

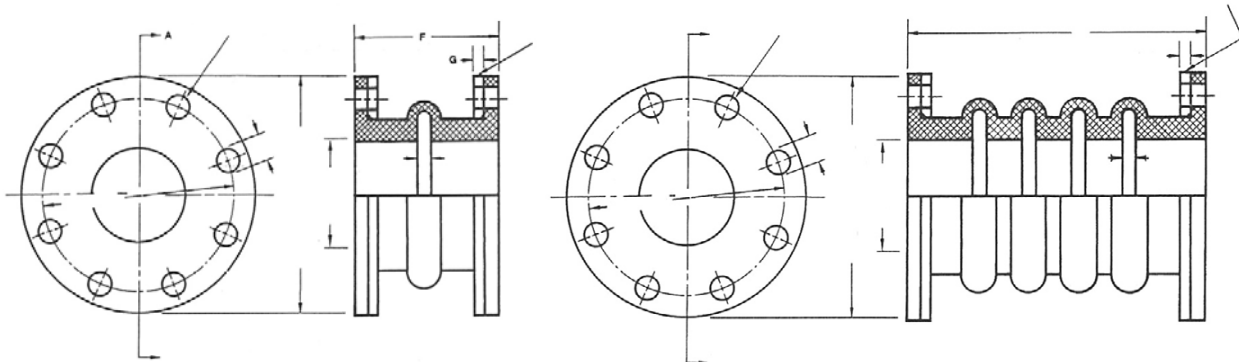
Rubber Expansion Joint

5. Type of Rubber Expansion Joint

Spool Arch Type

Single Arch Type(PER-AS). Construction is of fabric and rubber, reinforced with metal rings or wire. The full face flanges are integral with the body of the joint and drilled to conform to the bolt pattern of the companion metal flanges of the pipeline. This type of rubber face flange is of sufficient thickness to form a tight seal against the metal flanges without the use of gaskets. The shortest face-to-face dimensions are available with this type of construction.

Multiple Arch Type(PER-AD/AT). Joints with two or more arches may be manufactured to accommodate movements greater than those of which a Single Arch Type joint is capable. Multiple Arch joints of most manufacturers are composites of standard-sized arches and are capable of movements of a single arch multiplied by the number of arches. The minimum length of the joint is dependent upon the number of arches. In order to maintain lateral stability and prevent sagging when the joint is installed in a horizontal position, a maximum number of four (4) arches is recommended.



Single Arch Type Expansion Joint

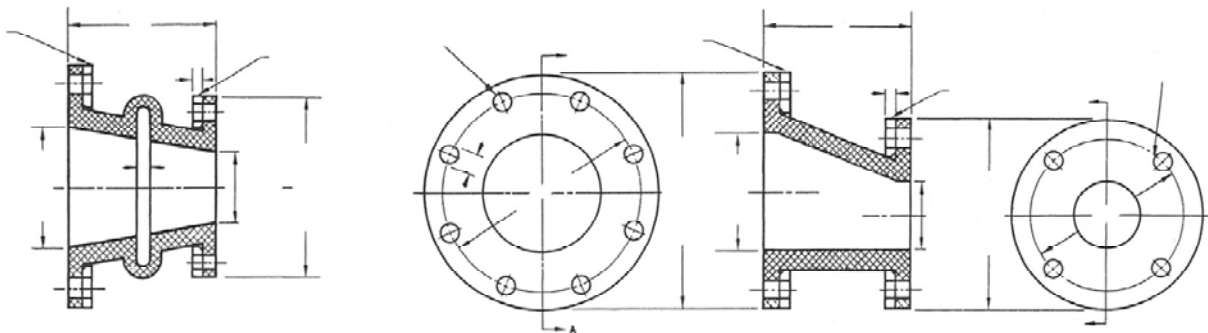
Multiple Arch Type Expansion Joint

Lightweight Type(PER-AL). Both the Single Arch and Multiple Arch Types are available in a lightweight series from most manufacturers. Dimensionally the same as the standard product, except for reduced body thickness, this series is designed for lower pressure and vacuum applications.

TPE/FEP Lined(PER-AF). Spool Arch Type joints are available in many standard pipe sizes with Teflon liners of TPE and/or FEP. These liners are fabricated as an integral part of the expansion joint during manufacture and cover all wetted surfaces in the tube and flange areas. Teflon provides exceptional resistance to almost all chemicals within the temperature range of the expansion joint body construction.

Reducer Type: "TAPER"(PER-RE/RC)

Reducing expansion joints are used to connect piping of unequal diameters. They may be manufactured as a concentric reducer with the axis of each end concentric with each other as an eccentric reducer having the axis of each end offset from each other. Tapers in excess of 15 degrees are not desirable. Recommendations concerning the degree of taper and working pressures should be obtained from the manufacturer of your choice. Normally, pressures are based on the larger of the two inside dimensions. Available with or without arches.

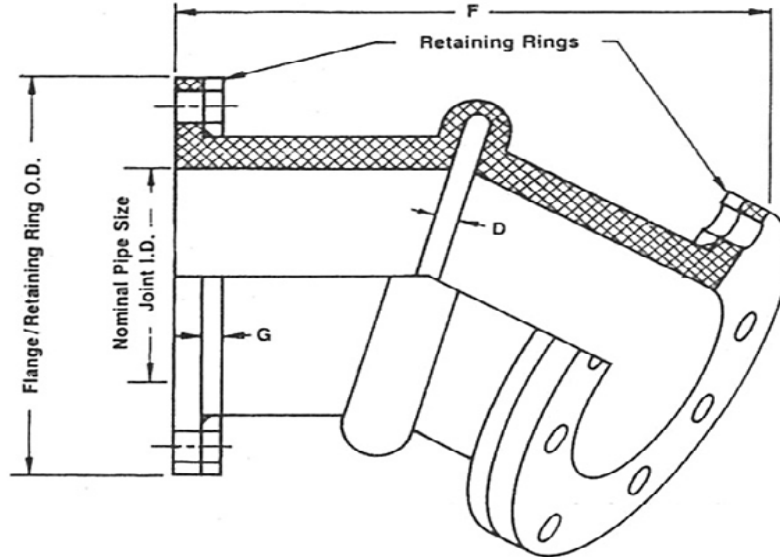


Concentric Reducer Type Expansion Joint

Eccentric Reducer Type Expansion Joint

Offset Type(PER-OF)

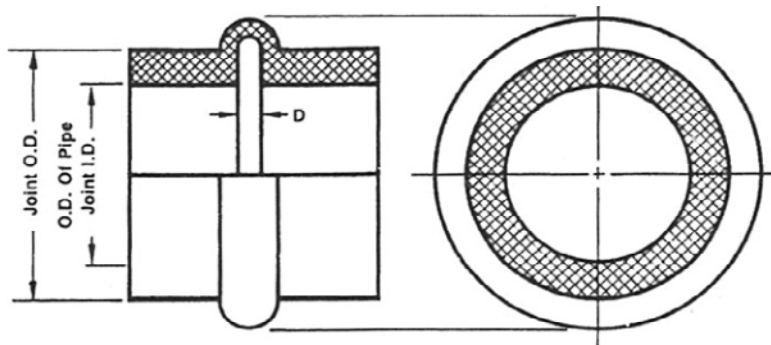
Offset joints are custom built to specifications to compensate for initial misalignment and nonparallelism of the axis of the piping to be connected. Offset joints are sometimes used in close quarters where available space makes it impractical to correct misalignment with conventional piping. Generally, the industry follows the practice of drilling flanges according to pipe size of flanges when not specified otherwise. It is recommended that complete drawings and specifications accompany inquiries or orders offset joints.



Offset Type Expansion Joint

Sleeve Type

A sleeve design is available in both single and multiple arch types. Both Types are available in several construction design series, based on the application pressure and flexibility requirements. A special sleeve type is offered by some manufacturers, which meets the requirements of MILE- 15330D Class B. (Note: This specification is scheduled to be replaced by a "Component Item Description" issued by the U.S. Navy.) Contact the manufacturer for movement and pressure limitations; and type of sleeve ends required.



Sleeve Type Expansion Joint

Spool Type(PER-LS). This joint is similar to the Spool "Arch" Type except that the capped sleeve ends have an I.D. dimension equal to the O.D. of the pipe. These joints are designed to slip over the straight ends of the open pipe and be held securely in place with clamps. This type of joint is recommended only for low to medium pressure and vacuum service because of the difficulty of obtaining adequate clamp sealing.

Lightweight Type(PER-LL). Dimensionally the same as the sleeve "Spool Type", except for reduced body thickness. This series is designed for very low pressure and vacuum applications. Joints are available in single and multiple arch types. Consult the manufacturer for the types of clamps available for sealing. This type generally offers greater flexibility than the spool type.

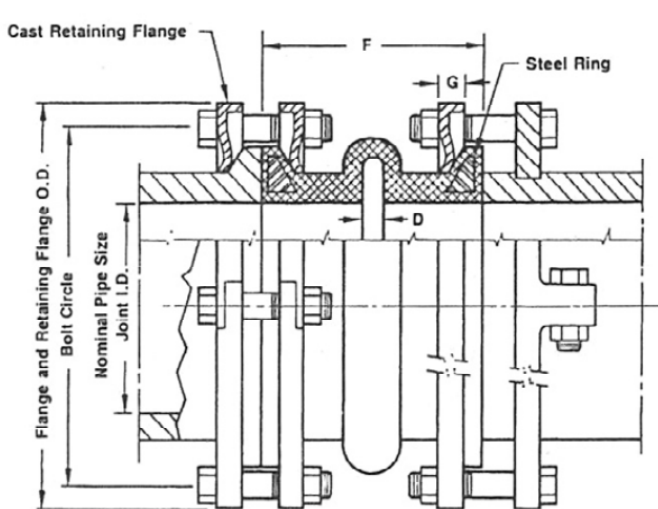
Enlarged End Type(PER-LE). This joint can be manufactured in the same design as the spool type and lightweight type. The sleeve ends on this design are the same dimension as the O.D. of the pipe, while the rest of the joint is the same dimension as the I.D. of the pipe. This design can be manufactured with a filled arch to reduce possible turbulence and to prevent collection of solid material in the arch.

Special Flange Type

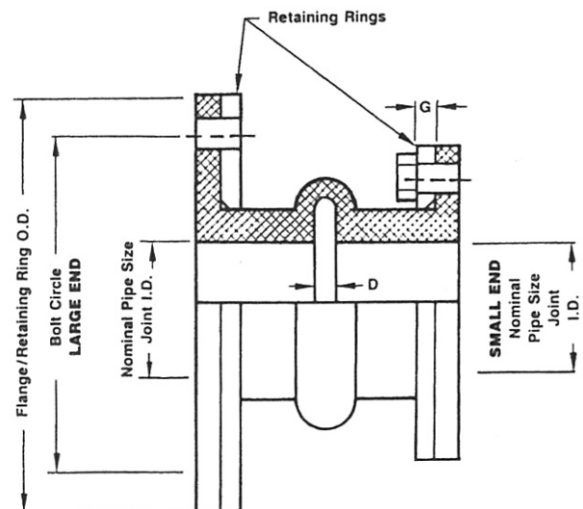
Most of the expansion joint types depicted in this chapter are available with modifications to the flanges. These modifications include "Van Stone" beaded ends, enlarged flanges, different drill patterns and weld-end stubs, and to prevent collection of solid material in the arch.

"Van Stone" Beaded End Flanged Type (PER-FV). The construction of this joint is the same as the Spool "Arch" Type except that the ends are specially designed flanges containing built-in steel rings. They are often specified for Duriron or Haveg piping systems. Special split steel flanges must be used with this design in place of standard retaining rings. Also available without arch.

Enlarged Flange Type (PER-FE). Expansion joints utilizing a full face integral flange design can be furnished with an enlarged flange on one end. (For example, an 8" expansion joint can be fabricated with a flange to mate to an 8" pipe flange on one end; and a 12" flange on the other end to mate to a 12" pipe flange.) Additionally, drilling of different specifications may be furnished. For example, an expansion joint can be furnished with one end drilled to ANSIB 16.5, Class 150, and the other end drilled to MIL-F-20042C.



"Van Stone" Flange Type Expansion Joint



Enlarged Flange Type Expansion Joint

Weld-End Type (PER-FW). Several manufacturers offer an expansion joint with weld-end nipples which allow the unit to be directly welded into place on the job or welded to associated equipment before final installation. The design is basically the Sleeve Type expansion joint bonded to matching steel weld-end nipples. Normally, there are steel band clamps around the periphery of the rubber sleeve end to reinforce the rubber-metal bond.

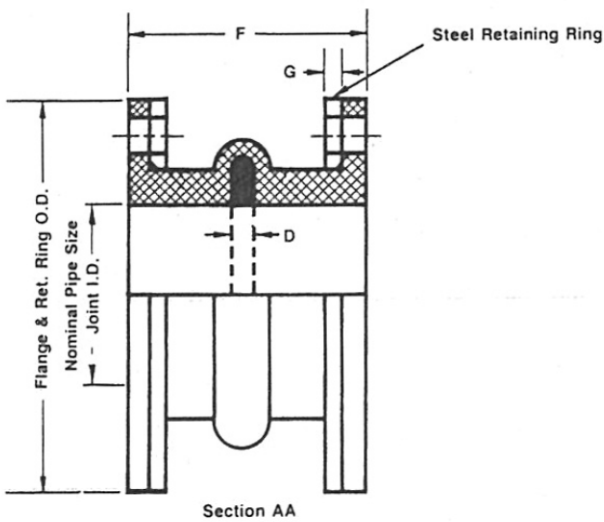
Designs for Reduction of Turbulence and Abrasion

The open-arch design of the Standard Spool Type Expansion Joint may be modified to reduce possible turbulence and to prevent the collection of solid materials that may settle from the solution handled and remain in the archway.

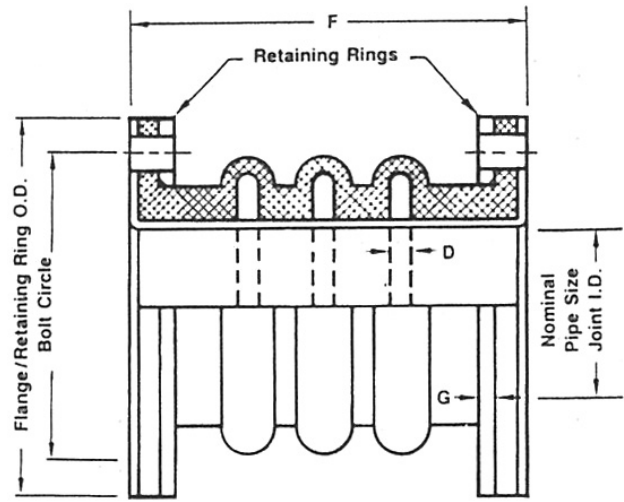
Filled Arch Type (PER-TF). Arch-type expansion joints may be supplied with a bonded-in-place soft rubber filler to provide a smooth interior bore. Filled arch joints also have a seamless tube so the arch filler cannot be dislodged during service. Filled arches, built as an integral part of the carcass, decrease the flexibility of the joint and should be used only when necessary. Movements of expansion joints with filled arches are limited to 50% of the normal movements of comparable size expansion joints with unfilled (open) arches.

Drop-In, Replaceable Elastomeric Type (PER-TD). A separate flanged liner, dimensioned to the I.D. of the expansion joint, can provide the same advantages as the Filled Arch Type; except movements are not reduced. Not recommended for vacuum applications.

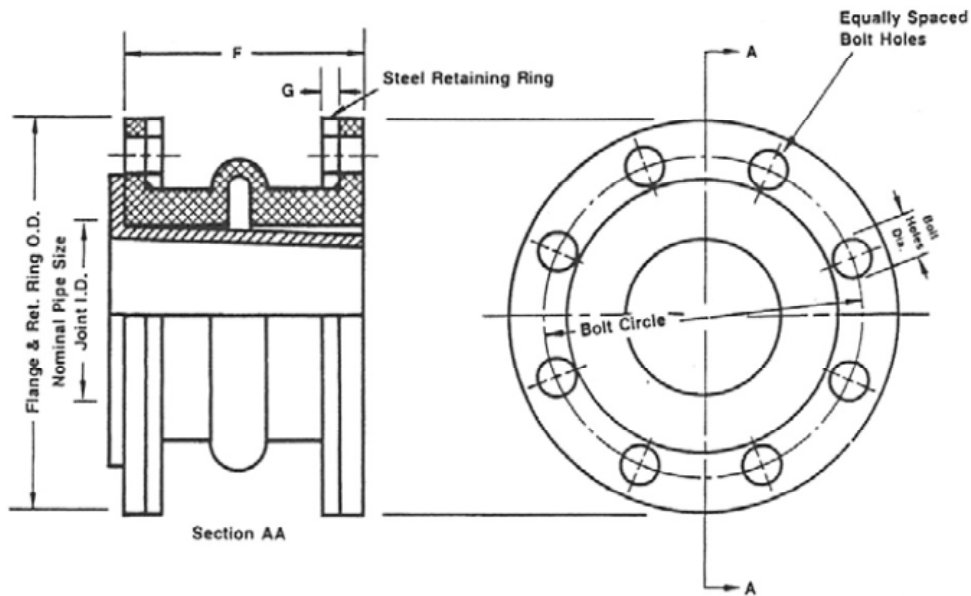
"Top Hat" Liner (PER-TT). This product consists of a sleeve extending through the bore of the expansion joint with a Van Stone or a full face flange on one end. Constructed of hard rubber, metal or TFE; it reduces frictional wear of the expansion joint and provides smooth flow, reducing turbulence. This type sleeve should not be used where high viscosity fluids, such as tars, are being transmitted. These fluids may cause "packing-up" of the arch area, which reduces movements and in turn may cause premature expansion joint failure. Baffles are rarely required on rubber expansion joints.



Section AA
Single Arch Type Expansion Joint With Filled Arch



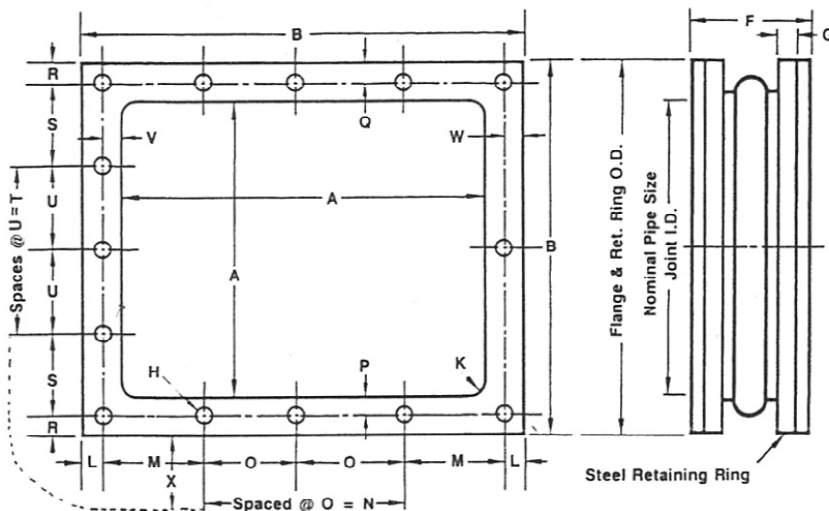
Section AA
Replaceable Liner Type Expansion Joint



Section AA
Top Hat Liner

Rectangular with Arch Type(PER-QA)

A custom-made flexible connector for use with rectangular flanges on low pressure service. The arch design accommodates greater movement than the "U" type joint.

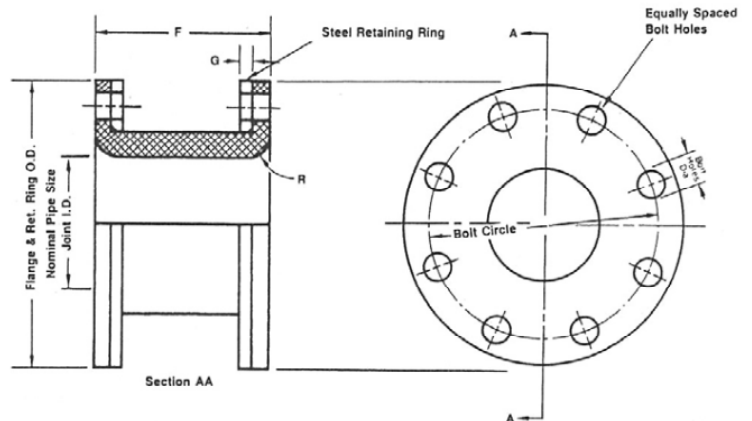


Rectangular With Arch Type Expansion Joint

U Type

"U" type joints are available for low pressure applications in external and internal flange design and for higher pressure service in a no-arch modification of the single Arch Type.

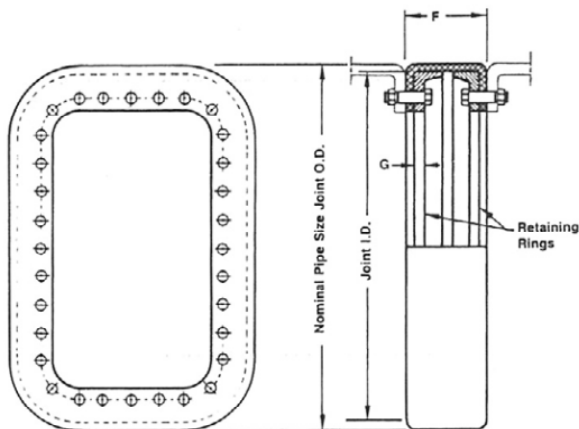
External Full Face Integral Flange Joint(PER-UE). This lightweight custom-made flexible joint is generally used between a turbine and condenser. It is constructed of plies of rubber and fabric usually without metal reinforcement. The joint is recommended for full vacuum service or a maximum pressure of 25 PSIG. Flange drilling may be staggered to facilitate installation and tightening of bolts. The joint is securely bolted in place with conventional retaining rings for vacuum service or special support rings for pressure service. The joint may be rectangular, round or oval in shape.



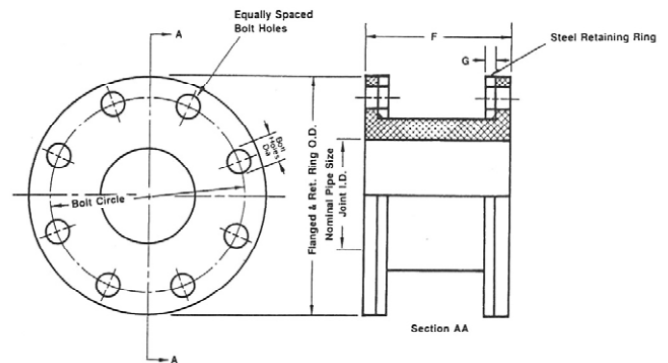
Lightweight External Flange "U" Type Connector

Internal Full Face Integral Flange Joint(PER-UI). This joint is similar to the external flange joint except that conventional retaining rings are used for pressure service and special support rings are used for vacuum service. The joint may be rectangular, round or oval in shape. which depicts a rectangular version with special support rings.

Spool Type, No Arch(PER-UN). The construction of this joint is the same as the Single Arch Type, except modified to eliminate the arch. Not recommended for movement, this connector will absorb vibration and sound.



Lightweight Internal Flange Type "U" Type Connector



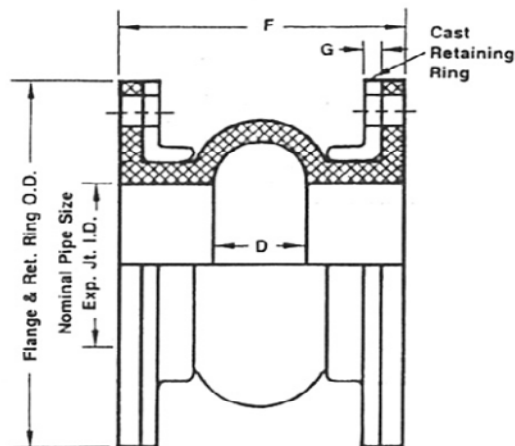
No-Arch "U" Type Connector

Wide Arch Type

This type, similar to the Spool "Arch" Type, is available in a metallic reinforced and a non-metallic reinforced design. Generally, the Wide Arch Type features greater movements than the Standard Spool "Arch" Type.

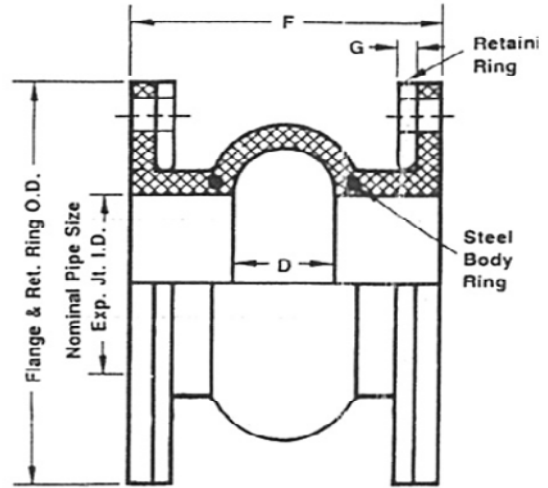
Non-Metallic Reinforced Design(PER-WN).

Constructed similar to the Spool "Arch" Type except the carcass does not contain wire or metal ring reinforcement. Pressure resistance is accomplished through the use of a special external flanged retaining ring furnished with the joint. Available also in a "Filled Arch" design.



Molded Wide Arch Non-Metallic Reinforced Type Expansion Joint

Metallic Reinforced Design(PER-WM). A molded version of the Spool "Arch" Type utilizing solid steel rings in the carcass, at the base of the arch. The reduced body thickness requires special retaining rings available from the manufacturer.



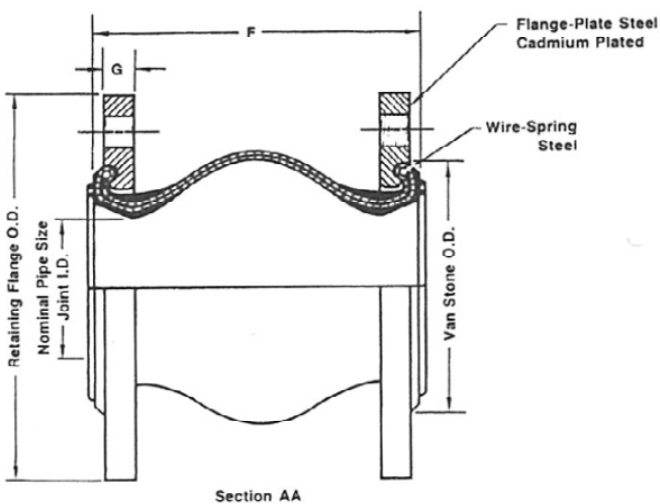
Molded Wide Arch Metallic Reinforced Type Expansion Joint

Spherical Molded Type

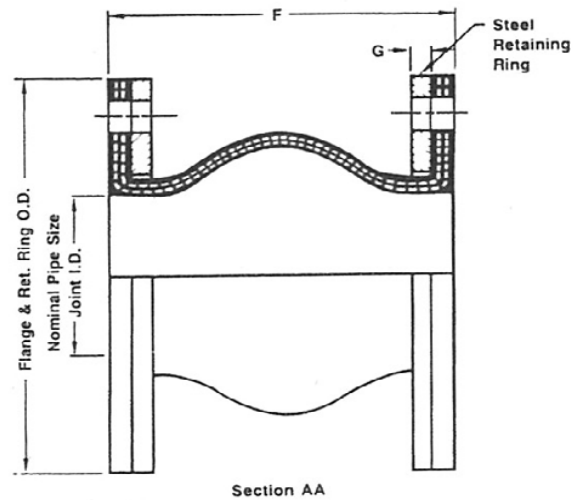
A molded spherical design is manufactured in two types. One type utilizes solid floating metallic flanges. The other type has built-in full face integral flanges. The design incorporates a long radius arch, providing additional movement capabilities when compared to other types. The arch is self-cleaning, eliminating the need of Filled Arch Type construction. These types are recommended for basically the same applications as the Spool "Arch" Type.

Floating Flange Spherical Type(PER-MF). The molded sphere design utilizes similar construction except the carcass does not contain metallic reinforcement. Utilizing special weave fabric for reinforcement, the spherical shape offers a high burst pressure. Movements and pressure ratings should be obtained from the manufacturer. Furnished complete with solid floating flanges, this design is generally available for pipe sizes under 30" diameter and in single or double arch designs.

Integral Flange Spherical Type(PER-MI). Basically the same design as the Floating Flange Spherical except full face flanges are integral with the body of the joint. Pressure-resisting hoop strength is a function of the special weave fabric and its ply placement in the body, as well as the design of the retaining rings. Special retaining rings are sometimes required. Contact the manufacturer for pressure and movement rating.



Molded Spherical Type Expansion Joint With Solid Floating Flanges



Molded Spherical Type Expansion Joint With Integral Flanges