

## SECTION 238900 - DUCTWORK

### PART 1 - GENERAL

#### 1.1 WORK INCLUDED

- A. Air conditioning ductwork – supply and return air
- B. Air conditioning ductwork – outdoor air
- C. Toilet exhaust ductwork
- D. Dryer vent ductwork

#### 1.2 DEFINITIONS

- A. Duct Sizes: Inside clear dimensions.

#### 1.3 REGULATORY REQUIREMENTS

- A. Construct ductwork to NFPA 90A, NFPA 90B, NFPA 96 standards.

#### 1.4 SUBMITTALS

- A. Indicate duct materials, fittings, and particulars such as gauges and sizes prior to start of work.

### PART 2 - PRODUCTS

#### 2.1 DUCTWORK CONSTRUCTION

- A. General: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
- B. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows are used, provide air foil turning vanes.
- C. Increase duct sizes gradually, not exceeding 15 degree divergence wherever possible. Divergence upstream of equipment shall not exceed 30 degree; convergence downstream shall not exceed 45 degree.
- D. Provide easements where ductwork conflicts with piping and structure. Where easements exceed 10 percent duct area, split into two ducts maintaining original duct area.

## 2.2 AIR CONDITIONING DUCTWORK – SUPPLY AND RETURN AIR

- A. General: All materials shall conform to the requirements of UL 181 for Class 1 air duct materials.
- B. Fiberglass Duct Board: Duct board shall be 1-1/2 inch thick rigid fiber with a minimum installed R-value of 6.0. Duct board shall be internally coated with a black acrylic polymer formulated with an immobilized, EPA-registered, anti-microbial agent passing UL 181 mold-growth resistance testing. The exterior of the duct shall be laminated with a foil-scrim-kraft (FSK) facing.
  - 1. Longitudinal Seams and Transverse Joints: All seams and joints shall be mechanically fastened and sealed with glass fabric and mastic complying with UL 181A.
- C. Round Galvanized Steel Ductwork: Minimum 26 gauge galvanized steel snap-lock pipe.
  - 1. Longitudinal Seams: Seal all seams with pressure-sensitive tape imprinted with listing information.
  - 2. Transverse Joints: All seams and joints shall be mechanically fastened and sealed with glass fabric and mastic complying with UL 181A.
- D. Insulated Flexible Ducts: UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire; fibrous-glass insulation; aluminized vapor-barrier film.
  - 1. Pressure Rating: 10 in.w.g positive and 1.0 in.w.g. negative
  - 2. Maximum Air Velocity: 4000 fpm
  - 3. Temperature Range: Minus 10 to plus 160 deg F
  - 4. Insulation R-value: 6.0 or greater at 75 deg F
  - 5. Transverse Joints: All joints shall be mechanically fastened with a compression strap and sealed with mastic complying with UL 181A.

## 2.3 AIR CONDITIONING DUCTWORK – OUTDOOR AIR

- A. General: All materials shall conform to the requirements of UL 181 for Class 1 air duct materials.
- B. Rectangular Galvanized Steel Ductwork: G90 galvanized sheet steel complying with ASTM A653.
  - 1. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-5, "Longitudinal Seams - Rectangular Ducts," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible." Seal all seams with pressure-sensitive tape imprinted with listing information.

2. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 1-4, "Transverse (Girth) Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible." All joints shall be mechanically fastened and sealed with glass fabric and mastic complying with UL 181A.
  3. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 2, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible." All fittings shall be mechanically fastened and sealed with glass fabric and mastic complying with UL 181A.
- C. Round Galvanized Steel Ductwork: Minimum 26 gauge galvanized steel snap-lock pipe.
1. Longitudinal Seams: Seal all seams with pressure-sensitive tape imprinted with listing information.
  2. Transverse Joints: Slide-in crimped ends mechanically fastened and sealed with glass fabric and mastic complying with UL 181A.

## 2.4 BATHROOM EXHAUST DUCTWORK

- A. General: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
- B. Round Galvanized Steel Ductwork: Minimum 26 gauge galvanized steel snap-lock pipe with pre-installed gasket.
1. Longitudinal Seams: Seal all seams with pressure-sensitive tape.
  2. Transverse Joints: Slide-in crimped ends mechanically fastened and sealed with pressure-sensitive tape.

## 2.5 DRYER VENT DUCTWORK

- A. General: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
- B. Round Galvanized Steel Ductwork: Minimum 26 gauge galvanized steel snap-lock pipe with pre-installed gasket.
1. Longitudinal Seams: Seal all seams with pressure-sensitive tape.
  2. Transverse Joints: Slide-in crimped ends sealed with pressure-sensitive tape. The insert end of the duct shall extend into the adjoining duct or fitting in the direction of airflow. Use no screws or other fasteners that will obstruct the exhaust flow.

## 2.6 FASTENERS AND ADHESIVES

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
- B. Fasteners: When attaching to sheet metal fittings, slide the crimped end of the duct into the straight end of the fitting and secure with sheet metal screws at 4 inches on center and seal all seams with fabric and mastic.
- C. Pressure-Sensitive Tape: Comply with UL 181A; imprinted by the manufacturer with the coding "181A-P," the manufacturer's name, and a date code.
  - 1. Tape: Aluminum foil tape imprinted with listing information.
  - 2. Minimum Tape Width: 3 inches.
  - 3. Water resistant.
  - 4. Mold and mildew resistant.
- D. Fabric and Mastic: Glass fabric and mastic shall comply with UL 181A. Water-based mastic compatible with duct system.

## 2.7 HANGER RODS AND SUPPORTS

- A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
- B. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 4-1, "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct."
- C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Glass Fabric and Mastic Application: Apply a thin, even coat of mastic approximately 3 inches wide over the center of the joint. Press the 3 inch wide glass fabric into the wet mastic. Apply a second coat of mastic, using care to fill the scrim pattern in the glass fabric.
- B. Rectangular ductwork shall be constructed of fiberglass duct board.
- C. Toilet exhaust ductwork shall be galvanized steel.
- D. Dryer vent ducts shall be galvanized steel and shall be constructed without any screws.

- E. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- F. Any ductwork installed within a garage shall be constructed of not less than 26 gauge galvanized steel.
- G. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

### 3.2 DUCT SEALING

- A. All ducts, air handlers, filter boxes and building cavities used as ducts shall be sealed. Joints and seams shall comply with Section M1601.4.1 of the *International Residential Code*.

Duct tightness shall be verified by the following postconstruction test:

Leakage to outdoors shall be less than or equal to 8 cfm per 100 ft<sup>2</sup> of *conditioned floor area* or a total leakage less than or equal to 12 cfm per 100 ft<sup>2</sup> of *conditioned floor area* when tested at a pressure differential of 0.1 inches w.g. across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.

END OF SECTION 238900