Part 1 General

1.1 RELATED SECTIONS

.1 Section 23 05 13 - Common Motors Requirements for HVAC Equipment.

.2 Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment.

.3 Section 23 33 00 - Air Duct Accessories.

1.2 REFERENCES

.1 Air Conditioning and Mechanical Contractors (AMCA)

.1 AMCA 99-10, Standards Handbook.

.2 American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME)

.1 ANSI/AMCA 210-07, Laboratory Methods of Testing Fans for Aerodynamic Performance Rating.

.2 ANSI/AMCA 300-08, Reverberant Room Method for Sound Testing of Fans.

.3 ANSI/AMCA 301-14, Methods for Calculating Fan Sound Ratings from Laboratory Test Data.

.3 Canadian General Standards Board (CGSB)

.1 CAN/CGSB 1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

.4 Health Canada/Workplace Hazardous Materials Information System (WHMIS)

.1 Material Safety Data Sheets (MSDS).

1.3 SYSTEM DESCRIPTION

.1 Performance Requirements:

.1 Catalogued or published ratings for manufactured items: obtained from tests carried out by manufacturer or those ordered by manufacturer from independent testing agency signifying adherence to codes and standards in force.

.2 Capacity: flow rate, total and static pressure, bhp, W, efficiency, revolutions per minute, power, model, size, sound power data and as indicated on schedule.

.3 Fans: statically and dynamically balanced, constructed in conformity with AMCA 99.

.4 Provide sound ratings: comply with ANSI/AMCA 301, tested to AMCA 300. Supply unit with AMCA certified sound rating seal.

.5 Performance ratings: based on tests performed in accordance with ANSI/AMCA 210. Supply unit with AMCA certified rating seal, except for propeller fans smaller than 300 mm diameter.

1.4 SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet in accordance with Section 01 00 10 – General Instructions, Include product characteristics, performance criteria, and limitations.

.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

.4 Quality assurance submittals: submit following in accordance with Section 01 00 10 – General Instructions.

.1 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.2 Instructions: submit manufacturer's installation instructions.

.1 Engineer will make available 1 copy of systems supplier's installation instructions.

.5 Closeout Submittals:

.1 Provide operation and maintenance data for incorporation into manual specified in Section 01 00 10 – General Instructions.

1.5 QUALITY ASSURANCE

.1 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.6 MAINTENANCE

.1 Extra Materials:

.1 Provide maintenance materials in accordance with Section 01 00 10 – General Instructions.

.1 Spare parts to include:

.1 Matched sets of belts.

.2 Furnish list of individual manufacturer's recommended spare parts for equipment, include:

.1 Bearings and seals.

.2 Addresses of suppliers.

.3 List of specialized tools necessary for adjusting, repairing or replacing.

1.7 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with Section 01 00 10 – General Instructions.

.2 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Waste Management and Disposal:

.1 Construction Waste Management and Disposal: separate waste materials for reuse and recycling in accordance with Section 01 00 10 – General Instructions.

Part 2 Products

2.1 FANS GENERAL

.1 Motors:

.1 In accordance with Section 23 05 13 - Common Motors Requirements for HVAC Equipment supplemented as specified herein.

.2 For use with variable speed controllers.

.3 Sizes as indicated.

.2 Factory primed before assembly in colour standard to manufacturer.

.3 Scroll casing drains: as indicated.

.4 Bearing lubrication systems plus extension lubrication tubes where bearings are not easily accessible.

.5 Where fans are installed in parallel in a common plenum, install backdraft dampers at the outlet of each fan.

.6 Vibration isolation: to Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment.

.7 Flexible connections: to Section 23 33 00 - Air Duct Accessories.

2.2 CENTRIFUGAL FANS

.1 Casing shall be cold rolled steel, fully welded, strengthened to eliminate any vibration, demountable into two or more parts when the fan wheel has more than 1016 mm in diameter, suitable flanges for connecting and fastening of ductwork, air inlets with airfoil cones.

.2 Wheel steel with backward inclined blades, unless otherwise as indicated. Provide a nameplate indicating the diameter and width of the wheel.

.3 V-belts drive.

.4 Motors shall be mounted on rails allowing movement in both directions. Install these rails on a common metal base for the fan and its motor. When installed on the centrifugal fan, support the engine with a reinforced frame part of the fan.

.5 Characteristics as indicated.

2.3 DRIVES

.1 Refer to section 23 05 13 – Common Motor Requirements for HVAC Equipment

.2 Direct:

.1 <u>General requirements</u> :

.1 Adjust width and diameter of the wheel as required to meet specified characteristics.

.2 When fan speed indicated on the schedules is lower than the speed of the motor, it means that the fan can operate at a high flow and higher static when operating at the same speed as the motor.

.2 Maximum characteristics can be calculated with the following equation:

$$cfm_{max} = \left[\frac{rpm_{mot}}{Rpm_{fan}}\right] \times cfm_{fan} \qquad SP_{max} = \left[\frac{rpm_{mot}}{Rpm_{fan}}\right]^2 \times SP_{fan}$$

.1 Fan maximum power must not exceed the motor horsepower.

.2 Maximum speed of the fan's class must be at least 10% higher to the motor's nominal speed.

.3 Direct coupling to the motor :
Aluminum wheel with steel hub TECF motor in cast iron casing.

.4 Direct with flexible couplings :
String type or flexible membrane. Rubber couplings will not be accepted.

.3 Belts and pulleys :

.1 Unless otherwise indicated, connect fans to motors using V-belt with minimum drive rating 150% of torque at motor start-up.

.2 Variable diameter pulleys shall allow plus or minus 10% adjustment from nominal speed.

.3 All pulleys shall be statically and dynamically balanced. At least two pulleys shall drive motors of 0.38 kW (½ HP) or more when fan wheel is 406 mm and over.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 FAN INSTALLATION

.1 Install fans as indicated, complete with resilient mountings specified in Section 23 05 48 - Vibration and Seismic Controls for HVAC Piping and Equipment, flexible electrical leads and flexible connections in accordance with Section 23 33 00 - Air Duct Accessories.

.2 Provide sheaves and belts required for final air balance.

.3 Bearings and extension tubes to be easily accessible.

.4 Access doors and access panels to be easily accessible.

3.3 ANCHOR BOLTS AND TEMPLATES

.1 Size anchor bolts to withstand seismic acceleration and velocity forces as specified.

3.4 CLEANING

.1 Proceed in accordance with Section 01 00 10 – General Instructions.

.2 Upon completion and verification of performance of installation, remove surplus materials, excess materials, rubbish, tools and equipment.

END OF SECTION