

SECTION 23 07 00 - HVAC INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The requirements of this section apply to the insulation of mechanical equipment specified elsewhere in these specifications.
- B. Related Work: The requirements of Section 23 05 00, Common HVAC Materials and Methods, also apply to this section.

1.2 QUALITY ASSURANCE

- A. Insulation Thickness and Thermal Performance: Comply with provisions of the State of Oregon Energy Code.
- B. Composite (Insulation, Jacket or Facing and Adhesives) Fire and Smoke Hazard Ratings: Not to exceed a flame spread of 25 or smoke development of 50 and containing less than 0.1% by weight deca-PDE fire retardant.
- C. Component Ratings of Accessories (Adhesives, Mastics, Cements, Tapes, Finishing Cloth for Fittings): Same as "B" requirements above and permanently treated. No water soluble treatments.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. General: In addition to the requirements specified in Section 23 05 00, the following apply:
 - 1. Deliver insulation, coverings, cements, adhesives and coatings to the site in factory-fabricated containers with the manufacturer's stamp or label affixed showing fire hazard ratings of the products. Store insulation in original wrappings and protect from weather and construction traffic.
 - 2. Protect insulation against dirt, water, chemical and mechanical damage. Do not install damaged insulation. Remove such insulation from project site.

1.4 SUBMITTALS

- A. Submit catalog data and performance characteristics for each product specified.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Insulating Manufacturers: Johns Manville, Knauf, Armstrong, Owens-Corning, Pittsburgh Corning, Pabco, Imcoa or Certain Teed. Johns Manville products are listed unless indicated otherwise.
- B. Adhesive Manufacturers: Foster, 3M, Insul-Coustic, Borden, Kingco or Armstrong.

2.2 PIPING INSULATION

- A. Interior and Exterior Piping Systems 50 to 850 Deg. F: Glass fiber preformed pipe insulation with a minimum K-value of 0.23 at 75 Deg. F, a minimum density of 3.5 pounds per cubic foot within all-service vapor barrier jacket, vinyl or pre-sized finish and pressure sensitive seal containing less than 0.1% by weight deca-PDE fire retardant.
- B. Exterior Piping Systems 32 to 50 Deg. F: Glass fiber preformed pipe insulation with a minimum K-value of 0.23 at 75 Deg. F, a minimum density of 3.5 pounds per cubic foot within all-service vapor barrier jacket, vinyl or pre-sized finish and pressure sensitive seal containing less than 0.1% by weight deca-PDE fire retardant. Cover with 0.016" aluminum finish jacket coordinate with insulation of heat trace.
- C. Interior Piping Systems 32 to 50 Deg. F: Glass fiber preformed pipe insulation with a minimum K-value of 0.23 at 75 deg. F, a minimum density of 3.5 pounds per cubic foot. Polymer vapor barrier jacket containing less than 0.1% by weight deca-PDE fire retardant and with pressure sensitive seal and wicking system to remove condensation from pipe surface. Owens Corning "VaporWick."

2.3 EQUIPMENT INSULATION

- A. Equipment Temperatures Below 70 Deg. F: Flexible, closed cell, elastomeric sheet insulation of 5.5 #/cubic feet density and 0.27 thermal conductivity at 75 deg. F. Armstrong "Armaflex."
- B. Equipment Temperatures From 70 to 450 Deg. F: Glass fiber 3 pound density insulation with a 0.23 thermal conductivity at 75 deg. F. Johns Manville "814 Spin-Glas" with "FSK" jacket containing less than 0.1% by weight deca-PDE fire retardant or finished as recommended by manufacturer.

2.4 INSULATION ACCESSORIES

- A. Insulation Compounds and Materials: Provide rivets, staples, bands, adhesives, cements, coatings, sealers, welded studs, etc., as recommended by the manufacturers for the insulation and conditions specified except staples not permitted on chilled water lines.
- B. Interior Tanks and Equipment Insulation Covering: Finished metal jacket or as recommended by the manufacturer for insulation material specified.
- C. PVC Protective Jacketing and Valve and Pipe Fitting Covers: Johns Manville Zeston 2000, Proto LoSmoke, or Ceel-Co Ceel-Tite 100 Series with precut fitting fiberglass insulation or approved.
- D. Jacket Lap Sealing Adhesives: Foster Drion 85-75 contact cement or approved substitute.
- E. Saddles and Shields: Unless otherwise indicated and except as specified in piping system specification sections, install the following types:
 - 1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.

2. Protection Shields (MSS Type 40): Of length recommended by manufacturer to prevent crushing insulation.
 3. Thermal-Hanger Shield Inserts: For supporting insulated pipe, 360-degree insert of high-density, 100-psi (690-kPa) minimum compressive strength, water-repellent-treated calcium silicate or cellular-glass pipe insulation, same thickness as adjoining insulation with vapor barrier and encased in 360-degree sheet metal shield.
- F. Removable/Reusable Insulation Covers:
1. 100 to 600 Deg. F Insulation Filler: Install 2-1/4# - 4#/cu. ft. glass fiber, 6# - 8# / cu. ft. mineral wool or glass fiber/type E felted (9#/cu. ft.) flexible blankets and pads for large, irregular shaped equipment such as pump casings, bolting flanges, etc. For small common shapes such as valves, elbows, flanges, etc., install preformed flexible glass fiber pipe wrap, preformed glass fiber pipe covering or glass fiber/type E felted (9#/cu. ft.) insulation.
 2. Stitching, 200 to 600 Deg. F: Glass fiber thread/PVC coated, staples - galvanized or stainless steel, galvanized or stainless steel hog rings, 0.010" - 0.15" dia/dead soft stainless steel wire.
 3. Attachments and Securements:
 - a. Quilting: Stainless 2-hole washers, both sides with twisted 0.035" - 0.051" wire loops, 12 ga. stainless spindle/washer/ speed clip assembly or stainless 0.035" - 0.051" wire loops.
 - b. Lacing and Hooks: Stainless 2-hole 12 gage bent wire lacing hooks, stainless 2-hole dished washer assembly with twisted 0.035" - 0.051" wire loops, 12 gage stainless spindle washer with built-in hook and speed clip or stainless 1-hole dished and flat washer riveted through the cloth.

PART 3 - EXECUTION

3.1 PIPING INSULATION

- A. General: Do not insulate underground piping except at joints and fittings on preinsulated piping unless indicated otherwise.
- B. Chilled Water Piping: Above grade insulate with glass fiber pipe covering:
- | <u>Size</u> | <u>Thickness</u> |
|----------------|------------------|
| 1/2" to 1-1/2" | 1-1/2" |
| 2" to 3" | 2" |
| 4" and larger | 2-1/2" |
- C. Condensing Water Piping: Where heat traced insulate with exterior approved material, thickness shall be 1 1/2 " unless thinner material can be used with the heat tracing system and provide required performance.
- D. Pipe Fittings:
1. Insulate and finish all fittings including valve bodies, bonnets, unions, flanges and expansion joints with precut fiberglass insulation and preformed PVC covers sealed to adjacent insulation jacket for continuous vapor barrier covering over all fittings.

2. Provide removable/reusable insulation covers on 4" and larger valves, unions, flanges, pump casings, strainers and similar fittings or equipment requiring periodic service.
- E. Protective Covering: Install continuous protective PVC or metal covering on all piping and fittings in mechanical rooms below 8' AFF, and where insulation may be subject to damage. Install metal jacketing on all roof mounted lines. Install with rivets or cement seams and joints. Install with lap on the bottom of the pipe and all fasteners on the bottom of the pipe.
- F. Insulated Piping: Comply with the following.
 1. Attach clamps and spacers to piping.
 - a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
 - b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - c. Do not exceed pipe stress limits according to ASME B31.9.
 2. Install MSS SP-58, Type 39 or Type 40 protection saddles, if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
 - a. Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 (DN100) and larger if pipe is installed on rollers.
 3. Shield Dimensions for Pipe: Not less than the following.
 - a. NPS 1/4 to NPS 3-1/2 (DN8 to DN90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.
 - b. NPS 4 (DN100): 12 inches (305 mm) long and 0.06 inch (1.52 mm) thick.
 - c. NPS 5 and NPS 6 (DN125 and DN150): 18 inches (457 mm) long and 0.06 inch (1.52 mm) thick.
 - d. NPS 8 and NPS 14 (DN200 and DN350): 24 inches (610 mm) long and 0.075 inch (1.91 mm) thick.
 - e. NPS 16 and NPS 24 (DN400 and DN600): 24 inches (610 mm) long and 0.105 inch (2.67 mm) thick.
 4. Pipes NPS 8 (DN200) and Larger: Include wood inserts.
 5. Insert Material: Length at least as long as protective shield.
 6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.
- G. Piping Insulation Lap Seams and Butt Joints: Install insulation jacket in accordance with manufacturer's recommendation. Where jacket joint and lap seams have not adhered, remove affected section of insulation and reinstall or apply lap sealing adhesive in accordance with manufacturer's instructions.

3.2 EXPANSION JOINTS

- A. Insulation: Insulate expansion joints on heating and/or cooling piping to match thickness of adjacent piping. Build up piping insulation adjacent to the expansion joints sufficiently to allow internal clearance within the insulation for the diameter of the expansion joint. Fasten one end of the expansion joint insulation securely and provide aluminum or sheet metal on the built-up insulation at the other end to permit movement of the insulation without damage.
- B. Finish: Finish as specified for adjacent piping with fireproof covering.

END OF SECTION