

SECTION 23 34 00 – HVAC FANS

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.

1.2 SUMMARY

- A. This Section includes various types of fans, exhaust and supply, as well as fan accessories. Refer to the drawings plans and schedules and provide all required options and accessories.

1.3 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.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 1. Wiring Diagrams: Power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.
- C. Maintenance Data: For power ventilators to include in maintenance manuals specified in Division 1.
- D. Submittals for exhaust fans will require a coordination review by the HVAC Controls manufacturer/installer prior to submission to the Engineer. Refer to Section 23 09 00.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain all similar types of fans from one source and from a single manufacturer, regularly engaged in production of exhaust fans.
- B. 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.
- C. 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."

- D. 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.
- E. AMCA Compliance: Products shall comply with performance requirements and shall be licensed to use the AMCA-Certified Ratings Seal.
- F. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.
- G. UL Standard: Power ventilators shall comply with UL 705.

1.5 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.

1.6 COORDINATION

- A. Coordinate size and location of structural-steel support members.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations.

1.7 WARRANTY

- A. All equipment, material and labor provided under this specification section shall be warranted for a period of one year from the date of substantial completion.

1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. One set of belts for each belt-driven unit.

PART 2 - PRODUCTS

2.1 CENTRIFUGAL DOWNBLAST ROOF VENTILATORS

- A. Manufacturers: Subject to compliance with requirements, provide roof ventilators manufactured by Loren Cook models ACE-B and / or ACE-D. Subject to review, equipment meeting the full requirements of the specifications, manufactured by the following will be considered:
 - 1. Carnes Corp.
 - 2. Greenheck.
 - 3. Penn Barry.

4. Solar & Palau, USA.
 5. CaptiveAire
- B. Description: Belt-driven or direct-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, curb base and accessories.
- C. Housing: Removable, spun-aluminum, dome top and outlet baffle with square aluminum base and venturi cone inlet for exhaust applications; and die formed louvered aluminum inlet panels in rectangular configuration with square base and rectangular outlet for makeup applications.
- D. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.
- E. Belt-Driven Drive Assembly: Resiliently mounted to housing, with the following features:
1. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
 2. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
 3. Pulleys: Cast-iron, adjustable-pitch motor pulley.
 4. Fan and motor isolated from airstream on exhaust fans.
- F. Accessories:
1. Variable-Speed Controller: Solid-state control to reduce speed from 100 percent to less than 50 percent on direct drive units.
 2. Disconnect Switch: Non-fusible type, with thermal-overload protection mounted inside fan housing, factory wired through an internal aluminum conduit.
 3. Bird Screens: Removable, 1/2-inch mesh, aluminum or brass wire.
 4. Dampers: parallel-blade, backdraft dampers mounted in curb base on exhaust fans; factory set to close when fan stops.

2.2 CEILING MOUNTED FANS

- A. Manufacturers: Subject to compliance with requirements, provide ceiling mounted fans manufactured by Loren Cook, model GC. Subject to review, equipment meeting the full requirements of the specifications manufactured by the following will be considered:
1. Carnes Corp.
 2. Greenheck.
 3. Penn Barry.
 4. Solar & Palau, USA.
 5. CaptiveAire
- B. Description: Fan shall be ceiling, wall, or inline mounted, direct driven, centrifugal exhaust fan.
- C. Construction: The fan housing shall be minimum 20-gauge galvanized steel and acoustically insulated. Blower and motor assembly shall be mounted to a minimum 14 gauge reinforcing channel and shall be easily removable from the housing. Motor shall be mounted vibration isolators. Unit shall be supplied with integral wiring box and disconnect receptacle shall be standard. Discharge position shall be convertible from right angle to straight through by moving interchangeable panels. The outlet duct collar shall include a reinforced aluminum damper with continuous aluminum hinge rod and brass bushings. To accommodate different ceiling thickness, an adjustable pre-punched mounting bracket shall be provided. A powder painted white steel grille shall be provided as standard.
- D. Fan Wheel: Wheel shall be centrifugal forward curved type, constructed of galvanized steel. Larger fan wheels shall be Wheels shall be twin DWDI centrifugal forward curved type, constructed of galvanized

steel. Wheel shall be balanced in accordance with AMCA Standard 204-96, Balance Quality and Vibration Levels for Fans.

- E. Motor: Motor shall be open drip proof type with permanently lubricated bearings, built-in thermal overload protection and disconnect plug. Motor shall be furnished at the specified voltage.
- F. Accessories: Provide accessories noted on the drawings.

2.3 ROOF CURBS

- A. Provide insulated metal roof curbs, internally reinforced and capable of supporting superimposed live and dead loads, including equipment loads and other construction to be supported on roof curbs. Fabricate with welded or sealed mechanical corner joints, with integral formed mounting flange at perimeter bottom. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.
- B. Refer to drawings for the type of curb required for the specified roofing system and the required curb height. Provide curbs with an integral metal cant, stepped integral metal cant raised the thickness of roof insulation or as required to suit the details.
- C. Provide curbs to match the roof slope. Refer to contract drawings to verify roof slope.
- D. Curb Material: Galvanized sheet, minimum 16 Gauge.

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. Ceiling Units: Suspend units from structure; use steel wire or metal straps.
- D. Install units with clearances for service and maintenance.
- E. Roof curbs: furnish and install a roof curb for all roof mounted fans. Install the roof mounted unit(s) on the roof curb immediately after the curb is installed. If immediate installation is not performed provide temporary watertight covering, for all curb openings, consisting of minimum $\frac{3}{4}$ " exterior grade plywood and watertight rubber or plastic cover.

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.
- C. Ground equipment.

3.3 FIELD QUALITY CONTROL

- A. Equipment Startup Checks: Perform startup per Manufacturer's Instructions on all fans. Verify that unit is secure on mountings and supporting devices and connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
- B. Verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation.
- C. Verify lubrication for bearings and other moving parts.
- D. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
- E. Starting Procedures: Energize motor and adjust fan to indicated rpm and measure and record motor voltage and amperage.
- F. 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.
- G. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- H. Shut unit down and reconnect automatic temperature-control operators.
- I. Replace fan and motor pulleys as required to achieve design airflow.
- J. Repair or replace malfunctioning units. Retest as specified above after repairs or replacements are made.
- K. The installing contractor shall provide a completed written startup report that records results of all tests and inspections and verifies all fans, associated controls and wiring are installed properly. The start-up report shall be forwarded to the owner's representative.

3.4 ADJUSTING

- A. Adjust damper linkages for proper damper operation and adjust belt tension where required.

3.5 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.

3.6 DEMONSTRATION

- A. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment and schedules. Schedule training with Owner, through Architect, with at least seven days' advance notice.

END OF SECTION 23 34 00