

## SECTION 15081 - DUCT INSULATION

## PART 1 - GENERAL

## 0.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

## 0.2 SUMMARY

- A. This Section includes semirigid and flexible duct, plenum, and breeching insulation; insulating cements; field-applied jackets; accessories and attachments; and sealing compounds.

## 0.3 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the U.S. Department of Labor, Bureau of Apprenticeship and Training.
- B. Fire-Test-Response Characteristics: As determined by testing materials identical to those specified in this Section according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and sealer and cement material containers with appropriate markings of applicable testing and inspecting agency.
  - 1. Insulation Installed Indoors: Flame-spread rating of 25 or less, and smoke-developed rating of 50 or less.

## 0.4 SCHEDULING

- A. Schedule insulation application after testing duct systems. Insulation application may begin on segments of ducts that have satisfactory test results.

## PART 2 - PRODUCTS

## 0.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Mineral-Fiber Insulation:

- a. CertainTeed Manson.
- b. Knauf FiberGlass GmbH.
- c. Owens-Corning Fiberglas Corp.
- d. Schuller International, Inc.

## 0.2 INSULATION MATERIALS

- A. 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.
- B. Mineral-Fiber Duct Liner Thermal Insulation. Bonded flexible glass fibers. Comply with ASTM C553 and ASTM C1071. Comply with NFPA 90A or NFPA 90B and NAIMA's "Fibrous Glass Duct Liner Standard." Surface exposed to air stream is a coated surface to withstand maximum 4000 ft/min air velocity. 'K' value at 0.26 at 75 degrees F.
- C. Lining materials installed inside ducts and plenums shall meet UL 181. When air velocity exceeds 2000 fpm, liners must be attached both mechanically and with adhesives. Treated exposed edges must withstand operating velocities.

## 0.3 ACCESSORIES AND ATTACHMENTS

- A. Glass Cloth and Tape: Comply with MIL-C-20079H, Type I for cloth and Type II for tape. Woven glass-fiber fabrics, plain weave, presized a minimum of 8 oz./sq. yd..
  1. Tape Width: 4 inches.
- B. Bands: 3/4 inch wide, in one of the following materials compatible with jacket:
  1. Stainless Steel: ASTM A 666, Type 304; 0.020 inch thick.
  2. Galvanized Steel: 0.005 inch thick.
  3. Aluminum: 0.007 inch thick.
  4. Brass: 0.010 inch thick.
  5. Nickel-Copper Alloy: 0.005 inch thick.
- C. Wire: 0.080-inch, nickel-copper alloy; 0.062-inch, soft-annealed, stainless steel; or 0.062-inch, soft-annealed, galvanized steel.
- D. Weld-Attached Anchor Pins and Washers: Copper-coated steel pin for capacitor-discharge welding and galvanized speed washer. Pin length sufficient for insulation thickness indicated.
  1. Welded Pin Holding Capacity: 100 lb for direct pull perpendicular to the attached surface.

#### 0.4 VAPOR RETARDERS

- A. Mastics: Materials recommended by insulation material manufacturer that are compatible with insulation materials, jackets, and substrates.

### PART 3 - EXECUTION

#### 0.1 PREPARATION

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

#### 0.2 GENERAL APPLICATION REQUIREMENTS

- A. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; and free of voids throughout the length of ducts and fittings.
- B. Refer to schedules at the end of this Section for materials, forms, jackets, and thicknesses required for each duct system.
- C. Apply multiple layers of insulation with longitudinal and end seams staggered.
- D. Seal joints and seams with vapor-retarder mastic on insulation indicated to receive a vapor retarder.
- E. Apply insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by the insulation material manufacturer.
- F. Apply insulation over fittings and specialties, with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
- G. Hangers and Anchors: Where vapor retarder is indicated, seal penetrations in insulation at hangers, supports, anchors, and other projections with vapor-retarder mastic. Apply insulation continuously through hangers and around anchor attachments.
- H. Apply insulation with integral jackets as follows:
  - 1. Pull jacket tight and smooth.
  - 2. Joints and Seams: Cover with tape and vapor retarder as recommended by insulation material manufacturer to maintain vapor seal.
  - 3. Vapor-Retarder Mastics: Where vapor retarders are indicated, apply mastic on seams and joints and at ends adjacent to duct flanges and fittings.
- I. Roof Penetrations: Apply insulation for interior applications to a point even with top of roof flashing.
  - 1. Seal penetrations with vapor-retarder mastic.

2. Apply insulation for exterior applications tightly joined to interior insulation ends.
3. Seal insulation to roof flashing with vapor-retarder mastic.

- J. Interior Wall and Partition Penetrations: Apply insulation continuously through walls and partitions, except fire-rated walls and partitions.
- K. Fire-Rated Wall and Partition Penetrations: Terminate insulation at fire/smoke damper sleeves for fire-rated wall and partition penetrations.

### 0.3 MINERAL-FIBER INSULATION APPLICATION

- A. Blanket Applications for Ducts and Plenums: Secure blanket insulation with adhesive and anchor pins and speed washers.
1. Apply adhesives according to manufacturer's recommended coverage rates per square foot, for 100 percent coverage of duct and plenum surfaces.
  2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
  3. Install anchor pins and speed washers on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
    - a. On duct sides with dimensions 18 inches and smaller, along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
    - b. On duct sides with dimensions larger than 18 inches. Space 16 inches o.c. each way, and 3 inches maximum from insulation joints. Apply additional pins and clips to hold insulation tightly against surface at cross bracing.
    - c. Anchor pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    - d. Do not overcompress insulation during installation.
  4. Impale insulation over anchors and attach speed washers.
  5. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from one edge and one end of insulation segment. Secure laps to adjacent insulation segment with 1/2-inch staples, 1 inch o.c., and cover with pressure-sensitive tape having same facing as insulation.
  6. Apply insulation on rectangular duct elbows and transitions with a full insulation segment for each surface. Apply insulation on round duct elbows with individually mitered gores cut to fit the elbow.
  7. Insulate duct stiffeners, hangers, and flanges that protrude beyond the insulation surface with 6-inch-wide strips of the same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with anchor pins spaced 6 inches o.c.
  8. Apply vapor-retarder mastic to open joints, breaks, and punctures for insulation indicated to receive vapor retarder.
- B. Type C: Liner Applications. Secure liner insulation with adhesive and mechanical fasteners.

1. Apply adhesives according to manufacturer's recommended coverage rates per square foot, for 100 percent coverage of duct surface.
2. Secure insulation with mechanical fasteners on 15-inch centers maximum on top and side of ductwork with dimension exceeding 20 inches. Seal and smooth joints. Do not use nail-type fasteners. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesives.
  - a. Liner Adhesive: Comply with NFPA 90A or NFPA 90B and ASTM C 916.
  - b. Mechanical Fasteners: Galvanized steel, suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without causing leakage in duct.
    - 1) Tensile Strength: Indefinitely sustain a 50 lb (23 kg) tensile, dead-load test perpendicular to duct wall.
    - 2) Fastener Pin Length: As required for thickness of insulation and without projecting more than 1/8-inch (3 mm) into air stream.
    - 3) Adhesive for Attaching Mechanical Fasteners: Comply with fire-hazard classification of duct liner system.

#### 0.4 DUCT SYSTEM APPLICATIONS

- A. Items Not Insulated: Unless otherwise indicated, do not apply insulation to the following systems, materials, and equipment:
  1. Metal ducts with duct liner.
  2. Factory-insulated flexible ducts.
  3. Flexible connectors.
  4. Vibration-control devices.
  5. Testing agency labels and stamps.
  6. Nameplates and data plates.
  7. Access panels and doors in air-distribution systems.

#### 0.5 INDOOR DUCT APPLICATION SCHEDULE

- A. Service: Round, and rectangular supply-air ducts, and return-air ducts, located inconcealed / unconditioned space.
  1. Material: Mineral-fiber blanket.
  2. Thickness: 2 inch.
- B. Service: round and rectangular supply-air ducts, exposed.
  1. Material: Mineral-fiber blanket.
  2. Thickness: 1-inch (minimum).
- C. Service: Round and rectangular exhaust-air ducts, concealed and exposed, within 10-feet of roof or wall penetration.
  1. Material: Mineral-fiber blanket.
  2. Thickness: 1-inch (minimum).

- D. Service: Round and rectangular supply-air duct, and return-air duct, within 10-feet of roof top units.
  - 1. Material: Mineral-Fiber Duct Liner Thermal Installation.
  - 2. Thickness: 1 ½ -inch (minimum).

END OF SECTION 15081