
GENERAL:

This sections provides criteria for selection and installation of stand alone return, relief and exhaust fans that will affect equipment operation and maintenance over the life of the equipment. Fans for laboratory exhaust (including fume hoods are found in Section 230001.

DESIGN GUIDELINES:

A. Design General

1. For new construction, and existing buildings where possible, locate all fans inside the building or in a penthouse.
2. If a rooftop location is being proposed it must be approved by the project manager. All rooftop fans shall be mounted on a minimum 12" deep curb.
3. Above ceiling or sidewall locations are not permitted.
4. Return or Relief Fans shall be provided when return/exhaust/relief duct system pressure drop exceeds 0.30" wg.
5. Fans SP shall include the velocity pressure component in the calculation when inlet velocity is above 550 fpm.
6. Vibration and sound transmission from mechanical equipment will not exceed ASHRAE sound criteria.
7. Relief fans are required whenever the economizer air relief path ΔP exceeds 0.07" Wg. (0.07" wg exerts 8 lbs of force on a 36" x 72" exterior door and will prevent the door from closing and locking).

B. Fans

1. Fans shall be selected to provide highest efficiency and lowest noise characteristics practical while meeting specific system requirements. Recommended level shall not exceed 85db, five (5) feet from the unit. Fan wheel speed (rpm) shall not exceed 1800.
2. The following fan types are acceptable:
 - 2.1 Utility set DWDI, Forward curved, Airfoil or backward inclined , floor mounted.
 - 2.2 Cabinet type centrifugal. Cabinet fans may be used for smaller requirements.
 - 2.3 Propeller fans are acceptable for mechanical rooms/ penthouses. Clear access must be provided below the unit.
 - 2.4 Inline circular centrifugal, tubeaxial or vaneaxial fans are PROHIBITED.
3. Variable speed drives shall be used on all fans over 5HP.

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4. The fan-system operating point shall fall within range recommended for proper operation as indicated in Figure 5-4, AMCA Standard 201-90 "Fans and Systems". Fan type and characteristics will be selected to assure stable non-pulsing performance in required operating ranges.
5. External Maintenance access requirements:
 - 5.1 Access and service space shall comply with International Mechanical Code, Section 306.
 - 5.2 All HVAC equipment will be located to facilitate accessibility, maintainability and replacement. All sides must have a minimum of 24" to walk around the unit.
 - 5.3 Mechanical contract drawings shall show the access areas as a hatched area adjacent to the unit. Access doors shall also be shown at all required locations. An elevation view of each air handling unit is required.
 - 5.4 All mechanical equipment/systems will be installed on a 4" minimum concrete housekeeping pad.
 - 5.5 Future replacement of the entire unit shall be considered.

SPECIFICATION REQUIREMENTS:

A. The following statements shall be included in the contract specification.

1. Fan Section
 - 1.1 Fans will comply with AMCA Standard 210 and ASHRAE Standard 51.
 - 1.2 Statically and dynamically balanced fans and shafts.
 - 1.3 Fan shaft shall be solid steel, turned, ground, and polished. Fan wheels shall be keyed to the shaft.
 - 1.4 Shaft Bearings shall be grease-lubricated ball bearings selected for $L_{10} = 200,000$ hours
 - 1.5 Extend grease fittings extended to an accessible location outside the fan section.
 - 1.6 Motors and fan wheel shall have fixed pitch sheaves.
 - 1.7 Fan/Motor belt drives and sheave combination shall be selected using a Drive Selection Program such as Gates Designflex Pro. Manufacturer shall submit the drive selection program output with the AHU submittal.
 - 1.8 Fan section shall be run-balanced at the factory at the scheduled RPM.
 - 1.9 An allowance of 1.5 inches Static Pressure for dirty filters shall be added to the internal static pressure calculation before fan selection.
2. Motors
 - 2.1 Motors will be designed to operate continuously at all speeds with variable speed drives having carrier frequency of 12 KHZ or higher without large fluctuations in amps drawn at any single speed.
 - 2.2 Motor Construction: Open, drip-proof, NEMA Standard MG 1, general purpose, continuous duty, Design B, insulation class H.
 - 2.3 Motor shall not operate within the service factor range.
 - 2.4 Minimum efficiency shall be 90% per ASHRAE Standard 90A.
 - 2.5 Indicate the full identification of manufacturer, ratings, characteristics, construction, and special features.