DESIGN GUIDELINE 230011
FANS AND ACCESSORIES

Scope

Fans and accessories. Fan arrays.

Related Sections

U-M Design Guideline Sections:
220514 Variable Speed Drives
230013 Air Handling Units

U-M Master Specification Sections:
233400 - Fans

General

U-M Master Specification Section 233400 - Fans shall be used as the basis for fan specifications on all projects. The A/E shall edit the U-M fan specification to make it project specific. While many fan types are covered by this specification, not all fan types are included. Turn on hidden text and read all spec. editor's notes when editing the specification.

Direct drive fans are preferred for fans driven by variable frequency drives.

Limit belt driven fan speeds to approximately 1400 RPM.

Limit direct drive fan speeds to approximately 2700 RPM. However, it is strongly preferred that fan speeds not exceed 1800 RPM.

Forward curved fans shall not be specified accept when air foil or backward inclined fans are unavailable, or when a forward curved fan provides significant performance advantages. Modular air handlers are often available with either forward curved or backward inclined/air foil fans. If backward/air foil type are available specify that type, except as qualified above.

For plenum fans, the impacts on fan performance from any inlet mounted back draft dampers shall be compensated for when selecting such fans. Backdraft dampers should be actuator driven.

Extended lube lines shall be specified where bearings are difficult to access or for units providing service to areas that might be compromised by opening an access door for bearing lubrication, e.g. clean room units, lab units with stringent temperature, pressure, or humidity controls, etc.

Fan Arrays

Fan arrays are not preferred except when space or redundancy requirements demand them. Each fan in an array requires a separate motor overload, and each fan should typically have a separate electrical disconnect. Refer to Design Guideline 220514 for additional requirements related to variable frequency drives. Typically additional air flow stations and controls are required. This all adds to complexity, cost, and maintenance. Fan arrays of more than 4 fans in particular are not preferred since they typically use more fan energy and do not save space when maintenance clearance requirements are considered. Therefore the A/E shall provide an analysis comparing the energy use, space savings, and any other benefit that results from various fan quantities, for any fan array system proposed to use more than 2 fans. This analysis shall include the impact of fan and motor efficiency differences between the various alternatives, as well as the cost for additional disconnects, fan motor overloads, air flow stations, controls, etc. .

Fan speeds in fan arrays should be limited to the range indicated for direct drive fans, above.

Each fan in a fan array should be equipped with its own variable frequency drive. Controlling multiple fans off the same VFD is discouraged and shall be approved by the U-M Design Manager. If multiple fans are controlled by a common VFD, provide a separate electrical disconnect for each fan. In such cases, early break contacts may be omitted from the individual fan disconnects.

Equipment Room Exhaust Fans

A single fan in the exhaust duct is preferred, provided the negative static pressure at the equipment room remains within reason. For rooms deep in the building, both supply and exhaust fans will be required.