

SECTION 15840DUCTWORK AND DEVICESPART 1 - GENERAL1.1 DESCRIPTION

- A. Work Included: Provide and install all required sheet metal and ductwork, setting of control dampers, louvers, flexible connections, and devices as shown on the Drawings or required to make the installation complete in accordance with the intent of the Drawings and Specifications.
- B. Related Work Specified Elsewhere:
  - 1. "HVAC - General" is specified in this Division.
  - 2. Pipe Sleeves and Seals are specified in Section 15092.
  - 3. Sealants are specified in Section 07900.
- C. Design Criteria: The drawings do not show every detail of fittings, hangers and equipment which are necessary for the complete installation, but are provided to show the general arrangement.

1.2 QUALITY ASSURANCE

- A. Ductwork:
  - 1. SMACNA "HVAC Duct Construction Standards - Metal & Flexible, 2<sup>nd</sup> Edition," 1995.
  - 2. ASHRAE Duct Construction Recommendations (5 percent maximum leakage allowable).
  - 3. SMACNA "Thermoplastic Duct (PVC) Construction Manual, 2<sup>nd</sup> Edition," 1995.
  - 4. SMACNA "Round Industrial Duct Construction Standards, 2<sup>nd</sup> Edition," 1999.

1.3 SUBMITTALS TO THE ENGINEER

- A. Submit manufacturer's certification for the type of material provided.
- B. Submit all shop drawings to the Engineer as specified in the General Conditions of the Construction Contract and as specified in paragraph 3.2.B of this Section.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver all ductwork and accessories as Work progress requires.
- B. Store all material to prevent damage of any nature.

1.5 JOB CONDITIONS

- A. Protection:
  - 1. Protect all ductwork, and accessories from the accumulation of paint, concrete, mortar, etc.
  - 2. Keep the interior of duct system free from dirt, rubbish, etc.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. All ducts, devices and accessories except PVC ducts and other ducts noted on drawings shall be constructed to SMACNA 2 inch water gage (w.g.) classification for both vacuum and pressure applications.
- B. Ducts, devices and accessories shall be constructed of materials as noted on the Drawings.
- C. Insulation and Lining: Ducts requiring lining or insulation shall use materials specified in the "Duct Insulation and Lining" Section in this Division. Note that duct sizes shown are inside clear dimension, not necessarily sheet metal size.
- D. Diffusers, grilles, and registers:
  - 1. All air devices shall be supplied by a single manufacturer.
  - 2. Acceptable manufacturers:
    - a. Tuttle & Bailey.
    - b. Anemostat.
    - c. Titus.
    - d. Manufacturers with equivalent diffusion pattern, air throw, velocity, and sound level.
  - 3. Return and exhaust grilles:
    - a. Equal to Anemostat Model X3.
    - b. Extruded aluminum with etch and clear acrylic plastic finish on all surfaces.
    - c. Horizontal extruded face bars.
    - d. Opposed blade damper with removable key where noted.
    - e. Size and capacity as shown on the Drawings.
  - 4. Ceiling Diffuser
    - a. 2'x2' lay-in panel.
    - b. Capacity, size, and directional characteristics as shown on the Drawing.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Elbows, vaned elbows, take-offs, branch connections, transitions, splitters, duct volume dampers, fire dampers, flexible connectors, and access doors shall conform to SMACNA Duct Construction Standards.
- B. Install duct so that ductwork shall operate without chatter, vibration, and be air tight so that no dust marks from air leaks will show at connections or outlets.
- C. Field Changes to Ductwork: Design changes such as those required to suit the size of factory fabricated equipment actually furnished to minimize losses in pressure and performance due to sudden expansion and contraction. Use transitions in field changes as well as modifications to connecting ducts.
- D. Splitters and Dampers: Dampers shall have accessible operating mechanism, and where operators occur in finished portions of the building, operators shall be chromium plated with all exposed edges rounded. Splitter dampers shall be operated by quadrant operators or 3/16 inch rod brought through the side of the duct with locking setscrew

and bushing. Two rods are required on splitters over 8 inches. Manual volume-control dampers shall be operated by locking type quadrant operators. Dampers and splitters shall be two gages heavier than duct in which installed. Unless otherwise indicated, multi-leaf damper shall be opposed blade type with maximum blade width of 4 inches. Access doors or panels shall be provided for all concealed damper operators and locking setscrews. Unless otherwise indicated, provide the locking type quadrant operators for dampers, when installed on ducts to be thermally insulated, with stand-off mounting brackets, bases or adapters to provide clearance between the duct surface and the operator not less than the thickness of the insulation. Stand-off mounting items shall be integral with the operator or standard accessory of the damper manufacturer. Provide volume dampers where shown on the Drawings.

- E Duct Access Doors: Provide hinged doors at all automatic dampers, fire dampers, coils, thermostats, temperature controllers, and other apparatus requiring service and inspection in the duct system. Doors shall be 12 by 12 inches unless otherwise shown on the Drawings. Where size of duct will not accommodate this size, make the doors as large as practical. Install doors not less than 24 by 24 inches on each side of each air-handling unit. Doors shall be rigid, and shall be provided with airtight felt gaskets. Provide doors with hinges, pins and two fasteners of the same material as the adjacent duct. Provide doors 24 by 24 inches or larger with fasteners operable from both sides. Doors in insulated ducts shall be of the insulated type. Unless otherwise shown on the Drawings, doors shall swing so that fan pressure or suction holds the door closed.
- F Duct Sleeves and Prepared Openings:
1. Round ducts - 15 inches in diameter or less: Provide duct sleeves for all round ducts 15 inches diameter or less passing through floors, walls, ceiling, or roof. Install ducts larger than 15 inches diameter and all square and rectangular ducts passing through floors, walls, ceilings or roof. Sleeves shall conform to the requirements of Section 15092 except as noted below:
    - a. Sleeve shall provide one inch clearance between the duct and the sleeve, or one inch clearance between the insulation and the sleeve for insulated ducts, except at grilles, registers, and diffusers.
  2. Round ducts larger than 15 inches diameter and all rectangular ducts:
    - a. Install ducts larger than 15 inches diameter and all square and rectangular ducts passing through floors, walls, ceilings or roof through prepared openings.
    - b. Provide one inch clearance between the duct and the prepared opening, or one inch clearance between the insulation and the prepared opening for insulated ducts, except at grilles, registers, and diffusers.
    - c. Space between the prepared opening and the duct or duct insulation shall be packed with commercial grade twisted fireproof yarn. Seal the annular space with polyurethane sealant, S-6, per Section 07900 for standard penetrations. Penetrations through fire rated walls and floors shall utilize Fyre-shield sealant, S-7, per Section 07900 in lieu of the polyurethane sealant.
  3. The contractor shall be responsible for the proper size and location of sleeves and prepared openings. The Drawings attempt to indicate approximate sleeve and prepared opening sizes. The actual size is to be carefully coordinated with

- concrete placement and other construction activities to ensure sufficient and properly sized sleeves and prepared openings are provided. Due consideration should be given to the need for increased opening sizes to accommodate devices such as fire dampers or contractor selected equipment.
4. Provide duct sleeves and prepared openings for all duct mains and duct branches. Branch takeoff connections to grilles, registers, and diffusers shall be in accordance with SMACNA HVAC Duct Construction Standards - Metal & Flexible 2<sup>nd</sup> Edition.
  - G. Duct Supports: Provide and install duct supports not less than two 1-inch by 1/16 inch thick spaced one on each side of duct in accordance with SMACNA HVAC Duct Construction Standards Metal & Flexible 2<sup>nd</sup> Edition. Supports on the risers shall allow free vertical movement of the duct.
  - H. Support ducts and install to be completely free from vibration under all conditions of operation. Attach supports only to structural framing member and concrete slabs. Do not anchor supports to metal decking unless a means is provided and approved for preventing the anchor from puncturing the metal decking. Where supports are required between structural framing members, provide suitable intermediate metal framing. Where C-clamps are used, use retainer clips.
  - I. Access Panels: Provide access panels for all concealed valves, controls, dampers, duct access doors, and any item requiring inspection and maintenance. Provide access panels of sufficient size.
  - J. Flexible Collars: Provide flexible collars in connections between fans and ducts or casings and where ducts are of dissimilar metals, as shown on the Drawings and were required. Make collars of neoprene coated glass fabric weighing approximately 30 ounces per square yard. Securely fasten flexible connections by stainless steel clinch type bands for round ducts. For rectangular ducts, install the flexible connections locked to metal collars using normal duct construction standards.
  - K. Flashings: Where ducts pass through exterior building walls and roofs, provide flashings and make waterproof. Flashing shall conform to Division 7.
  - L. Cleaning of Duct System: After completing installation of ductwork, clean the entire system of rubbish, plaster, dirt and any other debris. After installation of equipment and connections are made to fan, and before any grilles, outlets or registers are installed, blow out the entire system with dampers and outlets wide open.

### 3.2 QUALITY CONTROL

- A. Tests: Upon completion and prior to acceptance of the installation, perform the following tests:
  1. Low Velocity Ductwork: Test and make substantially airtight all supply, return, and exhaust ducts, plenums, and casings, at the static pressure indicated for the system before covering with insulation or concealing in masonry. Substantially airtight shall be construed to mean that no air leakage is noticeable through the senses of feeling or hearing at all duct joints.
- B. Preliminary Tests: Give the air supply and distribution system and its components an operational test for a period of not less than 4 hours.

- C. After preliminary test, adjust, test and balance the air supply and distribution system to obtain air volumes as shown on the Drawings. Record final balanced air quantities and submit to the Engineer for approval.
- D. Provide necessary samples from installed ductwork as Engineer may require (not to exceed 10) for inspection purposes. Patch all openings due to the removal of the samples at no additional cost to the Owner.

### 3.3 SHEET METAL THICKNESS TABLES

- A. Minimum Sheet Metal Gauges For Rectangular Duct for both galvanized steel and stainless steel ducts shall be according to SMACNA HVAC Duct Construction Standards, 2<sup>nd</sup> Edition - 1995 with Addendum No. 1 - November 1997.
- B. Wherever the tables allow for more than one choice of gage and reinforcement, the Contractor shall select the gage reinforcement and reinforcement spacing that will be used throughout the Contract and submit this information to the Engineer through the submittal process specified in the General Conditions.

END OF SECTION