

**SECTION 23 07 13
DUCTWORK INSULATION**

PART 1 GENERAL

1.1 REFERENCES

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
- B. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation
- C. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications
- D. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation
- E. ASTM C921 - Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials

1.2 SUBMITTALS

- A. Submit under provisions of Section 23 05 00.
- B. Product Data: For each product used in this project, provide catalog data for insulation, jackets and accessories, and installation instructions.
- C. Samples: Not required

1.3 QUALITY ASSURANCE

- A. Materials: Flame spread/smoke developed rating of 25/50 or less in accordance with ASTM E84.
- B. Applicator: A company specializing in performing the work of this section with minimum 3-years of experience.

1.4 DELIVERY, STORAGE AND HANDLING

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

PART 2 PRODUCTS

2.1 FLEXIBLE FIBER GLASS INSULATION

- A. Provide flexible, noncombustible, minimum R-6 (per plans) blanket insulation made from highly resilient, inorganic glass fibers bonded by a thermosetting resin.
 - 1. Density shall be 1 lb/cu ft. K-value shall be 0.28 at 75°F.
 - 2. ASTM C553
- B. Provide factory applied, foil-scrim-kraft vapor barrier with 2" wide stapling flange.
 - 1. ASTM C921
- C. Vapor Barrier Tape: Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive adhesive.

2.2 RIGID FIBER GLASS INSULATION

- A. Provide semi-rigid, noncombustible, board insulation made from highly resilient, inorganic glass fibers bonded by a thermosetting resin.
 - 1. Density shall be 6-lb/cu ft.
 - 2. K-value shall be 0.22 at 75°F, ASTM C612.
- B. Provide factory applied, foil-scrim-kraft vapor barrier. ASTM C921
- C. Vapor Barrier Tape: Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive adhesive.

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CELLULAR GLASS INSULATION

- D. Provide molded, impermeable, noncombustible, cellular glass equipment insulation.
 - 1. K-value shall be 0.35 at 75°F, ASTM C552.
- E. Provide open mesh, synthetic membrane to reinforce mastic finishes.
 - 1. Thread count shall be 6 strands by 6 strands per square inch.
 - a. Thickness shall be 27 mils.
- F. Provide 18-ga, Type 304 stainless steel tie wire with twisted ends on maximum 12" centers.
- G. Provide flexible, acrylic latex coating for use with cellular glass insulation to provide a vapor barrier finish.

2.3 ALUMINUM JACKET

- A. Provide 20-mil thick stucco embossed pattern finish, Type 1100 aluminum jacket per ASTM B209
- B. Provide 0.5" wide, 20-mil thick, Type 3003 aluminum bands on maximum 24" centers.

2.4 FIBER GLASS DUCT LINER

- A. Duct liner in contact with the air stream is NOT acceptable.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Before applying insulation, verify the inspection, testing and approval of ductwork is complete.
- B. Before applying insulation, verify that surfaces are clean (with foreign material removed) and dry.
- C. Before applying insulation, verify the installation of 2" high quadrant standoffs for volume dampers.
- D. Before applying insulation, verify the installation of 2" high brackets for motorized dampers.

3.2 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Ductwork and equipment insulation or covering shall not penetrate fire-rated assembly unless the specific material has been tested and approved as part of the fire-rated assembly, (FBC)
 - 1. Where not prohibited by code continue insulation through non-rated partitions, sleeves, hangers, and other penetrations.
- C. Flexible Fiber Glass Insulation
 - 1. Wrap insulation around ductwork with facing to the outside so that the 2" flap completely overlaps the facing and the insulation at the other end of stretch out.
 - 2. Place insulation snugly butted ductwork and other insulation.
 - 3. Staple seams with outward clinching staples on maximum 6" centers.
 - a. Seal seams with vapor barrier tape or two coats of vapor barrier mastic reinforced with 4" wide, open weave glass fabric.
 - 4. For ductwork 24" wide or greater, secure the insulation on the underside of the ductwork with mechanical fasteners and speed clips on maximum 18" centers.
 - a. Cut-off the protruding ends of the fasteners flush after installing the speed clips and seal with vapor barrier tape or mastic.
 - 5. Repair facing damage with vapor barrier tape or mastic.
 - 6. Insulate entire system including fittings, joints, flanges, etc.
- D. Rigid Fiber Glass Insulation
 - 1. Install insulation around ductwork with facing to the outside with joints firmly butted.
 - 2. Secure insulation with mechanical fasteners and speed clips located a maximum of 3" from each edge and spaced on a maximum of 12" centers.

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- a. Cut-off the protruding ends of the fasteners flush after installing the speed clips and seal with vapor barrier tape or mastic.
 3. Overlap vapor barriers a minimum of 2" and seal with vapor barrier tape or mastic.
 4. Repair facing damage with vapor barrier tape or mastic.
 5. Insulate entire system including fittings, joints, flanges, etc.
- E. Cellular Glass Insulation
1. Install insulation to ductwork with all joints tightly fitted and buttered with joint sealer.
 - a. Eliminate voids by refitting or replacing insulation.
 - b. Do NOT fill voids with joint sealer.
 2. Apply insulation as close as possible to ductwork by grooving, scoring, and beveling insulation, if necessary.
 - a. Secure insulation with studs, pins, clips, adhesive, wires, or bands.
 3. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface.
 - a. Use vapor barrier cement.
 4. Provide vapor barrier mastic, reinforcing membrane and aluminum jacket.
 - a. For horizontal ductwork, locate aluminum jacket seams on bottom of ductwork.
 - b. Caulk all seams.
 5. Insulate entire system including fittings, joints, flanges, etc.

3.3 SCHEDULE

- A. Supply Air Ductwork
1. For single wall sheet metal ductwork in concealed locations, provide 2" thick, 1.0 lb/cu ft, flexible fiberglass insulation.
 2. For single wall sheet metal ductwork in exposed areas, provide 1.5" thick, 6.0 lb/cu ft, rigid fiberglass insulation.
 - a. This includes mechanical equipment rooms.
 3. Double wall pre-insulated ductwork does not require additional insulation.
- B. Return Air Ductwork
1. For single wall sheet metal ductwork located within the conditioned thermal envelope of the building, insulation is NOT required, unless indicated otherwise in the design documents.
 2. For single wall sheet metal ductwork located outside of the conditioned thermal envelope of the building, provide insulation the same as for Supply Air Ductwork.
- C. Exhaust Air Ductwork: Insulation is NOT required.
- D. Outdoor Air Ductwork
1. For non-conditioned outdoor air, insulation is usually NOT required see plans.
 - a. Engineer may require exterior duct insulation to eliminate sweating inside the non-conditioned outdoor air duct.
 2. For conditioned outdoor air, provide minimum R-6 (per plans) insulation the same as for supply air ductwork.
 - a. Conditioned outdoor air is defined as outdoor air that has been dehumidified (cooled) or dehumidified (cooled) and reheated.
- E. Ceiling Diffusers: For lay-in type border, insulate the back of the ceiling diffuser with 2" thick, 1.0 lb/cu ft, flexible fiberglass insulation.
1. Seal the insulation to the perimeter of the extended panel (NOT to T-bar grid) with vapor barrier tape.
 2. Seal the insulation to the flexible duct with vapor barrier mastic.
- F. Stand-offs for Volume Dampers and Brackets for Motorized Dampers:

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1. For insulated ducts, insulate the space between the duct and standoff or bracket with 2" thick, 1.0 lb/cu ft, non-faced, flexible fiberglass insulation.
2. Insulate up to the standoff or bracket, and seal with vapor barrier mastic.
- G. Fire Dampers: Insulate the fire damper sleeve with the same type and thickness of insulation as the adjacent ductwork.
- H. To prevent condensation on the partition, insulate a 12" wide area around the fire damper sleeve on both sides of the partition.
 1. Insulate the partition with 1.5" thick, 6.0-lb/cu ft, rigid fiberglass insulation.
 2. Seal the partition insulation to the partition with vapor barrier tape.
 3. Seal the partition insulation to the ductwork insulation with vapor barrier tape and mastic.
 4. Partition insulation shall be above the ceiling.
- I. Flexible Connections: Insulate with 2" thick, 1.0 lb/cu ft, flexible fiberglass insulation.
 1. Seal with vapor barrier tape and mastic.

END OF SECTION