



SECTION 22 05 16 - EXPANSION FITTINGS AND LOOPS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Flexible pipe connectors.
 - 2. Expansion joints.
 - 3. Expansion compensators.
 - 4. Pipe alignment guides.
 - 5. Swivel joints.
 - 6. Pipe anchors.

1.2 REFERENCES

- A. General: Comply with appropriate standards.
 - 1. American Society of Mechanical Engineers: ASME.
 - 2. American Welding Society: AWS D1.1.

1.3 DESIGN REQUIREMENTS

- A. Expansion Compensation Design Criteria:
 - 1. Installation Temperature: 50 degrees F.
 - 2. Domestic Hot Water: 140 degrees F.

1.4 SUBMITTALS

- A. Shop Drawings: Indicate layout of piping systems, including flexible connectors, expansion joints, expansion compensators, loops, offsets, and swing joints. Submit shop drawings sealed by a registered professional engineer.
- B. Product Data:
 - 1. Flexible Pipe Connectors: Indicate maximum temperature and pressure rating, face-to-face length, live length, hose wall thickness, hose convolutions per foot and per assembly, fundamental frequency of assembly, braid structure, and total number of wires in braid.
 - 2. Expansion Joints: Indicate maximum temperature and pressure rating, and maximum expansion compensation.
- C. Design Data: Indicate criteria and show calculations. Submit sizing methods calculations sealed by a registered professional engineer.
- D. Manufacturer's Installation Instructions: Submit special procedures.



- E. Welders' Certificate: Provide welders' certificate.
- F. Operation and Maintenance Data: Submit adjustment instructions.

1.5 WARRANTY

- A. Provide one-year minimum.
- B. Furnish five year manufacturer warranty for leak free performance of packed expansion joints.

PART 2 - PRODUCTS

2.1 FLEXIBLE PIPE CONNECTORS

- A. Manufacturers:
 - 1. **Mason Industries, Inc.**
 - 2. **Vibrex / M.W. Sausse & Company, Inc.**
 - 3. **Metraflex Company.**
- B. Steel Piping:
 - 1. Inner Hose: Carbon Steel Stainless Steel Bronze.
 - 2. Exterior Sleeve: Double braided stainless steel bronze.
 - 3. Pressure Rating: 200 psig WOG and 250 degrees F.
 - 4. Maximum offset: 3/4 inch on each side of installed center line.
- C. Copper Piping:
 - 1. Inner Hose: Bronze.
 - 2. Exterior Sleeve: Braided bronze.
 - 3. Pressure Rating: 125 psig and 250 degrees F.
 - 4. Maximum offset: 3/4 inch on each side of installed center line.

2.2 EXPANSION JOINTS

- A. Manufacturers:
 - 1. **Mason Industries, Inc.**
 - 2. **Vibrex / M.W. Sausse & Company, Inc.**
 - 3. **Metraflex Company.**
- B. Stainless Steel Bellows Type:
 - 1. Pressure Rating: 125 psig and 250 degrees F.
 - 2. Maximum Compression: 1-3/4 inch.
 - 3. Maximum Extension: 1/4 inch.
 - 4. Application: Steel piping 3 inch and smaller.



- C. External Ring Controlled Stainless Steel Bellows Type:
 - 1. Pressure Rating: 125 psig and 250 degrees F.
 - 2. Maximum Compression: 1-1/4 inch.
 - 3. Maximum Extension: 5/16 inch.
 - 4. Maximum Offset: 5/16 inch.
 - 5. Application: Steel piping 3 inch and larger.

- D. Single or Double Sphere, Elbow or Flexible Compensators:
 - 1. Body: Teflon or Neoprene and nylon.
 - 2. Working Pressure: 125 psi.
 - 3. Maximum Temperature: 150 degrees F.
 - 4. Maximum Compression: 1-1/8 inch.
 - 5. Maximum Elongation: 7/8 inch.
 - 6. Maximum Offset: 7/8 inch.
 - 7. Maximum Angular Movement: 30 degrees.
 - 8. Application: Steel piping 2 inch and larger.

- E. Two-ply Bronze Bellows Type:
 - 1. Construction: Bronze with anti-torque device, limit stops, internal guides.
 - 2. Pressure Rating: 125 psig WOG and 250 degrees F.
 - 3. Maximum Compression: 1-3/4 inch.
 - 4. Maximum Extension: 1/4 inch.
 - 5. Joint: Soldered as specified in piping system.
 - 6. Application: Copper piping.

- F. Low Pressure Compensators with two-ply Bronze Bellows:
 - 1. Working Pressure: 80 psig.
 - 2. Maximum Temperatures: 250 degrees F.
 - 3. Maximum Compression: 1/2 inch.
 - 4. Maximum Extension: 5/32 inch.
 - 5. Application: Copper or steel piping 2 inch and smaller.

- G. Rubber Expansion Joints: ASTM F 1123, fabric-reinforced rubber with external control rods and complying with FSA's "Technical Handbook: Non-Metallic Expansion Joints and Flexible Pipe Connectors."
 - 1. Manufacturers:
 - a. **Flex-Weld, Incorporated / Keflex Manufacturing.**
 - b. **Mason Industries, Inc.**
 - c. **Metraflex Company.**
 - 2. Arch Type: Single or multiple arches.
 - 3. Spherical Type: Single or multiple spheres.



- a. Minimum Pressure and Temperature Ratings for NPS 1-1/2 to NPS 4: 150 psig at 220 deg F.
- b. Minimum Pressure and Temperature Ratings for NPS 5 and NPS 6: 140 psig at 200 deg F.
4. Material: EPDM.
5. End Connections: Full-faced, integral, steel flanges with steel retaining rings.
6. Equal to Mason Industries Vibraflex.

2.3 ACCESSORIES

- A. Pipe Alignment Guides and Anchors: Two piece welded steel with enamel paint, bolted, with spider to fit standard pipe, frame with four mounting holes, clearance for minimum 1 inch thick insulation, minimum 3 inch travel with weld down or bolt down anchor base.
- B. Swivel Joints: Fabricated steel, Bronze, Ductile Iron or Cast steel body, double ball bearing race, field lubricated, with rubber or (Buna-N) o-ring seals.

2.4 MATERIALS FOR ANCHORS

- A. Steel Shapes and Plates: ASTM A36 / A36M.
- B. Bolts and Nuts: ASME B18.10 or ASTM A183, steel, hex head.
- C. Washers: ASTM F844, steel, plain, flat washers.
- D. Expansion Anchors
 1. Smooth wall, non-self-drilling internal plug expansion type anchors constructed of AISC 12L14 steel and zinc plated in accordance with Fed. Spec. QQ-A-325 type 1, Class 3.
 2. Expansion anchors shall be U.L listed.
- E. Chemical Fasteners: Insert-type-stud bonding system anchor for use with hardened Portland cement concrete, and tension and shear capacities appropriate for application.
 1. Bonding Material: ASTM C881, Type IV, Grade 3, 2-component epoxy resin suitable for surface temperature of hardened concrete where fastener is to be installed.
 2. Stud: ASTM A307, zinc-coated carbon steel with continuous thread on stud, unless otherwise indicated.
 3. Washer and Nut: Zinc-coated steel.
- F. Grout: ASTM C1107, factory-mixed and packaged, dry, hydraulic-cement, non-shrink, nonmetallic grout; suitable for interior and exterior applications.
 1. Properties: Non-staining, noncorrosive, and nongaseous.
 2. Design Mix: 5000-psi, 28-day compressive strength.



PART 3 - EXECUTION

3.1 EXPANSION-JOINT INSTALLATION

- A. Install manufactured, nonmetallic expansion joints according to FSA's "Technical Handbook: Non-Metallic Expansion Joints and Flexible Pipe Connectors."
- B. Provide cast iron test tee expansion joints every 150 feet on vertical drainage and vent lines and where noted or required.

3.2 PIPE BEND AND LOOP INSTALLATION

- A. Install pipe bends and loops cold-sprung in tension or compression as required to partly absorb tension or compression produced during anticipated change in temperature.
- B. Attach pipe bends and loops to anchors.
 - 1. Steel Anchors: Attach by welding. Comply with ASME B31.9 and ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
 - 2. Concrete Anchors: Attach by fasteners. Follow fastener manufacturer's written instructions.

3.3 SWING CONNECTIONS

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

3.4 ALIGNMENT-GUIDE INSTALLATION

- A. Install guides on piping adjoining pipe expansion fittings and loops.
- B. Attach guides to pipe and secure to building structure.

3.5 ANCHOR INSTALLATION

- A. 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.
- B. Fabricate and install steel anchors by welding steel shapes, plates, and bars to piping and to structure. Comply with ASME B31.9 and AWS D1.1.



- C. Install pipe anchors according to expansion-joint manufacturer's written instructions if expansion joints are indicated.

3.6 MANUFACTURER'S FIELD SERVICES

- A. Furnish inspection services by flexible pipe manufacturer's representative for final installation and certify installation is in accordance with manufacturer's recommendations and connectors are performing satisfactorily.

END OF SECTION 22 05 16