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**SECTION 23 34 23**  
**HVAC POWER VENTILATORS****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Roof and Wall Mounted Fans, Downblast.
- B. Roof and Wall Mounted Fans, Upblast.
- C. Cabinet Exhaust Fans.
- D. Ceiling Exhaust Fans.

**1.2 RELATED REQUIREMENTS**

- A. Section 01 30 00 - Administrative Requirements.
- B. Section 23 09 23 - Direct-Digital Control System for HVAC.
- C. Section 23 33 00 - Air Duct Accessories.
- D. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.
- E. Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- F. Section 26 05 83 - Wiring Connections: Electrical characteristics and wiring connections.

**1.3 REFERENCE STANDARDS**

- A. AMCA (DIR) - (Directory of) Products Licensed Under AMCA International Certified Ratings Program 2015.
- B. AMCA 99 - Standards Handbook 2016.
- C. AMCA 204 - Balance Quality and Vibration Levels for Fans 2020.
- D. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating 2016.
- E. AMCA 211 - Certified Ratings Program Product Rating Manual for Fan Air Performance 2022.
- F. AMCA 300 - Reverberant Room Method for Sound Testing of Fans 2014.
- G. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data 2022.
- H. AMCA 311 - Certified Ratings Program Product Rating Manual for Fan Sound Performance 2016.
- I. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- J. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations 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. Provide data on fans and accessories.
  - 1. Including fan curves with specified operating point clearly plotted.
  - 2. Power, RPM, sound power levels at rated capacity, electrical characteristics and connection requirements.
  - 3. Roof and Wall Mounted Fans, Downblast (23 34 23 - 001 - A)
  - 4. Roof and Wall Mounted Fans, Upblast (23 34 23 - 001 - A)

- 5. Ceiling Exhaust Fans (23 34 23 - 001 - A)
- D. Project Record Documents: Record actual locations of components and locations of access doors in radiation cabinets required for access or valving.
  - 1. Refer to Section 01 78 00 - Closeout Submittals.
- E. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listings.
  - 1. Refer to Section 01 78 00 - Closeout Submittals.
- F. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list, and wiring diagrams.

### **1.5 WARRANTY**

- A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.
- B. Provide 3 year warranty, including parts, materials and labor for defective parts, for the following:
  - 1. Include in Closeout Submittals Book.
  - 2. Roof and Wall Mounted Fans, Downblast.
  - 3. Roof and Wall Mounted Fans, Upblast.
  - 4. Cabinet Exhaust Fans.
  - 5. Ceiling Exhaust Fans.

### **1.6 FIELD CONDITIONS**

- A. Permanent ventilators may not be used for ventilation during construction.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Greenheck Fan Corporation.
- B. Loren Cook Company.
- C. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.2 POWER VENTILATORS - GENERAL**

- A. Manufacturers:
  - 1. Greenheck Fan Corporation.
  - 2. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Static and Dynamically Balanced: AMCA 204 - Balance Quality and Vibration Levels for Fans.
- C. Performance Ratings: Determined in accordance with AMCA 210 and bearing the AMCA Certified Rating Seal.
- D. Sound Ratings: AMCA 301, tested to AMCA 300 and bearing AMCA Certified Sound Rating Seal.
- E. Fabrication: Comply with AMCA 99.
- F. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- G. Enclosed Safety Switches: Comply with NEMA 250.

### **2.3 ROOF OR WALL MOUNTED FANS, DOWNBLAST**

- A. Fan Unit: V-belt or direct driven as indicated, with spun aluminum housing; resilient mounted motor; 1/2 inch mesh, 0.62 inch thick aluminum wire birdscreen; square base to suit roof curb with continuous curb gaskets.

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- B. Roof Curb: 16 inch high self-flashing of galvanized steel with continuously welded seams, built-in cant strips.
  - C. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor, NEMA 3, mounted exterior to fan housing.
    - 1. Coordinate disconnect switch and relays with control system. Refer to section 23 09 23 - Direct-Digital Control System for HVAC.
    - 2. Factory wired from disconnect switch to fan motor, or contractor wired. Refer to section 26 27 17 - Equipment Wiring
  - D. Motor Operated Damper: Power actuated, aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked, and line voltage motor drive, power open, spring return.
    - 1. Coordinate voltage with control system. Refer to section 23 09 23 - Direct-Digital Control System for HVAC.
  - E. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheave selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.
  - F. Manufacturers:
    - 1. Greenheck; Model GB.
    - 2. Loren Cook Company.
    - 3. Substitutions: See Section 01 6000 - Product Requirements.

#### **2.4 ROOF OR WALL MOUNTED FANS, UPBLAST**

- A. Manufacturers:
    - 1. Greenheck Fan Corporation.
    - 2. Substitutions: See Section 01 60 00 - Product Requirements.
  - B. Fan Unit: V-belt or direct driven as indicated, with spun aluminum housing; resilient mounted motor; 1/2 inch mesh, 0.62 inch thick aluminum wire birdscreen; square base to suit roof curb with continuous curb gaskets.
  - C. Roof Curb: 16 inch high self-flashing of galvanized steel with continuously welded seams, built-in cant strips.
  - D. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor , NEMA 3, mounted exterior to fan housing.
    - 1. Coordinate disconnect switch and relays with control system. Refer to section 23 09 23 - Direct-Digital Control System for HVAC.
    - 2. Factory wired from disconnect switch to fan motor, or contractor wired. Refer to section 26 27 17 - Equipment Wiring
  - E. Motor Operated Damper: Power actuated, aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked, and line voltage motor drive, power open, spring return.
    - 1. Coordinate voltage with control system. Refer to section 23 09 23 - Direct-Digital Control System for HVAC.
  - F. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheave selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.
  - G. Smoke exhaust fans to be UL rated for smoke evacuation systems.
  - H. Drain connection with cup.
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- I. Manufacturers:
  - 1. Greenheck.
  - 2. Loren Cook Company.

## **2.5 CEILING EXHAUST FANS**

- A. Manufacturers:
  - 1. Greenheck Fan Corporation.
  - 2. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Centrifugal Fan Unit: V-belt or direct driven with galvanized steel housing lined with acoustic insulation, resilient mounted motor, gravity backdraft damper in discharge.
- C. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor , NEMA 1, mounted exterior to fan housing.
  - 1. Coordinate disconnect switch and relays with control system. Refer to section 23 09 23 - Direct-Digital Control System for HVAC.
  - 2. Factory wired from disconnect switch to fan motor, or contractor wired. Refer to section 26 27 17 - Equipment Wiring.
- D. Grille: Molded white plastic.
- E. Manufacturers:
  - 1. Greenheck; Model SP.
  - 2. Loren Cook Company.
  - 3. Substitutions: See Section 01 6000 - Product Requirements.

## **PART 3 EXECUTION**

### **3.1 INTERFACE WITH WORK OF OTHER SECTIONS**

- A. Confirm framing and support members. Refer to section 20 05 48 - Supports for Piping, Ductwork and Equipment.
- B. Confirm rough-in and framing of ceilings, roof, walls and partitions with supports for equipment and accessories.
- C. Confirm rough-in locations and power requirements before rough-in installation. Refer to Section 23 09 23 - Direct-Digital Control System for HVAC.
- D. Confirm rough-in locations and power requirements before rough-in installation. Refer to Section 26 27 17 - Equipment Wiring.

### **3.2 EXAMINATION**

- A. Verify that surfaces are suitable for installation.
- B. Verify that field measurements are as shown on the drawings.
- C. Examine areas to receive equipment for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- D. Electrical:
  - 1. Verify electrical power, voltage, phase and current is available and of the correct characteristics.
  - 2. Verify rough-in for electrical connections to verify actual locations before installing.
  - 3. Verify motor type and VFD or disconnect type for compatibility prior to ordering equipment.
- E. Controls:
  - 1. Verify signal power, voltage, phase and current is available and of the correct characteristics.
  - 2. Verify rough-in for control connections to verify actual locations before installing.

3. Verify motor type and VFD or disconnect type for compatibility with control sequence and control devices prior to ordering equipment.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.3 INSTALLATION**

- A. Install in accordance with the following:
  1. Federal, state and local codes.
  2. Manufacturer's instructions.
  3. NFPA 90A.
  4. National Electric Code.
- B. Install equipment level and plumb.
- C. Connect wiring according to Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.
- D. Ground equipment according to Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- E. Secure roof exhausters with cadmium plated steel lag screws to roof curb.
- F. Extend ducts to roof exhausters into roof curb. Counterflash duct to roof opening.
- G. Secure wall exhausters with cadmium plated steel lag screws to structure.
- H. Extend ducts to wall exhausters into structure. Counterflash duct to wall opening.
- I. Ceiling mounted fans: mount fan independent of ceiling system.
- J. Install fans with resilient mountings and flexible electrical leads.
- K. Install flexible connections specified in Section 23 33 00 - Air Duct Accessories between fan and ductwork. Ensure metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.
- L. Provide sheaves required for final air balance.
- M. Install motor operated dampers on inlet to fans.
- N. Provide backdraft dampers on outlet from cabinet and ceiling exhauster fans and as indicated.

### **3.4 INSTALLATION**

- A. Install in accordance with the following:
  1. Federal, state and local codes.
  2. Manufacturer's instructions.
  3. NFPA 90A.
  4. National Electric Code.
- B. Install equipment level and plumb.
- C. Connect wiring according to Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables.
- D. Ground equipment according to Section 26 05 26 - Grounding and Bonding for Electrical Systems.
- E. Secure roof exhausters with cadmium plated steel lag screws to roof curb.
- F. Extend ducts to roof exhausters into roof curb. Counterflash duct to roof opening.
- G. Secure wall exhausters with cadmium plated steel lag screws to structure.
- H. Extend ducts to wall exhausters into structure. Counterflash duct to wall opening.
- I. Ceiling Mounted Fans: Mount fan independent of ceiling system.
- J. Install fans with resilient mountings and flexible electrical leads.
- K. Install flexible connections specified in Section 23 33 00 - Air Duct Accessories between fan and ductwork. Ensure metal bands of connectors are parallel with minimum one inch flex between ductwork and fan while running.
- L. Provide sheaves required for final air balance.

M. Install motor operated dampers on inlet to fans.

**3.5 START-UP**

- A. Perform start-up.
1. Roof and Wall Mounted Fans, Downblast.
  2. Roof and Wall Mounted Fans, Upblast.
  3. Ceiling Exhaust Fans.

**END OF SECTION 23 34 23**