# SECTION 23 0713
# DUCT INSULATION

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Duct insulation

B. Duct Liner

### 1.02 RELATED REQUIREMENTS

A. Section 23 3100 - HVAC Ducts and Casings: Glass fiber ducts

### 1.03 REFERENCE STANDARDS

A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.

B. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013.

C. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014.

D. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation; 2014.

E. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2012.

F. ASTM C1290 - Standard Specification for Flexible Fibrous Glass Blanket Insulation Used to Externally Insulate HVAC Ducts; 2011.

G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

H. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.

I. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association 2007.

J. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005.

K. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

### 1.04 SUBMITTALS

A. Refer to Section 23 0510 - General HVAC Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

### 1.05 QUALITY ASSURANCE

A. Applicator Qualifications: Company specializing in performing the type of work specified in this section, with minimum three years of experience.

### 1.06 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labeled 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 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E 84, NFPA 255, or UL 723.

### 2.02 GLASS FIBER, FLEXIBLE

A. Manufacturer:
   1. Knauf Insulation: www.knaufinsulation.com.
   2. Johns Manville: www.jm.com.
   3. Owens Corning Corporation; SOFTR: www.ocbuildingspec.com.
   4. CertainTeed Corporation: www.certainteed.com.

B. Insulation: ASTM C 553; flexible, noncombustible blanket.
   1. 'K' value: 0.36 at 75 degrees F, when tested in accordance with ASTM C 518.
   2. Maximum Service Temperature: 250 degrees F.
   3. Maximum Water Vapor Sorption: 5.0 percent by weight.
   4. Density: 3/4 lb./cu ft.

C. Vapor Barrier Jacket:
   1. Kraft paper with glass fiber yarn and bonded to aluminized film.
   2. Moisture Vapor Permeability: 0.029 ng/Pa s m (0.02 perm inch), when tested in accordance with ASTM E96/E96M.
   3. 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. Tie Wire: Annealed stainless steel, 16 gage.

### 2.03 DUCT LINER - GLASS FIBER

A. Manufacturers: Certainteed Toughguard2, Owens-Corning QuietR Textile Duct Liner, JohnsManville Permacote Linacoustic HP, Knauf Rigid Plenum Liner.

B. Insulation: Incombustible glass fiber complying with ASTM C 1071; flexible blanket; impregnated surface and edges coated with acrylic polymer shown to be fungus and bacteria resistant by testing to ASTM G 21.
   1. Apparent Thermal Conductivity: Maximum of 0.31 at 75 degrees F.
   2. Service Temperature: Up to 250 degrees F.
   3. Rated Velocity on Coated Air Side for Air Erosion: 5,000 fpm, minimum.
   4. Density: 1.5 pcf.
   5. Minimum Noise Reduction Coefficients:
      a. 1 inch Thickness: 0.45.
      b. 2 inch Thickness: 0.70.

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

D. Liner Fasteners: Galvanized steel, welded with press-on head.

### 2.04 ADHESIVES, COATINGS, SEALING COMPOUNDS AND PROTECTIVE FINISHES

A. Lagging Adhesive and Coating for Glass Cloth Jackets and Other Facings - MIL-A-3316 B, Class 1.

B. Lap Adhesive for Vapor Barrier Jacket - MIL-A-3316 B, Class 2.

C. Bonding Adhesives - for securing insulation to metal surfaces - MIL-A-3316 B, Class 2 for temperature up to 200 degree F.

D. Contact Type Adhesive - For installing flexible unicellular insulation - MIL-A-24179, Type II, Class 1.

E. Bedding Compound and Joint Sealers - MIL-B-19564A.

F. Coating Compound - Vapor Barrier Treatment - MIL-C-19565B, Type 1 or II.

G. Protective Finish Outside of Buildings - Coating Compound MIL-C-19565 B, Type I.

H. Manufacturers: Childers, Foster, Armstrong, Mon-Eco.

## 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. Provide insulation with vapor barrier jackets.

D. Seal all joints, mechanical fastener penetrations, and vapor barrier penetrations with Vapor Barrier Tape

E. Continue insulation through walls, sleeves, hangers, and other duct penetrations.

F. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, duct lined with duct liner, heating coil return bends at terminal units, and expansion joints.

G. Fiber Glass, Flexible:
   1. Do not pull insulation tight around ducts.
   2. Lap transverse joints 2 inch, minimum and secure with staples 18 inches on center.
   3. Wrap insulation with Tie Wire 18 inches on center, maximum.
   4. Install mechanical fasteners not more than 18 inches on center on ducts over 24 inches wide.
   5. Provide 6 inches length, minimum, of rigid glass fiber insulation on bottom of insulated ducts supported from trapeze hangers.

H. Weld mechanical fasteners to duct. No glue or stick on allowed.

I. Duct Accessories, Duct Mounted Meters and Gages Instruments and Duct Mounted Instrumentation and Other Control Devices:
   1. In conditioned spaces devices shall be left exposed and/or accessible above the insulation vapor barrier jacket for access. Seal to vapor barrier jacket.
   2. In non-conditioned spaces devices shall be insulated within the insulation vapor barrier jacket with the insulation and jacket arranged to provide access.
   3. Accessible devices to include:
      a. Duct mounted Instrumentation,
      b. Airflow Measuring Station pressure ports,
      c. Input/Output Sensors,
      d. Duct access door handles,
      e. Volume Control damper handles(MVD),
   4. Damper operators shall be left exposed and/or accessible above the insulation vapor barrier jacket for access. Seal to vapor barrier jacket.

J. Duct Liner Locations:
   1. Line return and mixed air ducts where noted on drawings with 1 inch liner.
   2. Provide 2 inch liner at field fabricated mixing plenums.
   3. Do not install liner in duct within six feet downstream of a cooling coil or outside air intake.

K. Duct Liner Application: (Glass Fiber Liner)
   1. Install liner in accordance with manufacturer's Published Installation Instructions and SMACNA Installation Standards including Figure No. 7-11 and 7-12.
   2. Adhere insulation with adhesive for 90 percent coverage.
   3. Secure insulation with mechanical liner fasteners, type 3 or 4 located in accordance with SMACNA Figure 7-11. Refer to SMACNA (DCS) Standards for spacing.

4. Install with longitudinal and transverse joints under compression.
5. Seal and smooth all longitudinal and transverse joints, field cuts exposed edges and any minor surface damage with edge coat.
6. Seal liner surface penetrations with edge coat.
7. Provide 26 gauge metal nosing on leading edge at fan discharges and at any interval of lined duct proceeded by unlined duct.
8. Terminate liner at duct mounted accessories such as turning vanes and dampers. Provide sheet metal "hat" section build out in accordance with SMACNA Figure 7-13.
9. Duct dimensions indicated are net metal inside dimensions required for air flow. Do not Increase duct size to allow for insulation thickness.
10. Provide protection for surfaces that may be subject to damage by tradesmen installing electrical, controls or other work.

**3.03 CLEANING**

A. Clean adjacent surfaces, valves, valve handles, etc. of jacketing materials.

**3.04 SCHEDULES**

A. Exhaust Ducts Within 10 ft of Exterior Openings/Termination:
   1. Glass Fiber, Flexible;2 inch thick.

B. Plenums:
   1. Glass Fiber, Flexible; 2 inch thick.

C. Supply Ducts:
   1. Concealed and exposed in Mechanical Rooms and Non Conditioned Interior Spaces: Glass Fiber, Flexible; 2 inch thick.
   2. Exposed Supply Ducts in Conditioned Spaces: Do Not Insulate.
   3. Tops of Ceiling diffusers: Glass Fiber, Flexible; 2 inch thick.

D. Concealed Air Coils: Insulate return bends and headers of duct mounted coils with Glass Fiber, Flexible; 2 inch thick.

END OF SECTION