

FAN CONTROL

In some heating and ventilating systems it is desirable to vary the volume of air handled by the fan, and this may be accomplished by a number of methods. Where the change is made infrequently, the pulley or sheave on the driving motor, or fan, may be changed to vary the speed of the fan and alter the air volume. Dampers may be placed in the duct system to vary the volume. Variable speed pulleys or transmissions, such as fan belt change boxes, electric or hydraulic couplings, may be used to vary the fan speed. Variable speed motors and variable fan inlet vanes may also be used to adjust the fan volume. All of these methods will give control. From a power consumption standpoint, a reduction of the fan speed is most efficient. Inlet vanes save some power and dampers save the least. From the standpoint of first cost, dampers usually are the lowest in cost. In some installations adjustments of volume are desirable at various times during the day or continuously. In others an increased supply of air in summer over that needed in winter is demanded. The demands of each case will dictate which type of control is most desirable. Where noise is a factor, lowering the fan speed if possible is preferred as a control means, because of the resulting reduction in sound level.

MOTIVE POWER

Heating, ventilating and air conditioning fans are usually driven by electric motors, although other prime movers may be used. The small sizes of fans, and especially those operating in the higher speed range, are equipped with direct-connected motors. For larger size fans and those operating at lower speed V-belt drives are generally used.

In selecting the size of motor for operating a fan, it is advisable to select at least the standard size next larger than the fan requirements. Direct-connected motors do not require so great a safety factor as belted units. Justification for liberal power provision exists only in systems where it is possible that larger volumes of air may be required at intervals and made available by use of by-pass dampers, thus greatly reducing the system resistance. If such a system includes a fan with forward-curved blades, it would be necessary that the motor be sized for the maximum volume and duty. If such a system includes fans with backward-curved blades, the volume peak would not make it necessary to provide additional motor power. In selecting fans for such a system, sound ratings should be given careful consideration.

Where a system is constant, and has no provision for volume change that would materially reduce the resistance, and when the resistance calculations are reasonably accurate, there is no necessity for too liberal a motor allowance, even where fans with forward-curved blades are used, if the fan has been properly selected. Fig. 4 shows that the system resistance varies as the square of the volume and the fan static pressure varies approximately inversely as the volume, thus greatly offsetting the trend toward both increase in air delivery and motor load. Reference to Fig. 4 indicates that there is no justification for allowing large spare motor capacity, and it is generally more economical to operate motors well loaded.

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