

SECTION 15083
HVAC INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes
 - 1. Insulation Materials
 - a. Mineral fiber
 - 2. Adhesives
 - 3. Mastics
 - 4. Sealants
 - 5. Field-applied jackets
 - 6. Tapes

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any)

1.4 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency
 - 1. Insulation installed indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature

1.6 COORDINATION

- A. Coordinate size and location of supports, hangers, and insulation shields specified in Section 15070

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C871
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C795
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process
- F. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C53, Type II and ASTM C1290, Type III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" article
 - 1. Products: Subject to compliance with requirements, provide one of the following
 - a. CertainTeed Corp.; Duct Wrap
 - b. Johns Manville; Microlite
 - c. Knauf Insulation; Duct Wrap
 - d. Manson Insulation Inc.; Alley Wrap
- G. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C612, Type IA or Type IB. For duct and plenum applications, provide insulation with factory-applied ASJ. For equipment applications, provide insulation with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" article
 - 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

2.2 INSULATING CEMENTS

- A. Mineral-Fiber Insulating Cement: Comply with ASTM C195

2.3 ADHESIVES

- A. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints

2.4 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II
- B. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services

2.5 SEALANTS

- A. FSK and Metal Jacket Flashing Sealants
 - 1. Products: Subject to compliance with requirements, provide one of the following
 - a. Childers Products, Division of ITW; CP-76-8
 - b. Foster Products Corporation, H. B. Fuller Company; 95-44
 - c. Marathon Industries, Inc.; 405
 - d. Mon-Eco Industries, Inc.; 44-05
 - e. Vimasco Corporation; 750
 - 2. Materials shall be compatible with insulation materials, jackets, and substrates
 - 3. Fire- and water-resistant, flexible, elastomeric sealant

2.6 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C921, Type I, unless otherwise indicated

2.7 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C1136
- B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C1136
- C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive. Suitable for indoor and outdoor applications
- D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive

2.8 SECUREMENTS

A. Bands

1. Stainless steel: ASTM A167 or ASTM A240/A240M, Type 304; 0.015 inch thick, ½-inch wide with wing or closed seal
2. Aluminum: ASTM B209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020-inch thick, ½-inch wide with wing or closed seal

B. Wire: 0.062-inch soft-annealed, stainless steel

2.9 CORNER ANGLES

A. PVC Corner Angles: 30 mils thick, minimum 1 by 1 inch, PVC according to ASTM D1784, Class 16354-C. White or color-coded to match adjacent surface

B. Aluminum Corner Angles: 0.040-inch thick, minimum 1 by 1 inch, aluminum according to ASTM B209, Alloy 3003, 3005, 3105 or 5005; Temper H-14

PART 3 - EXECUTION

3.2 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application

1. Verify that systems and equipment to be insulated have been tested and are free of defects
2. Verify that surfaces to be insulated are clean and dry
3. Proceed with installation only after unsatisfactory conditions have been corrected

3.3 PREPARATION

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

B. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water

3.4 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment, ducts and fittings, and piping including fittings, valves, and specialties

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment, duct system, and pipe system as specified in insulation system schedules

- C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state
- D. Install insulation with longitudinal seams at top and bottom of horizontal runs
- E. Install multiple layers of insulation with longitudinal and end seams staggered
- F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties
- G. Keep insulation materials dry during application and finishing
- H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer
- I. Install insulation with least number of joints practical
- J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic
 - 1. Install insulation continuously through hangers and around anchor attachments
 - 2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic
 - 3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer
 - 4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield
- K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses
- L. Install insulation with factory-applied jackets as follows
 - 1. Draw jacket tight and smooth
 - 2. Cover circumferential joints with 3-inch wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches O.C.
 - 3. Overlap jacket longitudinal seams at least 1½ inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 4 inches O.C.
 - a. For below ambient services, apply vapor-barrier mastic over staples
 - 4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal

5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct and pipe flanges and fittings
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness
- N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement
- O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints

3.5 MINERAL-FIBER INSULATION INSTALLATION

- A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins
 1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 50 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 either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows
 - a. On duct sides with dimensions 18 inches and smaller, place pins 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, place pins 16 inches O.C. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing
 - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums
 - d. Do not overcompress insulation during installation
 - e. Impale insulation over pins and attach speed washers
 - f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing
 4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from 1 edge and 1 end of insulation segment. Secure laps to adjacent insulation section with ½-inch outward-clinching staples, 1 inch O.C. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions
 - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal
 - b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of

insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to 2 times the insulation thickness but not less than 3 inches

5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches O.C.
6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow
7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches O.C.

B. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 50 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 either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
 - a. On duct sides with dimensions 18 inches and smaller, place pins 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 pins 16 inches O.C. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing
 - c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums
 - d. Do not overcompress insulation during installation
 - e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing
4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from 1 edge and 1 end of insulation segment. Secure laps to adjacent insulation section with ½-inch outward-clinching staples, 1 inch O.C. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions
 - a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal
 - b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be

insulated a width equal to 2 times the insulation thickness but not less than 3 inches

5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow
6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches O.C.

3.6 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

- A. Concealed, round and flat-oval, supply-air duct insulation shall be the following
 1. Mineral-fiber blanket: 1½-inches thick and 0.75-lb/cu. ft. nominal density
- B. Concealed, round and flat-oval, return-air duct insulation shall be the following
 1. Mineral-fiber blanket: 1½-inches thick and 0.75-lb/cu. ft. nominal density
- C. Concealed, round and flat-oval, outdoor-air duct insulation shall be the following
 1. Mineral-fiber blanket: 3-inches thick and 0.75-lb/cu. ft. nominal density
- D. Concealed, round and flat-oval, exhaust-air duct insulation within 10 feet of exterior openings shall be the following:
 1. Mineral-fiber blanket: 1½-inches thick and 0.75-lb/cu. ft. nominal density
- E. Concealed, rectangular, supply-air duct insulation shall be the following
 1. Mineral-fiber blanket: 1½-inches thick and 0.75-lb/cu. ft. nominal density
- F. Concealed, rectangular, return-air duct insulation shall be the following
 1. Mineral-fiber blanket: 1½-inches thick and 0.75-lb/cu. ft. nominal density
- G. Concealed, rectangular, outdoor-air duct insulation shall be the following
 1. Mineral-fiber blanket: 3-inches thick and 0.75-lb/cu. ft. nominal density

END OF SECTION