

SECTION 23 07 13

DUCT INSULATION

1.0 GENERAL

1.01 DESCRIPTION

- A. All work specified in this Section is governed by the Common Work Results for HVAC Section 23 05 00.
- B. This Section 23 07 13 and the accompanying drawings cover the provisions of all labor, equipment, appliances, and materials and performing all operations in connection with the construction of the ductwork systems as specified herein and as shown. These systems include, but are not limited to, the following:
 - 1. Insulation for typical ductwork
 - 2. Duct liner
 - 3. Insulation for ductwork outside

1.02 INTENT

- A. It is the intent of this Section of the specifications to provide a complete operable duct system as shown and specified which is reasonably airtight, free of noise, vibration and sweating, and fabricated so as to fit into the space allotted and to exhibit a minimum resistance to airflow.

2.0 PRODUCTS

2.01 DUCT LINER

- A. Duct liner shall be one inch thick, 1 ½ lb. density (3 lb. density on medium- and high-pressure supply air systems except that 1 lb. density is acceptable if the liner is at least $R \geq 4.2$ and $NRC \geq 0.65$) fibrous glass with one face coated with a black fire retardant compound. The permanent composite fire and smoke hazard rating of the liner shall be stenciled on the liner face and shall be:
 - 1. Maximum Flame Spread 25
 - 2. Maximum Smoke Developed 50

2.02 TYPICAL DUCT INSULATION

- A. Duct insulation shall be 2.2" thick, minimum 3/4 lb. density fiberglass, installed $R \geq 6.0$, with an FSKL 0.00035" thick aluminum foil jacket, reinforced with fiberglass scrim. Thermal conductivity shall be a maximum of $K = 0.29$ at 75°F mean temperature, or a maximum of $K=0.27$ at 25% compression.
- B. Insulation adhesive shall be Benjamin Foster 85-20. Tape shall be aluminum foil

and shall be SMACNA listed and labeled.

- C. The composite NFPA 90A and 90B, ASTM E84, UL rating of the installed insulation shall not exceed 25/50.
- D. The grease exhaust ductwork shall have zero-clearance to combustibles wrap from the hood connection to discharge termination. Coordinate the insulation with all required access panels, drains, etc. as required by NFPA 96.

2.03 INSULATION FOR DUCTWORK OUTSIDE

- A. See specification 23 31 00 for duct construction installed outside the building and exposed to weather. Note requirement for soldered or welded duct. Ductwork installed outside shall be provided with a cover as noted below with water-proof coating and seams. Seams shall be located so as to not be subject to water flow. Cover shall be painted a light colour as selected by the Owner. All ductwork installed outside shall be constructed with sloped top "watershed" design with a slope of not less than 2% to avoid ponding water. Any ductwork supports connected directly to the ductwork shall also abide by the insulation requirements below.
 - 1. Ductwork conveying conditioned air shall, in addition, have minimum R-12 insulation of one of following options:
 - a. 3" thick, 3 PCF density rigid fiberglass board insulation, finished with waterproof mastic and glass fiber with aluminum jacket. Jacket shall have waterproof silicone caulk joints and seams. Seam opening shall be installed facing downward.
 - b. 3" thick, 3 PCF density rigid fiberglass board insulation with foil-kraft facing with Polyguard, or equal, finished with waterproof mastic and glass fiber with aluminum jacket. Jacket shall have waterproof silicone caulk joints and seams. Seam opening shall be installed facing downward.
 - c. 2" thick polyisocyanurate board insulation finished with waterproof mastic and glass fiber with aluminum jacket. Jacket shall have waterproof silicone caulk joints and seams. Seam opening shall be installed facing downward.
 - 2. As an alternate to single wall duct and exterior insulation, ductwork installed outside may be double-walled meeting SMACNA requirements, R-12 insulation between walls, and the exterior wall shall be corrosion-coated for outside installation. Ductwork shall be weathertight.
 - 3. Ductwork installed outside but not exposed to weather, such as in covered

loading docks and parking decks more than 15' from exterior openings, and conveying unconditioned air, shall not be required to be covered or insulated. See Section 23 31 00 for coating required for seacoast area installations.

4. Access into ductwork installed outside shall be located inside the building where feasible. Where outside access is required, access shall be through removable cover and insulation to match the above requirements. Removable areas shall be permanently labeled on the outside and shall be insulated to minimize exposure to water infiltration.

3.0 EXECUTION

3.01 INSTALLATION

- A. Ductwork shall be installed in strict accordance with SMACNA, UL, and NFPA standards.
- B. Duct liner shall be provided throughout all return air, transfer, and plenums. Duct liner shall also be provided for the following minimum distances, through the first elbow(s), or as otherwise indicated on the drawings, whichever is greater, downstream of each unit indicated below:
 1. Packaged rooftop unit – 25 ft
 2. Self-contained air conditioning unit – 25 ft
 3. Central air handling unit – 25 ft
 4. Split system air handling unit – 5 ft
 5. Water-source heat pump – 5 ft
 6. Fan coil unit – 5 ft
 7. Terminal unit – 5 ft
- C. Straight runs only shall be factored into the above distance requirements. Elbows, etc. within the length shall be lined but shall not count towards the length requirement.
- D. Duct liner shall not be installed within six inches of a damper, including fire and/or smoke dampers. Metal nosings are required on the upstream side of the exposed insulation. Where lining has been interrupted, external insulation is required.
- E. Duct liner shall be cut to provide overlapped and compressed longitudinal corner joints. Liner shall be installed with the coated surface facing the air stream. Duct liner shall be adhered to the ductwork with a 100% coverage of the sheet metal surfaces using a fire-retardant adhesive applied by spraying. Coat all exposed leading edges and all transverse joints with fire retardant adhesive. The liner shall be additionally secured using metal pins welded to the duct and speed washers. All leading edges shall be secured with sheet metal airfoils.

- F. Inside the vapor barrier of the building: All supply air ductwork which is not lined shall be insulated. All outside air ductwork shall be insulated. Insulation shall be cut slightly longer than circumference of duct to insure full thickness at corners. All insulation shall be applied with edges tightly banded. Insulation shall be adhered to duct with fire resistant adhesive. Adhesive shall be applied so that insulation conforms to duct surfaces uniformly and firmly. In addition to the adhesive, the insulation shall be additionally secured to the bottom of all ducts 18" or wider by means of welded pins and speed clips. The protruding end of the pins shall be cut off flush after the speed clips have been applied. The vapor barrier facing shall be thoroughly sealed with tape where the pins have pierced through. All joints shall be sealed with 2" wide SMACNA tape. Any cuts or tears shall be sealed with SMACNA tape.
- G. All outside air ductwork located in conditioned or semi-conditioned spaces shall be externally insulated similar to supply ductwork.
- H. All conditioned air ductwork, including partially conditioned energy recovery ventilator outside air supply to the building and exhaust ductwork, installed in spaces that are ventilated only, i.e. penthouses, shall be insulated.

END OF SECTION