SECTION 22 07 16

PLUMBING EQUIPMENT INSULATION

**PART 1 GENERAL**

1. **SECTION INCLUDES**
2. Equipment insulation.
3. Covering.
4. **RELATED REQUIREMENTS**
5. Section 09 9113 - Exterior Painting: Painting insulation covering from csi.
6. Section 09 9123 - Interior Painting: Painting insulation covering from csi.
7. Section 22 0553 - Mechanical Identification.
8. Section 22 1005 - Plumbing Piping and Valves: Placement of hangers and hanger inserts.
9. **REFERENCE STANDARDS**
10. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
11. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.
12. ASTM C14 - Standard Specification for Nonrein forced Concrete Sewer, Storm Drain, and Culvert Pipe; 2015.
13. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 2013.
14. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007 (Reapproved 2013).
15. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement; 2007 (Reapproved 2013).
16. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.
17. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2014.
18. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation; 2015.
19. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013.
20. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type); 2013.
21. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014.
22. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel; 2008 (Reapproved 2013).
23. ASTM C1410 - Standard Specification for Cellular Melamine Thermal and Sound-Absorbing Insulation; 2014.
24. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
25. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
26. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.
27. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
28. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.
29. **SUBMITTALS**
30. See Section 01 3000 - Administrative Requirements, for submittal procedures.
31. Product Data: Provide product description, thermal characteristics, list of materials and thickness for equipment scheduled.
32. Samples: Submit one samples of any representative size illustrating each insulation type.
33. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.
34. **QUALITY ASSURANCE**
35. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with not less than ten years of documented experience.
36. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum five years of experience.
37. **DELIVERY, STORAGE, AND HANDLING**
38. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
39. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.
40. **FIELD CONDITIONS**
41. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
42. Maintain temperature during and after installation for minimum period of 24 hours.

**PART 2 PRODUCTS**

1. **REGULATORY REQUIREMENTS**
2. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.
3. **GLASS FIBER, FLEXIBLE**
4. Insulation: ASTM C553; flexible, noncombustible.
5. Vapor Barrier Jacket: Factory applied Kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
6. Tie Wire: 1.22 mm (0.048 inch) stainless steel with twisted ends on maximum 300 mm (12 inch) centers.
7. Vapor Barrier Lap Adhesive: Compatible with insulation.
8. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.
9. **GLASS FIBER, RIGID**
10. Insulation: ASTM C612 or ASTM C592; rigid, noncombustible.
11. 'Ksi' ('K') Value: 0.036 at 24 degrees C (0.25 at 75 degrees F), when tested in accordance with ASTM C177 or ASTM C518.
12. Vapor Barrier Jacket:
13. Factory applied Kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
14. Moisture Vapor Permeability: 0.029 ng/Pa s m (0.02 perm inch), when tested in accordance with ASTM E96/E96M.
15. Facing: 25 mm (1 inch) galvanized steel hexagonal wire mesh stitched on one face of insulation.
16. Vapor Barrier Lap Adhesive: Compatible with insulation.
17. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.
18. **FLEXIBLE ELASTOMERIC CELLULAR INSULATION**
19. Insulation: Preformed flexible elastomeric cellular EPDM non-polar rubber insulation complying with ASTM C534/C534M Type 2, Grade 1, in sheet form.
20. 'Ksi' ('K') Value: 0.036 at 24 degrees C (0.25 at 75 degrees F), when tested in accordance with ASTM C177 or ASTM C518.
21. Minimum Service Temperature: Minus 40 degrees C (Minus 40 degrees F).
22. Maximum Service Temperature: 104 degrees C (220 degrees F).
23. Connection: Waterproof vapor barrier adhesive.
24. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.
25. **JACKETS**
26. Canvas Jacket: UL listed 220 g/sq m (6 oz/sq yd) plain weave cotton fabric treated with dilute fire-retardant lagging adhesive.
27. Lagging Adhesive: Compatible with insulation.
28. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.
29. Thickness: 0.64 mm (0.025 inch) sheet.
30. Finish: Smooth.
31. Joining: Longitudinal slip joints and 50 mm (2 inch) laps.
32. Metal Jacket Bands: 10 mm (3/8 inch) wide; 0.38 mm (0.015 inch) thick aluminum.

**PART 3 EXECUTION**

1. **EXAMINATION**
2. Verify that equipment has been tested before applying insulation materials.
3. Verify that surfaces are clean and dry, with foreign material removed.
4. **INSTALLATION**
5. Install in accordance with manufacturer's instructions.
6. Factory Insulated Equipment: Do not insulate.
7. Exposed Equipment: Locate insulation and cover seams in least visible locations.
8. Apply insulation close to equipment by grooving, scoring, and beveling insulation. Fasten insulation to equipment with studs, pins, clips, adhesive, wires, or bands.
9. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment, use vapor barrier cement.
10. Insulated equipment containing fluids below ambient temperature: Insulate entire system.
11. For fiberglass insulated equipment containing fluids below ambient temperature, provide vapor barrier jackets, factory-applied, and finish with glass cloth and vapor barrier adhesive.
12. For hot equipment containing fluids 60 degrees C (140 degrees F) or less, do not insulate flanges and unions, but bevel and seal ends of insulation.
13. For hot equipment containing fluids over 60 degrees C (140 degrees F), insulate flanges and unions with removable sections and jackets.
14. Fiberglass insulated equipment containing fluids above ambient temperature: Provide standard jackets, with vapor barrier, factory-applied. Finish with glass cloth and adhesive.
15. Inserts and Shields:
16. Application: Equipment 40 mm (1-1/2 inches) diameter or larger.
17. Shields: Galvanized steel between hangers and inserts.
18. Insert location: Between support shield and equipment and under the finish jacket.
19. Insert configuration: Minimum 150 mm (6 inches) long, of same thickness and contour as adjoining insulation; may be factory fabricated.
20. Insert material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
21. Finish insulation at supports, protrusions, and interruptions.
22. Equipment in Mechanical Equipment Rooms or Finished Spaces: Finish with canvas jacket sized for finish painting.
23. Exterior Applications:
24. Provide vapor barrier jacket or finish with glass mesh reinforced vapor barrier cement.
25. Cover with aluminum.
26. Cover glass fiber insulation with metal mesh and finish with heavy coat of insulating cement.
27. Nameplates and ASME Stamps: Bevel and seal insulation around; do not insulate over.
28. Equipment Requiring Access for Maintenance, Repair, or Cleaning: Install insulation so it can be easily removed and replaced without damage.

**END OF SECTION**