

SECTION 23 07 00
INSULATION

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. The Contractor shall furnish all labor and supervision, materials, equipment, and tools required to insulate piping and ductwork installed under this contract as indicated on the plans and as specified herein. The scope of work includes coordination with the piping and ductwork installation contractors to ensure that hangers and supports, valve stems and damper operators, and other appurtenances are properly sized to allow for the thickness of insulation when they are installed.
- B. Refrigerant suction, hot gas and liquid piping, domestic cold water, non-potable piping shall be covered with either pre-formed mineral fiber or closed cell elastomeric pipe insulation.
- C. Humidifier and drain piping shall be covered with pre-formed mineral fiber insulation.
- D. The insulation of all supply air ductwork systems, makeup air and return/ exhaust air system sections in contact with outside air shall be in accordance with the International Energy Conservation Code and local energy codes, with flexible or rigid mineral fiber blanket insulation as specified herein.
- E. Exterior ductwork insulation and weatherproofing is by Section 07 72 00.

1.2 REFERENCES

- A. ASTM C518, C534, C547, C553 and related standards for insulation performance
- B. ASTM E96 – Water Vapor Transmission of Materials
- C. ASTM E84/NFPA 255/UL 723 - Surface Burning Characteristics of Building Materials.
- D. International Energy Conservation Code 2009
- E. Section 23 00 10 – General Mechanical Requirements, is an integral part of this section. Requirements and work indicated in 23 00 10 are not repeated in this Section.

1.3 SUBMITTALS

- A. Provide insulation schedule with product data descriptions and thickness for each service. Provide samples if requested by Engineer.
- B. Provide product data for field applied jackets.
- C. Provide manufacturer's installation instructions, which indicate procedures that ensure acceptable workmanship and installation standards will be achieved.

1.4 QUALITY ASSURANCE

- A. Materials: Flame spread/smoke developed rating of 25/50 or less in accordance with UL 723.
- B. Installers: Company specializing in the work of this section with a minimum of three years of experience.

- C. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- D. Ensure that piping and ductwork is complete and tested, clean and dry before applying insulation.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- B. Store insulation in original wrapping and protect from weather and construction traffic. Protect insulation against dirt, water, chemical, and mechanical damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Mineral-Fiber Insulation:
 - a. CertainTeed Manson.
 - b. Johns Manville
 - c. Knauf FiberGlass GmbH.
 - d. Owens-Corning Fiberglas Corp.
 - e. Schuller International, Inc.
 - 2. Flexible Elastomeric Thermal Insulation:
 - a. Armacell Company
 - b. Armstrong World Industries, Inc.
 - c. Rubatex Corp.

2.2 INSULATION MATERIALS

- A. Mineral-Fiber Board Thermal Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IB, without facing and with all-service jacket manufactured from kraft paper, reinforcing scrim, aluminum foil, and vinyl film.
- B. Mineral-Fiber Blanket Thermal Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II, without facing and with all-service jacket manufactured from kraft paper, reinforcing scrim, aluminum foil, and vinyl film.
- C. Flexible Elastomeric Thermal Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type II for sheet materials.
 - 1. Adhesive: As recommended by insulation material manufacturer.
 - 2. Ultraviolet-Protective Coating: As recommended by insulation manufacturer.

2.3 PIPE INSULATION

- A. Preformed closed cell elastomeric pipe insulation shall be equal to Armacell Company AP/Armaflex, conforming to ASTM C534, a preformed, self-seal pipe insulation consisting of elastomeric material with expanded closed-cell structure. Insulation shall be provided to match thickness as shown in the schedule, and shall have the following properties:
 - 1. K-value not more than 0.27 Btu-in/hr-sf-°F @ 75° F;
 - 2. Rated for service temperatures between -20° and 180° F;
 - 3. Maximum moisture absorption: 0.2% by volume;
 - 4. Vapor barrier permeance: 0.08 perms maximum.

- B. All exposed insulation located outdoors, and in any other areas subject to physical damage, shall be covered with aluminum or PVC jacketing and fitting covers.
- C. Performed mineral fiber pipe insulation shall be equal to Johns Manville Micro-Lok, conforming to ASTM C547, consisting of preformed glass fibers bonded with a thermosetting resin, and jacketed with a reinforced vapor barrier facing and a factory-applied, longitudinal adhesive closure system. Insulation shall be provided to match thickness as specified, and shall have the following properties:
 - 1. K-value not more than 0.24 Btu-in/hr-sf-°F@75°F;
 - 2. Rated for service temperatures between 0° and 300°F;
 - 3. Maximum moisture absorption: 0.2% by volume;
 - 4. Vapor barrier permeance: 0.02 perms maximum.

2.4 DUCT INSULATION

- A. Mineral fiber duct wrap insulation shall be equal to Johns Manville Microlite, EQ, Type 75, conforming to ASTM C553, consisting of flexible glass fibers bonded with a thermosetting resin, and jacketed with a U.L. rated foil-scrim-kraft vapor barrier covering. Insulation shall have the following properties:
 - 1. Density: 0.75 lb/cf
 - 2. K-value not more than 0.29 Btu-in/hr-sf-°F @ 75° F ("out of package" R-value: 5.2 for 1½" thickness);
 - 3. Rated for service temperatures between 40° and 250° F;
 - 4. Maximum moisture absorption: 0.2% by volume;
 - 5. Vapor barrier permeance: 0.02 perms maximum.
- B. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IB. For duct and plenum applications, provide insulation with factory-applied white FSK or ASJ jacket.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. CertainTeed Corp.; Commercial Board.
 - b. Fibrex Insulations Inc.; FBX.
 - c. Johns Manville; 800 Series Spin-Glas.
 - d. Knauf Insulation; Insulation Board.
 - e. Manson Insulation Inc.; AK Board.
 - f. Owens Corning; Fiberglas 700 Series.

2.5 FIELD-APPLIED JACKETS, PIPING

- A. General: ASTM C 921, Type 1, unless otherwise indicated.
- B. Foil and Paper Jacket: Laminated, glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil.
- C. PVC Jacket: High-impact, ultraviolet-resistant PVC; 20 mils thick; roll stock ready for shop or field cutting and forming, suitable for outdoor use.
 - 1. Adhesive: As recommended by insulation material manufacturer.
 - 2. PVC Jacket Color: White.
 - 3. For indoor use, use Zeston 300 series PVC.
- D. PVC Fitting Covers: Factory-fabricated fitting covers manufactured from 20-mil- thick, high-impact, ultraviolet-resistant PVC, suitable for outdoor use.
 - 1. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories for the disabled.

2. Adhesive: As recommended by insulation material manufacturer.
 3. For indoor use, use Zeston 300 series PVC.
- E. Aluminum Jacket: Aluminum roll stock, factory cut and rolled or ready for shop or field cutting and forming to indicated sizes. Comply with ASTM B 209, 3003 alloy, H-14 temper.
1. Finish and Thickness: Smooth finish, 0.010 inch thick.
 2. Moisture Barrier: 1-mil- thick, heat-bonded polyethylene and kraft paper.
 3. Elbows: Preformed, 45- and 90-degree, short- and long-radius elbows; same material, finish, and thickness as jacket.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.3 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions. Insulate fittings, joints and valves with molded insulation of like material and thickness as adjacent pipe. Provide access for valves, unions, and strainers. Do not insulate flexible connections or expansion joints.
- B. Continue insulation and covering through wall, roof "dog houses", sleeves, pipe hangers and other pipe penetrations. Finish insulation at supports, protrusions and interruptions.
- C. Provide galvanized steel shields on all piping at hanger locations, and use inserts for piping 1½ inches diameter or larger, between the shield and the pipe. See Section 230529.
- D. All indoor exposed water and drain piping located within ten feet of finished floor level in any occupied area, and any piping in other locations which are subject to physical damage shall be insulated as specified above, then covered with Zeston 300 PVC jacketing and fitting covers in 30 mil thickness.
- E. Insulate ductwork after connections have been made to branch ducts and diffuser takeoffs. Use weld pins and staples on ducts over 18" wide.
- F. Exterior supply and return ductwork insulation and weatherproofing is by Section 07 72 00.
- G. RTU Curb Insulation:
 1. Refer to drawing M201, detail #4 & 10 for RTU curb insulation requirements.

3.4 INSULATION SCHEDULE

- A. Furnish and install ½" thick, preformed mineral-fiber or preformed self-seal closed cell elastomeric insulation on all domestic water and non-potable water piping and condensate drain piping located indoors.
- B. Furnish and install 2" thick, flexible mineral-fiber duct wrap insulation on all concealed supply and outside air ductwork.

- C. Furnish and install 2" thick, mineral-fiber duct board insulation on all exposed supply and outside air ductwork.
- D. Furnish and install 2" thick, mineral-fiber duct board insulation on all exhaust air discharge and outside air intake sheet metal plenums.
- E. Furnish and install 2" thick, flexible mineral-fiber duct board insulation on all exhaust air ductwork between exhaust fans and discharge plenums.
- F. Furnish and install 1½" thick, preformed mineral-fiber pipe insulation on all humidifier steam supply and steam condensate piping.
- G. Furnish and install ½" thick, pre-formed mineral-fiber or pre-formed self-seal closed cell urethane insulation on all non-potable water piping and condensate drain piping located indoors.
- H. Furnish and install 1" thick, closed cell elastomeric insulation on refrigerant suction, hot gas and liquid piping. Install PVC or aluminum jacket on all outdoor piping.
- I. Exterior supply and return ductwork insulation and weatherproofing is by Section 07 72 00

END OF SECTION