

and assumes that no condition of normal regulation will require enough throttling to make freezing possible. If this were not the case, such a method would not be suitable, as it prevents regulation beyond the point where the bypass valve opens.

As a precaution against allowing the unit heater motors to continue to run if the steam supply fails or is for some reason shut off, either a pressurestat or thermostat in the supply line, or an aqua switch on the return line may be installed to stop the motor when the pressure or temperature in the supply line, or the temperature in the return line drops below a predetermined point.

Control of Bypass-Type Units

The bypass-type units are equipped with a bypass opening and two interconnected dampers, so arranged that all or any portion of the air may be passed through or around the coil without being heated. It is possible to obtain a fair degree of temperature regulation by manually operating the dampers, but with the application of automatic controls, unusually good temperature control is obtained.

There are two types of control applicable to the bypass units. The older method is the *pneumatic* while the newer method is the *electric*. For the former, an air motor is installed on the unit to actuate the dampers. A pneumatic room thermostat is connected by means of small air lines to this air motor as well as to a source of compressed air supply. Should the room temperature tend to rise above the thermostat setting, the position of the dampers will shift to allow more air to be bypassed and less air to be heated through the coil. This produces a lower discharge temperature, which restores the desired temperature condition in the room. Conversely, should the room temperature tend to fall, the damper positions shift, so that less air is bypassed and more air is heated in going through the coil and a greater quantity of heat is supplied to the room.

The electric controls are similar to the pneumatic controls. In place of the air motor, a small reversible electric motor is used, and this is actuated by a room thermostat. When more heat is required, the thermostat makes a contact which causes the motor to shift the damper positions so that less air is bypassed and more air is drawn through the coil. When less heat is required, the thermostat makes another contact which causes the motor to operate in the reverse direction.

Where conditions require, an additional thermostat may be used to stop the fan motor when the bypass damper is wide open and the coil damper tightly closed. Also, an aquastat may be applied to the return line which will stop the fan motor should the steam supply fail.

For additional information on the control of unit heaters, see Chapter 23.

Chapter 36

UNIT VENTILATORS

Apparatus Usually Included; Functions of Unit Ventilators; Split and Combined Systems; Location of Units; Vent Openings; Capacities; Unit Ventilator Calculations.

A UNIT ventilator¹ is primarily a unit heater (see Chapter 35) which uses all or part out-door air for ventilation purposes, and which is provided with means for controlling the temperature of the air delivery. Various types are illustrated in the Catalog Data Section of this issue of THE GUIDE. Unit ventilators are used principally for heating and ventilating schools and public buildings, whereas unit heaters are used mainly for industrial heating.

APPARATUS USUALLY INCLUDED

A unit ventilator must be pleasing in design because it is generally used where it must harmonize with the furniture or with the decorative scheme. It consists usually of a rectangular steel cabinet finished with an enameled surface and containing the following necessary or optional parts:

1. Outside air inlet.
2. Inlet damper for closing the opening to the outside air inlet when the unit is not in use.
3. Adhesive type filters for cleaning the air (optional).
4. A heating element usually of special design and intended for hot water or low pressure steam.
5. Motor and fan assembly.
6. Mixing chamber where warm and cold air streams are brought together. (No mixing chamber is normally provided where sectional type heating units are used).
7. Recirculating damper (optional).
8. Humidifying arrangement² (optional).
9. Device for ozonizing air (optional).
10. Discharge grille or diffuser.
11. Temperature control arrangement.

FUNCTIONS OF UNIT VENTILATORS

The primary functions of a unit ventilator are:

1. To supply a given quantity of out-door air for ventilation.
2. To warm the air to approximately the room temperature if the unit is intended for

¹A roof ventilator is sometimes termed a *unit ventilator*. For information on roof ventilators, see Chapter 26.

²If the unit includes provision for control of humidity, it is usually called a *unit conditioner*. See Chapter 37.