SECTION 23 07 13

DUCT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Duct insulation.

B. Duct Lagging.

C. Insulation jackets.

1.02 RELATED REQUIREMENTS

A. Section 09 90 00 - Painting and Coating: Painting insulation jackets.

B. Section 22 05 53 - Identification for Plumbing Piping and Equipment.

C. Section 23 05 53 - Identification for HVAC Piping and Equipment.

D. Section 23 31 00 - HVAC Ducts and Casings: Glass fiber ducts.

1.03 REFERENCE STANDARDS

A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric].

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

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

E. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation.

F. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation.

G. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material).

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

I. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials.

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

K. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association.

L. SMACNA (DCS) - HVAC Duct Construction Standards; Sheet Metal and Air Conditioning Contractors' National Association.

M. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc..

1.04 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 necessary to ensure acceptable workmanship and that installation standards will be achieved.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type 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 three years of experience and approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

1.07 FIELD CONDITIONS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

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

PART 2 PRODUCTS

2.01 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION

A. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84, NFPA 255, or UL 723.

2.02 GLASS FIBER, FLEXIBLE

A. Manufacturer:
   1. Knauf Insulation: www.knaufusa.com.
   2. Johns Manville Corporation: www.jm.com.
   3. Owens Corning Corp: www.owenscorning.com.
   4. CertainTeed Corporation: www.certainteed.com.

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: 450 degrees F.
   3. Maximum Water Vapor Sorption: 5.0 percent by weight.

C. Vapor Barrier Jacket:
   1. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
   2. Secure with pressure sensitive tape.

D. Vapor Barrier Tape:
   1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

E. Outdoor Vapor Barrier Mastic:
   1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.

F. Tie Wire: Annealed steel, 16 gage.

2.03 GLASS FIBER, RIGID

A. Manufacturer:
   1. Knauf Insulation: www.knaufusa.com.
   2. Johns Manville Corporation: www.jm.com.
   3. Owens Corning Corp: www.owenscorning.com.
   4. CertainTeed Corporation: www.certainteed.com.

B. Insulation: ASTM C612; rigid, noncombustible blanket.
   1. 'K' value: 0.24 at 75 degrees F, when tested in accordance with ASTM C518.
   2. Maximum service temperature: 450 degrees F.
   3. Maximum Water Vapor Sorption: 5.0 percent.
   4. Maximum Density: 8.0 lb/cu ft.

C. Vapor Barrier Jacket:
   1. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
   2. Secure with pressure sensitive tape.

D. Vapor Barrier Tape:
   1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

E. Indoor Vapor Barrier Finish:
   1. Cloth: Untreated; 9 oz/sq yd weight, glass fabric.
   2. Vinyl emulsion type acrylic, compatible with insulation, black color.

2.04 JACKETS

A. Aluminum Jacket: ASTM B209 (ASTM B209M).
   1. Thickness: 0.016 inch sheet.
   2. Finish: Smooth.
   3. Joining: Longitudinal slip joints and 2 inch laps.
   4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
   5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.
   6. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.

2.05 DUCT LAGGING

A. Manufacturers:
   1. Sound Seal: www.soundseal.com
   2. Kinetics Noise Control: www.kineticsnoise.com.
   3. Substitutions: See Section 01 60 00 - Product Requirements.

B. Lagging: Loaded vinyl noise barrier with a scrim reinforced aluminum foil facing on one side with a 1" thick fiberglass decoupler.
   1. Apparent Thermal Conductivity: Maximum of.25 at 75 degrees F
   2. Service Temperature: Up to 350 degrees F.

C. Adhesive: Waterproof, fire-retardant type, ASTM C916.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that ducts have been tested before applying insulation materials.

B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NAIMA National Insulation Standards.

C. Insulated ducts conveying air below ambient temperature:
   1. Provide insulation with vapor barrier jackets.
   2. Finish with tape and vapor barrier jacket.
   3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
   4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.

D. Insulated ducts conveying air above ambient temperature:
   1. Provide with or without standard vapor barrier jacket.
   2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.

E. Exterior Applications: Provide insulation with vapor barrier jacket. Cover with with calked aluminum jacket with seams located on bottom side of horizontal duct section.

F. External Duct Insulation Application:
   1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
   2. Secure insulation without vapor barrier with staples, tape, or wires.
   3. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
   4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
   5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.

3.03 SCHEDULES

A. INDOOR DUCT AND PLENUM APPLICATION SCHEDULE
   1. NOTE: Apply duct lagging where indicated on drawings.
   2. Service: Round, supply-air ducts, concealed.
      a. Material: Mineral-fiber blanket.
      b. Thickness: 1-1/2 inches.
      c. Jacket: Foil and paper.
      d. Vapor Retarder Required: Yes.
   3. Service: Round, return-air ducts, concealed.
      a. Material: Mineral-fiber blanket.
      b. Thickness: 1 inch.
      c. Jacket: Foil and paper.
      d. Vapor Retarder Required: No.
   4. Service: Round, outside-air ducts, concealed.
      a. Material: Mineral-fiber blanket
      b. Thickness: 1-1/2 inches.
      c. Jacket: Foil and paper.
      d. Vapor Retarder Required: Yes.
   5. Service: Rectangular, supply-air ducts, concealed.
      a. Material: Mineral-fiber blanket
      b. Thickness: 1-1/2 inches.
      c. Jacket: Foil and paper.

   d. Vapor Retarder Required: Yes.
6. Service: Rectangular, return-air ducts, concealed.
   a. Material: Mineral-fiber blanket
   b. Thickness: 1 inch.
   c. Jacket: Foil and paper.
   d. Vapor Retarder Required: No.
7. Service: Rectangular, outside-air ducts, concealed.
   a. Material: Mineral-fiber blanket
   b. Thickness: 1- 1/2 inches.
   c. Jacket: Foil and paper.
   d. Vapor Retarder Required: Yes.
8. Service: Round, supply-air ducts, exposed.
   a. Material: Mineral-fiber blanket
   b. Thickness: 2 inches.
   c. Jacket: Spiral-wound steel, paintable.
   d. Vapor Retarder Required: Yes.
9. Service: Round, return-air ducts, exposed.
   a. Material: Mineral-fiber board.
   b. Thickness: 1 inch.
   c. Jacket: Spiral-wound steel, paintable.
   d. Vapor Retarder Required: No.
   e. NOTE: Provide double-walled spiral ductwork in areas noted on drawings as defined in specification section 15890.
10. Service: Round, outside-air ducts, exposed.
   a. Material: Mineral-fiber board.
   b. Thickness: 2 inches.
   c. Jacket: Spiral-wound steel, paintable.
   d. Vapor Retarder Required: Yes.
   e. NOTE: Provide double-walled spiral ductwork in areas noted on drawings as defined in specification section 15890.
11. Service: Rectangular, supply-air ducts, exposed.
   a. Material: Mineral-fiber board.
   b. Thickness: 2 inches.
   c. Jacket: Aluminum, painted to architects specifications.
   d. Vapor Retarder Required: Yes.
12. Service: Rectangular, return-air ducts, exposed.
   a. Material: Mineral-fiber board.
   b. Thickness: 1 inch.
   c. Jacket: Aluminum, painted to architects specifications
   d. Vapor Retarder Required: No.
13. Service: Rectangular, outside-air ducts, exposed.
   a. Material: Mineral-fiber board.
   b. Thickness: 2 inches.
   c. Jacket: Aluminum, painted to architects specifications.
   d. Vapor Retarder Required: Yes.
14. Service: Rectangular, dishwasher exhaust ducts, concealed.
   a. Material: Mineral-fiber blanket.
   b. Thickness: 1/2 inch.
   c. Jacket: Foil and Paper
   d. Vapor Retarder Required: No.
15. Service: Rectangular, dishwasher exhaust ducts, exposed.
   a. Material: Mineral-fiber board.
   b. Thickness: 1/2 inch.

c. Jacket: Aluminum
d. Vapor Retarder Required: No.

B. OUTDOOR DUCT AND PLENUM APPLICATION SCHEDULE
1. Service: Round, supply-air ducts.
a. Material: Mineral-fiber board.
b. Thickness: 2 inches.
c. Field-Applied Jacket: aluminum
1) Aluminum Thickness: 0.032 inch
d. Vapor Retarder Required: Yes.
2. Service: Round, return-air ducts.
a. Material: Mineral-fiber board.
b. Thickness: 2 inches.
c. Field-Applied Jacket: aluminum
1) Aluminum Thickness: 0.032 inch
d. Vapor Retarder Required: Yes.
3. Service: Rectangular, supply-air ducts.
a. Material: Mineral-fiber board.
b. Thickness: 2 inches.
c. Field-Applied Jacket: aluminum
1) Aluminum Thickness: 0.032 inch
d. Vapor Retarder Required: Yes.
4. Service: Rectangular, return-air ducts.
a. Material: Mineral-fiber board.
b. Thickness: 2 inches.
c. Field-Applied Jacket: aluminum
1) Aluminum Thickness: 0.032 inch
d. Vapor Retarder Required: Yes.

END OF SECTION