

SECTION 233100 - HVAC DUCTS AND CASINGS

PART 1 - GENERAL

1.01 BUY AMERICAN REQUIREMENTS

A. Provide certificates to show that all products meet the following requirements.

1. American Iron and Steel (AIS)
2. Build America, Buy America Act

B. See Supplementary Conditions for details.

1.02 SUMMARY

A. Section Includes:

1. Duct Materials.
2. Flexible ducts.
3. Insulated flexible ducts.
4. Ductwork fabrication.
5. Duct cleaning.

1.03 REFERENCES

A. ASTM International:

1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
2. ASTM A90/A90M - Standard Test Method for Weight Mass of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings.
3. ASTM A167 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
4. ASTM A568/A568M - Standard Specification for Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for.
5. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
6. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
7. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
8. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

B. National Fire Protection Association:

1. NFPA 90A - Standard for the Installation of Air Conditioning and Ventilating Systems.

C. Sheet Metal and Air Conditioning Contractors:

1. SMACNA - HVAC Air Duct Leakage Test Manual.
2. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.

D. Underwriters Laboratories Inc.:

1. UL 181 - Factory-Made Air Ducts and Connectors.

1.04 PERFORMANCE REQUIREMENTS

- A. Variation of duct configuration or sizes other than those of equivalent or lower loss coefficient is not permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.

1.05 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Submit duct fabrication drawings, drawn to scale not smaller than 1/4 inch equals 1 foot, on drawing sheets same size as Contract Documents, indicating:
1. Fabrication, assembly, and installation details, including plans, elevations, sections, details of components, and attachments to other work.
 2. Duct layout, indicating pressure classifications and sizes in plan view. For exhaust duct systems, indicate classification of materials handled as defined in this section.
 3. Fittings.
 4. Reinforcing details and spacing.
 5. Seam and joint construction details.
 6. Penetrations through fire rated and other walls.
 7. Terminal unit, coil, and humidifier installations.
 8. Hangers and supports, including methods for building attachment, vibration isolation, and duct attachment.
- C. Product Data: Submit data for duct materials.
- D. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate, following SMACNA HVAC Air Duct Leakage Test Manual.
- E. Manufacturer's Installation Instructions: Submit special procedures for glass fiber ducts.

1.06 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

PART 2 - PRODUCTS

2.01 DUCT MATERIALS

- A. Galvanized Steel Ducts: ASTM A653/A653M galvanized steel sheet, lock-forming quality, having G60 zinc coating of in conformance with ASTM A90/A90M.
- B. Stainless Steel Ducts: ASTM A167, Type 304.
- C. Fasteners: Rivets, bolts, or sheet metal screws.
- D. Hanger Rod: ASTM A36/A36M; steel , galvanized; threaded both ends, threaded one end, or continuously threaded.

2.02 FLEXIBLE DUCTS

- A. Manufacturers: Thermaflex
- B. Flexible Air Duct: UL 181, two ply vinyl film supported by helical wound spring steel wire.
 - 1. Pressure Rating: 10 inches wg positive and 1.0 inches wg negative.
 - 2. Maximum Velocity: 5000 fpm.
 - 3. Temperature Range: -10 degrees F to 200 degrees F.
 - 4. Insulation Value: R6.0
 - 5. Surface Burning Characteristics: Max flame spread of 25, max smoke of 50.
- C. Acoustical Flexible Air Duct: UL 181, CPE duct liner bonded to spring steel wire helix. Exterior jacket to have vapor barrier, fiberglass reinforced metallized film or approved equal.
 - 1. Pressure Rating: 10 inches wg positive and 1.0 inches wg negative.
 - 2. Maximum Velocity: 5000 fpm.
 - 3. Temperature Range: -20 degrees F to 200 degrees F continuous.
 - 4. Insulation: Fiberglass, minimum R6.0
 - 5. Surface Burning Characteristics: Max flame spread of 25, max smoke of 50.

2.03 DUCTWORK FABRICATION

- A. Fabricate and support rectangular ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible and [as indicated on Drawings]. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- B. Fabricate and support round ducts with longitudinal seams in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible (Round Duct Construction Standards), and [as indicated on Drawings]. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- C. Construct T's, bends, and elbows with minimum radius 1-1/2 times centerline duct width. Where not possible and where rectangular elbows are used, provide [airfoil] turning

vanes. Where acoustical lining is indicated, furnish turning vanes of perforated metal with glass fiber insulation.

- D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- E. Fabricate continuously welded round and oval duct fittings two gages heavier than duct gages indicated in SMACNA Standard. Minimum 4 inch cemented slip joint, brazed or electric welded. Prime coat welded joints.
- F. Provide standard 45-degree lateral wye takeoffs. When space does not allow 45-degree lateral wye takeoff, use 90-degree conical tee connections.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify sizes of equipment connections before fabricating transitions.

3.02 INSTALLATION

- A. Install and seal ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- B. During construction, install temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- C. Use double nuts and lock washers on threaded rod supports.
- D. Connect flexible ducts to metal ducts with draw bands.

3.03 INTERFACE WITH OTHER PRODUCTS

- A. Connect air terminal units to supply ducts directly.

3.04 CLEANING

- A. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air flow, clean one half of system completely before proceeding to other half. Protect equipment with potential to be harmed by excessive dirt with temporary filters, or bypass during cleaning.

3.05 SCHEDULES

- A. Ductwork Material Schedule:

AIR SYSTEM	MATERIAL
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Supply (Heating Systems)	Galvanized Steel
General Exhaust	Galvanized Steel
Outside Air Intake	Galvanized Steel

B. Ductwork Pressure Class Schedule:

AIR SYSTEM	PRESSURE CLASS
Constant Volume Supply	1 inch wg regardless of velocity.
General Exhaust	1/2 inch wg regardless of velocity.

END OF SECTION

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