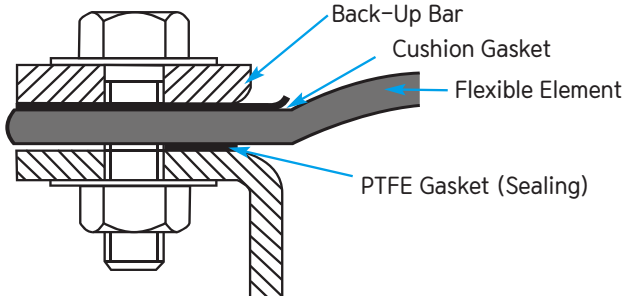
The Insulation Retainer Layers keep the insulating layers in place and provide protection during handling and system operation. Proper selection of suitable materials capable of withstanding system temperatures and chemical attacks is critical to a successful design.

The Flange Reinforcement (Cuff)

The Flange Reinforcement (Cuff) protects the gas seal membrane on a multi-layered flexible element from thermal degradation caused by hot metal flanges, back-up bars and bolting hardware.

Cushion Gasket, Single Membrane

Due to the high density of fluoroplastics, a flexible gasket compatible with the flow media is required between the metal attachment flange and the fluoroplastic gas seal membrane in order to provide an adequate seal.



All sharp edges which may come in contact with the flexible element should be ground smooth or radiused to prevent damage to the flexible element.

Clamping Devices

There are several methods of clamping expansion joints. Some of the most common are detailed below:

Expansion Joint Type	Clamping Device	Duct Cross Section	Duct Size	Operating Pressure	Cost of method
BELT	Worm Drive	Circular	Small	Low	Low
	Comment: Fast installation				
	T-Bolt	Circular	Small /Large	Low	Low
	Comment: Fast installation. Use toggle in several segments for larger diameters, to ensure even clamping pressure				
	Back-up Bar	Circ /Rect	Small /Large	Low /High	Medium
	Comment: High temperature capability				
FLANGED	Back-up Bar	Circ /Rect	Small /Large	Low /High	Medium
	Comment: Moderate temperature capability				

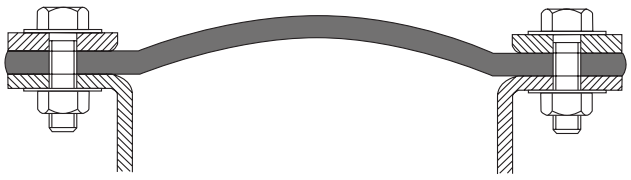
▲ *Clamping Devices*

Worm Gear ("Jubilee Clip") or Bolt-Type (T-Bolt) Clamp Bands

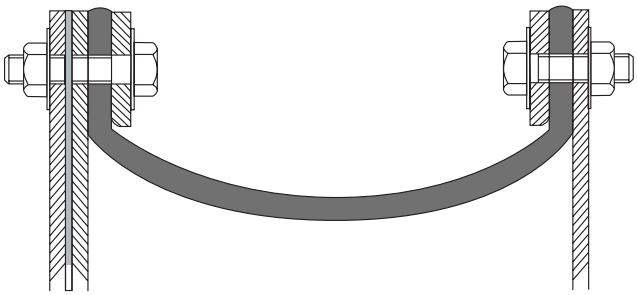
Used on small diameter circular belt type expansion joints, and usually manufactured from stainless steel strip.

Back-Up Bars

Metal bars used for the purpose of clamping the flexible element of the expansion joint to mating ductwork flanges or to expansion joint frames. Back-up bar selection depends upon the bolt spacing, bolt hole size and expansion joint flange width.



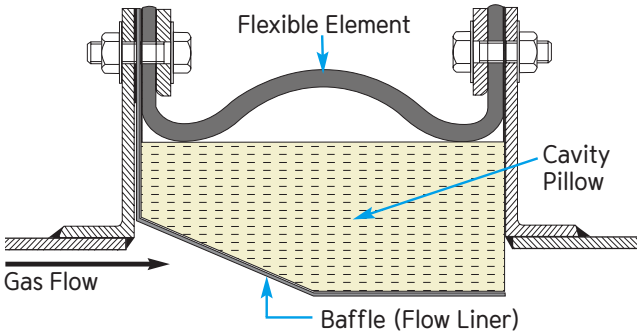
▲ *Belt Type*



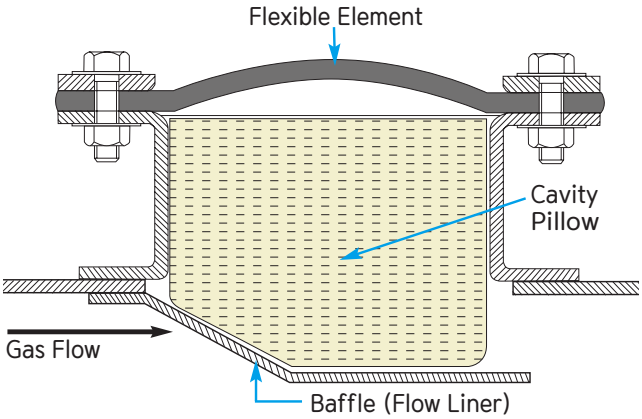
▲ *Flanged Type*

Cavity Pillow

Cavity Pillow, Attached by tabs or pins, fills the cavity between the flexible element and the baffle (flow liner) and helps prevent the accumulation of particulate matter. The cavity pillow minimizes unburned fuel, fly ash or other solid particulates from accumulating in the expansion joint cavity in such quantities that they can cause damage to the flexible element if they solidify to a cementitious state. Also, certain particles (fly ash) can create a severe corrosive (acidic) environment when subjected to cooling (below H_2SO_4 dew point) during a maintenance outage.



flexible element if they solidify to a cementitious state. Also, certain particles (fly ash) can create a severe corrosive (acidic) environment when subjected to cooling (below H2SO4 dew point) during a maintenance outage.



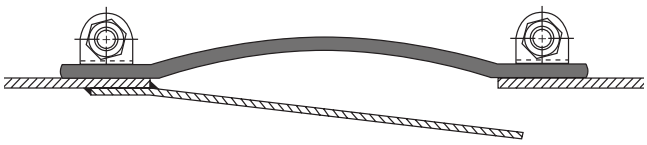
Frames

Effective sealing is dependent upon the design of the frames to which the flexible element is attached. Many variations of frames are possible, depending on the structure to which the expansion joints are attached, but there are some basic configurations which cover the majority of applications.

Belt Type Expansion Joint Frames

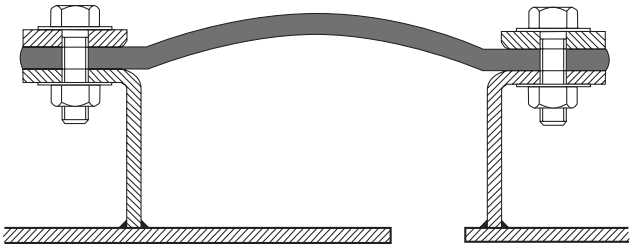
- **Simple Duct Attachment**

  Can be used effectively only for circular ducts operating at low pressure. For large diameters, clamp bands must be installed in several sections in order to ensure even clamping pressure.



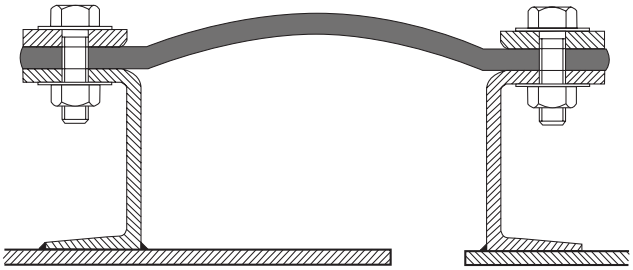
- **Angle Frame**

  A simple frame attachment for existing ductwork. For circular ducts the angles would be rolled toe-out in suitable lengths for welding. For rectangular ducts a fabricated, radiused corner would be used to join the straight lengths.

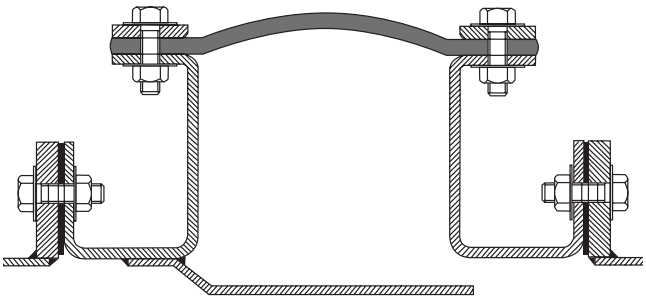


- **Channel Frame**

  When rolled steel (C type) channels are used, tapered (wedge) washers should be used under the flange. For rectangular ducts, radiused corners should be used.



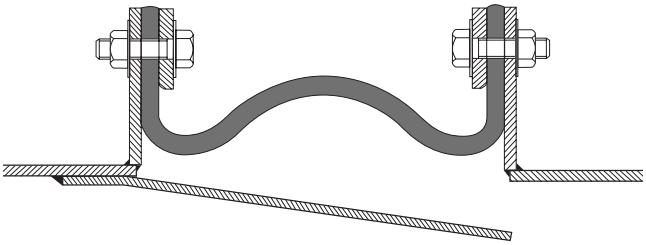
- **Fabricated "J or G" Frame for Slip In Service**



Flanged Type Expansion Joint Frames

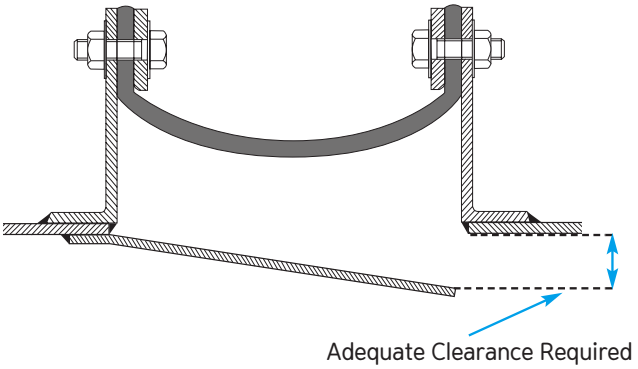
- **Simple Frame Design Using Flat Bar**

  Where internal baffles (flow liners) are fitted in this configuration they must be clear of the seal material, especially for rectangular joints at the corners.



- **Simple Frame Design Using "L" Shapes**

  Where internal baffles (flow liners) are fitted in this configuration, they must be clear of the seal material, especially for rectangular joints at the corners.

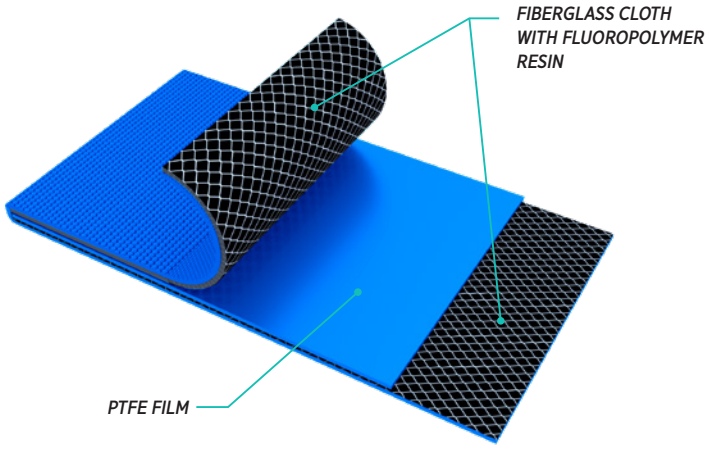


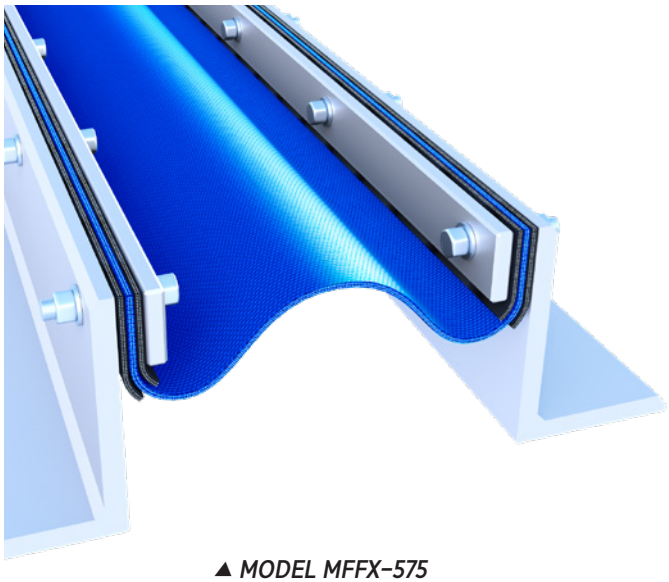
FLUOROPLASTIC
EXPANSION JOINTS

FOR SERVICE IN TEMPERATURES TO 575°F (301°C)

MFF–575

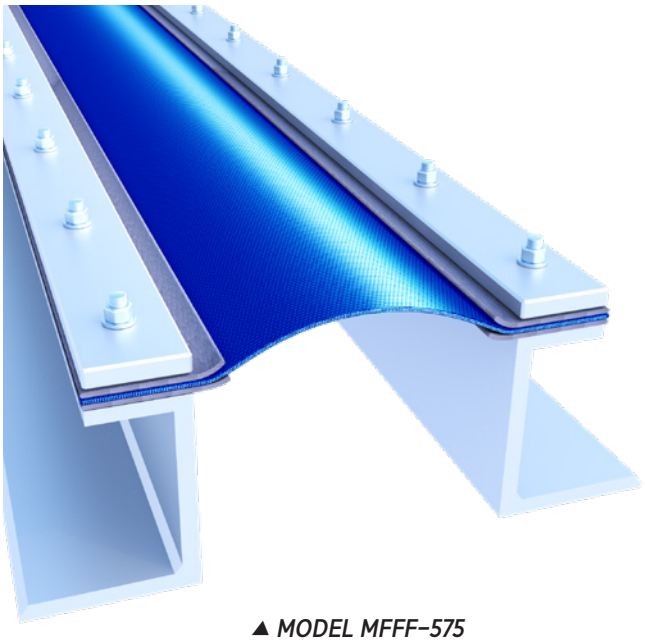
Designed for use in either wet or dry flue gas applications, the Model MFF–575 excels in resistance to both high temperatures and corrosive chemical environments. Strong fiberglass fabric is treated with fluoropolymer resins, then integrally combined with a PTFE film to produce a boot material with zero porosity. The heavy–duty (.010 thick) PTFE film is protected on both sides by the treated fiberglass to maintain maximum sealability during the life of the expansion joint.





▲ *MODEL MFFX–575*

The lightweight Model MFP–575 is easy to handle and can be readily spliced in the field, usually in less than 10 minutes, using lightweight tools provided by Megaflexon. It can be ordered in either belt(MFFF–575) or flanged (MFFX–575) configurations which are furnished with fiberglass tape for added sealability and wear protection at the flanges and clamp bars. Model MFFX–575 (Flanged) is available either as a round or rectangular joint. Baffles and pillows are recommended when service conditions are abrasive. Model MFF–575 is available as a completely fabricated flexible element, with or without baffles, pillows, or hardware.



▲ *MODEL MFFF–575*

MODELS MFFX-575, MFFF-575

DESCRIPTION

Model Number	Material Description	Thickness Nominal
MFFX-575 MFFF-575	Two plies of fluoropolymer coated fiberglass cloth and one layer of PTFE film	0.75"

MOVEMENTS AND DIMENSIONS

Joint Width	Breech Opening	Axial Compression	Axial Extension	Bolting * Set Back
6"	5.50"	1.50"	.50"	4.00"
9"	8.50"	2.75"	.50"	5.00"
12"	11.00"	3.50"	1.00"	6.00"
16"	15.00"	5.00"	1.00"	7.00"

OPERATING TEMPERATURES AND PRESSURES (all Models)

Pressure:	± 3 PSIG Operating ± 5 PSIG Intermittent
Temperature:	-100°F Minimum +575°F Maximum Operating +650°F 30 Minute Excursion

WEIGHT (approximate)

Kg per Meter

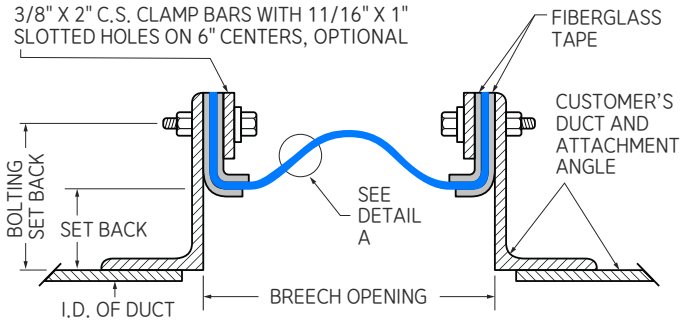
Width	MFFX-575	MFFF-575	Clamp Bars
6"	1.04	0.52	7.44
9"	1.31	0.79	7.44
12"	1.55	1.03	7.44
16"	1.89	1.37	7.44

CLAMP BARS (standard)

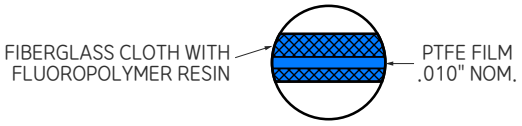
Carbon steel 2" x 3/8" with 11/16" x 1 " slotted holes punched on 6" centers (except at corners).

BOLTING

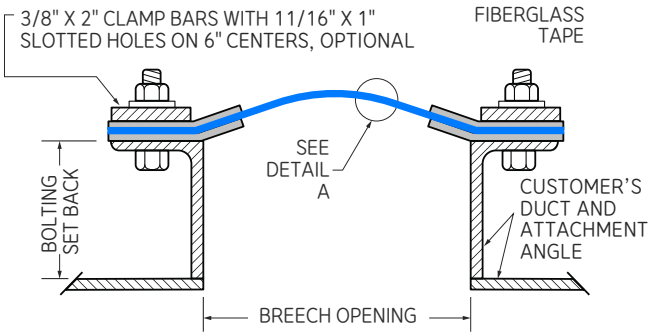
Megaflexon recommended bolting is 5/8" bolts on 6" centers with head of bolt on expansion joint side. (Carriage bolts may be utilized to provide smooth inside surface and to ease assembly. Holes in clamp bar to be square to accommodate carriage bolts). Use of corner hole is recomended. Odd hole spacing to be positioned at corner area with no hole spacing exceeding 6". The above can be altered to accommodate existing bolting and attachment methods.



▲ **MODEL MFFX-575**



▲ **DETAIL A**



▲ **MODEL MFFF-575**

AVAILABLE SIZES

All joints are custom manufactured and can be designed to fit most applications.

ALTERNATE CONFIGURATIONS

Various baffle designs and pillows are available for abrasion protection and additional temperature capabilities.

**** Bolting set back may vary***

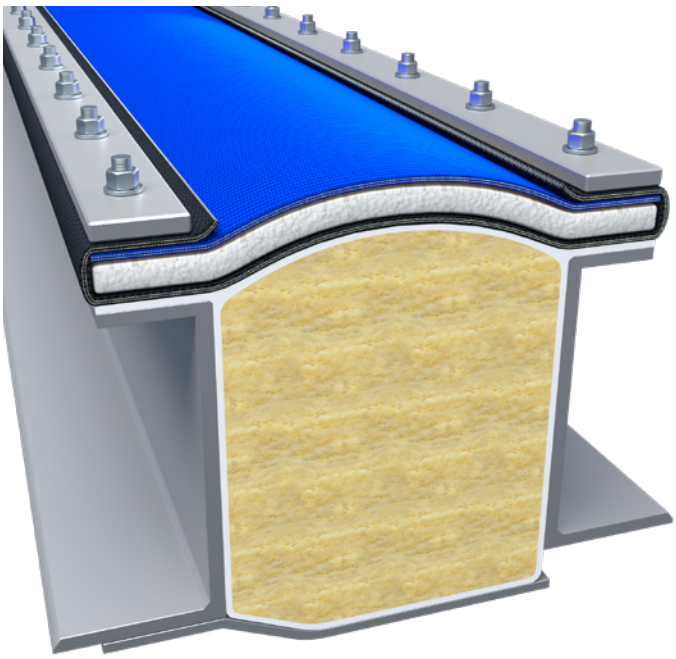
FLUOROPLASTIC
EXPANSION JOINTS

FOR SERVICE IN TEMPERATURES 500˚F (260˚C) TO 1000˚F (538˚C)

These three models of expansion joints share a common flat belt design but use different combinations of insulation, elastomeric and fluoropolymer belt materials. They are used in dry service primarily for their resistance to high temperatures, but all three models also have excellent chemical resistance. All models use a composite construction containing insulation and a PTFE vapor barrier within the body of the expansion joint belt. Rectangular joints use a 6" radius corner.

DESCRIPTION

The Model MFP series uses a composite belt design consisting of an inside layer of aluminized fiberglass cloth, followed by a layer of thermal insulation which is covered by a layer of untreated fiberglass cloth. Next is the gas and vapor seal outer belt. This outer belt is a fiberglass cloth reinforced EPDM elastomer on the MFP–501 and a fluoropolymer coated fiberglass cloth, with a PTFE laminate, in the MFF–800 and MFF–1000. The fluoropolymer coated cloth and special PTFE laminate enables the MFF–800 and MFF–1000 to provide tremendous temperature and acid resistance. Finally, the unique properties of the aluminized fiberglass cloth inner liner are utilized at the metal flanges by wrapping the liner around the edge of the composite belt and under the clamp bar. This design feature provides both thermal and physical protection to the belt, assuring longer life. In each case the outer belt provides gas sealing and chemical resistance for the temperature limits indicated.



MFF–500

An EPDM elastomer reinforced with fiberglass with a PTFE skive cut inner liner is used as an outer belt to give this joint excellent chemical resistance and an operating temperature to 500˚F (260 ˚C).

MFF–800

A specially integrated fluoropolymer impregnated fiberglass with a layer of PTFE provides a zero porosity outer belt. This special material provides tremendous temperature and acid resistance. These joints are excellent for high temperature service, such as turbine exhaust and economizer/air heater applications up to 800˚F (427˚C).

MFF–1000

By adding a specially designed insulation insert in the setback section to the same outer belt material as the MFP–801, the operating temperature of this model is increased to 1000˚F (538˚C), giving it special service application when dealing with very hot, dry gas.

MODELS MFF-500, 800, 1000		
PERATING TEMPERATURES AND PRESSURES (all models)		
Model	Temperature	Pressure
MFF-501	+500˚F to -40˚F (-40˚C)	± 3 PSIG
MFF-801	+800˚F to -40˚F (-40˚ C)	± 3 PSIG
MFF-1001	+1000˚F to -40˚F (-40˚ C	± 3 PSIG

WEIGHT (approximate)				
Kg per Meter				
Width	MFF-500	MFF-800	MFF-1000	Clamp Bars
6"	3.87	3.87	6.55	7.44
9"	4.91	4.91	8.63	7.44
12"	5.95	5.95	10.71	7.44
16"	7.29	7.29	13.69	7.44
20"	8.63	8.63	16.52	7.44

CLAMP BARS (standard)

Carbon steel 2" x 3/8"

11 / 16" x 1 " slotted holes punched on 6" centers (except at corners).

BOLTING

Recommended bolting is 5/8" diameter bolts on 4" centers.

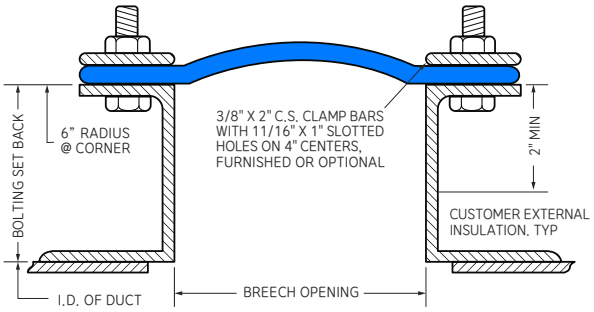
AVAILABLE SIZES

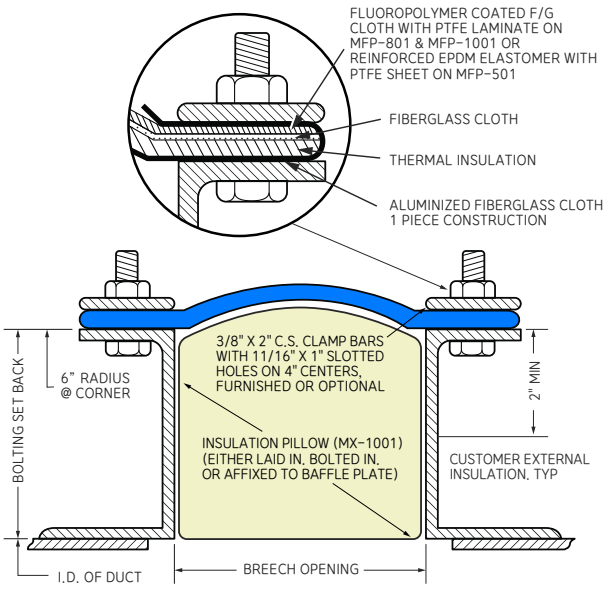
All joints are custom manufactured and can be designed to fit most applications.

NON-STANDARD DESIGN

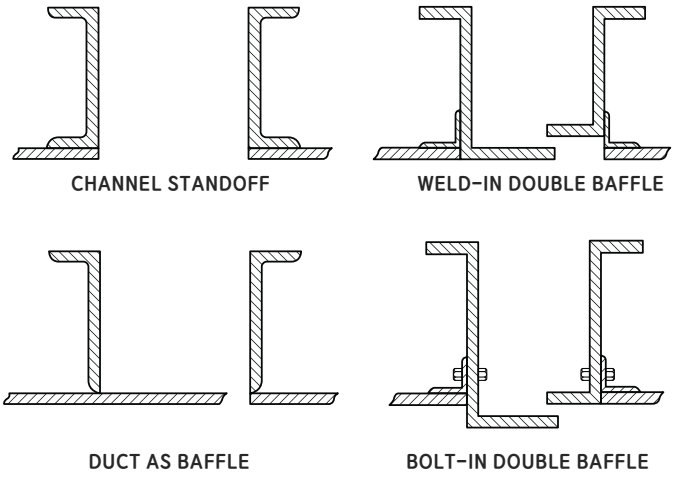
Variations from standard design can be accommodated. Contact our Engineering Department and let us solve your special problems.

MOVEMENTS AND DIMENSIONS					
Joint Width	Breech Opening	Axial Comp.	Axial Ext.	Resultant Lateral offset	Bolting * Set Back
6"	5.50"	1.00"	.50"	1.00"	6.00"
9"	8.50"	2.50"	.50"	2.50"	6.00"
12"	11.00"	3.25"	1.00"	3.25"	6.00"
16"	15.00"	4.50"	1.00"	4.50"	6.00"
20"	19.00"	5.00"	1.00"	5.00"	8.00"





ALTERNATE MOUNTING ARRANGEMENTS



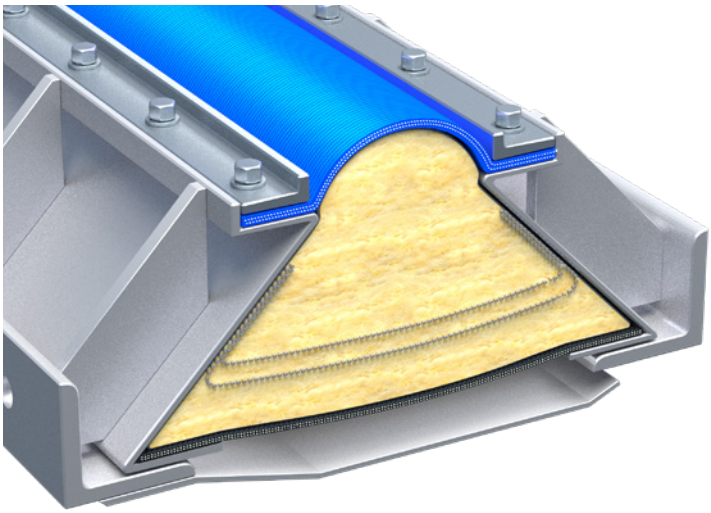
FLUOROPLASTIC
EXPANSION JOINTS

FOR SERVICE IN TEMPERATURES TO 1200°F (649°C)

MFF–1200

Megaflexon is a world leader in supplying high–temperature elastomeric expansion joints for the extreme conditions found with gas turbine and diesel exhaust systems. The Model MF P–1200 expansion joint is a completely engineered package utilizing a unique metal encased insulating section designed to lower temperatures at the elastomeric–boot gas seal. The Model MF P–1200 has been used successfully for over 15 years and the original design has undergone far more testing than most. It has met strict requirements for sound attenuation, shock resistance and vibration dampening. Even the patented stainless steel baffle is aerodynamically designed to eliminate turbulence and reduce resistance to gas flow.

Model MF P–1200 expansion joint is designed for use in gas turbine and diesel exhaust systems or wherever ducts carry hot air or gases at temperatures to 1800°F.



DESCRIPTION

Model MFP–1200 combines the strength of steel foil and metallic mesh with high temperature insulation to create an insulation system that doesn't shift or separate during operation. The boot is reinforced fluoroelastomer. Because MFP–1200 incorporates its own insulation, no supplemental insulation is required. Metallic components are specially designed to accommodate temperatures above 1200°F.

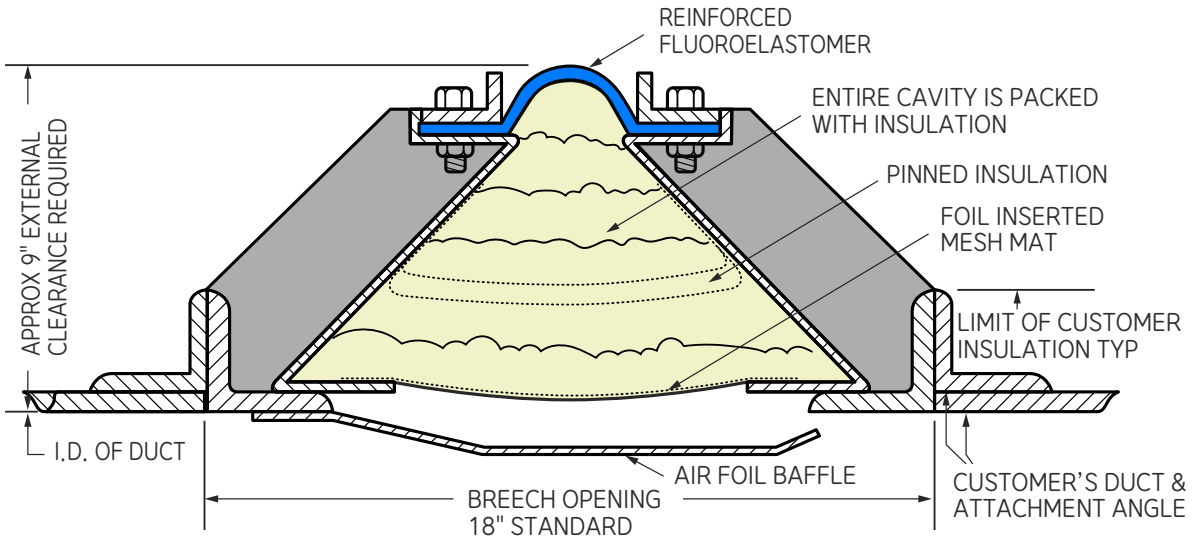
CONFIGURATIONS

Standard Model MFP–1200 Expansion Joints are furnished in rectangular and round configurations. They are generally installed into 18 inch openings between mating ducts, but joints to fit special needs can be custom designed.

MODEL MFP–1200	
MOVEMENTS AND DIMENSIONS	
Breech Opening	18.00"
Axial Compression	3.00"
Axial Extension	0.50"
Resultant Lateral Offset	1.50"

WEIGHT PER PERIMETER FOOT	
Rectangular	50 lbs./lin. ft.
Round	50 lbs./lin. ft.

OPERATING TEMPERATURES AND PRESSURES	
Constant Temperature	1200°F
Intermittent Temperature	1800°F
Minimum Temperature	–40°F
Pressure	±3 PSIG



ELASTOMER
EXPANSION JOINTS

FOR SERVICE IN TEMPERATURES TO 300°F (149°C)

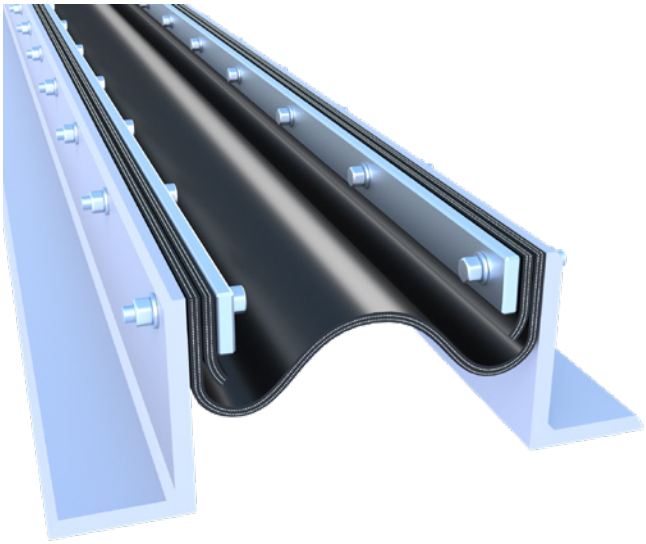
These two models share common Megaflexon design. One model is a lighter weight joint than the other and uses an EPDM rubber. The heavier, thicker model uses a chlorobutyl rubber. Both are exceptionally strong and possess excellent resistance to acid and weathering. Rectangular joints are constructed with a continuous corner.

MFE-275

A lightweight joint using a fiberglass reinforced EPDM. Possessing excellent resistance to ozone and acid environments, MFE-275 can be used wet or dry, on inlet ducts, fans, non-oily flue gases, or scrubber-treated gases.

MFE-300

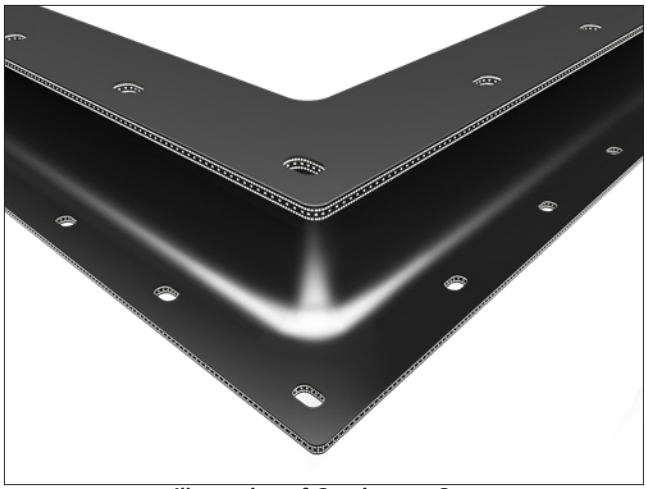
Thicker and heavier than Model MFE-275, the Model MFE-300 is designed around a two-ply, polyester reinforced chlorobutyl material. Resistance to weathering, acid, and abrasion give this model wide application in non-oily wet or dry service to 300°F (149°C).



※ *AVAILABLE IN BELT OR FLANGED DESIGN WITH CONTINUOUS CORNERS.*

CONTINUOUS CORNERS

The corner of expansion joints is usually under greater stress than the sides. Splices and bulky molded corner sections can increase corner stress and create weak areas that lead to early joint failure. Megaflexon's continuous formed corner eliminates both the extra bulk and the seams. The result is longer joint life.



▲ *Illustration of Continuous Corner*

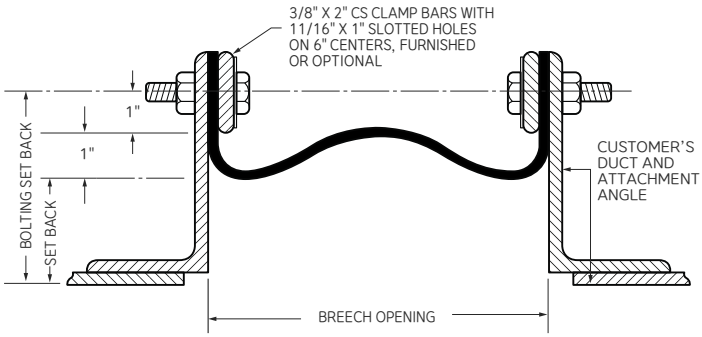
MFE–275, MFE–300

DESCRIPTION

Model	Description	Thickness
MFE –275	One ply of fiberglass reinforced EPDM	1 /8”
MFE –300	Two plies of polyester reinforced chlorobutyl	1/4”

OPERATING TEMPERATURES AND PRESSURES (Both Models)

Pressure:	± 3 PSIG operating ± 5 PSIG intermittent
Temperature:	+300˚F Operating +400˚F (1 hour) Excursion



MOVEMENTS AND DIMENSIONS

Joint Width	Breech Opening	Axial Compression	Axial Extension	Resultant Lateral offset	Bolting Set Back
6"	5.50"	1.50"	.50"	1.50"	4.00"
9"	8.50"	2.75"	.50"	2.75"	5.00"
12"	11.00"	3.50"	1.00"	3.50"	6.00"
16"	15.00"	5.00"	1.00"	5.00"	7.00"

WEIGHT (approximate)

Kg per Meter

Width	MFE–275	MFE–300	Clamp Bars
6"	1.49	3.13	7.44
9"	1.79	3.57	7.44
12"	2.08	4.17	7.44
16"	2.53	5.21	7.44

CLAMP BARS (standard)

Carbon steel 2” x 3/8”

11 / 16” x 1 “ slotted holes punched on 6” centers (except at corners).

BOLTING

Megaflexon recommended bolting is 5/8” bolts on 6” centers with head of bolt on expansion joint side.

(Carriage bolts may be utilized to provide smooth inside surface and to ease assembly. Holes in clamp bar to be square to accommodate carriage bolts.) Use of corner hole is recommended. Odd hole spacing to be positioned at corner area with no hole spacing exceeding 6”. The above can be altered to accommodate existing bolting and attachment methods.

AVAILABLE SIZES

All joints are custom manufactured and can be designed to fit most applications.

ALTERNATE CONFIGURATIONS

Flat Belts (with or without angles, clamp bars, nuts and bolts, etc.) can be supplied. Contact Megaflexon for additional information.

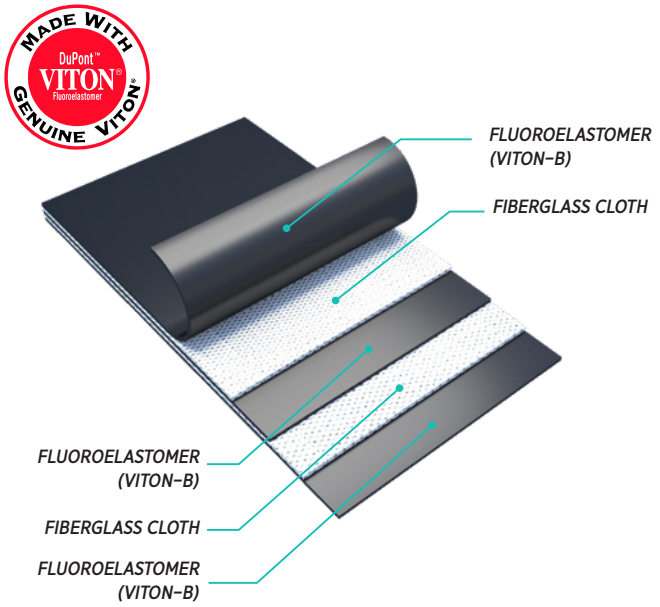
ELASTOMER
EXPANSION JOINTS

FOR SERVICE IN TEMPERATURES TO 400°F (204°C)
3/16" and 1/4" Thickness are available

MFE-400VB

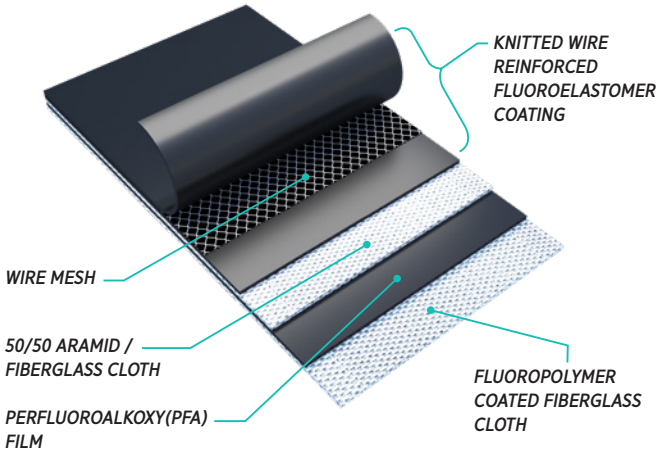
As well known, Viton-B is highly resistant to corrosion by resisting acid and chemicals, so is widely used in varies fields and application and there are not much of other materials in the marketplace can come close to matching the reliability and performance of the product. It has outstanding resistance to heat, oxidation, weathering, ozone including to a broad variety of fluids, such as aliphatic and aromatic hydrocarbons, halogenated fluids, strong acids, providing sealing performance and longevity unmatched by any non-fluorinated elastomer.

The 400-VB is especially ideal for FGD (fluid gas desulfurization). It has five-layers of configuration by inserting fiberglass clothes between the fluoroelastomers (Viton B), which to further strengthen and stabilize the composition.

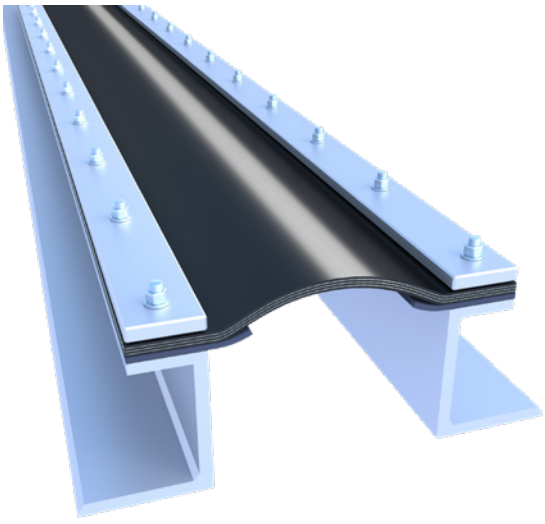


MFE-400VT

A strong, flexible, chemical barrier on the inside, firmly bonded to a tough wire-reinforced elastomer on the outside gives Model MFE-400VT a performance advantage. For added life, the chemical barrier has three integrally bonded layers. A layer of tough fluoropolymer coated fiberglass cloth protects one side of a zero-porosity, perflouroalkoxy (PFA) film. To further strengthen and stabilize this important film, a layer of high strength, finely woven, 50/50 Aramid/Fiberglass cloth is added. Finally, for greater tear and puncture resistance, this integrally bonded chemical barrier is then permanently bonded to a tough, protective, homogeneous layer of fluoroelastomer that is reinforced with a strong, flexible, knitted Carpenter-20 wire mesh.



Designed specifically to meet the needs of highly corrosive, wet or dry flue gas service, the medium weight Model MFE-400VB & MFE-400VT is easy to handle and install. It is manufactured in the belt configuration for use in round ducts or in rectangular duct openings with radius corners. For longer life, fiberglass tape is attached to each boot to increase sealability and wear protection at the flange. Insulation pillows and baffles are recommended for abrasive service. Model MFE-400 is available as a completely fabricated flexible element, with or without baffles, pillows, or hardware.



※ AVAILABLE IN BELT OR FLANGED DESIGN WITH CONTINUOUS CORNERS.

MFE–400	
DESCRIPTION	
Description	
Material Description	Thickness Nominal (inches)
Fluoropolymer coated fiberglass cloth, FPA film, Aramid/Fiberglass cloth, Fluoroelastomer/Wire.	130

MOVEMENTS AND DIMENSIONS				
Joint Width	Breech Opening	Axial Compression	Axial Extension	Bolting * Set Back
6"	5.50"	1.50"	.50"	4.00"
9"	8.50"	2.75"	.50"	5.00"
12"	11.00"	3.50"	1.00"	6.00"
16"	15.00"	5.00"	1.00"	7.00"

OPERATING TEMPERATURES AND PRESSURES (Both Models)	
Pressure:	± 3 PSIG operating ± 5 PSIG intermittent
Temperature:	+300°F Operating +400°F (1 hour) Excursion

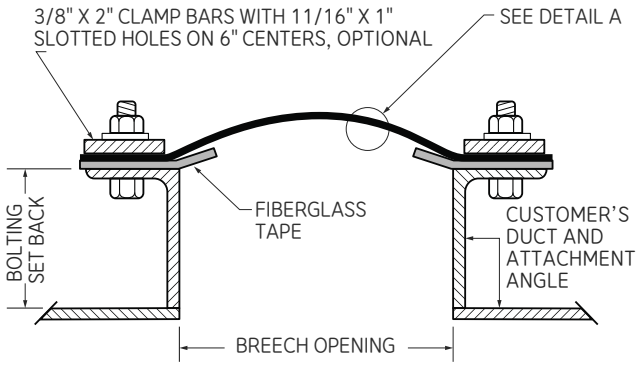
WEIGHT (approximate)		
Kg per Meter		
Width	MFE–400	Clamp Bars
6"	0.89	7.44
9"	1.34	7.44
12"	1.79	7.44
16"	2.38	7.44

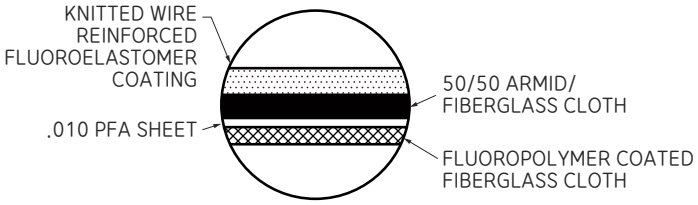
CLAMP BARS (standard)

Carbon steel 2" x 3/8" with 11/16" x 1 " slotted holes punched on 6" centers (except at corners).

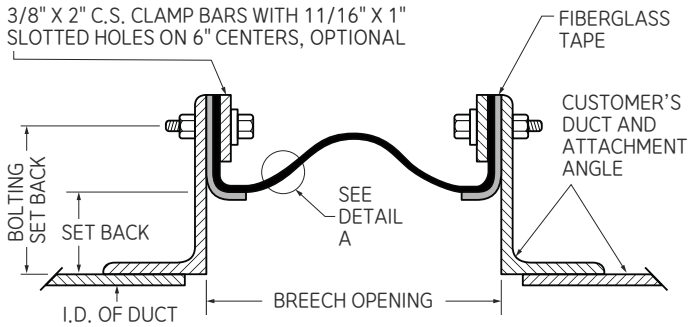
BOLTING

Megaflexon recommended bolting is 5/8" bolts on 6" centers with head of bolt on expansion joint side. (Carriage bolts may be utilized to provide smooth inside surface and to ease assembly. Holes in clamp bar to be square to accommodate carriage bolts). Odd hole spacing to be positioned at corner area with no hole spacing exceeding 6". The above can be altered to accommodate existing bolting and attachment methods.





▲ **DETAIL A**



▲ **FLANGED DESIGN**

AVAILABLE SIZES

All joints are custom manufactured and can be designed to fit most applications.

ALTERNATE CONFIGURATIONS

Various baffle designs and pillows are available for abrasion protection and additional temperature capabilities.

**** Bolting set back may vary***

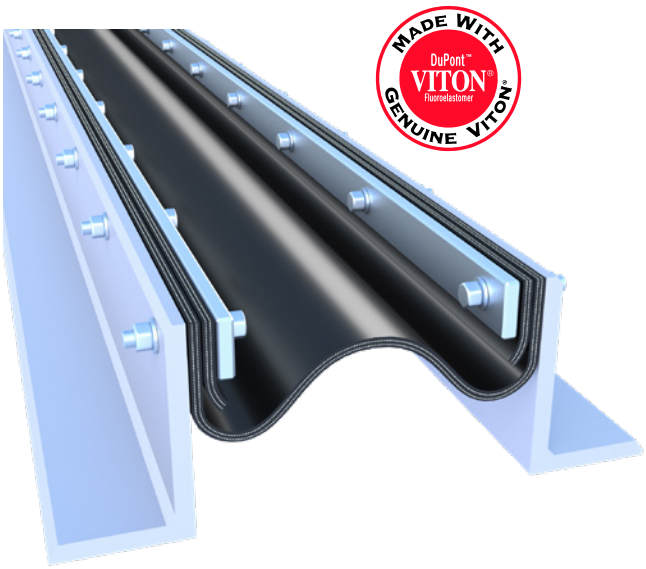
ELASTOMER
EXPANSION JOINTS

FOR SERVICE IN TEMPERATURES TO 400°F (204°C)

Megaflexon offers four basic models of 400°F flexible connectors. All use a reinforced fluoroelastomer. Two models are lightweight, utilizing either wire or Nomex® reinforcing. The other two models are heavier, more durable expansion joints that utilize either fiberglass or wire/aramid reinforcing. All have excellent heat and chemical resistance and are recommended for wet or dry systems. Rectangular expansion joints are constructed with our continuous corner.

MFE-404

For use in applications where gases are hot or corrosive and where light weight is desirable. When abrasive particulate is absent, or controlled with baffles, and vibration is minimal, Model MFE-404 can also offer greater economy than the thicker, heavier styles. Model MFE-404 is constructed of two plies of high-alloy, knitted wire, reinforced fluoroelastomer.



MFE-406

Our lightest weight, highly flexible expansion joint. Capable of withstanding corrosive and hot gases or liquids, MFE-406 is the first choice when abrasive particulate is at a minimum or controlled with baffles, and when light weight or economy is a factor. Constructed of Nomex® reinforced fluoroelastomer, Model MFE-406 has great strength and offers low resistance to movement.

MFE-419

A step up in strength, thickness and abrasion resistance, with excellent chemical and heat resistance. Megaflexon Model MFE-419 is an all-around design capable of operating in a wide range of demanding environments, particularly those that include abrasive particulate. Model MFE-419 is constructed of fluoroelastomer, reinforced with two plies of knitted high-alloy wire and one ply of special yarn made from a blend of fiberglass, Nomex® and Kevlar®.

MFE-425

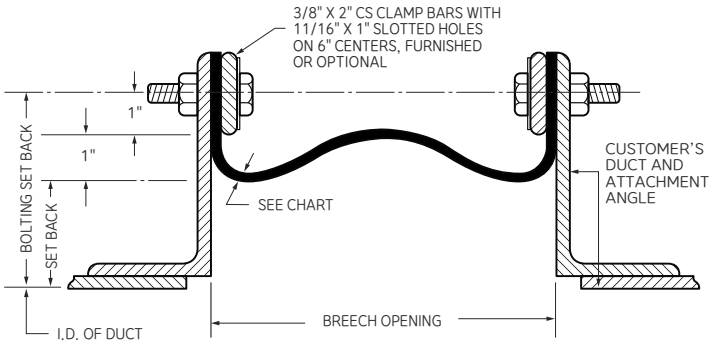
Possessing the greatest resistance to abrasive wear, the MFE-425 is the expansion joint that stands out in the toughest environments. Thick and strong, this joint can add significantly to the life of expansion joints operating without baffles in harsh conditions such as fly ash. It is constructed of fluoroelastomer reinforced with two plies of special heat and chemically resistant fiberglass.

MFE–404, 406, 419 & 425

DESCRIPTION

Model	Material Description	Thickness Nominal
MFE–404	2 plies of high–alloy knitted wire reinforced Fluoroelastomer[1]	0.125"
MFE–406	1 ply of Nomex® fabric reinforced Fluoroelastomer[1]	0.090"
MFE–419	2 plies of high–alloy knitted wire and 1 ply of F/G Kevlar® and Nomex® blended fabric reinforced Fluoroelastomer[1]	0.188"
MFE–425	2 plies of Fiberglass fabric reinforced Fluoroelastomer[1]	0.25"

[1] All Megaflexon's Fluoroelastomer polymers are either Viton® "B" compound with a "C" type cure or Fluorel® FT compound with an incorporated cure. The polymer comprises a minimum of 70% of the compound by weight. The remaining 30% consists of carbon black, oxides and other curative agents. Curing is done by pressing.



MOVEMENTS AND DIMENSIONS

Joint Width	Breech Opening	Axial Compression	Axial Extension	Resultant Lateral offset	Bolting Set Back
6"	5.50"	1.50"	.50"	1.50"	4.00"
9"	8.50"	2.75"	.50"	2.75"	5.00"
12"	11.00"	3.50"	1.00"	3.50"	6.00"
16"	15.00"	5.00"	1.00"	5.00"	7.00"

OPERATING TEMPERATURES AND PRESSURES (Both Models)

Pressure: ± 3 PSIG operating
± 5 PSIG intermittent

Temperature: –40°F Minimum
+400°F Maximum Operating

Excursions

Temperature °F	Single Occurrence Hrs.	Cumulative Hrs.
450	4	3000
500	2	1000
550	1	240
600	1	48
650	1/2	4

WEIGHT (approximate)

Kg per Meter

Width	MFE–404	MFE–406	MFE–419	MFE–425	Clamp Bars
6"	2.08	1.34	3.13	3.13	7.44
9"	2.68	1.64	3.57	3.57	7.44
12"	3.13	1.93	4.17	4.17	7.44
16"	3.72	2.38	5.21	5.21	7.44

Nomex®, Kevlar®, and Viton® are products of the DuPont Corporation. Fluorel® is a product of the 3–M Corporation.

CLAMP BARS (standard)

Carbon steel 2" x 3/8"

11 / 16" x 1 " slotted holes punched on 6" centers (except at corners).

BOLTING

Megaflexon recommended bolting is 5/8" bolts on 6" centers with head of bolt on expansion joint side. (Carriage bolts may be utilized to provide smooth inside surface and to ease assembly. Holes in clamp bar to be square to accommodate carriage bolts). Use of corner hole is recommended. Odd hole spacing to be positioned at corner area with no hole spacing exceeding 6". The above can be altered to accommodate existing bolting and attachment methods.

AVAILABLE SIZES

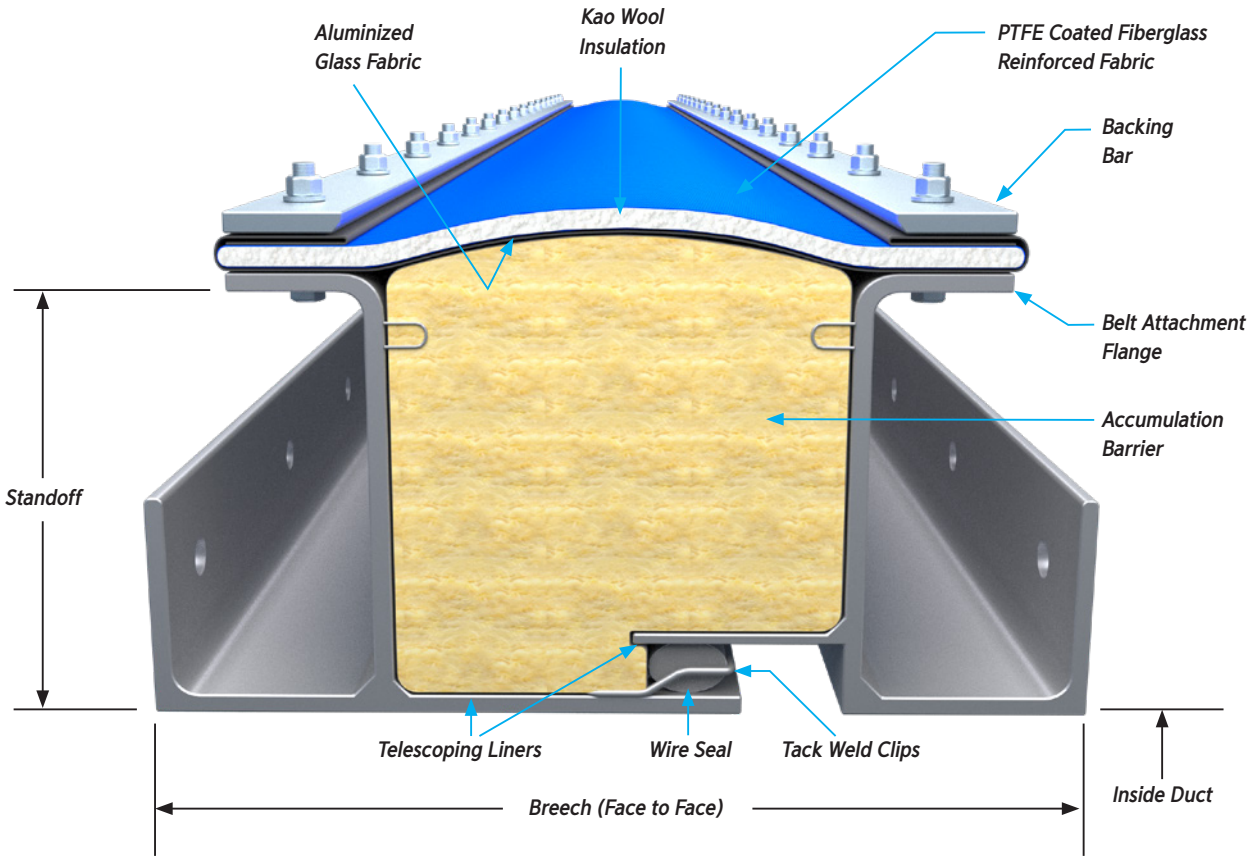
All joints are custom manufactured and can be designed to fit most applications.

ALTERNATE CONFIGURATIONS

Flat Belts (with or without angles, clamp bars, nuts and bolts, etc.) can be supplied. Contact Megaflexon for additional information.

HIGH TEMPERATURE
APPLICATIONS

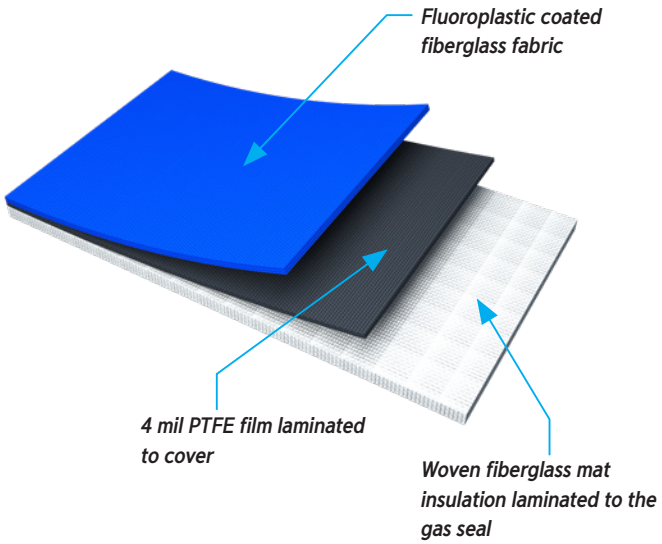
- Superior strength retention, even after repeated flexing.
- Fast, easy field splicing
- Outstanding corrosion resistance
- Less than 1/4 the weight of 100% fluoroelastomer fabrics, resulting in lower installed costs



▲ *High Temperature 3–Layer Expansion Joint*

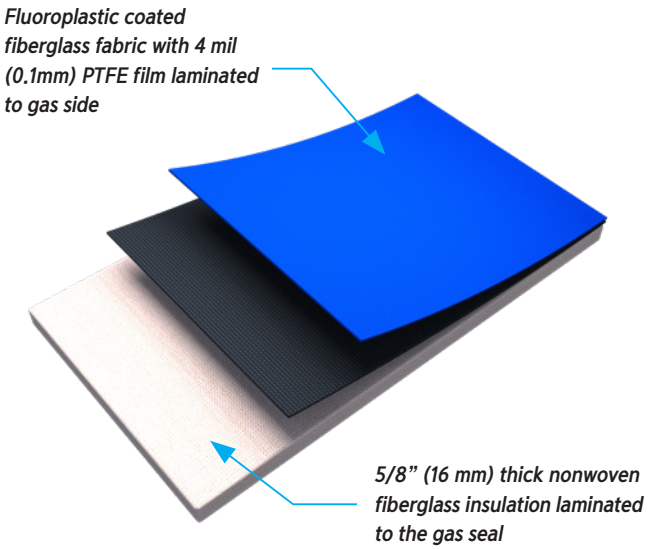
MFH–700

A composite belt designed to provide continuous reliable service at 700˚F (371˚C). A tightly woven fiberglass insulation is thermally bonded to the flexible material. This composite design provides insulating properties at elevated temperatures and prevents separation of the insulation.



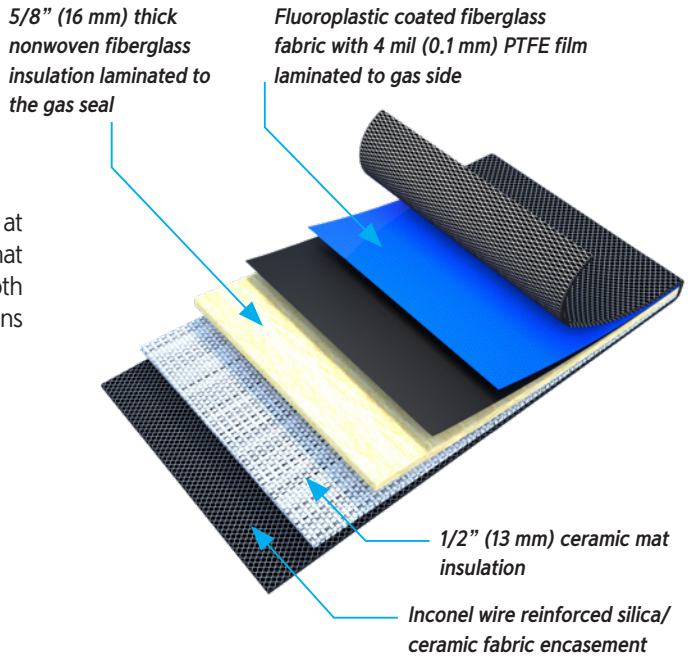
MFH–1000

A composite belt designed to provide continuous reliable service at 1000˚F (538˚C). A non–woven fiberglass needle–mat insulation is bonded to the Texfilm material and encased in aluminized coated fiberglass cloth.



MFH–1200

A composite belt designed to provide continuous service at 1200˚F (649˚C), by the addition of a 1/2" (13 mm) of ceramic mat insulation to the MFH–1000. Inconel® wire inserted silica cloth is used as the encasement to replace fiberglass in applications above 1000˚F (538˚C).

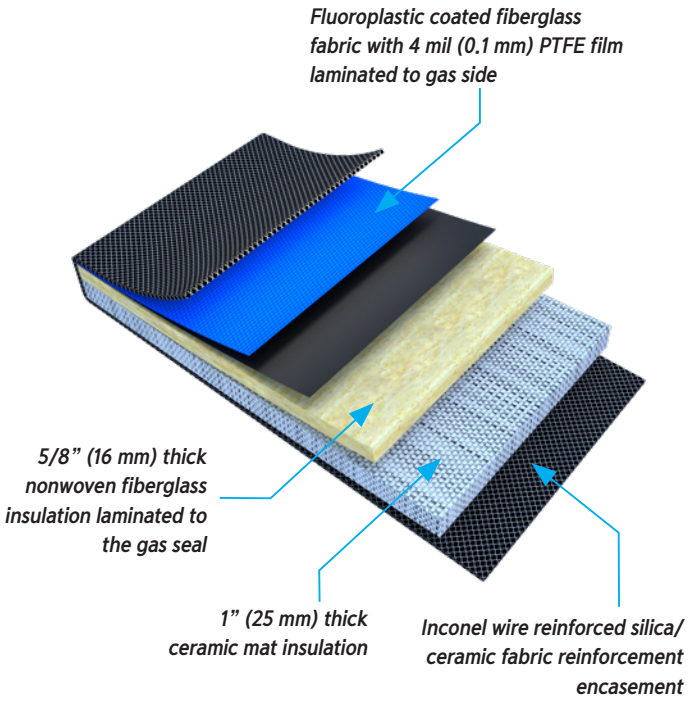


FLUOROPLASTIC COATED FIBERGLASS FABRIC WITH 4 MIL (0.1 MM) PTFE FILM LAMINATED TO GAS SIDE

MFH–1500

A composite belt designed to provide continuous service at elevated continuous temperatures to 1500˚F (816˚C).

Note: Designs are available to 2000˚F (1090˚C).

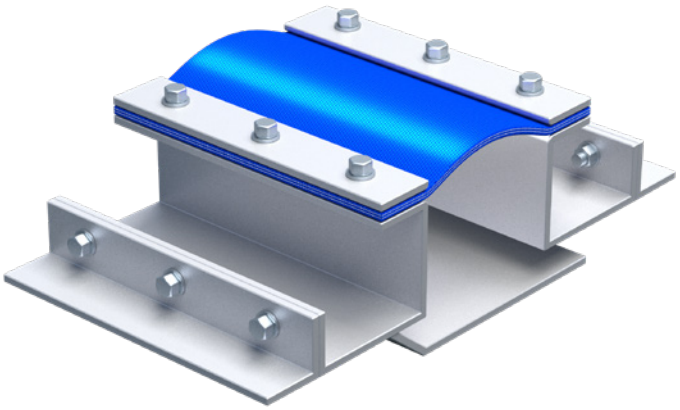


FRAME STYLE
FABRIC EXPANSION JOINTS

MR 2400

Design applications where the ductwork flanges are present and a complete frame assembly is preferred. This style works well for high temperature applications.

- *Complete drop-in assembly*
- *Prefabricated standard frames reduce cost*
- *Belting hardware accessible from outside*
- *Best choice when adjacent structures or equipment cannot permit liner protrusion beyond attachment flange.*
- *Accepts shop welded flow liner*
- *Readily accepts eared pillow design*
- *Used to fill large breech openings*
- *Accommodates large lateral movements*
- *Provides proper setback for belt protection*

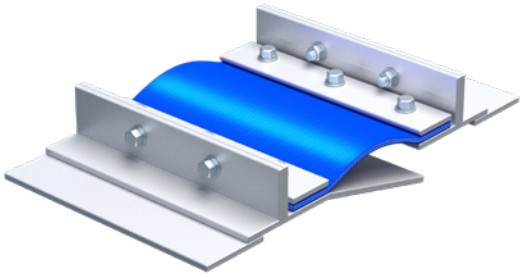


▲ *MR 2400*

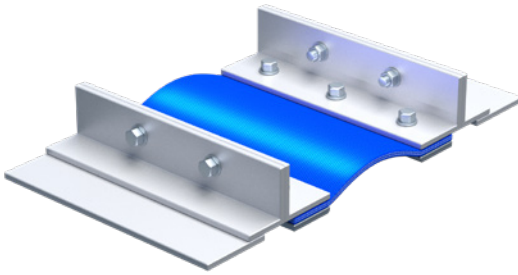
MR 2500

Complete drop-in assembly design which works well with low to moderate temperature applications with low levels of particulate accumulation.

- *Economic frame using standard angle sizes*
- *Accessibility to bolting hardware*
- *Accepts shop welded flow liner*
- *Designed for internal (MR2550) or external belt replacement (MR2500)*
- *Used frequently with fan applications*
- *Studs or tack welded nuts are optional on belt flange*



▲ *MR 2500*

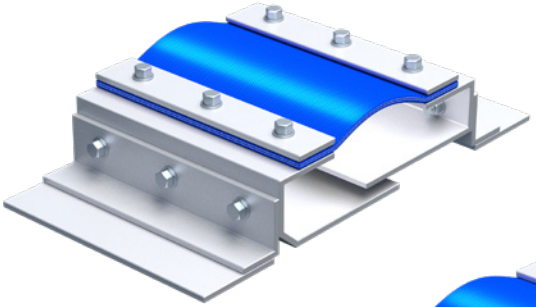


▲ *MR 2550*

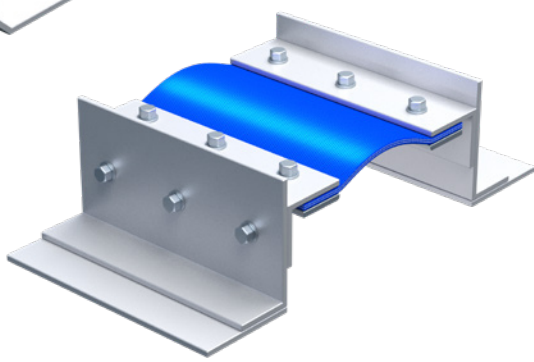
MR 2600

Similar to the SR2500 style and is used where additional standoff is necessary or preferred. This design works well in low to moderate temperature applications with low levels of particulate accumulation.

- *Economic frame using standard angle sizes*
- *Fabric wrap design used to retrofit over existing metal expansion joints (possible on-line installation)*
- *Complete assembly drop-in design*
- *Designed for internal (MR2650) or external belt replacement (MR2500)*
- *Used frequently with fan applications*
- *Accepts shop welded flow liner*
- *Studs or tack welded nuts are optional on belt flange*



▲ *MR 2600*



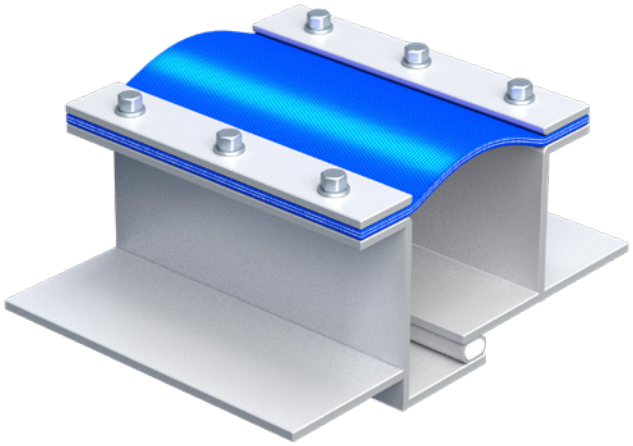
▲ *MR 2650*

** Megaflexon expansion joints are furnished assembled or unassembled.*

MR 2700

Used for low-to-high temperature applications with a cavity pillow, where high levels of particulate are present.

- *Accommodates both flanged and non-flanged ductwork*
- *"Z" style with integral telescoping flow liners*
- *Reduces particulate accumulation in frame cavity*
- *Provides protection for belts and pillows*
- *Complete accessibility to bolting hardware*
- *Accepts eared pillow design*
- *Accommodates large lateral movements*
- *Tack welded nuts are optional*
- *Provides proper setback for belt protection*

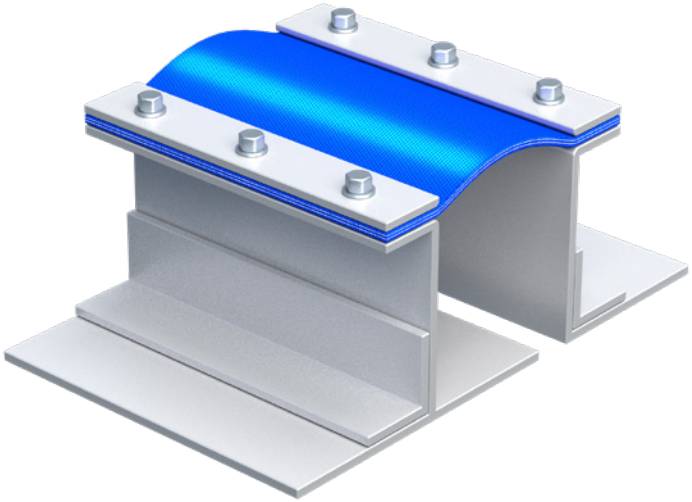


▲ *MR 2700*

MR 2750

Similar to MR2700 with the exception of a single integral flow liner. This design works well with lower particulate levels or vertical duct applications.

- *Accommodates both flanged and non-flanged ductwork*
- *"Z" style integral upstream flow liner*
- *Provides protection for belts and pillows*
- *Complete accessibility to bolting hardware*
- *Accommodates large lateral movements*
- *Tack welded nuts are optional*
- *Provides proper setback for belt protection*

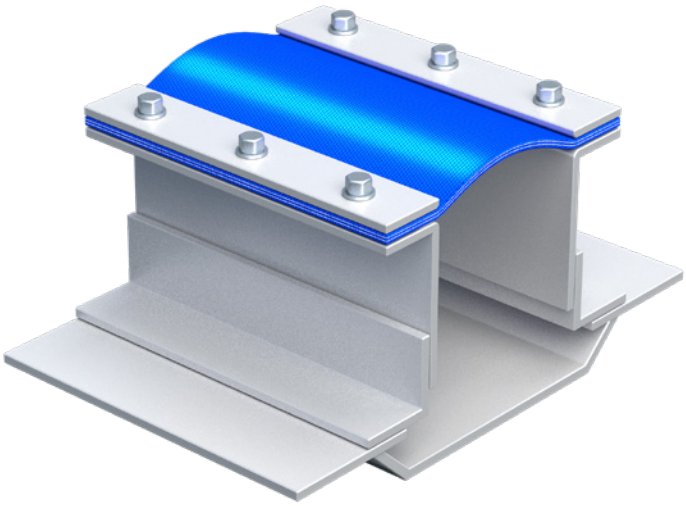


▲ *MR 2750*

MR 2800

This style frame is well suited for installation with field assembly over existing expansion joints, and is utilized for all temperature ratings.

- *Economic frame utilizing standard prefabricated angle iron*
- *Either welded or bolted frame can be utilized*
- *Fabric wrap design can be used to retrofit over existing metal expansion joints (possible on-line installation)*
- *Accepts eared pillow design*
- *Facilitates field assembly and fit-up*
- *Tack welded nuts are optional*
- *Provides proper setback for belt protection*



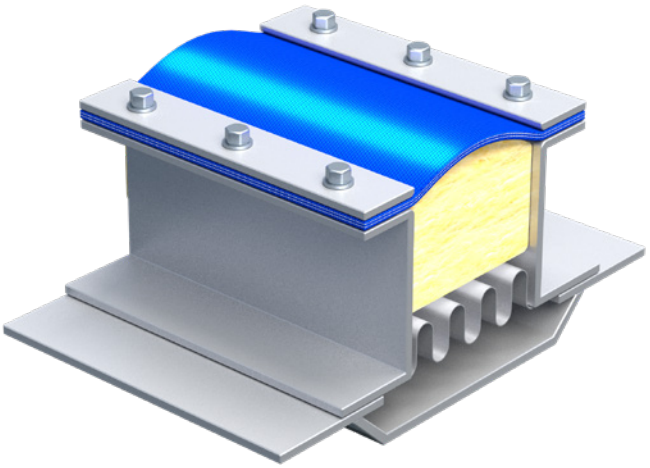
▲ *MR 2800*

** Megaflexon expansion joints are furnished assembled or unassembled.*

MR 2900

Best utilized where flanges are not present and field assembly is required or preferred.

- *Fabric wrap design used over existing metal expansion joints (possible on-line installation)*
- *Provides additional stiffener reinforcement to existing ductwork*
- *Utilizes standard structural steel channels for economical design*
- *Flanges act as duct stiffeners*

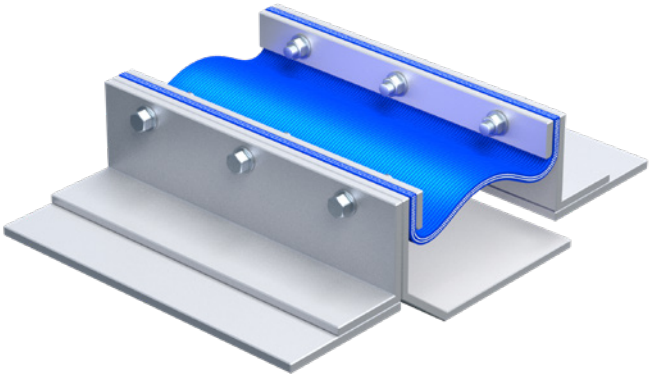


▲ *SR2900*

U 1000

The standard integrally flanged U-belt design is used for low to moderate temperatures applications where duct flanges are present and particulate loading is minimal.

- *Lowest initial cost due to reduced metal frame and fasteners cost*
- *Molded corners provided for rectangular ductwork*
- *Accommodates flanged ducting or equipment and utilized frequently for fan applications*
- *Minimal shipping costs*
- *Standard 3" (75mm) high flange design*

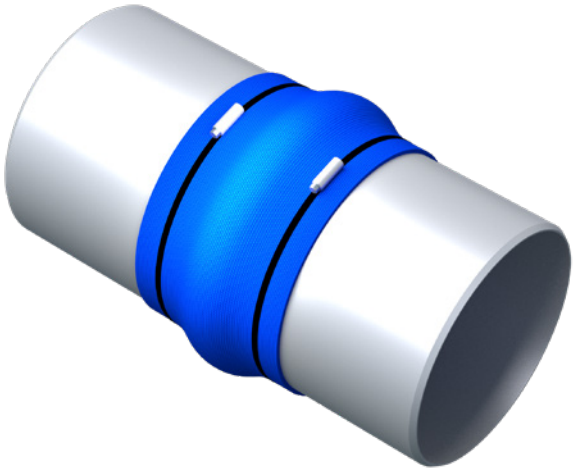


▲ *MEGA-F150*

SLEEVES

Sleeves are primarily used for vibration in H.V.A.C. applications with minimal pressures.

- *Least expensive design*
- *Supplied endless or open ended for field-wrap of pipe penetration applications*
- *Supplied with worm gear band clamps*
- *For vibration applications*
- *Provided with gaskets for Teflon® belt material*



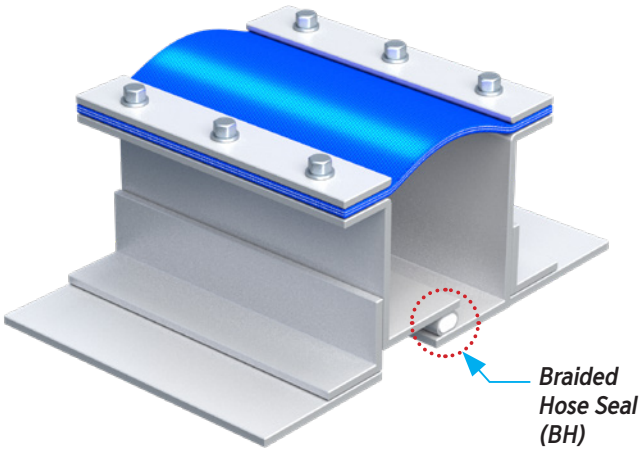
▲ *Sleeves*

** Megaflexon expansion joints are furnished assembled or unassembled.*

OPTIONS
AND ACCESSORIES

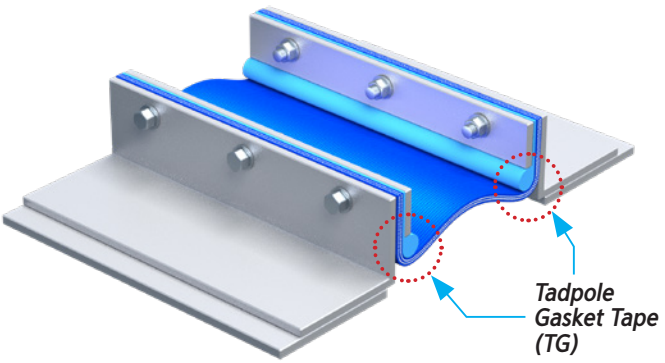
BRAIDED HOSE SEAL (BH)

Flexible stainless steel braided hose with enclosed ceramic insulation is often specified for expansion joints in areas of high particulate loading. The hose is secured between the flow liners to prevent particulate from entering the expansion joint cavity. This accessory along with a cavity pillow works well in cement plants.



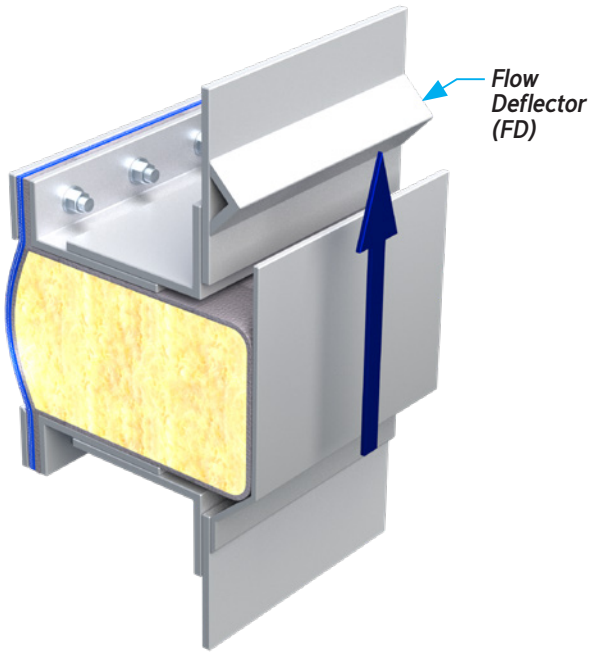
TADPOLE GASKET TAPE (TG)

When using integral flange-type expansion joints in duct systems with positive pressure operating conditions, Megaflexon recommends the use of tadpole gasketing between the flexible element flange and backup bars (as illustrated). This prevents the heads of the erection bolts from abrading the outside cover of the flexible element. This option also protects both flat and integrally flanged belts during large lateral or compression movements.



FLOW DEFLECTOR (FD)

In some expansion joint installations, an angle flow deflector is added to the design to increase the service life of the joint. A flow deflector is used to prevent moisture and particulate from sliding down vertical duct walls and being trapped in the expansion joint cavity by the flow liner.



OPTIONS & ACCESSORIES

FOR GAS TURBINE SYSTEM
FABRIC EXPANSION JOINTS

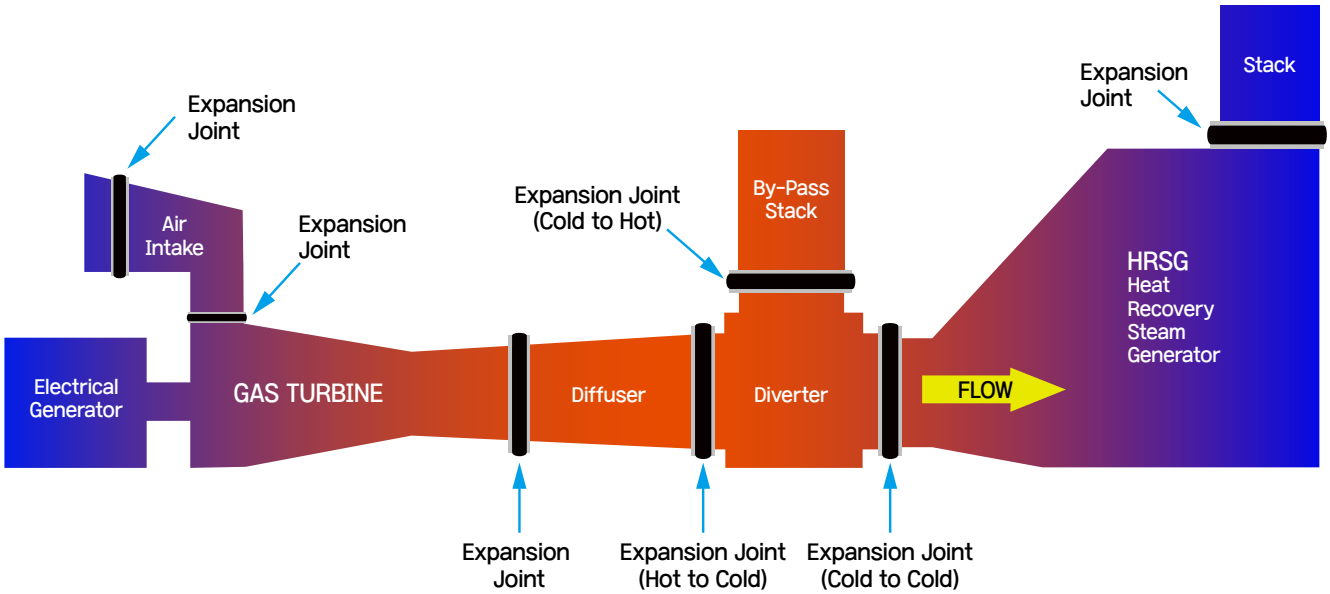
Megaflexon Fabric Expansion joints are designed to reduce noise emission and dampen vibration on the air intake side of the gas turbine; between the filter and the gas turbine compressor.

Constructed from a single layer of heavy non-reinforced rubber, Megaflexon Fabric expansion joints compensates for movements in multiple directions simultaneously.

This expansion joint provides the following advantages:

- Accommodates thermal expansion
- Absorbs movements in multiple directions and vibration
- Has proven sound reduction abilities
- Is a 100% gas tight solution without the use of gaskets due to the self-sealing property of the rubber
- Can be delivered pre-shaped at required dimensions
- Can be delivered with pre-punched holes for easy installation
- Needs no external insulation
- Is easy to transport and store

Expansion Joints in the Gas Turbine Part of a Combined Cycle Plant



APPENDIX

THERMAL EXPANSION CHART

Temperature °F	Temperature °C	Carbon Steel	Austenitic Stainless Steel	12CR/17CR/27CR	25CR/20NI
-325°F	-198°C	-2.37	-3.85	-2.04	-3.00
-300°F	-184°C	-2.24	-3.63	-1.92	-2.83
-275°F	-171°C	-2.11	-3.41	-1.80	-2.66
-250°F	-157°C	-1.98	-3.19	-1.68	-2.49
-225°F	-143°C	-1.85	-2.96	-1.57	-2.32
-200°F	-129°C	-1.71	-2.73	-1.46	-2.15
-175°F	-115°C	-1.58	-2.50	-1.35	-1.98
-150°F	-101°C	-1.45	-2.27	-1.24	-1.81
-125°F	-87°C	-1.30	-2.01	-1.11	-1.60
-100°F	-73°C	-1.15	-1.75	-0.98	-1.39
-75°F	-59°C	-1.00	-1.50	-0.85	-1.18
-50°F	-46°C	-0.84	-1.24	-0.72	-0.98
-25°F	-32°C	-0.68	-0.98	-0.57	-0.78
0°F	-18°C	-0.49	-0.72	-0.42	-0.57
25°F	-4°C	-0.32	-0.46	-0.27	-0.37
50°F	10°C	-0.14	-0.21	-0.12	-0.16
70°F	21°C	0.00	0.00	0.00	0.00
100°F	38°C	0.23	0.34	0.20	0.28
125°F	52°C	0.42	0.62	0.36	0.51
150°F	66°C	0.61	0.90	0.53	0.74
175°F	79°C	0.80	1.18	0.69	0.98
200°F	93°C	0.99	1.46	0.86	1.21
225°F	107°C	1.21	1.75	1.03	1.45
250°F	121°C	1.40	2.03	1.21	1.70
275°F	135°C	1.61	2.32	1.38	1.94
300°F	149°C	1.82	2.61	1.56	2.18
325°F	163°C	2.04	2.90	1.74	2.43
350°F	177°C	2.26	3.20	1.93	2.69
375°F	190°C	2.48	3.50	2.11	2.94
400°F	204°C	2.70	3.80	2.30	3.20
425°F	218°C	2.93	4.10	2.50	3.46
450°F	232°C	3.16	4.41	2.69	3.72
475°F	246°C	3.39	4.71	2.89	3.98
500°F	260°C	3.62	5.01	3.08	4.24
525°F	274°C	3.86	5.31	3.28	4.51
550°F	288°C	4.11	5.62	3.49	4.79
575°F	302°C	4.35	5.93	3.69	5.06
600°F	316°C	4.60	6.24	3.90	5.33
625°F	330°C	4.86	6.55	4.10	5.60
650°F	343°C	5.11	6.87	4.31	5.88
675°F	357°C	5.37	7.18	4.52	6.16
700°F	371°C	5.63	7.50	4.73	6.44
725°F	385°C	5.90	7.82	4.94	6.73
750°F	399°C	6.16	8.15	5.16	7.02
775°F	413°C	6.43	8.47	5.38	7.31
800°F	427°C	6.70	8.80	5.60	7.60
825°F	441°C	6.97	9.13	5.82	7.89
850°F	454°C	7.25	9.46	6.05	8.19
875°F	469°C	7.53	9.79	6.27	8.48
900°F	482°C	7.81	10.12	6.49	8.78
925°F	496°C	8.08	10.46	6.71	9.07
950°F	510°C	8.35	10.80	6.94	9.37
975°F	524°C	8.62	11.14	7.17	9.66
1000°F	538°C	8.89	11.48	7.40	9.95
1025°F	552°C	9.17	11.82	7.62	10.24
1050°F	566°C	9.46	12.16	7.95	10.54
1075°F	580°C	9.75	12.50	8.18	10.83
1100°F	593°C	10.04	12.84	8.31	11.13
1125°F	607°C	10.31	13.18	8.53	11.41
1150°F	621°C	10.57	13.52	8.76	11.71
1175°F	635°C	10.83	13.86	8.98	12.01
1200°F	649°C	11.10	14.20	9.20	12.31
1225°F	663°C	11.38	14.54	9.42	12.59
1250°F	677°C	11.66	14.88	9.65	12.88
1275°F	690°C	11.94	15.22	9.88	13.17
1300°F	704°C	12.22	15.56	10.11	13.46
1325°F	718°C	12.50	15.90	10.33	13.75
1350°F	732°C	12.78	16.24	10.56	14.05
1375°F	746°C	13.06	16.58	10.78	14.35
1400°F	760°C	13.34	16.92	11.01	14.65

PRESSURE CONVERSION CHART

To Convert To	Pounds Per Square Inch	Inches Of Water (32°F)	Inches Of Mercury (32°F)	Kilograms Per Square Centimeter	Bars	Atmospheres
Pounds Per Square Inch		27.680	2.036	0.070	0.069	0.068
Inches Of Water (32°F)	0.036		0.074	0.003	0.002	0.002
Inches Of Mercury (32°F)	0.491	1 3.590		0.035	0.034	0.033
Kilograms Per Square Centimeter	14.220	394.100	28.960		0.981	0.968
Bars	14.500	401.800	29.530	1.020		0.987
Atmospheres	14.700	406.900	29.921	1.033	1.013	

kP	Pounds Per Square Inch									
	0	1	2	3	4	5	6	7	8	9
0	– –	0.145	0.290	0.435	0.580	0.725	0.870	1.015	1.160	1.305
10	1.450	1.595	1.740	1.885	2.031	2.176	2.321	2.466	2.611	2.756
20	2.901	3.046	3.191	3.336	3.481	3.626	3.771	3.916	4.061	4.206
30	4.351	4.496	4.641	4.786	4.931	5.076	5.221	5.366	5.511	5.656
40	5.802	5.947	6.092	6.237	6.382	6.527	6.672	6.817	6.962	7.107
50	7.252	7.397	7.542	7.687	7.832	7.977	8.122	8.267	8.412	8.557
60	8.702	8.847	8.992	9.137	9.282	9.427	9.572	9.718	9.863	10.008
70	10.153	10.298	10.443	10.588	10.733	10.878	11.023	11.168	11.313	11.458
80	11.603	11.748	11.893	12.038	12.183	12.328	12.473	12.618	12.763	12.908
90	13.053	13.198	13.343	13.489	13.634	13.779	13.924	14.069	14.214	14.359
100	14.504	14.649	14.794	14.939	15.084	15.229	15.374	15.519	15.664	15.809

- Kilopascals to Pounds Per Square Inch (1kP= 0.1450377 lb/in.

TEMPERATURE CONVERSION CHART

Fahrenheit	Celsius	Fahrenheit	Celsius	Fahrenheit	Celsius
-688	-400	-7.6	-22	69.8	21
-508	-300	-5.8	-21	71.6	22
-418	-250	-4	-20	73.4	23
-328	-200	-2.2	-19	75.2	24
-238	-150	-0.4	-18	77	25
-148	-100	1.4	-17	78.8	26
-139	-95	3.2	-16	80.6	27
-130	-90	5	-15	82.4	28
-121	-85	6.8	-14	84.2	29
-112	-80	8.6	-13	86	30
-103	-75	10.4	-12	87.8	31
-94	-70	12.2	-11	89.6	32
-85	-65	14	-10	91.4	33
-76	-60	15.8	-9	93.2	34
-67	-55	17.6	-8	95	35
-58	-50	19.4	-7	96.8	36
-56.2	-49	21.2	-6	98.6	37
-54.4	-48	23	-5	100.4	38
-52.6	-47	24.8	-4	102.2	39
-50.8	-46	26.6	-3	104	40
-49	-45	28.4	-2	105.8	41
-47.2	-44	30.2	-1	107.6	42
-45.4	-43	32	0	109.4	43
-43.6	-42	33.8	1	111.2	44
-41.8	-41	35.6	2	113	45
-40	-40	37.4	3	114.8	46
-38.2	-39	39.2	4	116.6	47
-36.4	-38	41	5	118.4	48
-34.6	-37	42.8	6	120.2	49
-32.8	-36	44.6	7	122	50
-31	-35	46.4	8	167	75
-29.2	-34	48.2	9	212	100
-27.4	-33	50	10	302	150
-25.6	-32	51.8	11	392	200
-23.8	-31	53.6	12	482	250
-22	-30	55.4	13	572	300
-20.2	-29	57.2	14	752	400
-18.4	-28	59	15	932	500
-16.6	-27	60.8	16	1112	600
-14.8	-26	62.6	17	1292	700
-13	-25	64.4	18	1472	800
-11.2	-24	66.2	19	1652	900
-9.4	-23	68	20	1832	1000

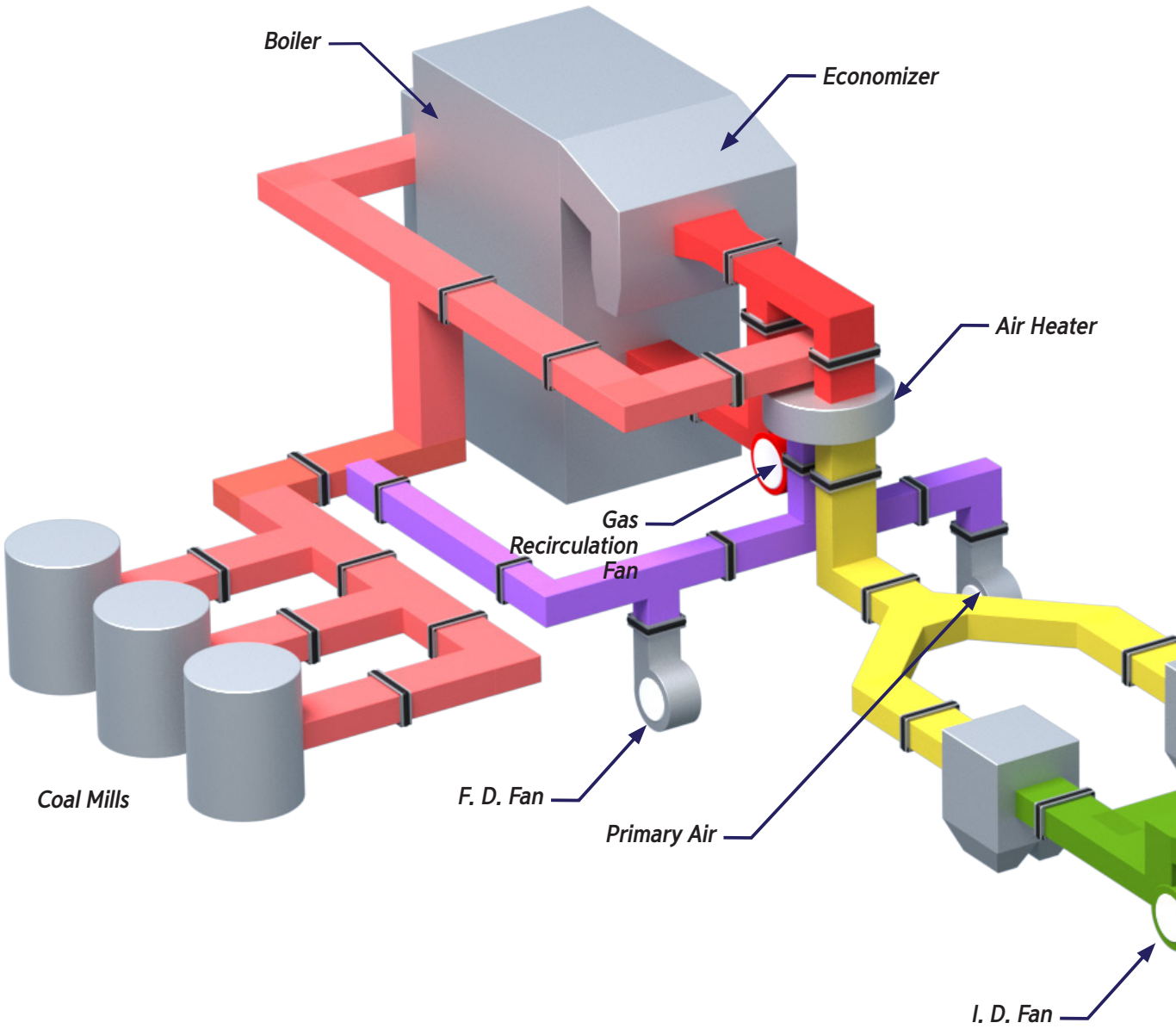
- *Fahrenheit to Celsius – ((°F–32)x(5/9))=°C*
- *Celsius to Fahrenheit – (°C x (9/5))+32=°F*

MEGAFLEXON has specially engaged in expansion joint industry since 1986

Since its founding in 1986 we have devoted ourselves to research, development and manufacture of high level of expansion joints in quality and reliability.
Based on our accumulated experience and know-how, all of our staff has an in-depth understanding of each industrial application and has done our best to meet customers' specialized needs.
As an expert in expansion joint industry, we will never stop exploring new solutions for expansion joint applications and will continuously provide high quality products and on-site service to our customers.

TYPICAL BOILER DUCTING LAYOUT

See figure below for examples of fabric expansion joints being used with ducting.
***Black components are Fabric Expansion Joints.*



Field survey technicians perform comprehensive inspection of all expansion joints and provide a written and photograph document to plan replacement based on existing and projected life expectancy. Infrared analysis determines leaks even if the expansion joints are lagged over. This methodical approach reduces/eliminates the potential of unplanned forced outages and accurately projects the scope and cost of outage work required.

600–800˚F (316–427˚C) Particulate laden flue gas
(flow liner and cavity pillow recommended)

600–700˚F (316–371˚C) Clean air

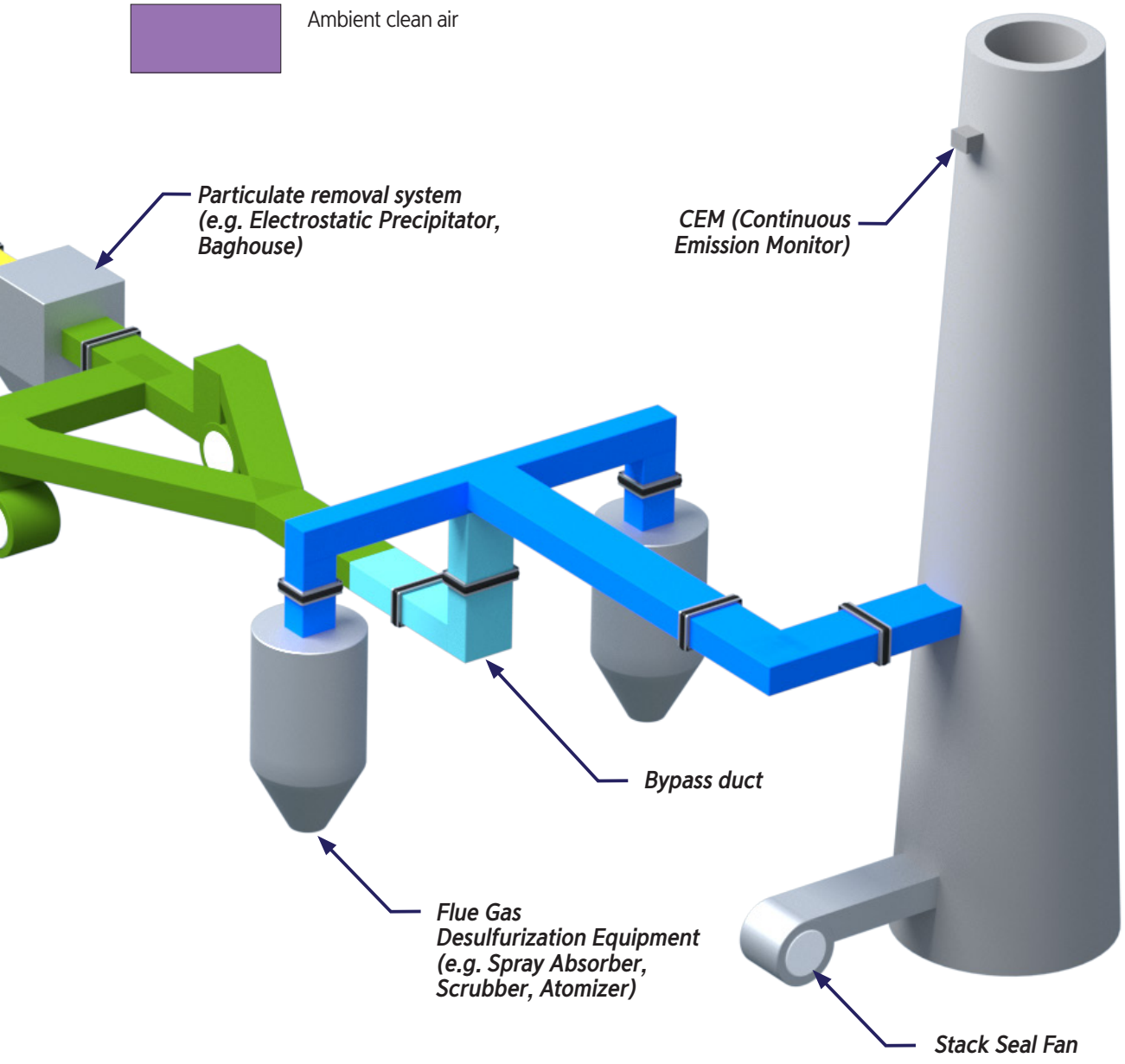
300–350˚F (149–177˚C) Particulate laden flue gas
(flow liner and cavity pillow recommended)

280–330˚F (138–166˚C) Flue gas with minimal particulate

280–330˚F (138–166˚C) Flue gas with acidic condition
(corrosion resistant frame and belt recommended)

120–180˚F (49–82˚C) Flue gas at the acid dew point
(corrosion resistant frame and belt recommended)

Ambient clean air



ISO 9001
ISO 14001
ISO 45001

MEGA FLEXON

EXPANSION JOINT & FLEXIBLE PRODUCTS

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