

## **SPECIAL SPECIFICATIONS**

### **SECTION 15835S**

#### **PROCESS EXHAUST FANS**

#### **PART 1 - GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Centrifugal fans for mechanical systems for MicroFab process general and solvent exhaust and associated items normally found with fan installation; including:
  - 1. Backward inclined centrifugal fans.
  - 2. Motors and drives.
  - 3. Access doors.
  - 4. Scroll drains.

##### **1.02 REFERENCES**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Requirements of the following Project Specification Sections apply to this section:
  - 1. Section 13085-S – Seismic Protection
  - 2. Section 15170-S - Motors.
  - 3. Section 15070S – Vibration Limits and Control.
  - 4. Section 15950-S – Testing Adjusting and Balancing.
  - 5. Section 15994 – Mechanical Systems Demonstration.
  - 6. Section 16269 – Variable Frequency Controllers.
- C. References :
  - 1. ANSI/AFBMA Std. 9-1990, American National Standard, AFBMA Standard Load Ratings and Fatigue Life for Ball Bearings.

2. AFBMA 11 - Load Ratings and Fatigue Life for Roller Bearings.
3. AMCA 99 - Standards Handbook.
4. NEMA Standards Publication No. MG1, Motors and Generators, 1993.
5. NFPA 70 - National Electrical Code.
6. SMACNA - HVAC Duct Construction Standards - Metal and Flexible.
7. AMCA 210 - Laboratory Methods of Testing Fans for Rating Purposes.
8. AMCA 300 - Test Code for Sound Rating Air Moving Devices.
9. AMCA 301 - Method of Calculating Fan Sound Ratings from Laboratory Test Data.

#### 1.03 SUBMITTALS

- A. Submit under provisions of Sections 01300-S.
- B. Shop Drawings: Indicate dimensional assembly of centrifugal fans and accessories including flanged inlet and outlet connections and bolt hole centers compatible with duct connections. Include electrical connection requirements. Include fan weights and center of gravity, and dimensioned fabrication drawings for galvanized steel fan support bases and spring pockets.
- C. Product Data: Provide data on centrifugal fans and accessories including fan curves with specified operating point clearly plotted, sound power levels for both fan inlet and outlet at rated capacity and electrical characteristics and connection requirements.
- D. Manufacturer's Installation Instructions.
- E. Submit Operation and Maintenance Data under provisions of Section 01700.
- F. Maintenance Data: Include instructions for lubrication, motor and drive replacement, spare parts list and wiring diagrams.

#### 1.04 QUALITY ASSURANCE

- A. Performance Ratings: Conform to AMCA 210 and bear the AMCA Certified Rating Seal.

- B. Sound Ratings: AMCA 301, tested to AMCA 300.
- C. Fabrication: Conform to AMCA 99.

## PART 2 - PRODUCTS

### 2.01 MANUFACTURERS

- A. New York Blower
- B. Twin City

### 2.02 GENERAL

- A. Select fans such that they do not increase motor size, increase noise level, or increase tip speed by more than 10 percent, or increase inlet air velocity by more than 20 percent, from specified criteria. Provide fans capable of accommodating static pressure variations of plus or minus 10 percent.
- B. Base performance on elevation 5300 ft. conditions.
- C. Statically and dynamically balance fans to eliminate vibration or noise transmission to occupied areas.
- D. General Exhaust, minimum Class II construction.
- E. Solvent Exhaust, minimum Class III spark resistant construction.

### 2.03 WHEEL AND INLET

- A. Backward Inclined: Steel or aluminum construction with smooth curved inlet flange, heavy backplate, backwardly curved blades welded or riveted to flange and backplate; cast-iron or cast steel hub riveted to backplate and keyed to shaft with set screws and key.
- B. Rotor Balance: Meet or exceed ISO 1940 **GI** specifications.

### 2.04 HOUSING

- A. Heavy gage steel, welded for AMCA 99 designated Class II fans, adequately braced, designed to minimize turbulence with spun inlet bell and shaped cut-off.

### 2.05 MOTORS AND DRIVES

- A. Motors: Inverter duty, Premium efficiency, factory mounted on integral frame.
- B. Bearings: AFBMA 9, L-10 life at 100,000 hours heavy duty pillow block type, self-aligning, grease-lubricated ball bearings, or AFBMA 11 L-50 life at 400,000 hours pillow block type, self-aligning, grease-lubricated roller bearings.
- C. Shafts: Hot rolled steel, ground and polished, with key-way, protectively coated with lubricating oil. Provide 316 stainless steel shafts for corrosive applications.
- D. Direct Drive:
  - 1. Shaft couplers: Provide flange-type couplers with horsepower ratings of 150 percent of the motor horsepower.
  - 2. Adjustable Frequency Drives: As specified in Division 16.

## 2.06 ACCESSORIES

- A. Access Doors: Shaped to conform to scroll with quick opening latches and gaskets.
- B. Vibration Isolation springs sized for fan-motor assembly.
- C. 1" threaded drain with cap.

## PART 3 - EXECUTION

### 3.01 INSTALLATION

- A. Do not operate fans for any purpose until ductwork is clean, bearings lubricated, and fan has been test run under observation.
- B. Install fans as indicated or specified with resilient mountings and flexible electrical leads.
- C. Install flexible connections specified in section on ductwork accessories between fan inlet and discharge ductwork. Install flexible connectors so that they are not in tension while running. Ensure metal bands of connectors are parallel with minimum 1 inch flex between ductwork and fan while running.
- D. Install fan restraining snubbers
- E. The fan, motor and drive assembly shall be mounted on an inertia base with 4-inch minimum deflection spring isolation. The spring shall have 50 percent overload*

*capacity. Isolators shall be individually selected from each load bearing location to maintain equal deflection*

- E.** *Vibration velocity readings taken at bearing locations in axial or radial direction shall not exceed 0.06 inches/sec (peak) under normal operating conditions over frequency range  $f_{min}=(0.4 \times \text{motor synchronous speed})$  to  $f_{max}=120,000 \text{ cpm}$ . It is allowable to test with the springs locked out.*

### 3.02 PAINING

- A. Provide fans with factory finish in accordance with the manufacturer's standard for exterior installation. Touch up scratches and marks from handling and placement of equipment with masking enamel to match manufacturer's color.

END OF SECTION