HVAC FANS - LABORATORY

DESIGN & INSTALLATION

1. This section applies to the following fan types:
   a. Laboratory Buildings Common space exhaust fans.
   b. Laboratory “strobic” type exhaust fans.

2. Design
   a. Location of equipment and what it serves determines quality of associated motor, bearings, etc.
   b. Motors shall not be in the exhaust air stream for laboratory exhaust fans.
   c. Select the most efficient wheel style (plenum, fan-wall, airfoil, backward inclined or forward curve, etc that is offered for fan style)
   d. Fans that do not bear the AMCA Performance Air and Sound Certified Rating Seal shall not be specified and are not be acceptable.
   e. Fan/Motor/Blower system shall be sized with a 20% safety factor for blower speed, motor HZ and pressure.
   f. All Fans shall have VFD drives with by-passes.
   g. Direct drive fans are preferred over belt driven fans.
   h. Direct Drive Fans:
      • Fan speed shall be limited in balancing through the setup of the VFD to the maximum fan speed required to deliver design airflow.
   i. Belt Driven Fans:
      • Provided with variable pitch sheaves for motor sizes 5 HP and less.
      • All sheaves shall be replaced with fixed pitch sheaves of the appropriate size as determined in the final balancing.
      • Sheaves shall be set such that the fan is at the maximum speed at 60 HZ.
      • Fans shall be capable of operating at 60 HZ without overloading.
   j. Fan motor shall be sized such that the fan operates below the service factor.
   k. Design the Inlet / Outlet conditions for minimal system effect/pressure drop.

3. Service and Clearance
   a. Fans shall be designed to be serviced.
   b. Fans shall not be designed to be installed >12” above the ceiling.
   c. Plug fans shall be designed with safety provisions for maintenance and shall be discussed with WUSM Engineering.

4. Seismic and Vibration Isolation
   a. Fans shall be installed with vibration isolation.
b. Fans shall be restrained to meet seismic requirements.

5. Related Sections
   a. HVAC Fans – Non-Laboratory

EQUIPMENT AND PRODUCT REQUIREMENTS

1. Laboratory Fume Exhaust Fan Approved Manufacturers:
   a. Strobic

2. Laboratory other fans: (in order of preference)
   a. Greenheck
   b. Cook
   c. Twin City

3. Fans shall:
   a. Be factory-fabricated, -assembled, -tested, and -finished, belt-driven or direct-drive fans consisting of housing, wheel, fan shaft, bearings, motor, drive assembly, and support structure.
   b. Be delivered as factory-assembled units, to the extent allowable by shipping limitations.
   c. Have safety protection for direct drive fans.

4. Shafts:
   a. Statically and dynamically balanced and selected for continuous operation at maximum rated fan speed and motor horsepower, with adjustable alignment and belt tensioning.
   b. Turned, ground, and polished hot-rolled steel with keyway. Ship with protective coating of lubricating oil.
   c. Designed to operate at no more than 70 percent of first critical speed at top of fan's speed range.

5. Grease-Lubricated Shaft Bearings:
   a. Self-aligning, pillow-block-type, tapered roller bearings with double-locking collars and two-piece, cast-iron housing and zerk fittings for greasing.
   b. Extend lubrication tubes for interior bearings or ducted units to outside of unit case.
   c. Bearing Rating Life
      - Ball-Bearing: ABMA 9, L10 at 200,000 hours.
      - Roller-Bearing: ABMA 11, L10 at 200,000 hours.
   d. Specification of any bearings that require greasing at intervals less than three months shall not be specified. It is the University desire to grease bearings every three months via a Preventative Maintenance schedule. The University frowns on automatic greasing equipment.

6. Belt Drives:
   a. Factory mounted, with adjustable alignment and belt tensioning.
b. Service Factor Based on Fan Motor Size: 1.5.
c. Fan Pulleys: Cast iron or cast steel with split, tapered bushing; dynamically balanced at factory.
d. Motor Pulleys: Adjustable pitch for use with motors through 5 hp; fixed pitch for use with larger motors. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
e. Belts:
   • Shall utilize poly chain belts, no exceptions.
   • Multi-belt fan motor drives
   • Oil resistant
   • Non-sparking
   • Non-static
   • matched sets for multiple belt drives.
f. Belt Guards:
   • Fabricate to comply with OSHA and SMACNA requirements of diamond-mesh wire screen welded to steel angle frame or equivalent, prime coated.
   • Secure to fan or fan supports without short circuiting vibration isolation. Include provisions for adjustment of belt tension, lubrication and use of tachometer with guard in place.
g. Motor Mount: Adjustable for belt tensioning.

7. Accessories:
   b. Scroll Drain Connection: NPS 1 steel pipe coupling welded to low point of fan scroll.
   c. Weather Cover: Enameled-steel sheet with ventilation slots, bolted to housing.

END OF SECTION