

**SECTION 23 3100
HVAC DUCTS AND CASINGS**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Metal ductwork.
- B. Duct cleaning.

1.2 RELATED REQUIREMENTS

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 23 3700 - Air Outlets and Inlets.

1.3 REFERENCE STANDARDS

- A. ASHRAE (FUND) - ASHRAE Handbook - Fundamentals; 2013.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- C. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2016.
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- F. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005.

1.4 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for duct materials.

PART 2 PRODUCTS

2.1 DUCT ASSEMBLIES

- A. Regulatory Requirements: Construct ductwork to NFPA 90A standards.
- B. All Ducts: Galvanized steel, unless otherwise indicated.
- C. General Exhaust: 1/2 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. 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. Surface Burning Characteristics: Flame spread of zero, smoke developed of zero, when tested in accordance with ASTM E84.
- C. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

2.3 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards and as indicated.
- B. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install, support, and seal ducts in accordance with SMACNA HVAC Duct Construction Standards.
- B. Install in accordance with manufacturer's instructions.
- C. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- D. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.
- E. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

3.2 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

**SECTION 23 3416
CENTRIFUGAL HVAC FANS**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Ceiling mounted centrifugal exhaust fans.
- B. Forward curved centrifugal fans.
- C. Accessories.

1.2 RELATED REQUIREMENTS

- A. Section 23 3100 - HVAC Ducts and Casings

1.3 REFERENCE STANDARDS

- A. AMCA (DIR) - (Directory of) Products Licensed Under AMCA International Certified Ratings Program; <http://www.amca.org/certified/search/company.aspx>.
- B. AMCA 99 - Standards Handbook; 2010.
- C. AMCA 300 - Reverberant Room Method for Sound Testing of Fans; 2014.
- D. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data; 2014.
- E. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005.

1.4 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on centrifugal fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels for both fan inlet and outlet at rated capacity, and electrical characteristics and connection requirements.
- C. Manufacturer's Instructions: Include complete installation instructions.
- D. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect motors, shafts, and bearings from weather and construction dust.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Greenheck Fan Corp; SP-A 110 VG.

2.2 PERFORMANCE REQUIREMENTS

- A. Sound Ratings: AMCA 301, tested to AMCA 300, and bear AMCA Certified Sound Rating Seal.
- B. Fabrication: Comply with AMCA 99.
- C. Air Flow: 110 cfm.
- D. Static Pressure: 0.25 inches.
- E. Motor: 0.31 Max. Amp.
 - 1. 115 volts, single phase, 60 Hz.

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2. Type: Constant Airflow Electronically Commutated.

2.3 WHEEL AND INLET

- A. Backward Inclined: Steel or aluminum construction with smooth curved inlet flange, heavy back plate, backwardly curved blades welded or riveted to flange and back plate; cast iron or cast steel hub riveted to back plate and keyed to shaft with set screws.
- B. Forward Curved: Black enameled steel construction with inlet flange, back plate, shallow blades with inlet and tip curved forward in direction of airflow, mechanically secured to flange and back plate; steel hub swaged to back plate and keyed to shaft with set screw.

2.4 HOUSING

- A. Heavy gauge steel, spot welded for AMCA 99 Class I and II fans, and continuously welded for Class III, adequately braced, designed to minimize turbulence with spun inlet bell and shaped cut.
- B. Integral backdraft damper.

2.5 ACCESSORIES

- A. Control Switch: Programable fan control switch. Honeywell HVC0001.
- B. Inlet/Outlet Screens: Molded plastic. Concealed fasteners
- C. Exterior Wall Cap: 10"x3" Model WC powder coated-

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install with resilient mountings.
- C. Install discharge vent through exterior wall to wall cap.
- D. Adjust fan speed to maintain exhaust air volume specified.
- E. Program fan control switch to desired control mode. Coordinate parameters with Owner's representative.

END OF SECTION

**SECTION 23 3700
AIR OUTLETS AND INLETS**

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Diffusers:
 - 1. Rectangular ceiling diffusers.
- B. Registers/grilles:
 - 1. Ceiling-mounted, exhaust register/grilles.
 - 2. Wall-mounted, exhaust register/grilles.

1.2 REFERENCE STANDARDS

- A. AHRI 880 (I-P) - Performance Rating of Air Terminals; 2011 with Addendum 1.
- B. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Inlets; 2006 (R2011).
- C. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.3 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

PART 2 PRODUCTS

2.1 RECTANGULAR CEILING DIFFUSERS

- A. Manufacturers:
 - 1. Krueger-HVAC; MSH: www.krueger-hvac.com/#sle.
- B. Type: Provide square, stamped, multi-core and multi-louvered diffuser to discharge air in four way pattern.
- C. Connections: As required. Coordinate with existing duct connections..
- D. Fabrication: Steel with baked enamel finish.
- E. Color: White.
- F. Accessories: Provide opposed blade volume control damper; Provide with damper adjustable from diffuser face.

2.2 WALL AND CEILING EXHAUST REGISTERS/GRILLES

- A. Manufacturers:
 - 1. Krueger-HVAC; S80H: www.krueger-hvac.com/#sle.
- B. Type: Streamlined blades, 3/4 inch minimum depth, 3/4 inch maximum spacing, with blades set at 45 degrees, horizontal face.
- C. Frame: 1-1/4 inch margin with countersunk screw mounting. Provide lay-in T-bar frame for suspended ceiling installation.
- D. Fabrication: Steel with 20 gauge, 0.0359 inch minimum frames and 22 gauge, 0.0299 inch minimum blades, steel and aluminum with 20 gauge, 0.0359 inch minimum frame, or aluminum extrusions, with factory baked enamel finish.
- E. Color: White.

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PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Check location of outlets and inlets and make necessary adjustments in position to comply with architectural features, symmetry, and lighting arrangement.
- C. Install diffusers to ductwork with air tight connection.

END OF SECTION