

SECTION 15830  
FANS

PART 1 - GENERAL

1.01 PROVISIONS INCLUDED

- A. The general provisions of the Contract, including General and Supplementary General Conditions, and Division 1 General Requirements, apply to work specified in this Section.
- B. Requirements of Section 15050, "Basic Mechanical Materials and Methods" apply to work specified in this Section.

1.02 SUMMARY

- A. This Section includes the following types of power ventilators:
  - 1. Utility sets.
  - 2. Centrifugal roof ventilators.
  - 3. In line fans.
  - 4. Propeller fans.
- B. Related Work Specified in Other Sections:
  - 1. Division 15 Section "Vibration Control & Seismic Restraints" for vibration hangers and supports.
  - 2. Division 15 Section "Control Systems", for control devices.
  - 3. Division 16 for motor starters.
- C. Products furnished but not installed under this Section include roof curbs for roof-mounted exhaust fans.

1.03 SUBMITTALS

- A. Product data for selected models, including specialties, accessories, and 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 fan accessories.
  - 4. Material gages and finishes, including color charts.
  - 5. Dampers, including housings, linkages, and operators.
- B. Shop drawings from manufacturer detailing equipment assemblies and indicating dimensions, weights, required clearances, components, and location and size of field connections.
- C. Wiring diagrams that detail power, signal, and control wiring. Differentiate between manufacturer-installed wiring and field-installed wiring.
- D. Maintenance data for fans, for inclusion in Operating and Maintenance Manual specified in Division 1 and Division 15 Section "Basic Mechanical Requirements."

#### 1.04 QUALITY ASSURANCE

- A. UL Compliance: Fans shall be designed, manufactured, and tested in accordance with UL 705 "Power Ventilators."
- B. UL Compliance: Fans and components shall be UL listed and labeled.
- C. Listing and Labeling: Provide electrically operated fixtures specified in this Section that are listed and labeled.
  - 1. The Terms "listed" and "Labeled": As defined in the National Electrical Code, Article 100.
- D. AMCA Compliance: Provide products that meet performance requirements and are licensed to use the AMC Seal.
- E. NEMA Compliance: Provide motors and electrical accessories that comply with NEMA standards.
- F. Electrical Component Standard: Components and installation shall comply with NFPA 70 "National Electrical Code."

#### 1.05 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions by field measurements. Verify clearances.
- B. Do not operate fans until ductwork is clean, filters are in place, bearings are lubricated, and fans have been commissioned.

#### 1.06 COORDINATION AND SCHEDULING

- A. Lift and support units with the manufacturer's designated lifting or supporting points.
- B. Deliver fan units as a factory-assembled unit to the extent allowable by shipping limitations, with protective crating and covering.

#### 1.07 SEQUENCING AND SCHEDULING

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

#### 1.08 EXTRA MATERIALS

- A. Furnish one additional complete set of belts.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide fans by one of the following:
1. Acme Co.
  2. Greenheck Fan Corp.
  3. Twin City Fans Co.

### 2.02 SOURCE QUALITY CONTROL

- A. Testing Requirements: The following factory tests are required:
1. Sound Power Level Ratings: Comply with AMCA Standard 301 "Method for Calculating Fan Sound Ratings From Laboratory Test Data". Test fans in accordance with AMCA Standard 300 "Test Code for Sound Rating". Fans shall be licensed to bear the AMCA Certified Sound Ratings Seal.
  2. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings in accordance with AMCA Standard 210/ASHRAE Standard 51 - Laboratory Methods of Testing Fans for Rating.

### 2.03 CENTRIFUGAL ROOF VENTILATORS

- A. General Description: Belt-driven or direct-drive as indicated, consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, curb base, and accessories.
- B. Housing: Heavy-gage, removable, spun-aluminum, dome top and outlet baffle; square, one-piece, hinged aluminum base with venturi inlet cone.
- C. Fan Wheel: Aluminum hub and wheel with backward-inclined blades.
- D. Belt-Driven Drive Assembly: Resiliently mounted to the housing, with the following features:
1. Pulleys: Cast-iron, adjustable-pitch.
  2. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
  3. Fan Shaft: Turned, ground, and polished steel drive shaft keyed to wheel hub.
  4. Fan and motor isolated from exhaust air stream.
- E. Provide the following accessories:
1. Disconnect Switch: Nonfusible type, with thermal overload protection mounted inside fan housing, factory-wired through an internal aluminum conduit.
  2. Bird Screens: Removable 1/2-inch mesh, 16-gage, aluminum or brass wire.
  3. Dampers: Back draft type, parallel-blade, volume control dampers mounted in curb base.
    - a. Blades: Die-formed sheet aluminum.
    - b. Frame: Extruded aluminum, with waterproof, felt blade seals.
  4. Roof Curbs: Prefabricated, heavy-gage, aluminum; mitered and welded corners; 2-inch-thick, rigid, fiberglass insulation adhered to inside walls; built-in cant and

mounting flange for flat or sloped roof as required; and 2-inch wood nailer. Size as required to suit roof opening and fan base.

- a. Overall Height: 12 inches.
  - b. Provide neoprene strip between fan and curb for vibration isolation.
5. Unit mounted variable speed controller on all direct drive fans.
  6. Decorative coating. Entire exterior exposed surfaces to be **factory** applied baked on enamel finish. Field applied coatings are not acceptable. Provide finished color as selected by architect.

#### 2.04 PROPELLER FANS

- A. General Description: Belt-driven or direct-drive propeller fans as indicated consisting of fan blades, hub, housing, orifice ring, motor, drive, and accessories.
- B. Housings: Galvanized, sheet steel with flanged edges, and integral orifice ring.
- C. Wheels: Formed-steel blades riveted to a heavy-gage steel spider bolted to cast-iron hub.
- D. Fan Wheel: Replaceable, cast-aluminum blades fastened to cast- aluminum hub. Factory set pitch angle of blades.
- E. Belt-Driven Drive Assembly: Resiliently mounted to the housing, with the following features:
  1. Pulleys: Cast-iron, adjustable-pitch.
  2. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
  3. Fan Shaft: Turned, ground, and polished steel drive shaft keyed to wheel hub.
  4. Motor and Drive Assembly: Resiliently mounted to the housing.
- F. Accessories: The following accessories are required as indicated:
  1. Belt Guards: Expanded metal with reinforced edges.
  2. Motor Operated Dampers: Motor operated damper with aluminum blades in steel frames, mounted on discharge side of fan.

#### 2.05 MOTORS

- A. Torque Characteristics: Sufficient to accelerate the driven loads satisfactorily.
- B. Motor Sizes: Minimum sizes and characteristics as indicated. If not indicated, large enough so that the driven load will not require the motor to operate in the service factor range.
- C. Temperature Rating: 50°C maximum temperature rise at 40°C ambient for continuous duty at full load (Class A Insulation).
- D. Service Factor: 1.15 for polyphase motors and 1.35 for single-phase motors. Provide permanent-split capacitor classification motors for shaft-mounted fans and capacitor start classification for belted fans.
- E. Motor Construction: NEMA Standard MG 1, general purpose, continuous duty, Design B.
  1. Bases: Adjustable.
  2. Bearings: The following features are required:

- a. Ball or roller bearings with inner and outer shaft seals.
  - b. Grease lubricated.
  - c. Designed to resist thrust loading where belt drives or other drives produce lateral or axial thrust in motor.
- 3. Enclosure Type: Open drip-proof motors where satisfactorily housed or remotely located during operation.
  - 4. Overload protection: Built-in, automatic reset, thermal overload protection.
  - 5. Noise rating: Quiet.
  - 6. Efficiency: Premium efficiency.
  - 7. Nameplate: Indicate the full identification of manufacturer, ratings, characteristics, construction, and special features.
- F. Starters, Electrical Devices, and Wiring: Electrical devices and connections are specified in Division 16.

## 2.06 FACTORY FINISHES

- A. Sheet Metal Parts: Prime coat before final assembly.
- B. Exterior Surfaces: Baked-enamel finish coat after assembly.
- C. Aluminum Parts: No finish required.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances, roof curbs, equipment supports, and other conditions affecting performance of fans.
- B. Do not proceed until unsatisfactory conditions have been corrected.

### 3.02 INSTALLATION, GENERAL

- A. Install fans level and plumb, in accordance with manufacturer's written instructions. Support units as described below, using the vibration control devices indicated. Vibration control devices are specified in Division 15 Section "Vibration Control and Seismic Restraints."
  - 1. Secure roof-mounted fans to roof curbs with cadmium-plated hardware.
- B. Arrange installation of units to provide access space around fans for service and maintenance.

### 3.03 CONNECTIONS

- A. Duct installations and connections are specified in other Division 15 sections. Make final duct connections with flexible connections.
- B. Electrical Connections: The following requirements apply:
  - 1. Electrical power wiring is specified in Division 16.

2. Temperature control wiring and interlock wiring are specified in Division 15 Section "Control Systems".
3. Grounding: Connect unit components to ground in accordance with the National Electrical Code.

### 3.04 ADJUSTING, CLEANING, AND PROTECTING

- A. Adjust damper linkages for proper damper operation.
- B. Adjust belt tension.
- C. Lubricate bearings.
- D. After completing installation, inspect exposed finish. Remove burs, dirt, and construction debris, and repair damaged finishes including chips, scratches, and abrasions.
- E. Clean unit interiors to remove foreign material and construction dirt and dust. Vacuum clean fan wheel and housing.

### 3.05 START-UP, ADJUSTMENT, & TESTING

- A. Final Checks Before Start-Up: Perform the following operations and checks before start-up:
  1. Remove shipping blocking and bracing.
  2. Verify unit is secure on mountings and supporting devices and that connections for ductwork, and electrical are complete. Verify proper thermal overload protection is installed in motors, starters, and disconnects.
  3. Perform cleaning and adjusting specified in this Section.
  4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operations. Reconnect fan drive system, align belts, and install belt guards.
  5. Lubricate bearings, pulleys, belts, and other moving parts with factory-recommended lubricants.
  6. Verify that manual and automatic volume control and fire dampers in connected ductwork systems are in the full open position.
  7. Disable automatic temperature control operators.
- B. Starting procedures for fans:
  1. Energize motor; verify proper operation of motor, drive system, and fan wheel. Adjust fan to indicated RPM.
    - a. Replace fan and motor pulleys as required to achieve design conditions.
  2. Measure and record motor electrical values for voltage and amperage.
- C. Shut unit down and reconnect automatic temperature control operators.

D. Refer to Division 15 Section "Testing, Adjusting, and Balancing" for procedures for fan-system testing, adjusting, and balancing.

E. Comply with USM IDAT per section 01810.

3.06 DEMONSTRATION

A. Demonstration Services: Arrange and pay for a factory-authorized service representative to train Owner's maintenance personnel on the following:

1. Procedures and schedules related to start-up and shutdown, troubleshooting, servicing, preventative maintenance, and how to obtain replacement parts.
2. Familiarization with contents of Operating and Maintenance Manuals specified in Division 1 Section "Project Closeout" and Division 15 Section "Basic Mechanical Materials and Methods."

B. Schedule training with at least 7 days advance notice.

END OF SECTION 15830