SECTION 22 07 16

PLUMBING EQUIPMENT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Equipment insulation.

B. Covering.

C. Breeching insulation.

1.02 RELATED REQUIREMENTS

A. Section 09 90 00 - Painting and Coating: Painting insulation covering.

B. Section 22 05 53 - Identification for Plumbing Piping and Equipment.

C. Section 22 10 05 - Plumbing Piping: Placement of hangers and hanger inserts.

D. Section 23 21 13 - Hydronic Piping: Placement of hangers and hanger inserts.

E. Section 23 21 14 - Hydronic Specialties.

1.03 REFERENCE STANDARDS

A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

B. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

C. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric].

D. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.

E. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement.

F. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

G. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type).

H. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

I. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials.

J. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association.

K. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc..

1.04 SUBMITTALS

A. See Gilbane Project Manual.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for equipment scheduled.

C. Samples: Submit two samples of any representative size illustrating each insulation type.

D. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with not less than three years of experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum three years of experience and approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.07 FIELD CONDITIONS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.01 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION

A. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84, NFPA 255, or UL 723.

2.02 GLASS FIBER, FLEXIBLE

A. Manufacturers:
   1. Knauf Insulation; : www.knaufusa.com.
   2. Johns Manville Corporation; : www.jm.com.
   3. Owens Corning Corp; : www.owenscorning.com.
   4. CertainTeed Corporation; : www.certainteed.com.
   5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Insulation: ASTM C553; flexible, noncombustible.
   1. 'K' Value: 0.36 at 75 degrees F, when tested in accordance with ASTM C177 or ASTM C518.
   2. Maximum Service Temperature: 450 degrees F, 850 degrees F, 1000 degrees F or 1200 degrees F.
   3. Maximum Water Vapor Sorption: 5.0 percent by weight.

C. Vapor Barrier Jacket: Kraft paper reinforced with glass fiber yarn and bonded to aluminized film or Vinyl.
   1. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
   2. Secure with self-sealing longitudinal laps and butt strips.

3. Secure with outward clinch expanding staples and vapor barrier mastic.

D. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.

E. Vapor Barrier Lap Adhesive:
1. Compatible with insulation.

F. Insulating Cement/Mastic:
1. ASTM C195; hydraulic setting on mineral wool.

2.03 GLASS FIBER, RIGID

A. Manufacturer:
1. Knauf Insulation: www.knaufusa.com.
2. Johns Manville Corporation: www.jm.com.
3. Owens Corning Corp: www.owenscorning.com.
4. CertainTeed Corporation; www.certainteed.com.
5. Substitutions: See Section 01 60 00 - Product Requirements.

B. Insulation: ASTM C612 or ASTM C592; rigid, noncombustible.
1. 'K' Value: 0.25 at 75 degrees F, when tested in accordance with ASTM C177 or ASTM C518.
2. Maximum Service Temperature: 850 degrees F or 1200 degrees F.
3. Maximum Water Vapor Sorption: 5.0 percent by weight.
4. Maximum Density: 8.0 lb/cu ft or 12.0 lb/cu ft.

C. Vapor Barrier Jacket:
1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film or Vinyl.
2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
3. Secure with self-sealing longitudinal laps and butt strips.
4. Secure with outward clinch expanding staples and vapor barrier mastic.

D. Facing: 1 inch galvanized steel hexagonal wire mesh stitched on one face of insulation.

E. Vapor Barrier Lap Adhesive:
1. Compatible with insulation.

F. Insulating Cement/Mastic:
1. ASTM C195; hydraulic setting on mineral wool.

2.04 CELLULAR GLASS

A. Manufacturer:
1. Pittsburgh Corning Corporation: www.foamglasinsulation.com.
2. Substitutions: See Gilbane Project Manual.

B. Insulation: ASTM C552, Grade 2.
1. 'K' Value: 0.41 at 100 degrees F.
2. Service Temperature: Up to 900 degrees F.
3. Water Vapor Permeability: 0.005 perm inch.
4. Water Absorption: 0.2 percent by volume, maximum.
5. Density: Minimum 6.80 lb/cu ft.

2.05 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

A. Manufacturer:
1. Armacell International: www.armacell.com.

B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C 534 Grade 3, Grad 2 or Grade 1, in sheet form.
   1. Minimum Service Temperature: -40 degrees F.
   2. Maximum Service Temperature: 220 degrees F.
   3. Connection: Waterproof vapor barrier adhesive.

C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

2.06 JACKETS

A. PVC Plastic:
   1. Manufacturers:
      a. Johns Manville Corporation: www.jm.com.
      b. Substitutions: See Gilbane Project Manual.
   2. Jacket: Sheet material, off-white color.
      a. Minimum Service Temperature: -40 degrees F.
      b. Maximum Service Temperature: 150 degrees F.
      c. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
      d. Thickness: 10 mil.
      e. Connections: Brush on welding adhesive or Pressure sensitive color matching vinyl tape.
   3. Covering Adhesive Mastic:
      a. Compatible with insulation.

B. Canvas Jacket: UL listed 6 oz/sq yd plain weave cotton fabric treated with dilute fire retardant lagging adhesive.
   1. Lagging Adhesive:
      a. Compatible with insulation.

C. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.
   1. Thickness: 0.016 inch, 0.020 inch, 0.025 inch, 0.032 inch or 0.040 inch sheet.
   2. Finish: Smooth.
   3. Joining: Longitudinal slip joints and 2 inch laps.
   4. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.
   5. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.

D. Stainless Steel Jacket: ASTM A666, Type 304 stainless steel.
   1. Thickness: 0.010 inch, 0.016 inch or 0.018 inch.
   2. Finish: Smooth.
   3. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that equipment has been tested before applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Factory Insulated Equipment: Do not insulate.

C. Exposed Equipment: Locate insulation and cover seams in least visible locations.

D. Apply insulation close to equipment by grooving, scoring, and beveling insulation. Fasten insulation to equipment with studs, pins, clips, adhesive, wires, or bands.

E. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment, use vapor barrier cement.

F. Insulated equipment containing fluids below ambient temperature: Insulate entire system.

G. Fiber glass insulated equipment containing fluids below ambient temperature: Provide vapor barrier jackets, factory-applied or field-applied. Finish with glass cloth and vapor barrier adhesive.

H. For hot equipment containing fluids 140 degrees F or less, do not insulate flanges and unions, but bevel and seal ends of insulation.

I. For hot equipment containing fluids over 140 degrees F, insulate flanges and unions with removable sections and jackets.

J. Fiber glass insulated equipment containing fluids above ambient temperature: Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Finish with glass cloth and adhesive.

K. Inserts and Shields:
   1. Application: Equipment 1-1/2 inches diameter or larger.
   2. Shields: Galvanized steel or Steel between hangers and inserts.
   3. Insert location: Between support shield and equipment and under the finish jacket.
   4. Insert configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
   5. Insert material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.

L. Finish insulation at supports, protrusions, and interruptions.

M. Nameplates and ASME Stamps: Bevel and seal insulation around; do not insulate over.

N. Equipment Requiring Access for Maintenance, Repair, or Cleaning: Install insulation so it can be easily removed and replaced without damage.

3.03 SCHEDULES

A. Equipment: Domestic hot-water storage tanks, solar hot water tanks, heat exchangers, and expansion tanks, not factory insulated.
   1. Operating Temperature: 55 to 140 degrees F.
   2. Insulation Material: Glass Fiber
   3. Insulation Thickness: 2 inch.
   4. Field-Applied Jacket: PVC
   5. Vapor Retarder Required: No
   6. Finish: None.

END OF SECTION