

Surface temperature and area of the coil or pipe, air volume and velocity, and spray temperature and volume are some of the controlling factors in unit air conditioner design and application. Ice as a cooling medium is practical but is seldom used in connection with units.

### Filtering

Cleaning of outside or recirculated air discharged to the conditioned area is one of the important functions of air conditioning, and air filters should be included on all units which condition air for comfort. Protection is also afforded the cooling and heating coils as well as the condenser coil in the case of the air cooled type.

Means of filtering may vary from the lint screen to the electrostatic filter, with the degree of efficiency covering a wide range. Inexpensive throwaway type filters lend themselves well to the compact design of the unit conditioner. Air cleaning devices form the subject of Chapter 28.

### Ventilating

Provision for the introduction of outside air should be an essential part of unit conditioner design. Odors and air vitiation are avoided and better load control is possible when a positive means of introducing outside air is available.

On the small, air cooled room units, it has been found practical to control the air in such a way as to permit variation from all recirculated air to 100 per cent outside air. An added feature is a dampering arrangement whereby it is possible to exhaust air from the room to remove smoke and generally ventilate the space.

A code<sup>4</sup> sponsored by a Joint Committee of the A.S.H.V.E. and the *American Society of Refrigerating Engineers* may be consulted, although it should be realized that individual applications may often show a need for ventilation in excess of these minimum requirements.

### Types of Units

Unit air conditioners fall into two general classifications, depending on the location of the refrigeration source. Those units having the condensing unit completely enclosed in the same cabinet as the evaporator are known as self-contained types, while those units having the condensing unit remotely located from the evaporator and requiring piping of refrigerant from the condensing unit to the evaporator and return are known as remote types.

Self-contained units are further divided into two groups in accordance with their condensing mediums, being either air-cooled or water-cooled. Evaporative cooled types are included in this latter class.

The air-cooled types are small in capacity, ranging from  $\frac{1}{3}$  to  $1\frac{1}{2}$  hp. Their principal application is for conditioning such spaces as hotel rooms, offices and residential living quarters. A duct connection between the unit and an outside window or ventilated air shaft is required to permit disposal of the heat extracted from the conditioned area. The unit may stand in front of the window or be mounted on the window sill. Various styles and types of windows are encountered which increase the difficulty of making the window connections. The evaporation of condensate on the condenser coils, as a means of disposing of this moisture, tends to increase the condensing capacity and reduce the operating head pressure.

<sup>4</sup>Code of Minimum Requirements for Comfort Air Conditioning (A.S.H.V.E. TRANSACTIONS, Vol. 44, 1938, p. 27). Reprints of this code are available at \$0.10 a copy.

Some units add supplementary water so that increased capacity may be obtained from constantly wetted condenser coil surface. Connections to an electrical outlet may be by means of a conventional cord and plug or a permanent electrical connection, depending on local code rulings pertaining to the installation of small motors. The exterior finish of the unit in metal, wood or fabric is decorated to harmonize with office or bedroom furnishings.

A unit of the air-cooled condenser type for floor mounting is shown in Fig. 1. Of the two fans shown, the lower one acts as condenser air fan, and in some units this fan is arranged with slingers for discharging condensate on the condenser coil while the upper fan discharges air into the conditioned area. A feature of the design shown in Fig. 1 is that the condensate from the cooling coil is sprayed over the condenser surface and vaporized, thus eliminating the need for drain connections. A simple dampering arrangement is generally provided for exhausting some air from the room, in addition to introducing outside air and recirculating

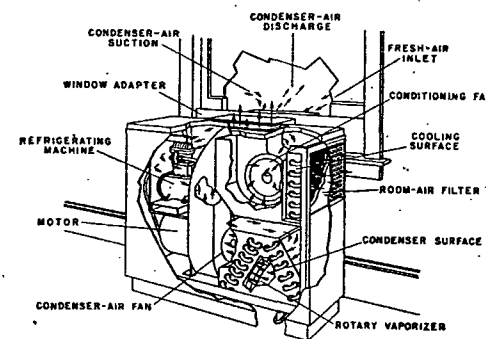


FIG. 1. SELF-CONTAINED AIR-COOLED UNIT AIR CONDITIONER

required amounts of air. It is possible to remove the equipment for winter storage or utilize the ventilating features for winter operation.

Water or evaporative-cooled units start at 1 hp in size and may be as large as 30 hp. Condensers requiring water use either city water, well water or recirculating water from a cooling tower. Evaporative condensers are seldom used on units under 5 hp.

The heat generated by the compression of refrigerant gases and that given off by the electric motor is removed from the compressor compartment in four ways: by the use of a water coil in the compressor compartment; by means of utilizing the cold suction gases; by drawing part of the return air through the compressor compartment and finally by circulating room air through the compressor compartment by means of a fan attached to the motor shaft.

The smaller water-cooled units have somewhat the same application as the air-cooled units. Water and drain facilities must be available and, although window connections are not required for heat disposal, it is desirable to have an outside air connection for ventilation purposes. Electrical wiring is generally permanently connected.

Up to  $7\frac{1}{2}$  or 10 hp in size the units are usually styled for locating directly in the conditioned area. Above this size the tendency is to