

SECTION 15835 - EXHAUST AND VENTILATING FANS**PART 1 - GENERAL****1.1 DESCRIPTION****A. Work Includes:**

1. Furnish all labor, materials, tools, equipment and services for all exhaust and ventilating fans as indicated, in accordance with provisions of the Contract Documents.
2. Completely coordinate with work of all other trades.
3. Although such work is not specifically indicated, furnish and install all supplementary or miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.
4. See Division 1 for General Requirements.
5. Commissioning of a system or systems specified in this section is part of the construction requirements. Specific documentation and testing of these systems as well as training of the Owner's operation and maintenance personnel are required to be conducted in cooperation with the Commissioning Authority. Substantial Completion is also dependent on the successful completion of all commissioning procedures, documentation, and outstanding issues. Refer to Section 01700, Contract Closeout, for substantial completion details. Refer to Section 01810, Commissioning, for further detailed commissioning requirements.

B. Description of System:

1. In-line centrifugal fans (square).
2. Centrifugal in-line and ceiling cabinet fans.
3. Power roof ventilators.
4. Cyclone dust collectors.

C. Related Sections include the following:

1. Division 15 Section "Common Work Results for HVAC."
2. Division 15 Section "Vibration Controls for HVAC Piping and Equipment."
3. Division 15 Section "Air Distribution System".
4. Division 15 Section "Automatic Control and Monitoring System."
5. Division 15 Section "Variable Frequency Drives (VFD)".
6. Division 15 Section "Testing, Adjusting and Balancing."
7. Division 16 Sections for electrical work.

D. Abbreviations:

1. AMCA: Air Moving and Conditioning Association.
2. ADC: Air Diffusion Council.
3. ASHRAE: American Society of Heating, Refrigeration and Air Conditioning Engineers.

1.2 QUALITY ASSURANCE

A. Standards:

1. ADC Standard 1062R4, Air Diffusing Equipment Test Code.
2. AMCA Standard 99 -Handbook, Standard 210 - Test Code for Air Moving Devices and Standard - 300 Test Code for Sound Rating.
3. ASHRAE Standard 70, Method of Testing for Rating the air flow performance of outlets and inlets.
4. NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems.

1.3 SUBMITTALS (See Division 1)

A. Refer to Division 15 Section "Common Work Results for HVAC" for general requirements regarding all Division 15 submittals.

B. Product Data: Provide product data indicating conformance with the requirements of this specification for each product intended for use on this project. Include rated capacities, furnished specialties, and accessories for each type of product 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 gauges and finishes, including color charts.
5. Dampers, including housing, linkages, and operators.

C. Shop Drawings:

1. Wiring Diagrams: Provide detailed wiring diagrams for power and control systems. Differentiate between manufacturer-installed and field-installed wiring.

D. Operating and Maintenance Data: Provide data for each product in accordance with the requirements of Division 1.

E. Warranties: Provide written warranties for each product in accordance with the requirements of Division 1.

1.4 EXTRA MATERIALS

A. Provide one additional set of belts for each belt-driven unit provided.

PART 2 - PRODUCTS

2.1 GENERAL

A. Acceptable Manufacturers:

1. In-Line Centrifugal Fans: Greenheck; Loren Cook; New York Blower; and Penn Ventilators.

2. Centrifugal In-Line and Ceiling Cabinet Fans: Acme; Loren Cook; Greenheck; and Penn Ventilators.
3. Power Roof Ventilators: Acme; Alladin; Exitaire; Greenheck; Jenn-Air; Loren Cook; and Penn Ventilators.
4. Propeller Fans: Acme; Greenheck; Hartzell; Loren Cook; New York Blower; Peerless; and Penn Ventilators.
5. Fume Extraction Fans: Nederman; Plymovent.
6. Cyclone Dust Collectors: Donaldson Torit, AAF International, and Cyclone Dust Collectors by Standard Tools and Equipment.
7. Other manufacturers desiring approval, comply with Division 1.

B. Fans - General:

1. Performance Ratings: Based on laboratory tests conducted in accordance with latest edition of the ASHRAE/AMCA Standard Test Codes.
2. Ratings: As indicated.
3. Arrangement and Drive: As indicated.
4. Provide removable belt guard.
5. Pulleys: Cast iron, split tapered hubs, both statically and dynamically balanced at factory.
6. Fans 5-Hp and Less: Provide with adjustable sheaves.
7. Finish: Factory primed.

C. Bearings: Self-aligning ball, roller or sleeve type, grease lubricated.

D. Motors and Control: As specified in Division 15 Section "Common Work Results for HVAC."

E. Motors Starters: Refer to Mechanical Equipment Connection Schedule in Electrical drawings for starters provided under Division 16. If not provided in Division 16, starter shall be provided under Division 15. Division 15 Section "Common Work Results for HVAC."

F. Housings: Constructed of steel scroll and side sheets conforming to standard gauges of the National Association of Fan Manufacturers.

1. Mount in heavy steel supports on both sides.
2. For outdoor installation provide hinged weather hood that will cover both drive and motor.

G. Drives:

1. Single or multiple belts as required to develop full horsepower of driving motor with service factor of not less than 1.50.
2. Where more than one belt is used for drive, provide "matched" sets.
3. V-Belt Drives: Allis-Chalmers; Fairbanks-Morse; Gates; and Reliance Electric.
4. Motors on Fan Drive: Provide with adjustable rail motor mounts of type using screws for tightening of belts.
5. Bolt motor mounts to fan bases or frames.
6. For fans suspended from ceilings, belt tightening device may be pivoted type.

7. See Division 15 Section "Variable Frequency Drives (VFD)".
8. Thermal overload protection.

H. Belt Guards: As specified in Division 15 Section "Common Work Results for HVAC."

2.2 IN-LINE (SQUARE) CENTRIFUGAL FANS

A. General: Direct or V-belt drive as scheduled on the drawings, bearing the AMCA Certified Ratings Seal for both sound and air performance.

B. Housing:

1. 18-gauge welded steel construction with bolt-on inlet flange.
2. Hinged or removable access door(s) to allow service or removal of the wheel, bearings and shaft without disconnecting the fan from the ductwork.
3. All steel parts are to be painted with manufacturer's standard powder paint coating.
4. Straightening blades at fan discharge.

C. Fan Wheel:

1. All aluminum construction.
2. Backward inclined non-overloading blades.
3. Statically and dynamically balanced.
4. Tapered inlet shroud.

D. A NEMA 1 disconnect switch shall be provided as standard. Factory wiring shall be provided from the motor to the handy box.

2.3 CENTRIFUGAL IN-LINE AND CEILING FANS (SMALL CABINET FAN)

A. Standards and Performance Criteria: Refer to paragraph, Quality Assurance.

B. Steel housing, manufacturer's standard powder paint coating, direct connected fan assembly, attached grille. Provide back draft damper assembly, aluminum wall (if not discharging into louver) cap and insect screen.

C. Acoustical Lining: 1/2-inch thick mineral fiber, dark finish.

D. Motor: Direct drive, shaded pole or permanent split capacitor, sleeve bearings, supported by steel brackets in combination with rubber isolators.

E. Inlet and discharge duct collar.

F. Ceiling Grille: White plastic egg crate design, 80-percent free area.

G. Solid state speed control for balancing.

H. A NEMA 1 disconnect switch shall be provided as standard. Factory wiring shall be provided from the motor to the handy box.

2.4 POWER ROOF VENTILATORS

- A. General: V-belt drive or direct drive, with suitable low speed motor as scheduled.
- B. Housing: Steel with fan drive, motor and accessories in separate compartment out of air stream, all arranged for lowest overall height.
- C. Explosion Proof Units (where scheduled): With spark-proof, nonferrous wheels, spark-proof belt, with motor in separate compartment, arranged for explosive vapor exhaust.
- D. Factory install and wire UL approved disconnect device in motor compartment.
- E. Isolate each fan motor and drive from enclosure by rubber-in-shear or spring type isolators standard with manufacturer. For direct connected fans, resiliently mounted motors may be used.
- F. Provide sound attenuating, insulated roof curbs as specified in this Section.
- G. Provide 1/2-inch mesh galvanized steel or aluminum birdscreen on outlet.
- H. Belt-Drive Units: With variable pitch motor pulley.
- I. Provide self acting backdraft damper.
- J. For automatic (motorized) dampers, see Division 15 Section "Automatic Control and Monitoring System."

2.5 FUME EXTRACTIONS FANS

- A. Construction: Housing shall be 14-gauge galvanized steel with polyester epoxy lacquer coating. Blower shall be centrifugal-type with backward curved impeller. Impeller shall be dynamically balanced.
- B. Motor shall be direct drive.

2.6 PREFABRICATED ROOF CURBS

- A. Construction: Galvanized steel, with continuous welded corner seams, 2-inch wall thickness, treated wood nailer, 1-1/2-inch thick, 3-pound density rigid mineral fiberboard insulation with metal liner, built-in cant strip, (except for gypsum or tectum decks). For surface insulated roof deck, provide raised cant strip to start at the upper surface of the insulation. Curbs shall be built for pitched roof or ridge mounting as required to keep top of curb level.

2.7 CYCLONE DUST COLLECTORS

- A. General: Integrated centrifugal separator consisting of centrifugal separator, material handling fan, hopper with gate, and bag filter on discharge of fan.
- B. Efficiencies: Sawdust 99 percent.

- C. Separator: Round, vertical, tapered-cone bottom discharge, tangential inlet, extended inlet on fan, top mounted fan.
- D. Hopper:
 - 1. Slope sided with slide gate bottom.
 - 2. Strengthened to support separator, cone, fan and motor.
- E. TEFC motor, voltage as indicated on drawing.
- F. 55 gallon drum collection container.
- G. Manufacturer-provided collector stand to support unit above 55 gallon drum.
- H. For outdoor use.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install as indicated and in accordance with manufacturer's recommendations and instructions.
- B. Align fan and motor sheaves to allow belts to run true and straight.
- C. Bolt equipment to curbs with galvanized lag bolts.
- D. Bolt dust collector to concrete base.

END OF SECTION 15835