**FLEX-TEND®**
Flexible Expansion Joint

**Features and Applications:**

- Sizes 2 inch through 48 inch
- Rated 350 PSI working water pressure (Sizes 2 inch and 30 inch and above rated at 250 PSI)
- For Ductile Iron, Steel, PVC or HDPE pipe
- Sizes 4 inch through 12 inch have had a configuration update.
- Expansion/Contraction travel preset at 50/50 setting. 50% percent reserved for expansion and the remaining 50% reserved for contraction.
- Designed to give Deflection and or Expansion/Contraction needs to protect pipeline systems from shear. Refer to submittal drawings for “offset” capability
- Constructed of ASTM A536 Ductile Iron
- Up to 20° Deflection per ball
- Additional Expansion Sleeves can be added for increased expansion capacity
- Each unit tested to rated working pressure prior to shipment
- Due to the design of the seals, no periodic maintenance is required
- End connections can be Flanged, Mechanical Joint or a combination of the two.
- Flange outlets conform to the dimensional requirements of ANSI/AWWA C110/A21.10 (class 150) with the addition of an O-ring gasket (except for 2 inch unit) which is provided to ensure a watertight seal.
- Mechanical Joint end connections conform to the dimensional requirements of either ANSI/AWWA C111/A21.11 or ANSI/AWWA C153/A21.53 depending on size.
- FLEX-TEND assemblies are suitable for direct burial. Polyethylene wrap is provided with each unit. If installed in a vault, the design must be such that movement is not impeded. Refer to Connections FT-2 found at www.ebaa.com.
- All “wetted” parts are coated with a fusion bonded epoxy which is NSF61 Approved.
- For use on water or wastewater pipelines subject to hydrostatic pressure and tested in accordance with either AWWA C600 or ASTM D2774

*Image depicts direct burial application (Polyethylene wrap not depicted). Refer to “Connections” FT-2 for more details.*

*U.S. Patent No. 4,776,617*
Pipeline Protection from ground Motion and Shear

Pipelines crossing unstable terrain such as faults, swamps or landfills all suffer some degree of vulnerability to damage from ground motion. This motion can be either gradual or sudden, and places damaging shear and bending forces on pipelines. In areas close to, or within structures where differential movement can occur, pipelines should be restrained and supported to isolate and accommodate movement in a controllable manner at a designated location.

FLEX-TEND flexible expansion joints provide pipeline protection from the stresses produced by these forces with their ability to deflect up to 20 degrees per ball, in any direction, while simultaneously expanding or contracting. They are available in sizes from 2 inches to 48 inches and can be used on ductile iron, steel, or PVC pipelines for:

Connection to buildings, tanks, and other structures
Underground to aerial transitions such as bridges
Areas of anticipated ground movement and unstable soils
Areas near roadways and dams
Active faults crossings and liquefaction zones

The FLEX-TENDS are available with both flange and mechanical joint end connections for adaptable protection for pipelines, pumps, bridge crossings, tank connections and many other critical installations, either above or below ground. Sizes of 3-inches through 24-inches are rated for 350 psi working water pressure. Sizes of 2 inch, 30 inch, and larger are rated for 250 psi working water pressure.

FLEX-TENDS are manufactured entirely of ductile iron, conforming to all applicable requirements of ANSI/AWWA C153/A21.53 and FLEX-TENDS are totally protected from internal corrosion with a lining of fusion-bonded epoxy.

FLEX-TEND flexible expansion joints are available in double ball or single ball configurations. Double-ball units offer the unique ability to accommodate a considerable degree of close-coupled vertical subsidence and will deflect up to 20 degrees per ball in any direction. Single-ball configurations can be used in pairs with a spool piece between them to increase the offset between the two ball ends.

Expansion/contraction capability is cast as an integral part of the ball and socket, and can be adjusted with additional sleeves installed at the factory prior to shipping or in the field at a later date. The use of additional sleeves increases both the axial movement and the available offset. The expansion pre-sets shown in the following tables can easily be changed by the purchaser during his purchase order or later in the field.

Important Updates

As of 2012-08-27 all FLEX-TEND Flexible Expansion Joints have a factory preset of 50/50 for the expansion/contraction travel. 50% of the total joint’s travel will be reserved for Expansion of the pipeline while the remaining 50% will be reserved for Contraction of the pipeline. This is a change from the previous 75% for contraction and 25% for expansion preset.

Sizes 4 inch through 12 inch FLEX-TENDS have had a change in their component configuration. The Sockets are now one piece and no longer have a second flanged gland. This new compact socket allows for a smaller overall outside diameter (OD), stronger more robust design, and lessens the total amount of fasteners on the unit.

The submittal drawings and their dimensions found within this brochure reflects these upgrades and changes. For submittal information of the previous design and presets refer to the FLEX-TEND product brochure with revision code letter “S”, found in the lower left hand corner of the first page on the brochure.

Additional Technical Documentation regarding FLEX-TEND and other EBAA Iron products can be found at www.ebaa.com. Refer to the Tech Support page and look under Connection Bulletins.
Sample Specification

1. Flexible expansion joints shall be installed in the locations indicated on the drawings and shall be manufactured of ductile iron conforming to the material requirements of ASTM A536 and ANSI/AWWA C153/A21.53. Foundry certification of material shall be readily available upon request.

2. Each flexible expansion joint shall be pressure tested prior to shipment against its own restraint to a minimum of 350 psi (250 psi for flexible expansion joints 2 inch and 30 inch diameter and larger.) A minimum 2:1 safety factor, determined from the published pressure rating, shall apply. Factory Mutual Approval for the 3 inch through 12 inch sizes is required.

3. Each flexible expansion joint shall consist of an expansion joint designed and cast as an integral part of a ball and socket type flexible joint, having a minimum per ball deflection of: 20º, 2" - 12"; 15º, 14" - 36"; 12º, 42"-48" and 4-inches minimum expansion. Additional expansion sleeves shall be available and easily added or removed at the factory or in the field. Both standardized mechanical joint and flange end connections shall be available.

4. All internal surfaces (wetted parts) shall be lined with a minimum of 15 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C213. Sealing gaskets shall be constructed of EPDM. The coating shall meet ANSI/NSF-61.

5. Exterior surfaces shall be coated with a minimum of 6 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C116/A21.16.

6. Appropriately sized polyethylene sleeves, meeting ANSI/AWWA C105/A21.5, shall be included for direct buried applications.

7. Manufacturer’s certification of compliance to the above standards and requirements shall be readily available upon request. The purchaser (or owner) shall reserve the right to inspect the manufacturer’s facility for compliance. All flexible expansion joints shall be FLEX-TEND as manufactured by EBAA Iron, INC. Eastland, TX., U.S.A.

(Download a copy of this specification from www.ebaa.com)
FLEX-TEND Double Ball Submittal Reference Drawing - Flange by Flange

Two inch unit can be ordered with additional sleeves to increase expansion/contraction capacity.

† Deflection in degrees per ball
†† The expansion values listed represent the total movement for the particular size and configuration. Unless otherwise specified, FLEX-TEND assemblies are preset at factory to reserve 50% of total movement for expansion and 50% for contraction. "Laying, Total, and CL" lengths reflects the standard 50% / 50% preset condition. Modifying the preset ratio requires a corresponding modification of these lengths.

All dimensions are in Inches and are ± 1%.

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NOTE: All dimensions listed in brochure are in inches and subject to change without notice.

All dimensions are ± 1%.

† Deflection in degrees per ball

†† The expansion values listed represent the total movement for the particular size and configuration. Unless otherwise specified, FLEX-TEND assemblies are preset at factory to reserve 50% of total movement for expansion and 50% for contraction.

*Laying, Total, and CL* lengths reflects the standard 50% / 50% preset condition. Modifying the preset ratio requires a corresponding modification of these lengths.

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### FLEX-TEND Double Ball Submittal Reference Drawing - M.J. by M.J.

**NOTE:** All dimensions listed in brochure are in inches and subject to change without notice.

All dimensions are ± 1%.

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<tr>
<th>Nominal Pipe Size</th>
<th>OD</th>
<th>Deflection† (Degrees)</th>
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<th>Expansion††</th>
<th>Total</th>
<th>Laying</th>
<th>CL</th>
<th>S (Offset)</th>
<th>Weight (lbs.)</th>
<th>Assembly Number</th>
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† Deflection in degrees per ball

†† The expansion values listed represent the total movement for the particular size and configuration. Unless otherwise specified, FLEX-TEND assemblies are preset at factory to reserve 50% of total movement for expansion and 50% for contraction.

*Laying, Total, and CL lengths reflects the standard 50% / 50% preset condition. Modifying the preset ratio requires a corresponding modification of these lengths.

All dimensions are ± 1%.
**FLEX-TEND Single Ball Submittal Reference Drawing - M.J. by M.J.**

*NOTE:* All dimensions listed in brochure are in inches and subject to change without notice.

All dimensions are ± 1%.

† Deflection in degrees per ball

†† The expansion values listed represent the total movement for the particular size and configuration. Unless otherwise specified, FLEX-TEND assemblies are preset at factory to reserve 50% of total movement for expansion and 50% for contraction.

*Laying, Total, and CL* lengths reflect the standard 50% / 50% preset condition. Modifying the preset ratio requires a corresponding modification of these lengths.

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<th>Nominal Pipe Size</th>
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<th>Expansion††</th>
<th>Total</th>
<th>Laying</th>
<th>Weight (lbs.)</th>
<th>Assembly Number</th>
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All dimensions are ± 1%.

NOTE: All dimensions listed in brochure are in inches and subject to change without notice.
Notes on Thrust Forces and Restraints

Because the FLEX-TEND and EX-TEND both incorporate an expansion joint, it behaves similar to other expansion joint under pressure. Due to their design, expansion joints generate end thrust when subject to internal pressure, as seen in Figure 1.1. This end thrust must be accounted for in pipeline design. The end thrust generated by either the FLEX-TEND or EX-TEND is calculated by multiplying the internal pressure (PSI) by the area listed in Table 1.1.

When used in a long and relatively straight pipeline, the pipe-to-soil friction is generally sufficient to balance the force. The use of thrust blocks or other means of anchoring is required when fittings are placed in close proximity to the expansion joint underground. This protects the pipeline from the tendency of the unit to expand when pressurized. In an above ground installation such as a bridge application, some means must be provided to prevent the expansion of the joint due to internal pressure. This can be accomplished by anchoring the piping to the structure while allowing room for movement when motion occurs. Please also consider EBAA's thrust or Force Balanced FLEX-TEND models that do not generate axial thrust under water pressure.

In order for the FLEX-TEND and EX-TEND to protect pipeline connections, any load must be transferred to the unit by the restrained joints. Depending on the piping arrangement and the anticipated movement of the pipelines, adjacent piping must be restrained to adequately transfer the loads to the unit. Joint restraint is provided with each mechanical joint end connection. The Table 1.2 lists some of the restraint products offered by EBAA Iron, Inc. as well as the pipe material on which each is used.

Weld-on flanges are generally used for applications on steel piping. For other piping materials please contact EBAA. For technical information call EBAA Engineering at 800.633.9190.

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<th>Area (Inch²)</th>
<th>Thrust @ 150 PSI (lb)</th>
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Table 1.2

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<td>PVC</td>
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</tbody>
</table>

Thrust Equation: \( T = PA \)

Where:
- \( T \) = Thrust Force, lbs.
- \( P \) = Hydrostatic Test Pressure (PSI), \( \text{in}^2 \)
- \( A \) = Area of Pipe, \( \text{in}^2 \)