

SECTION 233423 - HVAC POWER VENTILATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Ceiling-mounted ventilators.
 - 2. Centrifugal ventilators - roof downblast.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Construction details, material descriptions, dimensions of individual components and profiles, and finishes for fans.
 - 2. Rated capacities, operating characteristics, and furnished specialties and accessories.
 - 3. Certified fan performance curves with system operating conditions indicated.
 - 4. Certified fan sound-power ratings.
 - 5. Motor ratings and electrical characteristics, plus motor and electrical accessories.
 - 6. Material thickness and finishes, including color charts.
 - 7. Dampers, including housings, linkages, and operators.
 - 8. Prefabricated roof curbs.
 - 9. Fan speed controllers.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Include diagrams for power, signal, and control wiring.
 - 4. Design Calculations: Calculate requirements for selecting vibration isolators.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: Submit certificates that specified equipment will withstand required wind forces, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculations.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of wind force and locate and describe mounting and anchorage provisions.

3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For HVAC power ventilators to include in normal and emergency operation, and maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Belts: One set(s) for each belt-driven unit.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- B. NFPA Compliance: Comply with NFPA 90A for design, fabrication, and installation of unit components.
- C. ASHRAE 62.1 Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."
- D. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."
- E. Wind Performance: Air-handling units shall withstand the effects of wind determined in accordance with to ASCE/SEI 7 .

2.2 CEILING-MOUNTED VENTILATORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Acme Engineering & Manufacturing Corp.
 2. Greenheck Fan Corporation.
 3. Loren Cook Company.
 4. PennBarry.
- B. Housing: Steel, lined with acoustical insulation.
- C. Fan Wheel: Centrifugal wheels directly mounted on motor shaft. Fan shrouds, motor, and fan wheel removable for service.
- D. Back-draft damper: Integral.

- E. Grille: Aluminum , louvered grille with flange on intake and thumbscrew or spring retainer attachment to fan housing.
- F. Electrical Requirements: Junction box for electrical connection on housing and receptacle for motor plug-in.
- G. Accessories:
 - 1. Variable-Frequency Motor Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
 - 2. Manual Starter Switch: Single-pole rocker switch assembly with cover and pilot light.

2.3 CENTRIFUGAL VENTILATORS - ROOF DOWNBLAST

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Acme Engineering & Manufacturing Corp.
 - 2. Greenheck Fan Corporation.
 - 3. Loren Cook Company.
 - 4. PennBarry.
- B. Housing: Downblast; removable spun-aluminum dome top and outlet baffle; square, one-piece aluminum base with venturi inlet cone.
- C. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.
- D. Belt Drives:
 - 1. Resiliently mounted to housing.
 - 2. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
 - 3. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
 - 4. Fan Pulleys: Cast iron or cast steel with split, tapered bushing; dynamically balanced at factory.
 - 5. Motor Pulleys: Adjustable pitch for use with motors through 5 hp. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions. Provide fixed pitch for use with motors larger than 5 hp.
 - 6. Fan and motor isolated from exhaust airstream.
- E. Accessories:
 - 7. Variable-Frequency Motor Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
 - 8. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted inside fan housing, factory wired through an internal aluminum conduit.
 - 9. Bird Screens: Removable, 1/2-inch mesh, aluminum or brass wire.
 - 10. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.

- F. Prefabricated Roof Curbs: Galvanized steel; mitered and welded corners; 1-1/2-inch-thick, rigid, fiberglass insulation adhered to inside walls; and 1-1/2-inch wood nailer. Size as required to suit roof opening and fan base.
 - 1. Configuration: Built-in cant and mounting flange.
 - 2. Overall Height: 12 inches.
 - 3. Hinged sub-base to provide access to damper or as cleanout for grease applications.

2.4 MOTORS

- A. Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
 - 1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Install power ventilators level and plumb.
- B. Equipment Mounting:
 - 1. Secure roof-mounted fans to roof curbs with zinc-plated hardware. See Section 077200 "Roof Accessories" for installation of roof curbs.
- C. Install units with clearances for service and maintenance.
- D. Label units according to requirements specified in Section 230553 "Identification for HVAC Piping and Equipment."

3.2 DUCTWORK CONNECTIONS

- A. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Section 233300 "Air Duct Accessories."

3.3 ELECTRICAL CONNECTIONS

- A. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
- B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- C. Install electrical devices furnished by manufacturer, but not factory mounted, according to NFPA 70 and NECA 1.

1. Nameplate shall be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."
2. Nameplate shall be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch high.

3.4 CONTROL CONNECTIONS

- A. Install control and electrical power wiring to field-mounted control devices.
- B. Connect control wiring according to Section 260523 "Control-Voltage Electrical Power Cables."

3.5 STARTUP SERVICE:

- A. Perform startup service.
 1. Complete installation and startup checks in accordance with manufacturer's written instructions.
 2. Verify that shipping, blocking, and bracing are removed.
 3. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
 4. Verify that cleaning and adjusting are complete.
 5. For direct-drive fans, verify proper motor rotation direction and verify fan wheel free rotation and smooth bearing operation.
 6. For belt-drive fans, disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
 7. Adjust belt tension.
 8. Adjust damper linkages for proper damper operation.
 9. Verify lubrication for bearings and other moving parts.
 10. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
 11. Disable automatic temperature-control operators, energize motor and confirm proper motor rotation and unit operation, adjust fan to indicated rpm, and measure and record motor voltage and amperage.
 12. Shut unit down and reconnect automatic temperature-control operators.
 13. Remove and replace malfunctioning units and retest as specified above.

3.6 ADJUSTING

- A. Adjust damper linkages for proper damper operation.
- B. Adjust belt tension.
- C. Lubricate bearings.
- D. Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

3.7 CLEANING

- A. After completing system installation and testing, adjusting, and balancing and after completing startup service, clean fans internally to remove foreign material and construction dirt and dust.

3.8 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
 - 1. Fan Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 2. Test and adjust controls and safeties.
 - 3. Fans and components will be considered defective if they do not pass tests and inspections.
 - 4. Prepare test and inspection reports.

3.9 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain centrifugal fans.

END OF SECTION 233423