

by means of heating the air. The direction of air discharge is manually adjustable for seasonal operation. Their operation is controlled by an electric switch.

UNIT HUMIDIFIERS

A unit humidifier consists essentially of some type of equipment for adding moisture to the air, usually a fan to draw the air through the humidifier, and in some cases tempering coils and filters, all encased in a single cabinet. These units are generally used in conjunction with heating systems which do not provide the necessary humidification during winter operation. In any type of unit humidifier, the process of adding moisture to the air requires heat from a heating coil, water, or air itself.

Types of Units

Small unit humidifiers in decorative casings are made for applications where it is desired to place the unit directly in the room to be humidified. These units are usually of the atomizing type and are completely self-contained. The humidifier water is either supplied by a reservoir which must be refilled at intervals or may be supplied from a water main by means of a float control. In most units the fine spray of water is mixed with some room air and the mixture is discharged directly into the room. Since these units have no heating element the heat required for humidification in this method is obtained by transforming some of the sensible heat of the air to latent heat.

Another type of small unit humidifier employs the principle of vaporizing the water by the direct application of heat. One method commonly used is to immerse an electric heating element in a reservoir of water to heat it until some of the water is vaporized into the air stream.

A third type of unit humidifier used extensively is the larger spray type of unit to deliver enough humidifying capacity for a residence or small building. In this type of unit either the water or air is heated. Fig. 11 illustrates a typical unit of this type. These units usually include air filters and in some cases provide ventilation air by means of an outside air duct connection to the unit. The units are available for either floor or ceiling mounting and are usually placed in a central location in the basement with short supply and return duct connections from the first floor. Room air is brought into the unit through the return duct connection and first passes over a tempering coil heated by steam or hot water, then is humidified by passing through some type of spray humidifier. Surplus moisture is removed by an eliminator and the humidified air is delivered to the room through a duct connection. Since a large percentage of the tempering coil capacity is transformed into latent heat during the humidifying process, the unit does not generally eliminate any existing steam radiation but does tend to improve comfort conditions by supplying heating during the off-period of furnace operation.

For a complete discussion of the principles of the various methods of humidification, refer to Chapter 27.

¹Estimating the Humidification Requirements of Residences, by W. H. Severns (Papers Presented at the First Annual Conference on Air Conditioning, University of Illinois, Engineering Experiment Station Circular, No. 26, October, 1936).

Chapter 23

UNIT AIR CONDITIONERS, UNIT AIR COOLERS, ATTIC FANS

Definition of Types, Unit Air Conditioners, Heating, Ventilating, Humidifying, Cooling and Dehumidifying, Filtering, Ventilating, Types of Units, Application, Ratings, Unit Air Coolers, Design and Performance, Types of Units, Ratings, Defrosting, Economics, Attic Fans

AN assembly of functional elements, as indicated by the name, comprises the unit air conditioner or unit air cooler. Such a unit when complete in itself, employing its own direct means of air distribution and source of refrigeration is known as a self-contained unit. When used in various combinations with remote sources of refrigeration, heat or air supply, it is termed a remote unit, indicating that the source of refrigeration is not contained within the unit cabinet. Either the self-contained or remote type units may be located within or without the conditioned area, and are a separate classification from the central plant type of system, as described in Chapter 21.

The code, Standard Method of Rating and Testing Air Conditioning Equipment¹, defines the various types of unitary equipment:

1. A *Cooling Unit* is a specific air treating combination consisting of means for air circulation and cooling within prescribed temperature limits.
2. An *Air Conditioning Unit* is a specific air treating combination consisting of means for ventilation, air circulation, air cleaning and heat transfer with control means for maintaining temperature and humidity within prescribed limits.
3. A *Cooling Air Conditioning Unit* is a specific air treating combination consisting of means for ventilation, air circulation, air cleaning and heat transfer with control means for cooling and maintaining temperature and humidity within prescribed limits.
4. A *Self-Contained Air Conditioning or Cooling Unit* is one in which a condensing unit is combined in the same cabinet with the other functional elements. Self-contained air conditioning units are classified² according to the method of rejecting condenser heat (water cooled, air cooled, and evaporatively cooled), method of introducing ventilation air (no ventilation, ventilation by drawing air from outside, ventilation by exhausting room air to the outside, or ventilation by a combination of the last two methods), and method of discharging air to the room (free delivery or pressure type).
5. A *Free Delivery Type Unit* takes in air and discharges it directly to the space to be treated without external elements which impose air resistance.

¹Prepared by a Joint Committee of the American Society of Refrigerating Engineers, AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS, Refrigerating Machinery Association, National Electrical Manufacturers' Association, and Air Conditioning Manufacturers' Association.

²Standard Method of Rating and Testing Self-Contained Air Conditioning Units for Comfort Cooling prepared by a Joint Committee of the American Society of Refrigerating Engineers, AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS, Refrigerating Machinery Association, National Electrical Manufacturers' Association, and Air Conditioning Manufacturers' Association.