

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For expansion joints to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 2. ASME Boiler and Pressure Vessel Code: Section IX.

PART 2 - PRODUCTS

2.1 PACKED EXPANSION JOINTS

- A. Flexible, Ball-Joint, Packed Expansion Joints:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Advanced Thermal Systems, Inc.
2. Standards: ASME Boiler and Pressure Vessel Code: Section II, "Materials"; and ASME B31.9, "Building Services Piping," for materials and design of pressure-containing parts and bolting.
3. Material: Carbon-steel assembly with asbestos-free composition packing.
4. Design: For 360-degree rotation and angular deflection.
5. Minimum Pressure Rating: 250 psig at 400 deg F (1725 kPa at 204 deg C).
6. Angular Deflection for NPS 6 (DN 150) and Smaller: 30 degree minimum.
7. Angular Deflection for NPS 8 (DN 200) and Larger: 15 degree minimum.
8. End Connections for NPS 2 (DN 50) and Smaller: Threaded.
9. End Connections for NPS 2-1/2 (DN 65) and Larger: Flanged.

- B.

NORTHWESTERN UNIVERSITY
PROJECT NAME _____
JOB # _____

FOR: _____
ISSUED: 03/29/2017

1. Anvil International, Inc.
2. Shurjoint Piping Products.
3. Victaulic Company.

- B. Description: Factory-assembled expansion joint made of several grooved-end pipe nipples, couplings, and grooved joints.
- C. Standard: AWWA C606, for grooved joints.
- D. Nipples: Galvanized, ASTM A 53/A 53M, Schedule 40, Type E or S, steel pipe with grooved ends.
- E. Couplings: Multiple (as required), flexible type for steel-pipe dimensions. Include ferrous housing sections, with EPDM gasket suitable for project fluids, and bolts and nuts.

2.3 FLEXIBLE-HOSE PACKLESS EXPANSION JOINTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Metraflex, Inc.
 2. Flexhose
 3. Flexicraft
- B. Description: Manufactured assembly with inlet and outlet elbow fittings and two flexible-metal-hose legs joined by long-radius, 180-degree return bend or center section of flexible hose.
- C. Flexible Hose: Corrugated-metal inner hoses and braided outer sheaths.
- D. Expansion Joints for Copper Tubing NPS 2 (DN 50) and Smaller: Copper-alloy fittings with solder-joint end connections.
1. Bronze hoses and double-braid bronze sheaths with 700 psig at 70 deg F (4830 kPa at 21 deg C) and 500 psig at 450 deg F (3450 kPa at 232 deg C) ratings.
- E. Expansion Joints for Copper Tubing NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Copper-alloy fittings with threaded end connections.
1. Stainless-steel hoses and double-braid, stainless-steel sheaths with 420 psig at 70 deg F (2890 kPa at 21 deg C) and 315 psig at 450 deg F (2170 kPa at 232 deg C) ratings.
- F. E23

- H. Expansion Joints for Steel Piping NPS 8 to NPS 12 (DN 200 to DN 300): Carbon-steel fittings with flanged end connections.
 - 1. Stainless-steel hoses and double-braid, stainless-steel sheaths with 165 psig at 70 deg F (1130 kPa at 21 deg C) and 120 psig at 600 deg F (830 kPa at 315 deg C) ratings.
- I. Expansion Joints for Steel Piping NPS 14 (DN 350) and Larger: Carbon-steel fittings with flanged end connections.
 - 1. Stainless-steel hoses and double-braid, stainless-steel sheaths with 165 psig at 70 deg F (1130 kPa at 21 deg C) and 120 psig at 600 deg F (830 kPa at 315 deg C) ratings.

2.4 ALIGNMENT GUIDES AND ANCHORS

A. Alignment Guides:

- 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Advanced Thermal Systems, Inc.
- 2. Description: Steel, factory-fabricated alignment guide, with bolted two-section outer cylinder and base for attaching to structure; with two-section guiding spider for bolting to pipe.

B. Anchor Materials:

- 1. Steel Shapes and Plates: ASTM A 36/A 36M.
- 2. Bolts and Nuts: ASME B18.10 or ASTM A 183, steel hex head.
- 3. Washers: ASTM F 844, steel, plain, flat washers.
- 4. Mechanical Fasteners: Insert-wedge-type stud with expansion plug anchor for use in hardened portland cement concrete, with tension and shear capacities appropriate for application.
 - a. Stud: Threaded, zinc-coated carbon steel.
 - b. Expansion Plug: Zinc-coated steel.
 - c. Washer and Nut: Zinc-coated steel.
- 5. Chemical Fasteners: Insert-type-stud, bonding-system anchor for use with hardened portland cement concrete, with tension and shear capacities appropriate for application.
 - a. Bonding Material: ASTM C 881/C 881M, Type IV, Grade 3, two-component epoxy resin suitable for surface temperature of hardened concrete where fastener is to be installed.
 - b. Stud: ASTM A 307, zinc-coated carbon steel with continuous thread on stud unless otherwise indicated.
 - c. Washer and Nut: Zinc-coated steel.

NORTHWESTERN UNIVERSITY
PROJECT NAME _____
JOB # _____

FOR: _____
ISSUED: 03/29/2017

PART 3 - EXECUTION

3.1 EXPANSION-JOINT INSTALLATION

- A. Install expansion joints of sizes matching sizes of piping in which they are installed.
- B. Install packed-type expansion joints with packing suitable for fluid service.
- C. Install metal-bellows expansion joints according to EJMA's "Standards of the Expansion Joint Manufacturers Association, Inc."
- D. Install rubber packless expansion joints according to FSA-NMEJ-702.
- E. Install grooved-joint expansion joints to grooved-end steel piping

3.2 PIPE LOOP AND SWING CONNECTION INSTALLATION

- A. Connect risers and branch connections to mains with at least five pipe fittings including tee in main.
- B. Connect risers and branch connections to terminal units with at least four pipe fittings including tee in riser.

NORTHWESTERN UNIVERSITY
PROJECT NAME _____
JOB # _____

FOR: _____
ISSUED: 03/29/2017

- G. Use grout to form flat bearing surfaces for guides and anchors attached to concrete.

END OF SECTION 23 0516