

6. Sizes of Flues.

a. The cross-sectional area of smoke flues shall be designed and proportioned to meet the conditions of temperature, within and without flue, thickness of masonry, exposure, shape and material of flue, and other influences.

The National Building Code specifies lined chimneys and metal smoke stacks for all gas appliances which may be converted readily to the use of solid or liquid fuel, and also for all boilers and furnaces, except those having a flue-gas temperature not exceeding 550 F at the outlet of the draft hood when burning gas at the manufacturer's rating and which may, therefore, be connected to Type B vent piping. Approved Type B vent piping is noncombustible, corrosion-resistant piping of adequate strength and heat-insulating value, having bell and spigot or other acceptable joints. Fig. 4 may be used for selection of vent-pipe size.

Important points to be considered in the use of Type B vent piping are:

1. Type B flues must be plainly and permanently marked at the point where the vent connection enters the flue: *For Use on Gas Appliances Only*.
2. Type B gas vents shall be installed with a clearance to combustible material or construction, whether plastered or unplastered, of not less than one inch, provided that for vents of floor furnaces, such clearance shall be not less than 3 ft from the outlet of the draft hood, measured along the center line of the vent piping.

Other important points that should be considered for flues and vents for gas appliances are as follows:

1. Clearances from combustible material to gas appliance vent piping other than approved Type B gas vents shall be in accordance with the *Building Code Standards* of the National Board of Fire Underwriters for the Installation of Heat Producing Appliances, Heating, Ventilating, Air-Conditioning, Blower, and Exhaust Systems.

2. Every flue-connected appliance, except an incinerator, unless its construction serves the same purpose, shall be equipped with an effective draft hood which either (a) has been approved as part of the appliance or (b) complies with nationally recognized standards for draft hoods. The draft hood shall be attached to the flue collar of the appliance as conditions permit, and in a position for which it is designed with reference to horizontal and vertical planes. The draft hood shall be so located that the relief opening is not obstructed by any part of the appliance or adjacent construction.

3. No vent pipe from a gas appliance shall be interconnected with any other vent pipe, smoke pipe, or flue, unless such gas appliance is equipped with an automatic device to prevent the escape of unburned gas at the main burner or burners. Where a gas appliance vent pipe is joined with a smoke pipe from an appliance burning some other type of fuel, for connection into a single flue opening, they shall be joined by a Y fitting located as close as practicable to the chimney. With liquefied petroleum gases, the automatic device to prevent the escape of unburned gas shall shut off the pilot light, as well as the main burner or burners.

Tests of masonry chimneys made of a variety of materials

have developed additional recommendations regarding the construction of masonry chimneys that will decrease the hazard to surrounding combustible materials.

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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 principal 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 components of a unit ventilator are: fans, motor, heating element, dampers, filters, and outlet grilles (or diffusers), all encased in a housing.

The second type of unit ventilator is similar to the first, but, in addition to their normal winter season functions of heating, ventilating, and cooling with outdoor air, they are equipped to cool and dehumidify during the summer season. They are usually arranged and controlled to introduce a fixed quantity of outdoor air for ventilation during occupied periods in warm weather. Besides the elements listed above, they are usually furnished with hot and chilled water heating-cooling coils and condensate drains. Their application is described in the section: Year-round Unit Ventilators.

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 exceed the heat losses, 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 is used in vertical, horizontal, or inverted positions. Figs. 1 and 2 show typical floor-mounted units. Fig. 3 shows a typical ceiling-mounted unit, and Fig. 4 shows a typical auditorium-type unit in horizontal position.

The general responsibility for this chapter is assigned to TC 3.1, Hot Water and Steam Heating.

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.

Air Capacity 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 ASHRAE 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

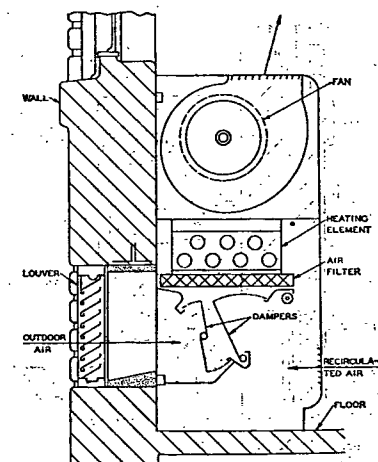


Fig. 1 Typical Floor-Mounted Unit Ventilator—Draw-Through Type