The AMERICAN Earthquake Joint system combines the rugged, tough, and time-proven deflection performance of AMERICAN's Flex-Ring restrained joint pipe with the capacity to expand and contract.

The system is built around a central ductile iron Earthquake System casting that features in its design an extended socket depth allowing the specially placed Flex-Ring weld ring an expansive range of motion.

The ductile iron earthquake casting and Flex-Ring connecting piece arrive at the jobsite pre-assembled by our professional staff at our manufacturing plant. The extended socket receives a special Flex-Ring spigot end with a specially located restraining ring. The pre-assembled Earthquake System spigot has a double stripe, one showing full insertion and the other mid-point insertion. The illustration below shows the joint installed in the fully extended position, such that both assembly stripes are fully visible.

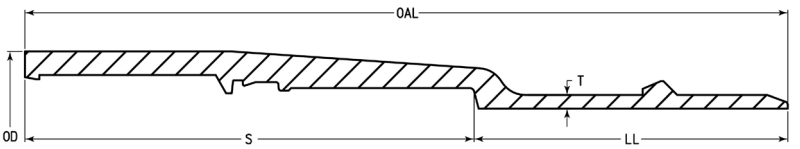
Pre-assembly means the on-site contractor needs to assemble only the familiar and conventional Flex-Ring joint. In this application, the Flex-Ring spigot on the ductile iron Earthquake System central casting is red in color and machined instead of welded. Conventionally, it's a Flex-Ring joint and is assembled in the field in the same manner.

The AMERICAN Earthquake System joint may be assembled in the fully contracted position, allowing for maximum expansion; it may be assembled in the mid-point position, allowing for both joint expansion and contraction; or it may be assembled in the fully extended position, allowing for maximum joint contraction.

The more common is the mid-point position, which allows for both expansion and contraction during a seismic event.

After assembly, the AMERICAN Earthquake Joint System can expand and contract longitudinally and deflect at both joints. With deflection from the conventional Flex-Ring joint and additional deflection from the extended socket Flex-Ring joint, the assembly provides 8 degrees deflection for 6", 8" and 12"; 7 degrees for 16"; and 6 degrees for 20" and 24"; as well as 2.4 inches of either expansion or contraction for all diameters. If assembled in the fully contracted or fully extended position, 4.8 inches of one-way longitudinal differential is available for all diamters.

Standard Dimensions



Size (in.)	Working Pressure[1] (psi)	Earthquake Casting OAL (in.)	Earthquake Casting LL (in.)	Socket Depth S (in.)	Thickness T (in.)	Bell OD (in.)	Spigot OD (in.)
6	350	25.63	10.53	15.10	0.43	9.54	6.90
8	350	25.93	10.71	15.22	0.45	11.78	9.05
12	350	27.60	11.38	16.22	0.49	16.34	13.20
16	350	31.75	14.31	17.44	0.70	20.54	17.40
20	350	32.20	15.02	17.18	0.80	25.20	21.60
24	350	33.70	16.44	17.26	0.89	29.46	25.80

[1]Working pressure is the maximum pressure rating of the joint and is based on its capability to resist thrust due to internal pressure. If higher working pressure is required, contact AMERICAN.

Nominal full* laying lengths for AMERICAN Earthquake Joint System assembled with AMERICAN Flex-Ring Joint Pipe

Size (in.)	Casting Fully Homed	Casting at Midpoint of Insertion	Casting Fully Extended	Cast Weight (lbs.)
6	20'-9.57"	21'-0.32"	21'-2.74"	104
8	20'-9.75"	21'-0.54"	21'-2.95"	140
12	20' -9.34"	21'-0.21"	21'-2.65"	263
16	20'-11.79"	21'-2.80"	21'-5.63"	419
20	21'-0.02"	21'-2.76"	21'-5.07"	610
24	21'-1.44"	21'-4.18"	21'-6.56"	779

* Subject to trim pipe allowances per AWWA C151. Where exact lengths are required, contact AMERICAN.

Deflection, offset, and radius for AMERICAN Earthquake Joint System

Size (in.)	Working Pressure[1] (psi)	Earthquake Casting OAL (in.)	Allowable Deflection (degrees)	Offset Per Nominal Assembly LL (in.)	Radius of Curvature (ft.)
6	350	25.63	8	35.12	150
8	350	25.93	8	35.15	150
12	350	27.60	8	35.10	150
16	350	31.75	7	31.05	174
20	350	32.20	6	26.63	203
24	350	33.70	6	26.78	204

Suggested Pipe Specification

As required on the project plans and in these specifications, in high-risk areas subject to earthquakes, a ductile iron system shall be provided that delivers joint deflection and longitudinal expansion and contraction. This system shall be the AMERICAN Earthquake Joint System or a system equal to or exceeding each of these performance criteria:

Size (in.)	Pipe Joint Deflection	Casting Joint Deflection	Combined Assembly Deflection	Expansion or Contraction from Mid-Point	Dead End Thrust Resistance
6	5 °	3 °	8 °	± 2.4 inches	102,000 lbs
8	5 °	3 °	8 °	± 2.4 inches	136,000 lbs
12	5 °	3 °	8 °	± 2.4 inches	204,000 lbs
16	5 °	2 °	7 °	± 2.4 inches	272,000 lbs
20	4 °	2 °	6 °	± 2.4 inches	340,000 lbs
24	4 °	2 °	6 °	± 2.4 inches	408,000 lbs

The ductile iron earthquake resistant pipe shall meet all applicable requirements of **AWWA C150** (design), **AWWA C151** (manufacture), **AWWA C104** (lining), C111 (joints), **AWWA C153** (fittings), **AWWA C105** (polyethylene encasement), and **AWWA C600** (installation). The ductile iron pipe shall be sized in inches.

The piping shall meet defined classifications detailed below as shown in **ISO 16134 Earthquake Resistant Ductile Iron Pipe and Subsidence-Resistant Design**. The seismic design shall be verified by an independent seismic lab such as Cornell University or an owner-approved alternative.

1. All ductile iron pipe and fittings joints shall meet or exceed **3dKN pull out strength or category A**.

2. Designated Earthquake System piping shall meet or exceed a minimum deflection of **7.5 degrees or category M2** for sizes 6" - 12" and **equal to or under 7.5 degrees or category M3** for sizes 16" and above.

3. Designated ductile iron Earthquake System piping will have a minimum **strain relief of plus or minus 1% or category S1**.

As a designation, the minimum requirements would be A-M2-S1 per ISO 16134 for sizes 6" - 12" and A-M3-S1 for sizes 16" and above, unless otherwise shown on plans and specifications.

The network of ductile iron pipe connected to the Earthquake Joint System shall have the exterior of the pipe coated with a layer of arc-sprayed zinc. The mass of the zinc applied shall be a minimum of 200 g/m^2 of pipe surface area and the coating system shall conform in every respect to **ISO 8179-1, "Ductile Iron Pipes - External Zinc-Based Coating - Part 1: Metallic Zinc with Finishing Layer,"** second edition 2004-06-01. The zinc shall have a top coat of approved materials. (Component pieces and field touch up may require the use of a zinc-rich coating 85% zinc per **ISO-8179-part 2)**

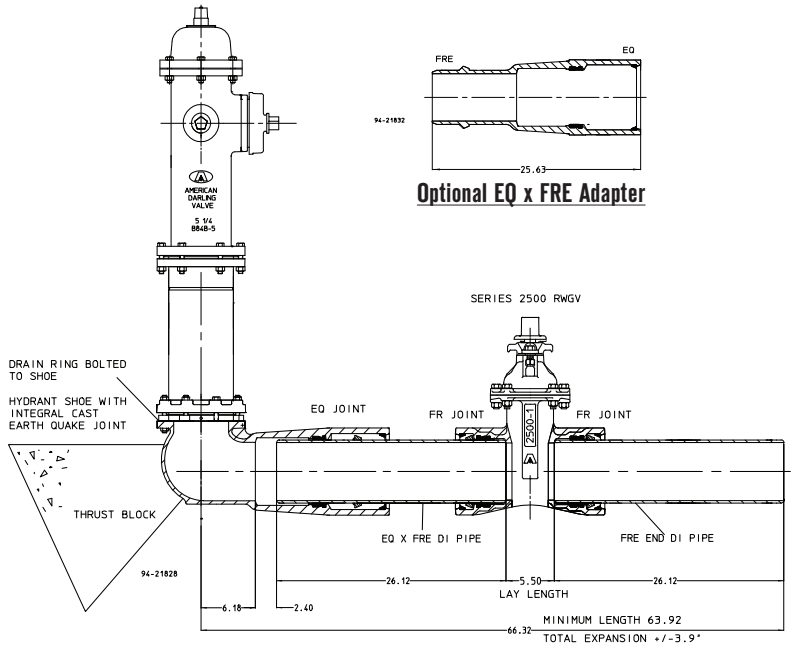
The Earthquake System piping will be installed in the fully open, fully closed, or mid-point position per design criteria. To facilitate determining field joint alignment, the expansion spigot in the assembly shall have a minimum of two assembly stripes – one indicating fully contracted and one indicating the mid-point of extension. Full extension can be achieved by pulling the completed joint out until the joint stops movement.

In addition, the connected network of ductile iron pipe shall be encased in 8 mil **V-Bio polyethylene encasement** meeting the requirements of AWWA C105 concerning both materials and installation.

The pipeline will be installed with a **locator tape** that identifies the buried line as an earthquake resistant pipeline. The tape will be a minimum 2 inches in width and red in color with the wording *"Earthquake Resistant Pipeline Below."*

Standard Dimensions

AMERICAN Flow Control – 5-1/4 B84B-5 Fire Hydrant with Integral Cast Earthquake Joint System Base



Optional EQ x FRE Adapter

Standard Earthquake Joint Configuration

Suggested Fire Hydrant Specification

Fire hydrants shall meet or exceed ANSI/AWWA C502, latest revision. Rated working pressure shall be 250 psig, test pressure shall be 500 psig and hydrants shall include the following specific design criteria:

The main valve closure shall be of the compression type. Traffic features to be designed for easy 360-degree rotation of nozzle section during field installation. The main valve opening shall not be less than 5-1/4 in. and be desingned so that removal can be accomplished without excavating.

The hydrant valve shall be constructed of EPDM rubber and have a vertical taper of 20-degrees, or less. The bronze seat shall be threaded into a bronze drain ring. The draining system of the hydrant shall be bronze and positively activated by a square operating rod. Hydrant drains shall close completely after no more than three turns of the operating nut. There shall be a minimum of two internal ports and four outlets to the exterior of the hydrant. Drain shutoff to be by a spring actuated positive compression closure. Sliding drains are not permitted.

Hydrant barrels shall have one (1) pumper nozzle and two (2) hose nozzles. The barrel shall be made of ductile iron and nozzles shall be retained by collars. Threaded-in nozzels and nozzles using set screws are not allowed. Hydrant upper barrel shall be factory coated with an electrodeposition (E-coat) epoxy primer and catalyzed two-part polyurethane top coating. Base shall be coated with fusion-bonded epoxy. All bolting below grade shall be Type 304 stainless steel. Friction loss not to exceed 3.0 psig at 100 GPM through 4 1/2" pumper nozzle. Fire hydrants shall be the AMERICAN Flow Control's American-Darling 5 1/4" B-84-B-5, or engineer approved equal.

AMERICAN Earthquake Joint System:
The B-84-B-5 hydrant is to be supplied with AMERICAN Earthquake Joint System base. The base shall be a single casting and shall be installed integral to the fire hydrant. It shall be coated with fusion-bonded epoxy coating. The Earthquake base shall allow for a minimum of: 3-degrees of joint deflection, +/- 2.4-inches of longitudinal extension and exhibit 102,000 lbs. of slip-out resistance.

The fire hydrant shall be incorporated in a hydrant lead with AMERICAN Flow Series 2500 resilient wedge gate valve with Flex-Ring ends for isolation. Each end of the gate valve shall be capable of 5-degrees of deflection.