SECTION 23 07 19
HVAC PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping insulation.

B. Flexible removable and reusable blanket insulation.

C. **High temperature flexible elastomeric insulation**.

D. Weather barrier coatings.

E. Jacketing and accessories.

F. Engineered wall outlet seals and refrigerant piping insulation protection.

1.02 REFERENCE STANDARDS

A. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus.

B. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

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

D. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form.

E. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.

F. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel.

G. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension.

H. ASTM D570 - Standard Test Method for Water Absorption of Plastics.

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

J. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials.

K. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

L. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.

M. ASTM E2178 - Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials.

N. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

O. ASTM G153 - Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials.

P. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials.

1.03 SUBMITTALS

A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

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

C. Sustainability Report: Submit a LEED Submittal Form for each different product stating:
   1. VOC content of each adhesive and/or sealant.
   2. State the total recycled content, broken down into Post Consumer and Post Industrial percentages.
   3. State the location where each component as well as the final product is extracted/harvested/recovered and manufactured within 500 miles (800 km) of the project site.

1.04 QUALITY ASSURANCE

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

B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum 3 years of experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.06 FIELD CONDITIONS

A. Maintain ambient conditions required by manufacturers of each product.

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

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

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

2.02 FIBERGLASS, FLEXIBLE

A. Manufacturers:
   1. Knauf Insulation
   2. Owens Corning
   3. Or Approved Equal

B. Insulation: ASTM C553; flexible, noncombustible blanket.
   1. K Value: 0.36 at 75 degrees F, when tested in accordance with ASTM C518.
   2. Maximum Service Temperature: 1,000 degrees F.
   3. Maximum Water Vapor Absorption: 5.0 percent by weight.

C. Vapor Barrier Jacket:
   1. Kraft paper with glass fiber yarn and bonded to aluminized film.
   2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.

D. Greenguard Gold certified, Conforms to UL 2818.

E. Validated to be formaldehyde free.

F. Recycled Content:
   1. SCS Global Services certified,
      a. Total Product Recycled Content: 28%
      b. Glass Only Recycled Content: 41%.
      c. Minimum 30% post-consumer recycled content.

G. Flame Spread Index: Less than 25.

H. Smoke Development Index: Less than 50.

I. Applications:
   1. Condensate piping.
   2. (Humidifier) steam distribution piping.

2.03 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

A. Manufacturers:
   1. Armacell
   2. Aeroflex
   3. K-flex.

B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.
   1. Minimum Service Temperature: Minus 40 degrees F.
   2. Maximum Service Temperature: 180 degrees F.
   3. Connection: Waterproof vapor barrier adhesive.
   4. Greenguard Gold certified. Conforms to UL 2818.
   5. Tested, rated, and labeled to ASTM C518.
   6. Flame Spread Index: Less than 25, conforms to ASTM E84.
   7. Smoke Development Index: Less than 50, conforms to ASTM E84.

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

D. Protective coating for exterior applications: Acrylic paint from elastomeric insulation manufacturer.

E. Application:
   1. Refrigerant suction and refrigerant liquid piping.

2.04 HIGH TEMPERATURE FLEXIBLE ELASTOMERIC INSULATION

A. **Manufacturers:**
   1. **Armacell**
   2. **Aeroflex**
   3. **K-flex.**

B. **Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.**
   1. **Minimum Service Temperature: Minus 40 degrees F.**
   2. **Maximum Service Temperature: 248 degrees F.**
   3. **Connection: Waterproof vapor barrier adhesive.**
   4. **Greenguard Gold certified. Conforms to UL 2818.**
   5. **Tested, rated, and labeled to ASTM C518.**
   6. **Flame Spread Index: Less than 25, conforms to ASTM E84.**
   7. **Smoke Development Index: Less than 50, conforms to ASTM E84.**

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

D. **Protective coating for exterior applications: Acrylic paint from elastomeric insulation manufacturer.**

E. **Application:**
   1. **Variable Refrigerant Volume (VRF) hot gas discharge piping.**
   2. **Optional for refrigerant suction and refrigerant liquid piping.**

2.05 WEATHER BARRIER COATINGS

A. Weather-Resistive Barrier Coating: Fire-resistive, UV resistant, water-based acrylic mastic for use over closed cell polyethylene and polyurethane foam insulation.
   1. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, Class A, when tested in accordance with ASTM E84.

2.06 JACKETING AND ACCESSORIES

A. PVC Plastic.
   1. Jacket: One piece molded type fitting covers and sheet material, off-white color.
      a. Minimum Service Temperature: 0 degrees F.
      b. Maximum Service Temperature: 150 degrees F.

c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
d. Thickness: 10 mil, 0.010 inch.
e. Connections: Brush on welding adhesive.

B. Aluminum Jacket:
1. Formed aluminum sheet complying with ASTM B209/B209M, Temper H14, minimum thickness of 0.016 inch with factory-applied polyethylene and kraft paper moisture barrier on the inside surface.
2. Thickness: 0.020 inch sheet.
3. Finish: Embossed.
4. Joining: Longitudinal slip joints and 2 inch laps.
5. Fittings: 0.016 inch thick die-shaped fitting covers with factory-attached protective liner.
6. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

2.07 ENGINEERED WALL OUTLET SEALS AND REFRIGERANT PIPING INSULATION PROTECTION

A. Pipe Penetration Wall Seal: Seals HVAC piping wall penetrations with compression gasket wall mounted rigid plastic outlet cover.
1. Wall Outlet Size, Stucco and Masonry Applications: 7-1/2 inch wide by 10 inch high.
a. Elastomeric Sleeve Diameter: 1-11/16 inch.
2. Outlet Cover Color: Gray.
3. Water Penetration: Comply with ASTM E331.
4. Air Leakage: Comply with ASTM E283.
5. Air Permeance: Comply with ASTM E2178.

B. Insulation Protection System: Refrigerant piping insulation PVC protective cover.
1. PVC Insulation Cover Color: Black with full-length velcro fastener.
2. Weatherization and Ultraviolet Exposure Protection: Comply with ASTM G153.
3. Water/Vapor Permeability: Comply with ASTM E96/E96M.
4. Anti-Fungal and Anti-Microbial Resistance: Comply with ASTM G21.
5. Flame Spread and Smoke Development Rating of 24/450: Comply with ASTM E84 or UL 723.
6. Carbon Arc Light Exposure: Comply with ASTM G153.
7. Tensile Strength After UV Exposure and Water Immersion: Comply with ASTM D412.
8. Water Absorption of Plastics: Comply with ASTM D570.
9. Adhesive free.

2.08 ACCESSORIES

A. General Requirements:
1. Provide required accessories in accordance with and subject to the recommendations of the insulation manufacturer.
2. Furnish compatible materials which do not contribute to corrosion, soften, or otherwise attack surfaces to which applied, in either the wet or dry state.
3. Comply with ASTM C795 requirements for materials to be used on stainless steel surfaces.
4. Supply materials that are asbestos free.

PART 3 EXECUTION

3.01 EXAMINATION

A. Test piping for design pressure, liquid tightness, and continuity prior to 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. Exposed Piping: Locate insulation and cover seams in least visible locations.

C. Insulated Pipes Conveying Fluids Below Ambient Temperature:
   1. Insulate entire system, including fittings, valves, unions, flanges, strainers, flexible connections, and expansion joints.

D. Elastomeric Insulated Pipes:
   1. Surfaces to be glued must be clean and free of grease.
   2. Secure with longitudinal lap and bond to pipe with manufacturer's contact adhesive. Secure with outward clinch expanding staples.
   3. Provide elastomeric foam tape to cover gaps or seal insulated sections.
   4. Seal all seams, butt joints, termination points and open ends.

E. Fiberglass Insulated Pipes for Humidifier Steam Distribution:
   1. Provide standard jackets, with vapor barrier, factory-applied, or field-applied. Secure with longitudinal laps and butt strips with pressure-sensitive adhesive. Secure with outward clinch expanding staples.
   2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth.

F. Fiberglass Insulated Pipes Conveying Fluids Below Ambient Temperature:
   1. Provide vapor barrier jackets, factory-applied or field-applied; secure with longitudinal laps and butt strips with pressure-sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
   2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.

G. Inserts and Shields:
   1. Application: Piping 1-1/2 inches diameter or larger.
   2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
   3. Insert location: Between support shield and piping 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.

H. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, see Section 07 84 00.

I. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with PVC jacket and fitting covers or aluminum jacket.

J. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping. Provide two coats of UV resistant finish for flexible elastomeric cellular insulation and PVC jacketing over insulation or provide aluminum jacketing.

END OF SECTION