

SECTION 15121 – PIPE EXPANSION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 WORK INCLUDED

- A. Furnish and install all necessary offsets, joints, expansion loops, compensators, anchors and guides so that no stress is placed on the piping systems or equipment due to thermal expansion.
- B. Make proper provision for expansion and contraction in all parts of piping systems wherever possible by means of pipe bends, pipe offsets, swing connections or changes in direction of piping. Where piping network cannot be employed to absorb expansion and contraction in the piping systems, provide expansion joint compensators.
- C. Expansion compensator elements shall be as specified herein and shall be selected by the manufacturer to withstand system pressure and temperature conditions and to absorb thermal expansion of the piping. Use of expansion compensators in non-accessible locations shall not be permitted.

1.3 RELATED SECTIONS

- A. Examine all drawings and criteria sheets and all other Sections of the Specifications for requirements which affect work under this Section whether or not such work is specifically mentioned in this Section.

1.4 REFERENCES

- A. Applicable provisions of the following Codes and Trade Standard Publications shall apply to the work of this Section, and are hereby incorporated into, and made a part of the Contract Documents.
- B. Material standards shall be as specified or detailed hereinafter and as follows:
- C. ASME B31.1 – Power Piping.
- D. ASME B16.5 – Pipe Flanges and Flanged Fittings.

- E. ASTM A 269 – Standard specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
- F. EJMA (STDS) – Standards; Expansion Joint Manufacturers Association; 1993.
- G. MIL-E-17814 – Expansion Joints, Pipe, Slip-Type, Packed

1.5 SUBMITTALS

- A. See Section 15050 and General conditions for additional information.
- 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 selection calculations.
- D. Complete expansion, stress, and seismic calculations.
- E. Manufacturer’s Instructions: Indicate manufacturer’s installation instructions, special procedures and external controls.
- F. Project Record Documents: Record installed locations of flexible pipe connectors, expansion joints, anchors and guides.
- G. Maintenance Data: Include adjustment instructions.

1.6 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing products of the type specified in Part 2 – Products.
- B. Installer: Company specializing in performing work of the type specified in this section, with documented experience.
- C. Welders: Certify in accordance with ASME.

1.7 REGULATORY REQUIREMENTS

- A. Conform to ASME B31.9 code for installation of piping system and ASTM F708 for design and installation of pipe supports.
- B. Welding Materials and Procedures: Conform to ASME (BPV IX) and applicable state labor regulations.
 - 1. Provide certificate of compliance from authority having jurisdiction, Indicating approval of welders.

1.8 DELIVERY, STORAGE AND HANDLING

- A. All expansion compensators shall be delivered in containers and shall be kept in a dry and protected area.
- B. All anchors and guides, where exposed, shall be given 2 coats of rust resistant paint of a color selected by the Architect prior to installation.

1.9 ENVIRONMENTAL

- A. Do not paint or install expansion compensators, anchors or guides when:
 - 1. Environmental conditions are outside the specific limitations of the referenced codes and/or manufacturer's recommendations.

PART 2 – PRODUCTS

2.1 ENGINEERING SERVICES

- A. The Contractor shall retain a registered Professional Engineer licensed to practice in the State of Maine to review all loads imposed on the building structure and piping system to assure that no points are overstressed.
- B. The maximum allowable stress shall be 15,000 psi for cold water, hot water, condensate, and steam piping if pipe material is low carbon steel A53 B or A106 B (Marks' Standard Handbook for Mechanical Engineers, Tenth Edition).
- C. The Contractor shall submit shop drawings with calculations (with P.E. stamp) detailing the proposed anchor locations for review.
- D. All anchor details and forces shall be submitted to the project structural engineer for review prior to any installation.

2.2 GENERAL

- A. Make proper provision for expansion and contraction in all parts of piping systems:
 - 1. Steam and condensate (all pressures)
 - 2. Hot water
 - 3. All under ground piping
 - 4. Relief vents
 - 5. Other piping
- B. Wherever possible, provide expansion and contraction by means of pipe bends, pipe offsets, swing connections or changes in direction of piping.
- C. Where piping network cannot be employed to absorb expansion and contraction in the piping systems, provide expansion joint compensators. Securely anchor all piping utilizing expansion loops and joints to the building structure with steel angles, properly braced and welded to the pipe.
- D. Furnish and install expansion compensators for hot water piping, for all steam and condensate piping and steam vents.
- E. Acceptable manufacturers subject to compliance with the specifications shall be as follows:
 - 1. Expansion compensators larger than 4".
 - a. American Boa, Inc.
 - b. Metraflex
 - c. Adsco Manufacturing
 - d. Flexonics
 - 2. Expansion compensators 4" and smaller.
 - a. American Boa, Inc.
 - b. Metraflex
 - c. Keflex Quadra-Side high pressure
 - d. Flexonics
 - e. Robertshaw-Fulton
 - f. PHD Manufacturing, Co.
 - 3. Guides
 - a. Keflex, Inc.
 - b. Metraflex
 - c. Robertshaw-Fulton
 - d. Flexonics
 - e. PHD Manufacturing, Co.

- F. Use of expansion compensators in non-accessible locations shall not be permitted.
- G. Temperature and pressure suitable for the service.

2.3 ANCHORS, GUIDES AND EXPANSION COMPENSATION

- A. Expansion compensators: water and steam larger than 4"
 - 1. Water: Expansion joints shall be of the corrugated multi-ply bellows type formed hydraulically from metallic tubes with longitudinal welded seams. The middle plies shall be spiral wound and act as a labyrinth seal, and shall be of packless, leakproof, all-welded construction and maintenance free. Bellows shall be minimum 20 gauge up to 6" and 18 gauge for pipes larger than 6". If joint will be exposed to salt (e.g., in manhole, direct buried, marine), material shall be Inconel 625, otherwise material shall be 321 stainless steel. End fittings shall match pipe schedule as specified. Compensators shall be equipped with setscrew and drain holes and shall have steel casing.
 - 2. Steam: Expansion joints shall be of the corrugated multi-ply bellows type formed hydraulically from metallic tubes with longitudinal welded seams, and shall have telescopic shrouds to snugly fit around the bellows. The middle plies shall be spiral wound and act as a labyrinth seal, and shall be of packless, leakproof, all-welded construction and maintenance free. Bellows shall be minimum 20 gauge up to 6" and 18 gauge for pipes larger than 6". If joint will be exposed to salt (e.g., in manhole, direct buried, marine), material shall be Inconel 625, otherwise material shall be 321 stainless steel. End fittings shall match pipe schedule as specified. Compensators shall be equipped with setscrew and drain holes and shall have steel casing.
 - 3. Compensators shall be fitted with lightweight reinforcing rings to reinforce bellows. Compensators shall be suitable for pressures and temperatures indicated under pipe specifications.
- B. Expansion compensators: water and steam 4" and smaller.
 - 1. Water: Expansion joints shall be of the corrugated multi-ply bellows type formed hydraulically from metallic tubes with longitudinal welded seams. The middle plies shall be spiral wound and act as a labyrinth seal, and shall be of packless, leakproof, all-welded construction and maintenance free. Bellows shall be minimum 20 gauge up to 6" and 18 gauge for pipes larger than 6". If joint will be exposed to salt (e.g., in manhole, direct buried, marine), material shall be Inconel 625, otherwise material shall be 321 stainless steel. End fittings shall match pipe schedule as specified. Compensators shall be equipped with setscrew and drain holes and shall have steel casing.
 - 2. Steam: Expansion joints shall be of the corrugated multi-ply bellows type formed hydraulically from metallic tubes with longitudinal welded seams, and shall have telescopic shrouds to snugly fit around the bellows. The middle plies shall be spiral wound and act as a labyrinth seal, and shall be of packless, leakproof, all-welded construction and maintenance free. Bellows shall be minimum 20 gauge up to 6" and 18 gauge for pipes larger than 6". If joint will be exposed to salt (e.g., in manhole,

direct buried, marine), material shall be Inconel 625, otherwise material shall be 321 stainless steel. End fittings shall match pipe schedule as specified. Compensators shall be equipped with setscrew and drain holes and shall have steel casing.

C. Guides

1. Pipe guides shall be of spider and sleeve type to insure multiplanar guiding and to allow complete insulation of the piping and shall be covered inside and outside with protective coating. Top half shall be removable.
2. Guides shall be installed in accordance with "Standards of the Expansion Compensators Mfrs. Assn.", latest edition.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. All mains and risers having expansion offsets or compensators shall be securely anchored to the building construction in such a manner as to throw all expansion towards the offsets or joints.
- B. All anchors shall be constructed from heavy steel and connected to the building construction. Anchors shall be furnished with turnbuckles or other suitable means for adjustment.
- C. Contractor shall be responsible for any additional structural members that may be required for proper installation of hangers, anchors, guides and supports.
- D. The method of securing the anchors to the building construction must be approved by the Architect prior to installation.

END OF SECTION