SECTION 23 34 00 – HVAC Fans

PART 1: GENERAL

1.1 PURPOSE:

A. This standard is intended to provide useful information to the Professional Service Provider (PSP) to establish a basis of design. The responsibility of the engineer is to apply the principles of this section such that the University of Texas at Dallas may achieve a level of quality and consistency in the design and construction of their facilities. Deviations from these guidelines must be justified through LCC analysis and submitted to UT Dallas for approval.

1.2 REFERENCES:

A. Codes and Standards that are Standard at UT Dallas:

1. AMCA 210 and 300: Centrifugal fans must be licensed to bear the AMCA Certified Ratings Seal for both air and sound. Sound rate centrifugal fans in accordance with the latest version of AMCA 300 "Test Code for Sound Rating Air Moving Devices".

2. AMCA 204: Balance Quality and Vibration Levels for Fans

2. ASHRAE Compliance: Test and rate centrifugal fans in accordance with the latest version ASHRAE 51 (AMCA 210) "Laboratory Methods of Testing Fans for Rating".

3. UL Compliance: Provide centrifugal fan electrical components which have been listed and labeled by UL.

1.3 REQUIREMENTS:

A. Fans shall be selected with minimum 75% fan efficiency at design operating point. In all cases, the PSP shall evaluate system conditions and select the optimum fan type and configuration based on efficiency, system curve, and fan characteristics at all anticipated design conditions.

B. Fans shall be dynamically balanced and factory-tested in accordance with AMCA 204-96 at the design operating RPM to Fan Application Category BV-3, Balance Quality Grade G6.3.

C. Design resonant speed of fan system (not critical speed) shall be minimum 25% greater than its maximum operating speed.

D. Air handling fan preference shall be double width, double inlet with backward inclined centrifugal airfoil blades. Plenum type plug fans required approval from UT Dallas.

E. Fans greater than 5,000 shall be rigidly mounted to floor with no vibration isolators. The fan shall be dynamically balanced and tested at the factory such that displacement does not exceed 1.5 mils peak to peak in any direction. Typical spring isolators may be specified with UT Dallas approval.

F. Provide epoxy coating finish as a minimum with additional protective coatings on fans as required by project conditions.

G. Provide AMCA spark resistant construction option: A, B, or C as required by project conditions.

H. Refer to 5.23.05 for fan vibration control requirements.

I. Provide heavy-duty, grease-lubricated, precision anti-friction ball or roller, self- aligning, bearings selected for minimum average life (AFBMA L10) of 200,000 hours.

J. Provide V-belt drive, selected for 1.2 service factor for fractional horsepower motors and 1.4 service factor for motors 1 horse power and above. Include belt guard with cutout for reading shaft RPM. Fixed sheaves shall be matched and sized for minimum 2x the NEMA rating.

K. Provide open drip-proof NEMA Premium Efficiency rated motor rated for compatibility with variable frequency drives where applicable. Select non- overloading motors at all points on the RPM operating curve.

L. Shafts shall be constructed of AISI grade 1040 or 1045 solid hot-rolled steel, turned, ground, and polished. The shaft's first critical speed shall be at least 125% of the fan's maximum operating speed.

M. Provide accessories per the following requirements where specified:

1. Access Doors: Provide access door in scroll housing, with latch-type handles, flush mounted for un- insulated housings, and raised-mounted for insulated housings.

2. Backdraft Dampers: Provide gravity-actuated dampers on fan discharge, counterweighted, with interlocking aluminum blades with felt edges in steel frame

3. Drain Connections: Provide minimum ¾" threaded coupling drain connection at lowest point of housing.

4. Extended Grease Lines: Extend copper grease lines from bearings to outside of inlet duct flange, terminate with grease fitting.

5. Heat Slingers: Provide metal disc between bearings and fan wheel, to dissipate heat from shaft.

6. Split Housings: Provide flanged, horizontally split housings as required by project conditions.

7. Weather Hoods: Provide protective weather hood with stamped vents over motor and drive compartment.

8. Screens: Provide heavy mesh removable screens on fan inlet and outlet.

9. Fan Guards: Specify guards on inlets and outlets not connected to ductwork, constructed of expanded metal in removable frame

PART 2: PRODUCTS

2.1 CENTRIFUGAL FANS, STEEL (GENERAL APPLICATION):

A. Provide centrifugal fans built to Class II construction (minimum).

B. Provide factory-assembled and tested fan units consisting of housing, wheel, fan shaft, bearings, and side support structure.

C. Housings: Provide curved scroll housings; lock seam construction for sizes 24" to 40", spot welded construction for sizes 44" to 60", and continuous weld construction for sizes 66" and larger. Provide horizontally split housings, bolted together for sizes 66" and larger. Provide spun inlet cones and duct connections.

D. Wheels: Provide backwardly inclined plate-type blades for sizes 22" and smaller, non-power-overloading backwardly inclined airfoil blades for sizes 24" and larger. Weld blades to wheel rim and hub plate. The wheels shall be backward inclined. Key wheels to shafts.

2.2 CENTRIFUGAL FANS, FIBERGLASS REINFORCED PLASTIC (CORROSIVE APPLICATIONS):

A. Fan Units: Provide factory-assembled and tested fan units consisting of housing, wheel, fan shaft, bearings, and fan support stand. The exterior of the fan housing shall be coated with an industrial grade gel coat, free from surface imperfections, a pigment to achieve the desired color and an inhibitor to prevent ultra-violet degradation.

B. Housings: Construct sections with flange joints utilizing stainless steel bolts and appropriate gasketing. The resins used to fabricate the fan housing shall be premium grade, fire retardant and selected for chemical environment. The fiberglass reinforcement shall be an industrial commercial grade of glass mat or woven roving, such as manufactured by Owens-Corning and shall have a suitable coupling agent to provide a bond between the glass reinforcement and the resin.

C. Wheels: Provide with a cast iron back plate or imbedded hub in the wheel and keyed to a polished steel shaft.

2.3 UTILITY FANS:

A. Fan Units: Provide factory-assembled and tested fan units consisting of housing, wheel, fan shaft, bearings, and fan drive.

B. Housings: Construct of heavy-gage steel with side sheets fastened to scroll sheets by means of deep lock seam. Provide round inlet collar, slip joint discharge duct connection. Construct housings to be convertible to 8 standard discharges. Provide adjustable motor supports.

C. Wheels: Provide forward curved or backward inclined wheels as scheduled. Provide swaged hubs.

2.4 TUBULAR CENTRIFUGAL FANS:

A. Fan Units: Provide factory-assembled and tested fan units consisting of housing, wheel, fan shaft, bearings, straightening vanes, and motor support. Clean, condition, and prime paint sheet metal parts prior to final assembly. Apply final coat of enamel to exterior surfaces after assembly.

B. Housings: Construct housings of low carbon steel with continuous-weld construction, braced to prevent vibration or pulsation. Provide streamlined inlet and outlet configurations.

C. Wheels: Provide airfoil type blades and welded construction. Statically and dynamically balance wheels before assembly, and balance again in assembled unit at design rpm.

2.5 INLINE CENTRIFUGAL FANS:

A. Housing: Aluminum split housing, constructed of spun aluminum, with aluminum straightening vanes, inlet and outlet flanges, and support bracket adaptable to floor, side wall, or ceiling mounting.

B. Direct-Drive Units: Specify ball bearing motor encased in housing so as to be out of air stream. Provide factory wiring to disconnect located on outside of fan housing.

C. Belt-Drive Units: Request ball bearing motor mounted on adjustable base. Provide enclosure around belts. Provide lubricating tubes from fan bearings to outside of fan housing.

D. Wheel: Aluminum airfoil blades on aluminum hub.

2.6 VANE AXIAL FANS:

A. Fan Units: Provide factory-assembled and tested fan units consisting of housing, propeller and hub, fan shaft, bearing, and drive.

B. Housing: Shall be constructed of steel with welded construction or corrosion resistant fasteners.

C. Propeller: Shall be adjustable pitch with cast aluminum blades.

END OF SECTION 23 34 00