
SECTION 230516 – EXPANSION FITTINGS AND LOOPS FOR HVAC PIPING

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(Engineer shall edit specifications and blue text in header to meet project requirements. This includes but is not limited to updating Equipment and/or Material Model Numbers indicated in the specifications and adding any additional specifications that may be required by the project. Also turn off all “Underlines”.)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section and all other sections of Division 23.

1.2 SUMMARY

- A. This section includes the requirements for expansion fittings, and loops using the following:
 - 1. Metal-bellows packless expansion joints.
 - 2. Rubber packless expansion joints.
 - 3. Alignment guides and anchors.

1.3 PERFORMANCE REQUIREMENTS

- A. Compatibility: Products shall be suitable for piping service fluids, materials, working pressures, and temperatures.
- B. Capability: Products to absorb 200% of maximum axial movement between anchors.

1.4 ACTION SUBMITTALS

- A. Product Data: For each specified product, include manufacturers cut sheets, dimensional data, performance data, installation instructions, specified options, and warranty information.
- B. Delegated-Design Submittal: For each anchor and alignment guide indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation. < Delete paragraph ‘B’ if not required>
 - 1. Design Calculations: Calculate requirements for thermal expansion of piping systems and for selecting and designing expansion joints, loops, and swing connections.
 - 2. Anchor Details: Detail fabrication of each anchor indicated. Show dimensions and methods of assembly and attachment to building structure.

3. Alignment Guide Details: Detail field assembly and attachment to building structure.
4. Schedule: Indicate type, manufacturer's number, size, material, pressure rating, end connections, and location for each expansion joint.

1.5 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Product Certificates: For each type of expansion joint, from manufacturer.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: Include a copy of each approved submittal along with any applicable maintenance data in the project operation and maintenance manual.

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.

1.8 WARRANTY/GUARANTEE

- A. See Division 23 Specification Section "Basic Mechanical Requirements – HVAC" for warranty and guarantee requirements.

PART 2 - PRODUCTS

2.1 GENERAL PRODUCT REQUIREMENTS

- A. Equipment Design and Selection: Expansion fittings, anchors, guides and loops shall be designed and selected, for the intended use, in accordance with the scheduled capacities on the drawings and the requirements of this specification.
- B. Acceptable Manufacturers: Subject to compliance with requirements, provide expansion fittings, joints, and guides by one (1) of the following:
 1. Expansion Joints :
 - a. Adscos Manufacturing LLC.
 - b. Metraflex Inc.
 - c. Tozen Corp.
 - d. Vibration Mountings.
 2. Alignment Guides:

- a. Advanced Thermal Systems Inc.
- b. Grinnell Corp.
- c. Metraflex Inc.

2.2 PACKLESS EXPANSION JOINTS

A. Metal-Bellows Packless Expansion Joints:<Select type expansion joint for project>

1. Standards: ASTM F 1120 and EJMA's "Standards of the Expansion Joint Manufacturers Association, Inc."
2. Type: Circular, corrugated bellows with external tie rods.
3. Minimum Pressure Rating: 175 psig.
4. Expansion Joints for Copper Tubing: Two (2) ply phosphor-bronze bellows, copper pipe ends, and brass shrouds.
 - a. End Connections for Copper Tubing two (2) and Smaller: Solder joint or threaded.
 - b. End Connections for Copper Tubing two and one half (2-1/2) to four (4) inches: Solder joint or threaded.
 - c. End Connections for Copper Tubing five (5) inches and Larger: Flanged.

B. Rubber Packless Expansion Joints:

1. Standards: ASTM F 1123 and FSA's "Technical Handbook: Non-Metallic Expansion Joints and Flexible Pipe Connectors."
2. Material: Fabric-reinforced rubber complying with FSA-NMEJ-703.
3. Spherical Type: Single or double spheres with external control rods.
4. Minimum Pressure Rating: 175 psig at 240°F.
5. Material for Water: Butyl rubber.
6. End Connections: Full-faced, integral steel flanges with steel retaining rings drilled to match flange bolt holes over entire surface of flanges.

C. Expansion Compensator expansion Joint:

1. Standards: ASTM F 1123 and FSA's "Technical Handbook: Non-Metallic Expansion Joints and Flexible Pipe Connectors."
2. Type: Two (2) ply phosphor bronze bellows, brass shrouds, and end fittings for copper piping systems and two (2) ply stainless-steel bellows, carbon-steel shrouds, and end fittings for steel piping systems. Include internal guides, antitorque device, and removable end clip for proper positioning.
3. Minimum pressure rating: for 60 psig minimum for pressure systems and for 175 psig minimum for high-pressure systems.

2.3 ALIGNMENT GUIDES AND ANCHORS

A. Alignment Guides:

1. Description: Steel, factory-fabricated alignment guide, with bolted two (2) section outer cylinder and base for attaching to structure; with two (2) 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 (2) 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.

PART 3 - EXECUTION

3.1 EXPANSION-JOINT INSTALLATION <Designer shall locate expansion compensators and loops or drawings>

- A. Install expansion joints of sizes matching sizes of piping in which they are installed.
- B. Install metal-bellows expansion joints according to EJMA's "Standards of the Expansion Joint Manufacturers Association, Inc."
- C. Install rubber packless expansion joints according to FSA-NMEJ-702.

3.2 PIPE LOOP AND SWING CONNECTION INSTALLATION

- A. Install pipe loops cold-sprung in tension or compression as required to partly absorb tension or compression produced during anticipated change in temperature.

- B. Connect risers and branch connections to mains with at least five (5) pipe fittings including tee in main.
- C. Connect risers and branch connections to terminal units with at least four (4) pipe fittings including tee in riser.
- D. Connect mains and branch connections to terminal units with at least four (4) pipe fittings including tee in main.

3.3 ALIGNMENT GUIDE AND ANCHOR INSTALLATION <Designer shall locate pipe anchors on drawings>

- A. Install alignment guides to guide expansion and to avoid end-loading and torsional stress.
- B. Install guide(s) on each side of pipe expansion fittings and loops. Install guides nearest to expansion joint not more than pipe diameters from expansion joint.
- C. Attach guides to pipe and secure guides to building structure.
- D. Install anchors at locations to prevent stresses from exceeding those permitted by ASME B31.9 and to prevent transfer of loading and stresses to connected equipment.
- E. Anchor Attachments:
 - 1. Anchor Attachment to Black-Steel Pipe: Attach by welding. Comply with ASME B31.9 and ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
 - 2. Anchor Attachment to Galvanized-Steel Pipe: Attach with pipe hangers. Use MSS SP-69, Type 42, riser clamp welded to anchor.
 - 3. Anchor Attachment to Copper Tubing: Attach with pipe hangers. Use MSS SP-69, Type 24, U-bolts bolted to anchor.
- F. Fabricate and install steel anchors by welding steel shapes, plates, and bars. Comply with ASME B31.9 and AWS D1.1/D1.1M.
 - 1. Anchor Attachment to Steel Structural Members: Attach by welding.
 - 2. Anchor Attachment to Concrete Structural Members: Attach by fasteners. Follow fastener manufacturer's written instructions.
- G. Use grout to form flat bearing surfaces for guides and anchors attached to concrete.

END OF SECTION 230516