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DIVISION 15 - MECHANICAL

SECTION 15838

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SECTION 15838

POWER VENTILATORS
06/04

NOTE: Delete, revise, or add to the text in this section to cover project requirements. Notes are for designer information and will not appear in the final project specification.

This section covers power roof ventilators designed to exhaust air from a building by means of a motor-driven fan.

Drawings should indicate and schedule the following:

Unit number

Location

Cubic feet meter per minute air

Static pressure inches kilopascal of water

Fan revolutions per minute

Type of fan

Type of wheel

Housing style

Maximum tip speed

Noise level in sonas

Fan motor power

Drive type

Controls

Type of damper(s)

Type of screens

PART 1 GENERAL

1.1 REFERENCES

NOTE: The following references should not be manually edited except to add new references. References not used in the text will automatically be deleted from this section of the project specification.

The publications listed below form a part of this section to the extent referenced:

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7 (2002) Minimum Design Loads for Buildings and Other Structures

ASTM INTERNATIONAL (ASTM)

ASTM A 653/A 653M (2003) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

ASTM B 209/B 209M (2004) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

ASTM B 37 (2003) Standard Specification for Aluminum for Use in Iron and Steel Manufacturer

UNDERWRITERS LABORATORIES (UL)

UL 705 (2004) UL Standard for Safety Power Ventilators

1.2 SUBMITTALS

NOTE: Review submittal description (SD) definitions in Section 01330, "Submittal Procedures," and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control. Include a columnar list of appropriate products and tests beneath each submittal description.

The following shall be submitted in accordance with Section 01330, "Submittal Procedures," in sufficient detail to show full compliance with the specification:

SD-02 Shop Drawings

Installation Drawings shall be submitted for power roof ventilator in accordance with the paragraph entitled, "Installation," of this

section.

As-Built Drawings shall be submitted for power roof ventilators in accordance with paragraph entitled, "General Requirements," of this section.

SD-03 Product Data

Equipment and Performance Data shall be submitted in accordance with paragraph entitled, "General Requirements," of this section.

Manufacturer's catalog data shall be submitted for the following items:

- Housing
- Fan
- Motor
- Bases
- Roof Curbs
- Dampers
- Screens
- Sound Baffles

SD-06 Test Reports

Test reports shall be submitted for system operational tests in accordance with the paragraph entitled, "Tests," of this section.

1.3 GENERAL REQUIREMENTS

NOTE: If Section 15003, "General Mechanical Provisions," is not included in the project specification, applicable requirements therefrom should be inserted and the first paragraph deleted. If Section 16225, "Motors" is not included in the project specification, applicable requirements therefrom should be inserted and the second paragraph deleted.

Section 15003, "General Mechanical Provisions," applies to work specified in this section.

[Section 16225, "Motors" applies to this section.]
Equipment and Performance Data shall be submitted for power roof ventilator.

As-Built Drawings shall be submitted for power roof ventilator providing current factual information such as deviations from, and amendments to, the drawings and concealed and visible changes in the work.

1.4 QUALITY ASSURANCE

Ventilators shall be rated and labeled in accordance with the applicable standards of the Air Movement Control Association, and shall be licensed to bear the AMCA seal for both air and sound.

PART 2 PRODUCTS

2.1 DESIGN AND FABRICATION REQUIREMENTS

Roof ventilators shall comply with UL 705 and be furnished complete with bases, curbs, flashing flanges, noise baffles, dampers, damper controls, louvers, and screens.

Ventilators shall be designed for windloads in accordance with ASCE 7 and in no case shall the installed design be for less than 80 [_____] miles per hour 130 [_____]kilometer per hour windload. Structural bracing shall be properly spaced to accommodate this loading and in accordance with the design requirements of the covering material. Ventilators shall be adequately reinforced and well braced with joints properly formed. Edges shall be wired or beaded where necessary to ensure rigidity. Galvanic action between different metals in direct contact shall be prevented by nonconductive separators. All soldering shall be even and smooth.

**NOTE: Retain the following paragraph only when
protected metal is required.**

Bolts, rivets, and other fastenings used in connection with protected metal shall be corrosion-resistant steel.

2.2 HOUSING STYLE(S)

Power roof ventilator shall be [round mushroom style] [louvered penthouse style] [low contour style] [vertical discharge style] as indicated.

2.3 FAN TYPE(S)

**NOTE: When possible the use of sealed bearings is
encouraged. One of the major causes of bearing
failures is overlubrication and lubrication
contamination. Using sealed bearings helps to
eliminate this failure mode.**

Fan shall be of the following type(s):

2.3.1 Type C-PRV Centrifugal, Direct Drive

Type C-PRV ventilator shall be a centrifugal roof ventilator with direct drive, nonoverloading, backward-inclined wheel. Drive shall be vibration isolated with elastomer. Drive components shall be mounted in a compartment isolated from airstream.

2.3.2 Type CB-PRV Centrifugal, V-Belt Drive

Type CB-PRV ventilator shall be a centrifugal roof ventilator with V-belt drive, nonoverloading, backward-inclined wheel. Drive shall be vibration isolated with elastomer. Drive components shall be mounted in a compartment isolated from airstream.

2.3.3 Type P-PRV Propeller, Direct Drive

Type P-PRV ventilator shall be a propeller roof ventilator with direct drive and shall be vibration isolated with elastomer. Drive components shall be mounted in a compartment isolated from airstream.

2.3.4 Type PB-PRV Propeller, V-Belt Drive

Type PB-PRV ventilator shall be a propeller roof ventilator with V-belt drive and shall be vibration isolated with elastomer. Drive components shall be mounted in a compartment isolated from airstream.

2.3.5 Type VA-PRV Vane Axial, Direct Drive

Type VA-PRV ventilator shall be a vane axial roof ventilator with direct drive and shall be vibration isolated with elastomer.

2.3.6 Type VAB-PRV Vane Axial, V-Belt Drive

Type VAB-PRV ventilator shall be a vane axial roof ventilator with V-belt drive and shall be vibration isolated with elastomer.

2.3.7 Type TA-PRV Tube Axial, Direct Drive

Type TA-PRV ventilator shall be a tube axial roof ventilator with direct drive and shall be vibration isolated with elastomer.

2.3.8 Type TAV-PRV Tube Axial, V-Belt Drive

Type TAV-PRV ventilator shall be a tube axial roof ventilator with V-belt drive and shall be vibration isolated with elastomer.

2.4 MATERIALS

Materials shall be manufacturers' standard materials.

**NOTE: When more than one material is required,
indicate location of various materials on the
drawings.**

2.4.1 Aluminum Alloy

Aluminum alloy shall be in accordance with ASTM B 209/B 209M and ASTM B 37.

2.4.2 Zinc-Coated Steel

Zinc-coated steel shall be in accordance with ASTM A 653/A 653M.

2.4.3 Fibrous Glass

Fibrous glass ventilators shall be molded from a glass-fiber reinforced polyester resin with a pigmented polyester resin gel coat in manufacturer's standard color, and shall be not less than 0.51 or more than 1.53 millimeter thick. Matrix material shall have not less than 30 percent, by weight, of chopped-fiber and random-strand glass fibers, and shall be thoroughly saturated and impregnated with not more than 70 percent high-solids polyester resin with not less than 5-percent antimony trioxide

fire-retardant additive. Material shall be smooth, dense, and uniform in texture, color, and cross section and shall be shatter-resistant, rigid, and free from visual defects, foreign inclusions, cracks, crazing, die lines, pinholes, striations, unsaturated and resin-poor areas, and excessive-resin areas.

2.5 FAN MOTOR

NOTE: Modify voltage as required and select motor power based on air flow and static pressure in inches millimeter of water.

NOTE: When possible the use of sealed bearings is encouraged. One of the major causes of bearing failures is overlubrication and lubrication contamination. Using sealed bearings helps to eliminate this failure mode.

Belt drive motors smaller than 1/2 horsepower 375 watt shall be single-phase, 120 volts, 60 hertz with permanently lubricated ball bearings and shall be split-phase type.

Motors 1/2 horsepower 375 watt and larger shall be three-phase [____], 460 [____] volts, 60 hertz.

Motors shall have local disconnects to provide means for fan and motor maintenance. All motors shall be provided with thermal overload protection. Motors located in airstreams shall be totally enclosed type.

Direct drive motors 1/2 horsepower 375 watt and smaller shall be of the energy efficient permanent split capacitor type, single phase, 60 hertz.

2.6 BASES

Bases provided with the ventilators shall be factory formed, of the type indicated, shall be the same material as the hoods, and the thickness necessary to meet the design requirement for connection to the roof. Bases shall be suitable for raised curb mounting where indicated. Curb flanges of the base shall be formed as cap flashing extending at least 2 inches 50 millimeter over roofing base. Where indicated or required, shafts of ventilators shall be extended a sufficient distance through the supporting construction to permit attachment of vent ducts.

2.7 ROOF CURBS

Factory-formed metal ventilator curbs shall be of type and design required for the ventilator and suitable for roof configuration and flashing.

Job-built curbs shall conform to the recommendations of the ventilator manufacturer, shall be sized correctly for the ventilator, and shall be suitable for type of supporting roof construction.

2.8 BACK-DRAFT DAMPERS

Back-draft dampers shall be gravity operated with adjustable counterweight

of the same material as fan housing.

[Back-draft dampers shall be motor operated and of the same material as fan housing.]

[Damper actuating motor shall be interlocked with fan motor.]

2.9 SCREENS

[Bird screens] [Insert screens] shall be provided with frames of the same material as that used in the ventilators and shall be securely attached in a manner that will permit easy removal for access and cleaning.

2.10 SOUND BAFFLES

Sound baffles shall be permanent construction and impervious to moisture. Baffles shall be removable.

PART 3 EXECUTION

3.1 INSTALLATION

Power roof ventilators shall be installed in accordance with manufacturer's installation instructions. Installation of ventilators shall be properly coordinated with other work. Anchors, attachments, and other items to be built shall be coordinated for installation as the work progresses. Ventilators shall be rigidly installed in a weathertight and watertight manner and shall be free from vibration. Refer to Section 15072, "Vibration Isolation for Air Conditioning Equipment," for vibration isolation considerations.

Installation Drawings shall be submitted for power roof ventilator in accordance with referenced standards in this section.

3.2 TESTS

After installation, each power roof ventilator shall be tested to demonstrate proper operation at indicated and specified performance requirements including running, balance, noise, and proper direction of fan rotation.

3.2.1 Vibration Analyzer

Contractor shall use an FFT analyzer to measure vibration levels. It shall have the following characteristics: A dynamic range greater than 70 dB; a minimum of 400 line resolution; a frequency response range of 5 Hz-10 KHz (300-600000 cpm); the capacity to perform ensemble averaging, the capability to use a Hanning window; auto-ranging frequency amplitude; a minimum amplitude accuracy over the selected frequency range of plus or minus 20 percent or plus or minus 1.5 dB.

An accelerometer, either stud-mounted or mounted using a rare earth, low mass magnet and sound disk (or finished surface) shall be used with the FFT analyzer to collect data. The mass of the accelerometer and its mounting shall have minimal influence on the frequency response of the system over the selected measurement range.

3.3 ACCEPTANCE

Prior to final acceptance, precision alignment devices shall be used to demonstrate that fan and motor are aligned as specified.

Prior to final acceptance, vibration analysis shall verify conformance to specifications. Vibration levels shall not be more than .075 in/sec at 1 times run speed and at fan/blade frequency, and .04 in/sec at other multiples of run speed.

3.4 LUBRICATION

Movable parts of dampers and related operating hardware shall be lubricated in accordance with manufacturer's printed instructions and shall operate smoothly and quietly without binding.

3.5 FINAL TEST REPORTS

Final test reports shall be provided to the Contracting Officer. Reports shall have a cover letter/sheet clearly marked with the System name, Date, and the words "Final Test Reports - Forward to the Systems Engineer/Condition Monitoring Office/Predictive Testing Group for inclusion in the Maintenance Database."

-- End of Section --