adding moisture to the air in the room. Tests[28] show that an average evaporative rate of about 0.235 lb per (hr) (sq ft of water surface) may be obtained from such pans, when a radiator is steam heated and the relative humidity in the room is between 25 and 40 percent. This source of supply of moisture alone is not adequate to maintain a relative humidity above 25 percent on a zero day.

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CHAPTER 15

UNIT VENTILATORS AND UNIT HEATERS

Unit Ventilators: Classification, Ratings, Capacity, Requirements, Application, Control, Location, Exhaust Vents, Window Downdraft Prevention, Mechanical Cooling; Unit Heaters: Classification, Application, Heating Medium, Type, Location, Sound Level, Ratings, Control, Piping, Maintenance.

UNIT ventilators and unit heaters are discussed in this chapter. The types, characteristics, method of rating, and procedures for selection and application of these products are described.

UNIT VENTILATORS

The term *unit ventilator* denotes an assembly, the principle functions of which are to heat, ventilate, and cool a space by the introduction of outdoor air in quantities up to 100 percent of its rated capacity. The heating medium may be steam, hot water, gas, or electricity. The essential elements of a unit ventilator are fans and motor, heating element, dampers, filters, and outlet grilles (or diffusers), all encased in a housing.

Unit ventilators are used primarily in schools, meeting rooms, offices and other areas where the density of occupancy indicates the need for controlled ventilation. The typical unit is equipped with a system of control that permits the heating, ventilating, and cooling effect to be varied while the fans are operating continuously. In normal operation, the discharge air temperature from a unit is varied in accordance with the room requirements. When heating is required, the air delivered is above room temperature. When the heat generated within the room by occupants, lights, sun, etc., is sufficient to cause overheating, the temperature of the air delivered is below that of the room. It is customary to equip unit ventilators with control devices that prevent the delivery of air at a temperature low enough to cause discomfort.

Classification

The various types of unit ventilators can be classified according to the three following methods:

1. *Heating Medium.* Four types of heating elements are used: (*a*) *steam*, (*b*) *hot water*, (*c*) *gas-fired*, and (*d*) *electric*.

2. *Type of Unit.* Under this classification there are three basic types to be considered: (*a*) *Floor-mounted* type, (*b*) *ceiling-mounted* type, and (*c*) *auditorium* type which are used in vertical, horizontal, or inverted positions. Figs. 1 and 2 show typical *floor-mounted* units. Fig. 3 shows a typical *ceiling-mounted* unit, while Fig. 4 shows a typical *auditorium-type* unit in horizontal position.

3. *Arrangement of Elements.* Unit ventilators may be of the (*a*) *draw-through*, or (*b*) *blow-through* arrangement. Fig. 1 shows a typical *draw-through* unit and Fig. 2 shows a typical *blow-through* unit.

Ratings of Unit Ventilators

Unit ventilators are customarily cataloged with two ratings: the *standard air rating* and the *anemometer air rating*. The *standard air rating* is obtained in accordance with the ASHAE *Standard Code for Testing and Rating Steam Unit Ventilators*.[1] This code requires 0 F entering air temperature, unit fan operating at rated speed with standard louver or grille on the outlet, and dry saturated steam at a temperature at the unit corresponding to a pressure of 16.7 psia (218.5 F). The *standard air rating* of the unit is the delivery in cubic feet per minute, converted to standard air at 70 F.

The *anemometer air rating* is peculiar to school ventilation. It originated as a convenient field measurement for checking air quantities, and is the basis of rating for ventilation requirements under some state and local building codes. The anemometer rating (air capacity) is obtained by averaging the air velocities obtained by an anemometer (propeller or averaging type) held over equal subdivisions of the outlet grille at a distance of 2 in. from the grille, and multiplying the average velocity by the gross area of the grille. The anemometer rating is based on the final temperature of the air leaving the grille while the unit is delivering outdoor air and recirculated air in the proper proportion and the heating element is supplying heat as specified. This

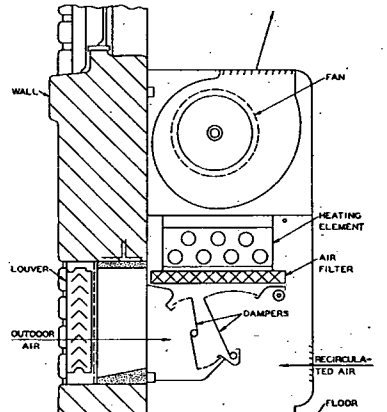

Fig. 1. . . . Typical Floor-Mounted Unit Ventilator—Draw-Through Type