

## **PART 1 - GENERAL**

### **1.1 RELATED SECTIONS**

- .1 Section 23 05 13 - Common Motor Requirements for HVAC Equipment.
- .2 Section 23 33 00 - Air Duct Accessories.

### **1.2 REFERENCES**

- .1 AMCA 99-10, Standards Handbook.
- .2 ANSI/AMCA 210-07, Laboratory Methods of Testing Fans for Rating.
- .3 AMCA 300-08, Reverberant Room Method for Sound Testing of Fans.
- .4 AMCA 301-06, Methods for Calculating Fan Sound Ratings from Laboratory Test Data.
- .5 ANSI/ASHRAE 51-2007, Laboratory Methods of Testing Fans for Rating.

### **1.3 SHOP DRAWINGS AND PRODUCT DATA**

- .1 Submit shop drawings and product data in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Provide :
  - .1 Fan performance curves showing point of operation, BHP kW and efficiency.
  - .2 Sound rating data at point of operation.
- .3 Indicate:
  - .1 Motors, sheaves, bearings, shaft details
  - .2 Minimum performance achievable with variable speed controllers and variable inlet vanes as appropriate.

### **1.4 CLOSEOUT SUBMITTALS**

- .1 Provide operation and maintenance data for incorporation into manual specified in Section 01 77 00 - Closeout Procedures.

### **1.5 EXTRA MATERIALS**

- .1 Provide maintenance materials in accordance with Section 01 77 00 - Closeout Procedures.
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- .2 Furnish list of individual manufacturer's recommended spare parts for equipment such as bearings and seals, and addresses of suppliers, together with list of specialized tools necessary for adjusting, repairing or replacing, for placement into operating manual.

## **1.6 MANUFACTURED ITEMS**

- .1 Catalogued or published ratings shall be those obtained from tests carried out by manufacturer or those ordered by him from independent testing agency signifying adherence to codes and standards in force.

## **PART 2 - PRODUCTS**

### **2.1 FANS GENERAL**

- .1 Capacity: flow rate, total static pressure, W, efficiency, revolutions per minute, power, size, and sound power data as indicated on schedule.
  - .2 Fans: statically and dynamically balanced, constructed in conformity with AMCA 99.
  - .3 Sound ratings: comply with AMCA 301, tested to AMCA 300. Unit shall bear AMCA certified sound rating seal.
  - .4 Performance ratings: based on tests performed in accordance with ANSI/AMCA 210-07, and ANSI/ASHRAE 51-2007. Unit shall bear AMCA certified rating seal, except for propeller fans smaller than 300 mm diameter.
  - .5 Motors:
    - .1 In accordance with Section 23 05 13 - Common Motors Requirements for HVAC Equipment supplemented as specified herein.
  - .6 Accessories and hardware: adjustable slide rail motor bases, belt guards, coupling guards fan inlet safety screens as indicated and as specified in Section 23 05 13 - Common Motor Requirements for HVAC Equipment. inlet outlet dampers and vanes and as indicated.
  - .7 Factory primed before assembly in colour standard to manufacturer.
  - .8 Scroll casing drains: as indicated.
  - .9 Bearing lubrication systems plus extension lubrication tubes where bearings are not easily accessible.
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- .10 Flexible connections: to Section 23 33 00 - Air Duct Accessories.

## **2.2 IN-LINE CENTRIFUGAL FANS**

- .1 Fan wheels: Characteristics and construction:
  - .1 Welded steel construction.
  - .2 Maximum operating speed of centrifugal fans not more than 40% of first critical speed.
  - .3 Forward curved blades.
- .2 Provide AMCA arrangements 1 or 9 as indicated with stiffened flanges, smooth rounded inlets, and stationary guide vanes.
- .3 Housings:
  - .1 Volute with inlet cones: fabricated steel for wheels 300 mm or greater, and with welded supports.
  - .2 Housing bearing supports shall be constructed of heavy gauge galvanized steel and shall include square duct mounting collars.
  - .3 For horizontally and vertically split housings provide flanges on each section for bolting together, with gaskets of non-oxidizing non-flammable material.
  - .4 Provide bolted airtight access doors with handles.
- .4 Acceptable material: Cook, Greenheck, Woods, Penn.

## **PART 3 - EXECUTION**

### **3.1 FAN INSTALLATION**

- .1 Install fans as indicated, complete with resilient mountings, flexible electrical leads and flexible connections in accordance with Section 23 33 00 - Air Duct Accessories.
- .2 Provide sheaves required for final air balance.
- .3 Bearings and extension tubes to be easily accessible.
- .4 Access doors and access panels to be easily accessible.
- .5 Size anchor bolts to withstand seismic acceleration and velocity forces as specified.