

SECTION 233423 - POWER AND GRAVITY VENTILATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Related Sections include the following:
 - 1. Division 23 Section "Common Work Results for Mechanical"

1.2 SUMMARY

- A. This Section includes fans and ventilators.

1.3 PERFORMANCE REQUIREMENTS

- A. Project Altitude: Base air ratings on actual site elevations.
- B. Operating Limits: Classify according to AMCA 99.

1.4 ACTION SUBMITTALS

- A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated and include the following:
 - 1. Certified fan performance curves with system operating conditions indicated.
 - 2. Certified fan sound-power ratings.
 - 3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
 - 4. Material gages and finishes, including color charts.
 - 5. Dampers, including housings, linkages, and operators.
 - 6. Wiring Diagrams: Power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.
 - 7. Vibration Isolation

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For power ventilators to include in 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 sets for each belt-driven unit.

1.7 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. AMCA Compliance: Products shall comply with performance requirements and shall be licensed to use the AMCA-Certified Ratings Seal for sound and air performance.
 1. Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.
 2. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210, "Laboratory Methods of Testing Fans for Rating."
- C. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.
- D. Power ventilators for use for restaurant kitchen exhaust shall also comply with UL 762.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver fans as factory-assembled unit, to the extent allowable by shipping limitations, with protective crating and covering.
- B. Disassemble and reassemble units, as required for moving to final location, according to manufacturer's written instructions.
- C. Lift and support units with manufacturer's designated lifting or supporting points.

1.9 COORDINATION

- A. Refer to Division 23 Section "Common Work Results for Mechanical"
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations.
- C. Coordinate size and location of structural-steel support members.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Cook
 2. JennFan
 3. New York Blower Company
 4. Penn Ventilation Companies, Inc.

5. Acme Engineering & Mfg. Corp.
6. Greenheck Fan Corp.
7. Hartzell Fan, Inc.

2.2 NFPA 96 GREASE HOOD EXHAUST ROOF VENTILATORS

A. General Description:

1. Discharge air up and away from the mounting surface.
2. Upblast fan shall be for roof mounted applications.
3. Maximum continuous operating temperature is 400 Fahrenheit (204.4 Celsius).
4. Each fan shall bear a permanently affixed manufacture's engraved metal nameplate containing the model number and individual serial number.

B. Wheel:

1. Material type: aluminum
2. Non-overloading, backward inclined centrifugal
3. Statically and dynamically balanced in accordance to AMCA Standard 204-05
4. The wheel cone and fan inlet will be matched and shall have precise running tolerances for maximum performance and operating efficiency

C. Motors:

1. Motor enclosures: Open drip-proof
2. Motors are heavy duty ball bearing type to match with the fan load and furnished at the specific voltage and phase.
3. Mounted on vibration isolators, out of the airstream
4. For motor cooling there shall be fresh air drawn into the motor compartment through an area free of discharge contaminants.
5. Accessible for maintenance

D. Shafts and Bearings:

1. Fan shaft shall be ground and polished solid steel with an anti corrosive coating
2. Permanently sealed bearings or pillow block ball bearings
3. Bearing shall be selected for a minimum L10 life in excess of 100,000 hours (equivalent to L50 average life of 500,000 hours), at maximum cataloged operating speed
4. Bearings are 100 percent factory tested
5. Fan Shaft first critical speed is at least 25 percent over maximum operating speed

E. Housing:

1. Constructed of heavy gauge aluminum includes exterior housing, curb cap, wind band, and motor compartment housing. Galvanized material is not acceptable.
2. Housing shall have a rigid internal support structure.
3. Wind band to be one piece uniquely spun aluminum construction and maintain original material thickness throughout the housing.
4. Wind band to include an integral rolled bead for strength.
5. Curb cap base to be fully welded to wind band to ensure a leak proof construction. Tack welding, bolting, and caulking are not acceptable.
6. Curb cap to have integral deep spun inlet venturi and pre-punched mounting holes to ensure correct attachment to curb.

7. Drive frame assemblies shall be constructed of heavy gauge steel and mounted on vibration isolators.
 8. Breather tube shall be 10 square inches in size for fresh air motor cooling, and designed to allow wiring to be run through it.
- F. Vibration Isolation:
1. Double studded or pedestal style true isolators
 2. No metal to metal contact
 3. Sized to match the weight of each fan
- G. Disconnect Switches:
1. NEMA rated: 3R
 2. Positive electrical shut-off
 3. Wired from fan motor to junction box installed within motor compartment
- H. Drive Assembly
1. Belts, pulleys, and keys oversized for a minimum of 150 percent of driven horsepower
 2. Belts: Static free and oil resistant
 3. Fully machined cast iron type, keyed and securely attached to the wheel and motor shafts
 4. The motor pulley shall be adjustable for final system balancing
 5. Readily accessible for maintenance
- I. Drain Trough: Allows for one-point drainage of water, grease, and other residues
- J. Provide Options/Accessories:
1. Auto Belt Tensioner: Automatic tensioning device that adjusts for the correct belt tension, only for single drives.
 2. Birdscreen: Material Type: Aluminum; Protects fan discharge
 3. Clean Out Port: Removable grease repellent compression rubber plug allows access for cleaning wheel through wind band.
 4. Drain Connection: Constructed of aluminum ; Allows single-point drainage of grease, water, or other residues
 5. Grease Trap:
 - a. Constructed of aluminum
 - b. Includes drain connection
 - c. Collects grease residue
 - d. Optional with grease absorbent sock
 6. NFPA 96 Hinge Base:
 - a. Aluminum hinges
 - b. Hinges and restraint cables are mounted to a base (sleeve)
 - c. Allows the fan to tilt away for access to wheel and ductwork for inspection and cleaning.
 7. Heat Baffle: 1 inch thick insulation shield that prevents heat from radiating into the motor compartment.
 8. Roof Curbs:
 - a. Types: suitable for existing roof conditions.
 - b. Mounted onto roof with fan

- c. Material: Aluminum
- d. Insulation thickness: 1.5 inches
- e. Coating Type: None
- f. Curb Extension: Curb height of 20” with a vented extension. The vented extension, constructed of galvanized steel, is used to increase the discharge height of the fan, as required to meet the NFPA 96 of 40” minimum discharge height. Vents in the extension allow the interior ductwork to dissipate heat.
- g. Curb Seal: Rubber seal between the fan and the roof curb

2.3 HEAT/MOISTURE HOOD EXHAUST ROOF VENTILATORS

A. Same as grease hood fan described above, except provide Options/Accessories:

1. Birdscreen: Construction of galvanized steel, Protects fan discharge
2. Roof Curbs
 - a. Types: suitable for existing roof conditions; 20” height.
 - b. Mounted onto roof with fan
 - c. Material: Aluminum
 - d. Insulation thickness: 1.5 inches
 - e. Coating Type: None
 - f. Curb Seal: Rubber seal between the fan and the roof curb
 - g. Hinge Base: Aluminum hinges; Hinges and restraint cables are mounted to a base (sleeve); Allows the fan to tilt away for access to wheel and ductwork for inspection and cleaning
3. Dampers:
 - a. Type: Gravity
 - b. Prevents outside air from entering back into the building when fan is off
 - c. Balanced for minimal resistance to flow
 - d. Galvanized frames with pre-punched mounting holes
4. Drain Connection: Constructed of aluminum; allows single-point drainage of grease, water, or ; other residues
5. Pressure Probe: ¼ inch diameter in the fan venturi that allows hook-up to manometer

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install power ventilators level and plumb.
- B. Secure roof-mounting fans to roof curbs with cadmium-plated hardware.
- C. Install units with clearances for service and maintenance.
- D. Label units according to requirements specified in the Division 23 HVAC Identification Section.

3.2 CONNECTIONS

- A. Duct installation and connection requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of ducts and duct accessories.
- B. Install ducts adjacent to power ventilators to allow service and maintenance.

3.3 FIELD QUALITY CONTROL

- A. Equipment Startup Checks and Adjustments:
 - 1. Verify that shipping, blocking, and bracing are removed.
 - 2. Verify that unit is secure on mountings and supporting devices. Verify that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
 - 3. Verify that cleaning and adjusting are complete.
 - 4. Inspect and tighten fasteners and setscrews, particularly fan mounting and bearing fasteners.
 - 5. 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.
 - 6. Verify lubrication for bearings and other moving parts.
 - 7. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
 - 8. Adjust damper linkages for proper damper operation.
 - 9. Adjust belt tension.
 - 10. Lubricate bearings.
 - 11. Disable automatic temperature-control operators.
- B. Starting Procedures:
 - 1. Energize motor and adjust fan to indicated rpm.
 - 2. Measure and record motor voltage and amperage.
- C. Inspection of the fan shall be conducted at the first 30 minute, 8 hour and 24 hour intervals of satisfactory operation. During the inspections, stop the fan and inspect as instructed.
 - 1. 30 Minute Interval: Inspect bolts, setscrews, and motor mounting bolts. Adjust and tighten as necessary.
 - 2. 8 Hour Interval: Inspect belt alignment and tension. Adjust and tighten as necessary.
 - 3. 24 Hour Interval: Inspect belt tension. Adjust and tighten as necessary.
- D. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new units, and retest.
- E. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- F. Shut unit down and reconnect automatic temperature-control operators.
- G. Refer to Division 23 Section "Testing, Adjusting, and balancing" for testing, adjusting, and balancing procedures.
- H. Replace fan and motor pulleys as required to achieve design airflow.
- I. Repair or replace malfunctioning units. Retest as specified above after repairs or replacements are made.

3.4 CLEANING

- A. On completion of installation, internally clean fans according to manufacturer's written instructions. Remove foreign material and construction debris. Vacuum fan wheel and cabinet.
- B. After completing system installation, including outlet fitting and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finishes.

END OF SECTION 233423