

## SECTION 23 31 00

### HVAC DUCT AND CASING

#### **PART 1 GENERAL**

##### **1.01 SUMMARY**

###### A. Section Includes:

1. Ductwork
2. Manufactured duct joints
3. Casings
4. Fibrous glass ductwork
5. Damper operator hardware
6. Volume control dampers
7. Fire dampers
8. Combination fire and smoke dampers
9. Smoke dampers
10. Back-draft dampers
11. Uninsulated triple-lock aluminum round ductwork
12. Insulated triple-lock aluminum round ductwork
13. Insulated flexible round ductwork
14. Flexible duct fan connections
15. Access door hardware
16. Duct access doors

##### **1.02 QUALITY ASSURANCE**

- A. All ductwork shall be in accordance with NFPA 90A and NFPA 90B. All kitchen exhaust duct shall be in accordance with NFFPA96 and local building code.

##### **1.03 SUBMITTALS**

###### A. Product Data:

1. Ductwork material.
2. Product data sheets for dampers, access doors, flexible duct, hardware, and sealants.

###### B. Quality Assurance Data:

1. Ductwork shop drawings indicating fabrication and installation details for metal ducts shall include the following:
  - a) Duct layout indicating size and pressure class.
  - b) Duct accessories such as dampers, louvers, access doors, and air devices.
  - c) Indicate duct length, fittings, hangers and supports, and seals.
2. Coordination drawings shall include the following. Coordination drawings may be combined with ductwork shop drawings.
  - a) Provide reflected ceiling plans, drawn to scale, which indicate the location of ceiling mounted diffusers, grilles, registers, lights, and other ceiling mounted devices or architectural ceiling treatments.

###### C. Project Record Documents:

1. Ductwork shop drawings and coordination drawings.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. General: all duct materials shall be non-combustible or conforming to requirements for Class 0 or Class 1 air duct materials, as per UL 181 with limitations as noted in NFPA 90A.
- B. Steel Ducts: ASTM A525 or ASTM A527 galvanized steel sheet, lock-forming quality, having zinc coating of 1.25 oz. per sq. ft. for each side in conformance with ASTM A90.
- C. Aluminum Ducts: ANSI/ASTM B209; aluminum sheet, alloy 3003-H14. Aluminum Connectors and Bar Stock: Alloy 6061-T6 or of equivalent strength.
- D. Stainless Steel Ducts: ASTM A167, Type 304.
- E. PVC-coated or stainless steel exhaust duct for chemicals or corrosive areas.
- F. Sealant: non-hardening, non-asbestos, water resistant, UL classified as fire resistive, compatible with mating materials.
- G. Duct Liner: Manville Permacote Linacoustic Duct Liner, or equally-coated duct liner installed per manufacturer's recommendations. (for transfer ducts and sound boots ONLY).
- H. Support members:
  1. Galvanized all thread rods
  2. Galvanized steel angles or painted unistrut.

### **2.02 MANUFACTURED DUCT JOINTS**

- A. Acceptable Manufacturer: Ductmate Industries, Inc. or approved equal.
- B. Transverse duct joints may be made with the Ductmate System, or approved equal, components of standard catalog manufacture.
- C. Elbows: Provide radius elbows with throat radius (measured at inside surface) equal to duct depth should be used wherever possible. Rectangular elbows are discouraged. If rectangular elbows are needed, they shall have insulated turning vanes, with intermediate supports if the length of the vanes exceeds 36". Edges of the turning vanes shall be parallel with the sides of the elbow.

### **2.03 CASINGS**

- A. Fabricate casings in accordance with SMACNA HVAC Duct Construction Standards.

### **2.04 FIBROUS GLASS DUCTWORK AND LINER**

- A. Not allowed unless approved by PM as absolutely necessary.

### **2.05 VOLUME CONTROL DAMPERS**

- A. Do not install a volume damper with a frame that protrudes into an airstream.
- B. Provide locking, indicating quadrant regulators on the volume control dampers.
- C. Leakage rates shall comply with IECC 2015.

### **2.06 FIRE DAMPERS**

- A. Specify that fire dampers shall be constructed, tested, and labeled in accordance with UL555S Standard and shall also be in compliance with NFPA 90A.
- B. Specify that fire dampers shall be installed in accordance with their UL listing, NFPA 90A, and the manufacturer's installation instructions.

### **2.07 COMBINATION FIRE AND SMOKE DAMPERS**

- A. Combination fire/smoke dampers shall be constructed, tested, and labeled in accordance with UL555/UL555S Standards and shall also be in compliance with NFPA 90A.
- B. Combination fire/smoke dampers shall be installed in accordance with their UL listing, NFPA 90A, and the manufacturer's installation instructions.

- C. Provide with electric (120V, 1Ø) operators in the buildings.
- D. Combination fire/smoke dampers shall be used in applications where both a fire damper and a smoke damper are required.

## **2.08 SMOKE DAMPERS**

- A. Smoke dampers shall be constructed, tested, and labeled in accordance with UL555S Standard and shall also be in compliance with NFPA 90A.
- B. Smoke dampers shall be installed in accordance with their UL listing, NFPA 90A, and the manufacturer's installation instructions.
- C. Provide with electric (120V, 1Ø) operators in the building.

## **2.09 BACKDRAFT DAMPERS**

- A. Backdraft dampers furnished with air moving equipment may be air moving equipment manufacturer's standard construction.
- B. Provide gravity back-draft dampers for positive closure of air duct on exhaust systems.
- C. Back-draft dampers of flexible materials are acceptable.

## **2.10 UNINSULATED TRIPLE-LOCK ALUMINUM ROUND DUCTWORK**

- A. Acceptable Manufacturers:
  - 1. Flexmaster Triple-Lock Type NI-TL Flexible Aluminum Air Duct.
  - 2. Hercules.
  - 3. Omni-Air.
  - 4. Thermaire.
- B. All aluminum metal flexible duct that is constructed without adhesive. Duct shall have UL 181 Class 0 Air Duct listing and meet the requirements of NFPA 90A and 90B.

## **2.11 INSULATED TRIPLE-LOCK ALUMINUM ROUND DUCTWORK**

- A. All aluminum metal flexible duct that is constructed without adhesive. Duct shall have UL 181 Class 1 Air Duct listing and meet the requirements of NFPA 90A and 90B. Insulation shall be fiberglass with thermal conductance C factor < 0.23. Flame Spread rating < 20 and Smoke Developed Rating < 25. Provide reinforced metalized outer jacket and vapor barrier.

## **2.12 INSULATED FLEXIBLE ROUND DUCTWORK**

- A. Insulated flexible round duct shall be in accordance the Denver Building Department requirements.
  - 1. Flexible duct shall meet the pressure class requirements of the system served.

## **2.13 FLEXIBLE DUCT FAN CONNECTIONS**

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards, and as indicated.
- B. UL-listed fire-resistant neoprene-coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz. per sq. yd. crimped into metal edging strip.
- C. Provide a minimum of one (1) inch slack in these connections to insure that no vibration is transmitted from fan to ductwork.
- D. Exhaust ducts shall have flexible connections appropriate for the type of exhaust and NFPA/ IMC requirements.

## **2.14 DUCT ACCESS DOORS**

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards as indicated.
- B. Access doors with sheet metal screw fasteners are not acceptable.

## **2.15 TRANSITIONS**

- A. Diverging transitions shall not exceed 15° per side. Converging transitions shall not exceed 30° per side.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. All flexible ductwork shall be secured to collars with metal bands. Plastic bands are not allowed. Length shall not exceed six (6) feet, and shall be supported at least every three (3) feet.
- B. All ductwork shall be installed per the most recent SMACNA and ASHRAE Guidelines for duct installation and support except as modified herein.
- C. Rigid metal ductwork shall be supported on trapeze carriers supporting the bottom surface of the duct.
- D. Ductwork support structure shall be attached directly to building structural members or supplemental framing members installed by the ductwork installer. Attachment to the decking is not permitted. Supplemental framing members shall be attached directly to the building structural systems.
- E. External duct insulation shall pass over trapeze support members so that the supporting member and the ductwork are separated by the duct insulation.
- F. Volume Control Dampers shall be set and permanently marked or painted to indicate the damper position in the final, balanced air volume condition.
- G. All open ends of ducts shall be covered at end of day to protect against dust, water, etc.

### **3.02 SUPPORT SYSTEMS FOR DUCTWORK**

- A. All rigid ductwork shall be supported by trapeze construction supported directly from the building structure.
- B. Support trapeze construction shall consist of all-thread rods and painted or galvanized support members (unistrut or steel angle).
- C. Duct insulation shall continue through support locations so that metal duct and support structure are separated by the insulation.

### **3.03 ACCESS DOORS**

- A. Install duct access doors for inspection, maintenance and cleaning at all automatic dampers, fire and smoke dampers, before duct turning vanes and before all booster coils.

**END OF SECTION 23 31 00**