
SECTION 23 31 00
HVAC DUCTS AND CASINGS**PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Metal Ductwork.
- B. Flexible Duct.
- C. Fume Exhaust Ductwork.

1.2 RELATED REQUIREMENTS

- A. Section 01 30 00 - Administrative Requirements.
- B. Section 07 84 00 - Firestopping.
- C. Section 23 07 13 - Duct Insulation: External insulation and duct liner.
- D. Section 23 33 00 - Air Duct Accessories.
- E. Section 23 36 00 - Air Terminal Units.

1.3 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- B. ASTM A480/A480M - Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip 2022a.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2022.
- D. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable 2021a.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023.
- F. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements 2015.
- G. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements 2015.
- H. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements 2015.
- I. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements 2016.
- J. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2021.
- K. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2021.

1.4 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Listed manufacturers and series are for reference only and do not promote any single product. Series are provided for reference and should not be used as an ordering model number. Accessories and options may be custom components purchased separately.
- C. Product Data: Provide manufacturer's most current catalog data sheet for equipment indicating rough-in size, finish and accessories. Manufacturer's data sheets on each item of equipment and device shall be clearly marked up to identify the items, accessories and options to be used on the project.
 - 1. Metal Duct (23 31 00 - 001 - A)
 - 2. Flexible Duct (23 31 00 - 003 - A)
- D. Shop Drawings: Indicate duct fittings, particulars such as gages, sizes, welds, and configuration prior to start of work for ductwork systems.

1. Metal Duct (23 31 00 - 001 - A)
2. Coordination Drawings, provide 1/4" scale ductwork drawings, indicate all ductwork elevations and coordinate with all other trades. (23 31 00 - 002 - A)
- E. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.
 1. Refer to Section 01 78 00 - Closeout Submittals.
 2. Record Documents.

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1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience, and approved by manufacturer.

1.7 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide 25 year manufacturer's warranty .
 1. Include in Closeout Submittals Book.
 2. Metal Duct
 3. Flexible Duct

1.8 FIELD CONDITIONS

- A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2 PRODUCTS

2.1 DUCT ASSEMBLIES

- A. Regulatory Requirements: Construct ductwork to NFPA 90A standards and schedule on drawings.
- B. Ducts: Galvanized steel, unless otherwise indicated.
- C. Low Pressure Supply (Heating Systems): 2 inch w.g. pressure class, galvanized steel.
- D. Low Pressure Supply (System with Cooling Coils): 2 inch w.g. pressure class, galvanized steel.
- E. Medium and High Pressure Supply: 2" inch w.g. pressure class, galvanized steel.
- F. Fume Hood Exhaust: 1 inch w.g. pressure class, stainless steel.
- G. Outside Air Intake: 1 inch w.g. pressure class, galvanized steel.
- H. Combustion Air: 1 inch w.g. pressure class, galvanized steel.
- I. Transfer Air and Sound Boots: 1 inch w.g. pressure class, galvanized steel.

2.2 MATERIALS

- A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
- B. Un-Galvanized Steel for Ducts: ASTM A1008/A1008M, Designation CS, cold-rolled commercial steel.
- C. Stainless Steel for Ducts: ASTM A480/A480M, Type 304.
- D. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
 - 1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
 - 2. VOC Content: Not more than 250 g/L, excluding water.
 - 3. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.
 - 4. For Use with Flexible Ducts: UL labeled.
 - 5. Manufacturers:
 - a. Carlisle HVAC Products; Hardcast Iron-Grip 601 Water Based Duct Sealant.
 - b. Design Polymerics; DP 1010 Water Based Smooth Duct Sealant, Zero VOC, Premium Quality: www.designpoly.com/#sle.
 - c. Ductmate Industries, Inc, a DMI Company: www.ductmate.com/#sle.
 - d. Substitutions: See Section 01 60 00 - Product Requirements.
- E. Hanger Rod:
 - 1. ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.
 - 2. Humid or harsh environments, stainless steel continuously threaded rod.
- F. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
 - 1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
 - 2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
 - 3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
 - 4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
 - 5. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.
 - 6. Other Types: As required.
 - 7. Manufacturers:
 - a. Powers Fasteners, Inc.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.

2.3 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.

- B. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- C. 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 must be used, provide air foil 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 in accordance with SMACNA (DCS).
- F. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide plenum box sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

2.4 MANUFACTURED DUCTWORK AND FITTINGS

- A. Spiral Ducts: Round spiral lockseam duct with galvanized steel outer wall.
 - 1. Manufacture in accordance with SMACNA (DCS).
- B. Round Ducts: Round lockseam duct with galvanized steel outer wall.
 - 1. Manufacture in accordance with SMACNA (DCS).
- C. Flexible Ducts: Two ply vinyl film supported by helically wound spring steel wire.
 - 1. Insulation: Fiberglass insulation with polyethylene vapor barrier film.
 - 2. Pressure Rating: 10 inches wg positive and 1.0 inches wg negative.
 - 3. Maximum Velocity: 4000 fpm.
 - 4. Temperature Range: Minus 10 degrees F to 160 degrees F.
- D. Flexible Ducts: Multiple layers of aluminum laminate supported by helically wound spring steel wire.
 - 1. UL labeled.
 - 2. Insulation: Fiberglass insulation with polyethylene vapor barrier film.
 - 3. Pressure Rating: 10 inches wg positive and 1.0 inches wg negative.
 - 4. Maximum Velocity: 4000 fpm.
 - 5. Temperature Range: Minus 20 degrees F to 210 degrees F.
- E. Transverse Duct Connection System: SMACNA "E" rated rigidly class connection, interlocking angle and duct edge connection system with sealant, gasket, cleats, and corner clips in accordance with SMACNA (DCS).
- F. Round Duct Connection System: Interlocking duct connection system in accordance with SMACNA (DCS).
- G. Fume Hood Exhaust: Minimum 21 gage, 0.0344 inch thick, single wall, Type 304 stainless steel.
 - 1. Single-wall, factory built chimney liner system.
 - 2. Designed, fabricated, and installed liquidtight preventing exhaust leakage into building.
 - 3. Seal joints during installation with factory supplied flanges and airtight gasketing.
 - 4. Manufacturers:
 - a. Selkirk Corporation; Model G.
 - b. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.1 INTERFACE WITH WORK OF OTHER SECTIONS

- A. Confirm framing and support members.
- B. Confirm rough-in and framing of walls and partitions with supports for equipment and accessories.

3.2 EXAMINATION

- A. Verify that surfaces are suitable for installation.
- B. Examine areas to receive equipment for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- C. Verify that piping and equipment are ready to receive work.
- D. Verify field measurements are as shown on shop drawings.
- E. Maintain clearances to combustibles and service clearances.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

- A. Install, support, and seal ducts in accordance with SMACNA (DCS).
- B. Install in accordance with the following:
 - 1. Federal, State and Local codes.
 - 2. Manufacturer's instructions.
 - 3. SMACNA 1966.
- C. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- D. Flexible Ducts:
 - 1. Connect inner liner to metal ducts with draw bands.
 - 2. Cover with insulated section.
 - 3. Connect outer cover to metal duct with draw bands and tape.
 - 4. Ducts shall be supported every 2 linear feet.
 - 5. Vertical section of flexible duct down to diffuser shall be aligned for a straight path.
- E. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
- F. Use double nuts and lock washers on threaded rod supports.
- G. Connect terminal units to supply ducts directly or with one foot maximum length of flexible duct. Do not use flexible duct to change direction.
- H. Connect diffusers or light troffer boots to low pressure ducts directly or with maximum length of flexible duct held in place with strap or clamp.

3.4 CLEANING

- A. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment that could be harmed by excessive dirt with temporary filters, or bypass during cleaning.

END OF SECTION 23 31 00