

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

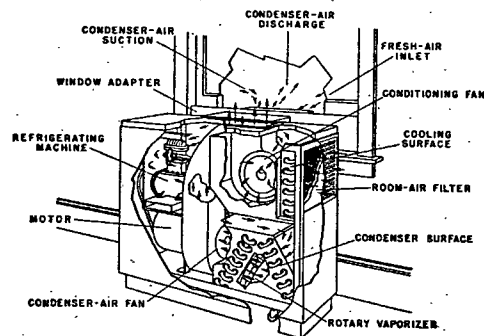


FIG. 1. SELF-CONTAINED AIR-COOLED UNIT AIR CONDITIONER

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. 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 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 locate the equipment adjacent to the conditioned area, with supply and return duct connections. Compressor compartment heat is removed by the same methods described previously.

On water units of the vertical type of 5 hp and under, use is made of air distributor headers, equipped with directional louvers, on one or more sides, for discharging the air directly into the conditioned space in which the unit is located. Above 5 hp this method usually becomes impractical and a system of ducts is employed. Arrangements for outside air supply are similar to those in central plant design, although simpler, hand operated dampers are usually employed.

Accessory equipment for the self-contained unit conditioners includes heating coils, humidifiers, and controls for utilizing the unit for winter heating and ventilating. Refinements of dust and odor control and constant temperature and humidity regulation are considered to be special application problems with this type of equipment.

A typical unit with water-cooled condenser is illustrated in Fig. 2. The header arrangement permits air distribution in several directions, and in such a way as not to fall on the room occupants. All side panels are removable for complete access to equipment. It is only necessary to bring water, drain and electrical service to the unit, and a source of heat if desired.

Remote type units cover a much broader range of size and application and generally are used in connection with or in lieu of a central plant system. They may be used individually or in groups in the place of self-contained equipment.