



SECTION 23 31 00
VENTILATION DUCTS

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PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pre-insulated HVAC ductwork system.

1.2 RELATED SECTIONS

- A. Section 23 05 00 - Common Work Results for HVAC.

1.3 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - 2. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE):
 - 1. ASHRAE Design Fundamentals Handbook.
 - 2. ASHRAE 90.1 - Energy Standard for Buildings Except Low-Rise Residential Buildings.
- C. National Fire Protection Association (NFPA):
 - 1. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems.
 - 2. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems.
- D. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
 - 1. SMACNA HVAC Air Duct Leakage Test Manual
 - 2. SMACNA Phenolic Duct Construction Standards
 - 3. SMACNA HVAC Duct System Design Manual.
- E. Underwriters Laboratories (UL):
 - 1. UL 181 - Standards for Factory Made Air Ducts and Air Connectors.
 - 2. UL 723 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Physical properties, performance criteria, and product limitations.
 - 2. Preparation instructions and recommendations.
 - 3. Storage and handling requirements and recommendations.

- 4. Installation methods.
- C. Shop Drawings:
 - 1. Provide project specific, scaled, shop drawings and calculations including layout, capacities, ventilation and warranty requirements.
 - 2. Show details including material layers and thicknesses, terminations, joints, and relationship to adjacent construction for each system to be installed.
- D. Qualifications: Submit manufacturer and installer qualifications
- E. LEED Submittals: Provide product data and manufacturer's certifications as requested by the Architect.

1.5 QUALITY ASSURANCE

- A. Single Source Responsibility: Provide primary materials from a single manufacturer. Secondary and accessory materials by other manufacturers shall be approved for compatibility by the primary manufacturer.
- B. Manufacturer Qualifications: Minimum 5 years' experience manufacturing similar products.
- C. Installer Qualifications: Experienced contractors who have received appropriate training for the installation of pre-insulated ducts and approved by the manufacturer.
- D. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. Finish areas designated by Architect.
 - 2. Do not proceed with remaining work until workmanship is approved by Architect.
 - 3. Refinish mock-up area as required to produce acceptable work.
 - 4. Accepted mock-up may be included in the final work and shall establish relationships between adjacent materials and the standard of workmanship for the final installation.

1.6 PRE-INSTALLATION MEETINGS

- A. Convene the manufacturer's authorized technical representative, general contractor, and related trades minimum two weeks prior to starting work of this section to discuss project conditions, manufacturer's warranty requirements, and installation procedures.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.
- B. Handling: Handle materials to avoid damage.

1.8 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.9 SEQUENCING

- A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Kingspan Insulation LLC, which is located at: 2100 RiverEdge Pkwy. Suite 175; Atlanta, GA 30328; Toll Free Tel: 800-241-4402; Tel: 678-589-7300; Fax: 678-589-7325; Email: request info (info@kingspaninsulation.us); Web: www.kingspaninsulation.us
- B. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.2 PRE-INSULATED HVAC DUCTWORK SYSTEM

- A. Pre-Insulated HVAC Ductwork System: Provide Kingspan KoolDuct System for supply, return, fresh, and exhaust air ductwork as shown on the Drawings. System shall include panels, fabrication methods, coupling systems, and accessories to provide a complete system to meet the following performance criteria:
 - 1. Classification: UL Listed as a Class 1 Air Duct, to UL 181, NFPA 90A and NFPA 90B
 - 2. Fire and Smoke Performance when tested in accordance with ASTM E84 or UL 723:
 - a. Flame Spread: ≤ 25
 - b. Smoke Developed: ≤ 50
 - 3. Materials: CFC/HCFC free, zero Ozone Depletion Potential (ODP), fiber-free rigid thermoset phenolic insulation core faced with 1 mil low vapor permeability aluminum foil reinforced with glass scrim. Foil is branded on inside of duct and plain on the outer facing.
 - 4. Nominal Density: 3.4 to 3.75 pcf (55 to 60 kg/m³).
 - 5. Closed Cell Content: minimum 90 percent
 - 6. Compressive Strength: Minimum 25 psi (175 kPa) at 10 percent compression.
 - 7. Air Leakage: SMACNA Air Leakage Class 3.
 - 8. Mean Air Velocity: Maximum 5000 fpm (25.4 m/s) with all joints sealed.
 - 9. Design Pressures:
 - a. Positive Pressure: Maximum 4 inch w.g. (1000 Pa).
 - b. Negative Pressure: Maximum 3 inch w.g. (750 Pa).
 - 10. Commissioning Pressures - As designed to, max commissioning 4 inch w.g. (1000Pa.).
 - 11. Temperature Range: Internal air temperature range -4F to 176F deg. F (-20 to 80C) during continuous operation, inside ducts or ambient surrounding temperature.
 - 12. Thermal Resistance, Wall Thickness and R-Value:
 - a. 7/8 inch (22 mm) thick, R 6.0 square feet per hour F/Btu (1.047 square meter K/W).
 - b. 1-3/16 inch (30 mm) thick, R 8.1 square feet per hour F/Btu (1.428 square meter K/W).
 - c. meter K/W).
 - d. 1-25/32 inch (45mm) thick, R 12 square feet per hour F/Btu (2.15 square meter K/W).
 - e. meter K/W).
 - 13. Thermal Conductivity: at 50 to 74 deg. F (10 to 23 deg C), mean 0.146 Btu inch per square foot per hour deg. F (0.021 W/m K) per ASTM C518.
 - 14. Typical Configuration: Rectangular.

2.3 ACCESSORIES

- A. Fittings: In accordance with SMACNA Phenolic Duct Construction Standards or the ASHRAE Design Fundamentals Handbook Chapter 35 or the SMACNA HVAC Duct Systems Design Manual.
- B. Support Systems:
 - 1. Tiger Support and Wire Hanger Assembly.

- 2. Steel Channel Support and Threaded Rods.
- C. Coupling Systems:
 - 1. Tiger Clip Coupling System.
 - 2. Aluminum Grip Coupling System.
 - 3. 4-Bolt Coupling System.
- D. Plenum Boxes:
 - 1. Lightweight and easy to install.
 - 2. For use with either pre-insulated duct or sheet metal systems.
- E. Dampers:
 - 1. Volume Control Dampers.
 - 2. Fire Dampers.
- F. Access Doors:
 - 1. Metal insulated access doors.
 - 2. Fabricated from the Kingspan KoolDuct System including the same insulation system, and to ensure a continuous vapor barrier.
- G. Turning Vanes.
- H. Reinforcement Systems.
- I. Tools.
- J. V-Groove sealant: Silicone with VOC content of 250 g/L or less.
- K. Tape: Comply with UL 181A.
 - 1. Product: Pressure-sensitive aluminum foil tape imprinted with manufacturer with UL markings, manufacturer name, and date.
 - 2. Minimum Width: 3 inch (75 mm).
 - 3. Water, mold, and mildew resistant.
 - 4. .
- L. Self-Adhesive Gaskets.
- M. Closures and Flanges.

2.4 FABRICATION

- A. Fabricate ductwork with panels, joints, seams, transitions, reinforcements, supports, elbows, connections, and accessories in accordance with SMACNA Phenolic Duct Construction Standards and the manufacturers' guidelines.
 - 1. 90 degree mitered elbows shall include turning vanes.
- B. Fabricate ductwork with branded foil facing consistently inside the duct system.

2.5 FINISH

- A. Standard Finish: Factory-applied aluminum foil vapor barrier facing.
- B. Mechanical and Weather Protection Finish: installed during fabrication of the ductwork or installed in place as recommended by the manufacturer.
 - 1. Aluminum zinc alloy coated sheet steel, 0.024 inch (0.609 mm) nominal thickness.
 - 2. Heavy-duty self-adhesive laminate.
 - 3. Synthetic elastomeric jacketing system.
 - 4. Reinforcing glass and synthetic cloth embedded between two coats of appropriate

- coating.
- 5. UV resistant glass reinforced with polyester / epoxy (GRP / GRE) cladding.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions using the fewest joints practical. Unless otherwise indicated, install tight to the building structure, parallel or perpendicular to building lines.
- B. Support: Installer is responsible to ensure duct system is properly and adequately supported using materials that are compatible with the duct system, with supports typically located in straight runs, changes in direction, at branch connections, tee fittings, and in accordance with industry best practices.
 - 1. Dampers and accessories shall be independently supported.
 - 2. Provide flexible connections between ductwork and adjacent materials subject to vibration or movement.
 - 3. If noise and vibration generated by the fan is likely to cause an issue, metal support members shall be separated from ductwork with soft gasket material.
- C. Join sections in accordance with SMACNA Phenolic Duct Construction Standards or using manufacturers system.
- D. Reinforce sections in accordance with SMACNA Phenolic Duct Construction Standards or as recommended by the manufacturer to prevent side deformation from positive or negative pressure.
- E. Apply Kingspan KoolDuct silicone sealant at each internal seam to ensure minimum air leakage.
- F. Tape external seams to ensure a permanent, smooth, wrinkle-free bond.
- G. Install control devices and equipment to allow access for operation, repair, and maintenance.
- H. Install access doors where indicated and where required for concealed equipment, seal air tight.

3.4 FIELD QUALITY CONTROL

- A. Commissioning: Include testing and verification of functional and operational performance at intended pressure and temperature ranges, training for operations and maintenance, and documentation. Commissioning test pressure shall not exceed the pressure rating to which the ductwork has been designed and fabricated; max commissioning 4 inch w.g. (1000Pa.)

- B. Air Leakage Testing: Test in accordance with ASHRAE 90.1 and with SMACNA HVAC Air Duct Leakage Test Manual., including operation at static pressure on at least 25 percent of the total installed duct area.

3.5 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION