



## **SECTION 21 05 16 EXPANSION FITTINGS AND LOOPS FOR FIRE-SUPPRESSION 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 Welding Society: AWS.
  - 2. Underwriters' Laboratories: U.L.

#### **1.3 DESIGN REQUIREMENTS**

- A. Provide structural work and equipment required for expansion and contraction of piping. Verify anchors, guides, and expansion joints provide and adequately protect system.
- B. Expansion Compensation Design Criteria:
  - 1. Installation Temperature: 50 degrees F.
  - 2. Fire Protection System Temperature: 75 degrees F.
  - 3. Safety Factor: 20 percent.

#### **1.4 SUBMITTALS**

- A. Submit data on all materials.
- B. Shop Drawings: Indicate layout of piping systems, including flexible connectors, expansion joints, expansion compensators, loops, offsets and swing joints. Drawings shall be sealed by a registered professional engineer. Include information for piping expansion compensation in shop drawings for all fire suppression piping system as needed.
- C. 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.



- D. Design Data: Indicate criteria and show calculations. Submit sizing methods calculations sealed by a registered professional engineer.
- E. Manufacturer's Installation Instructions: Submit special procedures.
- F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- G. Welders' Certificate: Include welders' certification of compliance with AWS D1.1.
- H. Manufacturer's Field Reports: Indicate results of inspection by manufacturer's representative.
- I. Operation and Maintenance Data: submit adjustment instructions.

## 1.5 WARRANTY

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

### 2.2 EXPANSION JOINTS

- A. Manufacturers:
  - 1. **Mason Ind.**
  - 2. **Vibrex-Sausse.**
  - 3. **Metraflex.**



- B. Stainless Steel Bellows Type:
  - 1. Pressure Rating: 200 psig WOG 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: 225 psig and 70 degrees F.
  - 2. Maximum Compression: 1-1/4 inch.
  - 3. Maximum Extension: 5/16 inch.
  - 4. Maximum Offset: 5/16 inch.
  - 5. Accessories: Internal flow liner.
  - 6. Application: Steel piping 3 inch and larger.
  
- D. Double Sphere, Elbow or Flexible Compensators:
  - 1. Body: Teflon or Neoprene and nylon.
  - 2. Working Pressure: 225 psi.
  - 3. Maximum Temperature: 80 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. Accessories: Control rods or Control cables.
  - 9. 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: 200 psi WOG and 250 degrees F.
  - 3. Maximum Compression: 1-3/4 inch.
  - 4. Maximum Extension: 1/4 inch.
  - 5. Application: Copper piping.
  
- F. Copper with Packed Sliding Sleeve:
  - 1. Maximum Temperature: 250 degrees F.
  - 2. Copper or steel piping 2 inches and larger.
  - 3. Application: Copper or steel piping 2 inch and larger.
  
- G. Pipe Alignment Guides: 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.
  
- H. Swivel Joints: Fabricated steel Bronze Ductile Iron Cast steel body, double ball bearing race, field lubricated, with rubber (Buna-N) O-ring seals.



## **PART 3 - EXECUTION**

### **3.1 INSTALLATION**

- A. Install flexible pipe connectors on pipes connected to equipment supported by vibration isolation. Provide line size flexible connectors.
- B. Install flexible connectors at right angles to displacement. Install one end immediately adjacent to isolated equipment and anchor other end. Install in horizontal plane unless indicated otherwise.
- C. Rigidly anchor pipe to building structure. Provide pipe guides to direct movement only along axis of pipe. Erect piping so strain and weight is not on cast connections or apparatus.
- D. Provide support and anchors for controlling expansion and contraction of piping. Provide loops, pipe offsets, and swing joints, or expansion joints as required.
- E. Provide grooved piping systems with minimum one joint per inch pipe diameter instead of flexible connector supported by vibration isolation. Grooved piping systems need not be anchored.

### **3.2 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 21 05 16