Easyflex™ Metallic Expansion Joints

Bellows are a flexible piping element. The corrugation of the expansion joint is designed to be flexible in order to absorb pipe expansion and contraction due to changes in temperature. The number of corrugation of bellows is decided according to the displacement amount and the expansionary and contracting force that the bellows have to absorb. Bellows have to be strong to the design pressure and operating pressure of piping and installation and they also have to be flexible to absorb thermal movement. The thrust force of the flow in the piping has to be buttressed by things other than bellows. These are usually anchors, tie rods, hinges or gimbaled structures and our style ETR thrust restraints.

The value of the thrust force of bellows is usually calculated by multiplying the value of the effective cross section area by the value of the flow pressure of pipe

Kanwal's Easy Flex Bellows are fabricated from cylindrical tubes made of high ductility material. The cylindrical body is formed onto parallel corrugations which accommodates all basic movements without encountering wear and tear as associated with conventional mechanical devices. Bellows are designed and manufactures as per the latest additions of EJMA, ASME, GIS, BS, DIN, IS standards under the supervision of highly qualified team of engineers and technocrats.

To attain high flexibility and above average life expectancy, our Bellows are made from tested S. S. 316/321/304 stainless steel material. These bellows retain the flexibility when subject to internal pressure. Kanwal's Easy Flex Bellows have proven their outstanding performance in a wide variety of applications.

Compliance - ASTM F1120, EJMA 10

- Due to policy of continual improvement, the specifications are subject to change without prior notice.
- Measurements are subject to 5% tolerance.
- To achieve good results do not over load fitting more than designed parameters as per drawing / catalogue.

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Operating Mechanism of Metallic Expansion Joints

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Why Expansion Joints are Required

While designing pipelines, a main artery of the modern industry, planners always face many obstacles : the expansion and contraction of pipes caused by temperature changes both external and internal, vibrations generated from machine operation and other stress imposed on the pipelines by wind or in some cases by earthquake. Therefore, protection from these hazardous elements is always of major interest to the pipeline engineers.

To absorb pressure from expansion, contraction and the vibration of pipes, flexibility is key. One of the most effective flexible elements is the metallic bellows type expansion joint, which is currently widely used due to continued developments and improvements in the performance and design technique.

Parts and Features of Expansion Joints

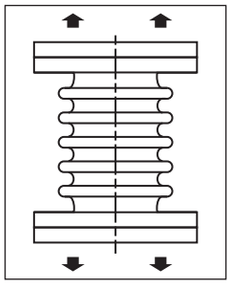
Bellows : After welded Piping forming with high-quality stainless steel sheets, bellows are produced through hydraulic forming or roll forming. And sometimes the bellows are heat treated to eliminate the remaining welding stress on the welded part or to remove the remaining stress generated during forming.

End Pipe: To facilitate connecting and fitting into the ends of bellows, the end pipe is normally made with the same material that is used for the pipeline, and also to the same size as the pipeline.

Liner/Internal Sleeve: A device which minimizes contact between the inner surface of the bellows of an expansion joint and the fluid flowing through it. It prevents vibration, and erosion of the Bellows.

Flange: Customer can choose a flange standard from among BS 10 Table D / ANSI / DIN / IS or any other standard.

Tie Rod: The rods protect a device from excessive stretching and prevent the dislocation of pipelines. They also stabilize pipelines by absorbing thrusts.

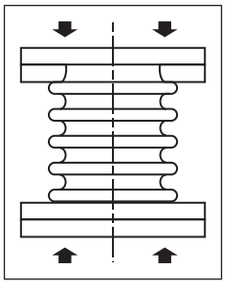


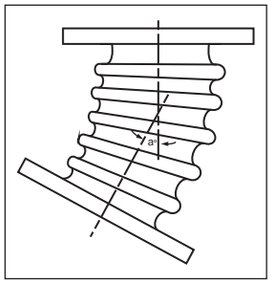
Axial Elongation

Axial Extension is the dimensional lengthening of the Expansion Joint.

Axial Compression

Axial Compression is the dimension shortening of an Expansion Joint along its longitudinal axis.



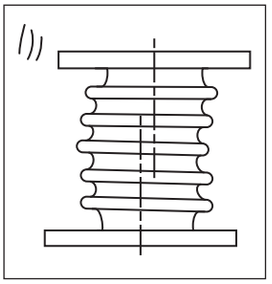


Angular Movement

Angular Rotation is the displacement of the longitudinal axis of the Expansion Joint from its initial straight line position into a circular arc.

Lateral Movement

Lateral Deflection is the relative displacement of the two ends of an Expansion Joint perpendicular to its longitudinal axis.



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Basic Types of Expansion Joints

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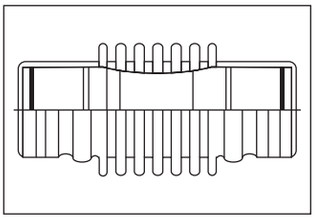
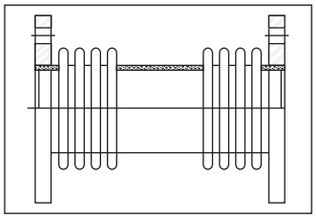
Single Bellows Assembly

The simplest type of expansion joint consists of a single bellows element welded to end fittings, normally flange or pipe ends. The single bellows can absorb small amounts of axial, lateral and angular movement with ease, but adequate anchors and guides must be provided.



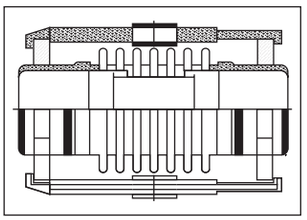


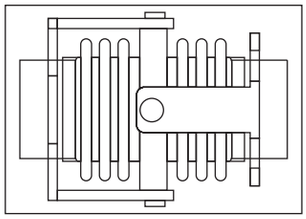
Universal Expansion Joint Assembly

This assembly consists of two bellows connected by a center spool piece with flange or pipe ends. The universal arrangement allows greater axial, lateral and angular movements than a Single Bellows Assembly. Increasing the center spool length produces increased movement capability. Like for the single Bellows adequate anchors and guides must be provided.

Hinged Bellows Assembly

When a Hinged Expansion Joint is used, movement is limited to angulations in one plane. Hinged Assemblies are normally used in sets of two or three to absorb large amounts of expansion in high pressure piping systems. Only low spring forces are transmitted to the equipment. The hinge hardware is designed to carry the pressure thrust of the system, and often is used to combat torsional movement in a piping system. Slotted hinged Expansion Joints are a variant of the standard Hinged Expansion Joints that allow axial and angular movement. Be careful; once a slotted Hinge is introduced, torsion in the piping system is still resisted but the hinge no longer carries pressure thrust.



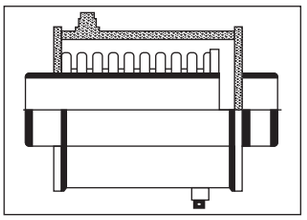


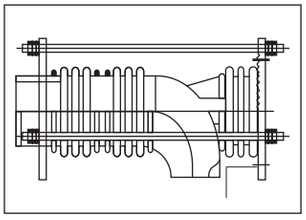
Gimbal Bellows Assembly

The gimbal restraint is designed to absorb system pressure thrust and torsional twist while allowing angulation in any plane. Gimbal Assemblies, When used in pairs or with a single hinged unit, have the advantage of absorbing movements in multi-planer piping systems. The gimbal works the same as an automobile's universal drive shaft.

Externally Pressurized Assembly

Line pressure acts externally on the bellows by means of a pressure chamber, This allows a greater number of convolutions to be used for large axial movements, without fear of bellows instability. Externally pressurized expansion joints have the added benefit of self-draining convolutions if standing media is a concern. Anchors and guides are an essential part of a good installation.





Pressure Balanced Elbow Assembly

These assemblies are used in applications where space limitations preclude the use of main anchors. Pressure thrust acting on the line bellows (bellows in the media flow) is equalized by the balancing bellows through a system of tie rods linkages. The only forces created by the axial, lateral, or angular movements. An elbow must be present in the piping network to install this style of expansion joint.

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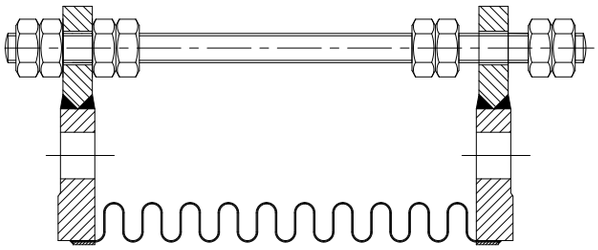
Stainless Steel Metallic Bellow



PN - 20

Model No. Nominal Bore x Overall Length	Design Temperature upto	Maximum Working Pressure	Lateral Movement (mm)	Axial Movement (mm)	Cycle Life (Cycles)	End Flanges Details
SSMB 2" x 150	250°C	20Kg/cm^2	2	±10	12000	ANSI B 16.5 # 150
SSMB 2½"x 150	250°C	20Kg/cm^2	2	±10	12000	ANSI B 16.5 # 150
SSMB 3" x 150	250°C	20Kg/cm^2	2	±10	12000	ANSI B 16.5 # 150
SSMB 4" x 150	250°C	20Kg/cm^2	2	±10	12000	ANSI B 16.5 # 150
SSMB 5" x 150	250°C	20Kg/cm^2	2	±10	12000	ANSI B 16.5 # 150
SSMB 6" x 150	250°C	20Kg/cm^2	2	±10	12000	ANSI B 16.5 # 150
SSMB 8" x 150	250°C	20Kg/cm^2	2	±10	12000	ANSI B 16.5 # 150
SSMB 10" x 200	250°C	20Kg/cm^2	2	±10	12000	ANSI B 16.5 # 150
SSMB 12" x 200	250°C	20Kg/cm^2	2	±10	12000	ANSI B 16.5 # 150
SSMB 14" x 200	250°C	20Kg/cm^2	2	±10	12000	ANSI B 16.5 # 150
SSMB 16" x 200	250°C	20Kg/cm^2	2	±10	12000	ANSI B 16.5 # 150
SSMB 18" x 200	250°C	20Kg/cm^2	2	±10	12000	ANSI B 16.5 # 150
SSMB 20" x 200	250°C	20Kg/cm^2	2	±10	12000	ANSI B 16.5 # 150
SSMB 24" x 200	250°C	20Kg/cm^2	2	±10	12000	ANSI B 16.5 # 150

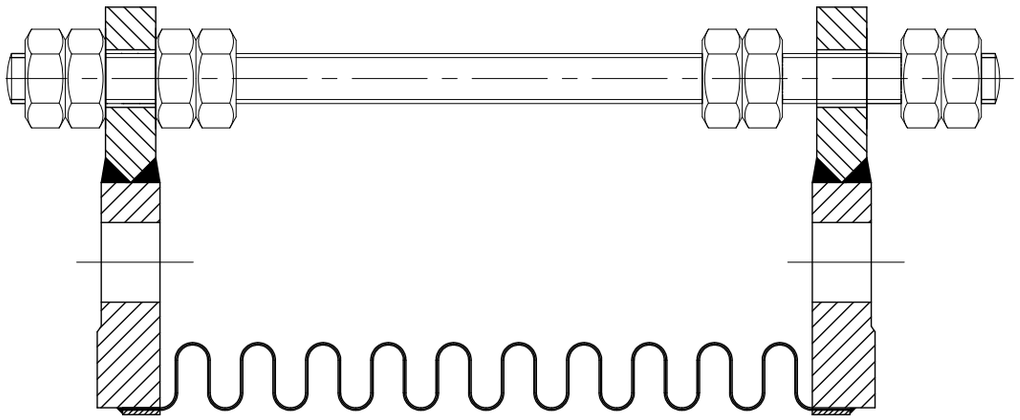
PN - 20

Model No. Nominal Bore x Overall Length	Design Temperature upto	Maximum Working Pressure	Lateral Movement (mm)	Axial Movement (mm)	Cycle Life (Cycles)	End Flanges Details
SSMB 2" x 200	250°C	20Kg/cm^2	2	±10	12000	ANSI B 16.5 # 300
SSMB 2½"x 200	250°C	20Kg/cm^2	2	±10	12000	ANSI B 16.5 # 300
SSMB 3" x 200	250°C	20Kg/cm^2	2	±10	12000	ANSI B 16.5 # 300
SSMB 4" x 200	250°C	20Kg/cm^2	2	±10	12000	ANSI B 16.5 # 300
SSMB 5" x 200	250°C	20Kg/cm^2	2	±10	12000	ANSI B 16.5 # 300
SSMB 6" x 200	250°C	20Kg/cm^2	2	±10	12000	ANSI B 16.5 # 300
SSMB 8" x 200	250°C	20Kg/cm^2	2	±10	12000	ANSI B 16.5 # 300
SSMB 10" x 200	250°C	20Kg/cm^2	2	±10	12000	ANSI B 16.5 # 300
SSMB 12" x 250	250°C	20Kg/cm^2	2	±10	12000	ANSI B 16.5 # 300
SSMB 14" x 250	250°C	20Kg/cm^2	2	±10	12000	ANSI B 16.5 # 300
SSMB 16" x 250	250°C	20Kg/cm^2	2	±10	12000	ANSI B 16.5 # 300
SSMB 18" x 250	250°C	20Kg/cm^2	2	±10	12000	ANSI B 16.5 # 300
SSMB 20" x 250	250°C	20Kg/cm^2	2	±10	12000	ANSI B 16.5 # 300
SSMB 24" x 250	250°C	20Kg/cm^2	2	±10	12000	ANSI B 16.5 # 300

Compliance - ASTM F1120, EJMA 10

- Material of Standard Exhaust Bellow SA 240 TP 304, SA 240 TP 316/321 also available.
- Material of End Flanges IS 2062 Grade 2 (Carbon Steel)
- Custom Made Bellows as per customer specification available for additional movements.
- End Flanges as per customers specification available.
- Accessories like nut bolts / gaskets / tie rod assembly / mating flanges available at extra cost.
- Compliance - Metallic Bellows designed as EJMA USA 10th Edition.
- Other drilling also available.

Easyflex™ Stainless Steel Metallic Bellow



PN - 25

Model No. Nominal Bore x Overall Length	Design Temperature upto	Maximum Working Pressure	Lateral Movement (mm)	Axial Movement (mm)	Cycle Life (Cycles)	End Flanges Details
SSMB 2" x 200	250°C	25Kg/cm^2	2	±10	12000	ANSI B 16.5 #300
SSMB 2½"x 200	250°C	25Kg/cm^2	2	±10	12000	ANSI B 16.5 #300
SSMB 3" x 200	250°C	25Kg/cm^2	2	±10	12000	ANSI B 16.5 #300
SSMB 4" x 200	250°C	25Kg/cm^2	2	±10	12000	ANSI B 16.5 #300
SSMB 5" x 200	250°C	25Kg/cm^2	2	±10	12000	ANSI B 16.5 #300
SSMB 6" x 200	250°C	25Kg/cm^2	2	±10	12000	ANSI B 16.5 #300
SSMB 8" x 200	250°C	25Kg/cm^2	2	±10	12000	ANSI B 16.5 #300
SSMB 10" x 250	250°C	25Kg/cm^2	2	±10	12000	ANSI B 16.5 #300
SSMB 12" x 250	250°C	25Kg/cm^2	2	±10	12000	ANSI B 16.5 #300
SSMB 14" x 250	250°C	25Kg/cm^2	2	±10	12000	ANSI B 16.5 #300
SSMB 16" x 250	250°C	25Kg/cm^2	2	±10	12000	ANSI B 16.5 #300
SSMB 18" x 250	250°C	25Kg/cm^2	2	±10	12000	ANSI B 16.5 #300
SSMB 20" x 300	250°C	25Kg/cm^2	2	±10	12000	ANSI B 16.5 #300
SSMB 24" x 300	250°C	20Kg/cm^2	2	±10	12000	ANSI B 16.5 #300

Compliance - ASTM F1120, EJMA 10

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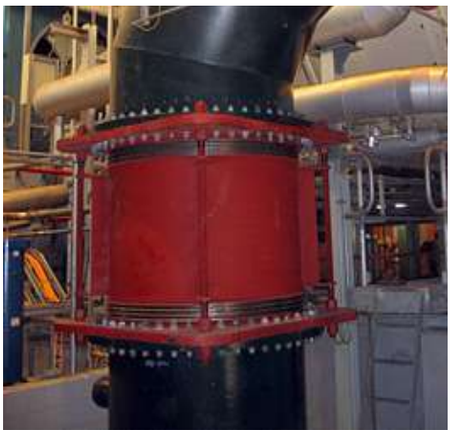
Easyflex™ Installation Instructions



Recommended Installation Instructions

Do's

- Inspect for damage during shipment, i.e. dents, broken hardware, water marks on carton, etc.
- Store in clean dry area where it will not be exposed to damaging environment.
- Make the piping system by fitting the expansion joint first. By stretching, compressing, or offsetting the joint to fit the piping, it may be over stressed when the system in service.
- It is good practice to leave one flange loose until the expansion joint has been fitted into position. Make necessary adjustment of loose flange before welding.
- Install joint with arrow pointing in the direction of flow.
- Remove all shipping devices after the installation is complete and before any pressure test of the installed system
- Remove any foreign material that may have been lodged between the convolutions.
- Refer to EJMA Standards for proper guide spacing and anchor recommendations.

Dont's

- Do not drop or strike carton.
- Do not remove shipping bars until installation is complete.
- Do not use chains or any lifting device directly on the bellows or bellows cover.
- Do not allow weld splatter to hit unprotected bellows. Protect with wet chloride free asbestos.
- Do not use cleaning agents that contain chlorides.
- Do not use steel wool or wire brushes on bellows.
- Do not force-rotate one end of an expansion joint alignment of bolt holes. Ordinary bellows are not capable of absorbing torque.
- Do not hydrostatic pressure test or evacuate the system before proper installation of all guides and anchors.
- Pipe hangers are not adequate guides.
- Do not exceed a pressure or 1½ times the rated working pressure of the expansion joint.
- Do not use shipping bars to retain the pressure thrust if tested prior to installation.

The manufacturer's warranty may be void if improper installation procedures have been used.

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