

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.2 SUMMARY**

- A. Section Includes:
  - 1. Expansion-compensator packless expansion joints.
  - 2. Metal-bellows packless expansion joints.
  - 3. Pipe loops and swing connections.
  - 4. 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 percent of maximum axial movement between anchors.

**1.4 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- 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.
  - 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.
- C. Welding certificates.
- D. Product Certificates: For each type of expansion joint, from manufacturer.
- E. Maintenance Data: For expansion joints to include in maintenance manuals.

**1.5 QUALITY ASSURANCE**

- A. Welding Qualifications: Qualify procedures and personnel according to the following:

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1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. ASME Boiler and Pressure Vessel Code: Section IX.

**PART 2 - PRODUCTS**

**2.1 PACKLESS EXPANSION JOINTS**

A. Metal, Expansion-Compensator Packless Expansion Joints:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Flexicraft Industries.
  - b. Flex Pression Ltd.
  - c. Flex-Weld, Inc.
  - d. Hyspan Precision Products, Inc.
  - e. Metraflex, Inc.
  - f. Senior Flexonics Pathway.
2. Minimum Pressure Rating: 150 psig (1035 kPa) unless otherwise indicated.
3. Configuration for Copper Tubing: Two-ply, phosphor-bronze bellows with copper pipe ends.
  - a. End Connections for Copper Tubing NPS 2 (DN 50) and Smaller: Solder joint..
  - b. End Connections for Copper Tubing NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Threaded.
4. Configuration for Steel Piping: Two-ply, stainless-steel bellows; steel-pipe end connections; and carbon-steel shroud.
  - a. End Connections for Steel Pipe NPS 2 (DN 50) and Smaller: Threaded.
  - b. End Connections for Steel Pipe NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Flanged.

B. Metal-Bellows Packless Expansion Joints:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Flexicraft Industries.
  - b. Flex Pression Ltd.
  - c. Flex-Weld, Inc.
  - d. Hyspan Precision Products, Inc.
  - e. Metraflex, Inc.
  - f. Senior Flexonics Pathway.
2. Standards: ASTM F 1120 and EJMA's "Standards of the Expansion Joint Manufacturers Association, Inc."
3. Type: Circular, corrugated bellows with external tie rods.
4. Minimum Pressure Rating: 150 psig (1035 kPa) unless otherwise indicated.

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5. Configuration: Single joint and double joint with base class(es) unless otherwise indicated.
6. Expansion Joints for Copper Tubing: Multi-ply phosphor-bronze bellows, copper pipe ends, and brass shrouds.
  - a. End Connections for Copper Tubing NPS 2 (DN 50) and Smaller: Solder joint.
  - b. End Connections for Copper Tubing NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Solder joint or threaded.
  - c. End Connections for Copper Tubing NPS 5 (DN 125) and Larger: Flanged.
7. Expansion Joints for Steel Piping: Multi-ply stainless-steel bellows, steel pipe ends, and carbon-steel shroud.
  - a. End Connections for Steel Pipe NPS 2 (DN 50) and Smaller: Threaded.
  - b. End Connections for Steel Pipe NPS 2-1/2 (DN 65) and Larger: Flanged.

**2.2 ALIGNMENT GUIDES AND ANCHORS**

A. Alignment Guides:

1. Manufacturers: Subject to compliance with requirements available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Flexicraft Industries.
  - b. Flex-Weld, Inc.
  - c. Hyspan Precision Products, Inc.
  - d. Metraflex, Inc.
  - e. Senior Flexonics Pathway.
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.

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- 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**

- 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."

**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 pipe fittings including tee in main.
- C. Connect risers and branch connections to terminal units with at least four pipe fittings including tee in riser.
- D. Connect mains and branch connections to terminal units with at least four pipe fittings including tee in main.

**3.3 ALIGNMENT-GUIDE AND ANCHOR INSTALLATION**

- A. Install alignment guides to guide expansion and to avoid end-loading and torsional stress.
- B. Install one guide(s) on each side of pipe expansion fittings and loops. Install guides nearest to expansion joint not more than four 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 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 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.

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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\*\***