

SECTION 23 34 00**HVAC FANS****PART 1 - DESIGN DIRECTIVES****1.1 DESIGN CRITERIA**

- A. When laying out fans, the consultant shall take into consideration duct inlet & outlet conditions to minimize fan effect.
- B. Adequate space & access shall be provided for all fan locations.
- C. Sound criteria shall be considered in the selection process for all fans.
- D. Generally, the fan supplier shall provide the roof curb for roof-mounted fans. The consultant shall insure that the proper curb for the roof type is specified, taking into account roof pitch. Roof curbs shall be insulated, and curb height shall be selected to raise the bottom of the fan base above the typical snow accumulation depth (18" minimum).
- E. For energy efficiency, consultant shall consider EC motors with integral speed adjustment or remote speed control options whenever available and when it makes sense for the application. Review EC motor applications with FO&M Engineering.

1.2 SUBMITTALS

- A. Product data specific for the project, including specialties, accessories, and fan performance curves with system operating conditions indicated.
- B. Certified fan sound power ratings in all octave bands (including 63 Hz) for fan inlet, fan discharge, and radiated casing.
- C. Motor ratings and electrical characteristics plus motor and fan accessories.

1.3 QUALITY ASSURANCE

- A. All fans and fan components shall comply with the latest applicable requirements of Underwriter's Laboratories (UL), NEMA, Air Movement and Control Association (AMCA), and the National Electric Code (NEC).

1.4 EXTRA MATERIALS

- A. Furnish one additional complete set of belts for each belt driven fan.

PART 2 - PRODUCTS**2.1 GENERAL**

- A. Fans and shafts shall be statically and dynamically balanced and designed for continuous operation at the maximum rated fan speed and motor horsepower.

- B. Motors and fan wheel pulleys shall be adjustable pitch for use with motors through 15 HP; fixed pitch for use with motors larger than 15 HP. Select pulley so that pitch adjustment is at the middle of the adjustment range at fan design conditions.
- C. Provide steel belt guards for motors mounted on the outside of the fan cabinet.
- D. Fans requiring grease shall be installed such that the grease fittings are easily accessible. Install extension lubrication lines if required.
- E. For direct-drive fans furnished without EC motors, provide solid-state speed controller mounted to the fan housing for use by the balancing contractor (mounted within the housing for rooftop fans).

2.2 CEILING & CEILING INLINE FANS

- A. Centrifugal forward curved direct drive fan with integral backdraft damper. Discharge arrangement shall be convertible from angled to in-line. Motors shall be mounted on vibration isolators and shall be removable without disturbing attached ductwork. Housing and wheel shall be galvanized steel; housing shall be lined with sound absorbing insulation.
- B. Manufacturers: Subject to compliance with requirements, provide fans of one of the following:
 - 1. Cook Gemini series
 - 2. Greenheck Model SP, CSP, & BCF
 - 3. PennBarry Zephyr series

2.3 PROPELLER WALL FANS

- A. Belt driven or direct drive propeller fans as indicated consisting of fan blades, hub, housing, orifice ring, motor, drive, and accessories. Fan housing shall be galvanized steel or factory applied primer with baked enamel or powder coat paint on cold rolled steel. Fan wheels shall be steel or aluminum blade riveted to a steel spider and reinforced. Bearings shall be ball bearing pillow block type, minimum life of (L50) 100,000 hours. Provide OSHA approved belt guards.
- B. Manufacturers: Subject to compliance with requirements, provide fans of one of the following:
 - 1. Cook Propeller wall ventilators
 - 2. Greenheck SB & S series
 - 3. PennBarry Breezeway series

2.4 SQUARE INLINE CENTRIFUGAL

- A. Fan housing shall be galvanized steel or factory finished cold rolled steel; housing shall be lined with sound absorbing insulation. Fan wheels shall be centrifugal backward-inclined aluminum; belt or direct drive fan. Fan housing shall be square with removable or hinged panels for access. Bearings shall be permanently lubricated, pillow block type, minimum (L50) life of 200,000 hours. Provide factory mounted disconnect switch accessible from the exterior of the fan.

- B. Manufacturers: Subject to compliance with requirements, provide fans of one of the following:
 - 1. Cook SQI or SQN series
 - 2. Greenheck Model SQ or BSQ
 - 3. PennBarry Centrex Inliner SX

2.5 CENTRIFUGAL UTILITY FANS

- A. Steel centrifugal fan set with rotatable housing. Housing shall be galvanized steel or factory finished cold rolled steel include an integral drain, and removable or hinged access panel. Fan wheel type shall be carefully selected by the consultant to provide the best combination of low sound and low power (highest efficiency). In addition, the consultant shall consider the shape of the fan curve and shall ensure the selected fan wheel type will provide stable operation over the entire range of possible operating points. Bearings shall be grease lubricated, self-aligning pillow block type, minimum (L50) life of 200,000 hours.
- B. Manufacturers: Subject to compliance with requirements, provide fans of one of the following:
 - 1. Cook CPS
 - 2. Greenheck USF Series
 - 3. PennBarry Dynamo

2.6 POWER ROOF/WALL EXHAUSTERS

- A. Belt or direct drive fans for roof or wall mounting with integral domed housing. Motor assembly shall be mounted on vibration isolators. Housing shall be seamless-spun aluminum, fan scroll shall be backward inclined aluminum. Bearings shall be pillow block type with minimum (L50) life of 200,000 hours. Provide a disconnect switch with a NEMA 1 enclosure within motor compartment.
- B. Where grease exhaust service is scheduled on the Drawings, provide NEMA 3R external disconnect, grease collection, and other accessories as required to meet UL 762 listing and the requirements of NFPA 96.
- C. Manufacturers: Subject to compliance with requirements, provide fans of one of the following:
 - 1. Cook ACE or ACRU series.
 - 2. Greenheck Models G, GB, & CUE or CUBE series.
 - 3. PennBarry Domex, Fumex.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install fans level and plumb, in accordance with manufacturer's written instructions. Support units as described below, using the vibration control devices as specified in Section 23 05 48 – Vibration and Seismic Controls for HVAC Equipment. Standard . Secure roof mounted fans to roof curbs with cadmium plated, copper, or stainless steel hardware.

- B. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearings operations. Reconnect fan drive system, align belts, and install belt guards. Lubricate bearings, pulleys, belts, and other moving parts with factory recommend lubricants.
- C. Clean unit cabinet interiors to remove foreign material and construction dirt and dust. Vacuum clean fan wheel and cabinet.

END OF SECTION 23 31 00