TYPE OF SERVICE

Because of the variety of arrangements with corresponding variation in the service rendered, unit air conditioners may be classified in three divisions:

A. ALL-YEAR, when supplying
- (1) Air circulation.
- (2) Air cleaning.
- (3) Air heating in winter.
- (4) Humidification in winter.
- (5) Air cooling in summer.
- (6) Dehumidification in summer.

B. WINTER, when supplying Items (1), (2), (3) and (4).

C. SUMMER, when supplying Items (1), (2), (5) and (6).

The All-Year unit generally takes its air supply from the room and out-of-doors, the cleaning being done by filters or air washers and the circulation being provided by motor-driven blowers or fans. Humidity is obtained usually by evaporation of water or entrained moisture from water sprays or wet surfaces. Dehumidification is accomplished by lowering the temperature below the dew-point and condensing the moisture either by passing the air through water sprays or over cooled surfaces. Heat is supplied to the air by bringing it in contact with steam or water-heated surfaces and in some instances, by the reverse cycle refrigeration method.

Surface cooling may be provided by direct expansion in the surface unit and by circulation of cold water or brine from a central refrigerating plant. The water may be cooled by melting ice or it may be taken from city mains or wells where a low temperature is available. A drip pan or container should discharge to drainage lines in order to remove the condensed moisture or that not taken up by the air.

MAKE-UP WATER REQUIRED

In the ordinary practice of humidifying, the water is constantly recirculated and the only water loss is that which is evaporated into the air and serves to humidify the air. Where air conditioning units recirculate 100 per cent room air and have no outside air connection, the amount of humidifying required for each passage of the air actually is small, as the air in rotating will gradually increase its moisture content to any point desired. If, however, the air is taken from outside, the treatment must increase the humidity to the desired degree (since the air only passes once through the device) and more water will be needed because of the larger requirement for humidifying. It is obvious that the tank must be drained and flushed periodically to dispose of the dirt and dust removed from the air by the water.

The air conditioning units for winter service omit the air cooling and dehumidification functions.

The units for summer use only usually consist of a cooling coil and a fan or fans electrically operated, erected within an enclosure so as to form a single piece of equipment and are intended solely for cooling purposes. A float valve, surge drum, valves and other auxiliary fittings may or may not constitute part of the complete device depending on the type. The

fan draws or forces the air across the cooling surface and discharges the air in selected directions. As a rule the outlets are specially designed so as to deliver the air without the use of ducts and the units are most frequently placed directly in the room to be cooled.

Cooling units are designed to:

1. Circulate the air of the room at a rapid rate.
2. Promote uniformity of temperature throughout the room.
3. Direct the cooled air positively and rapidly to points where it will be most effective.
4. Reduce the amount of space occupied by the cooling equipment.
5. Provide a system readily responding to thermostatic or manual control.
6. Increase the capacity of the cooling surface by passing the air over it at high velocity.
7. Provide, under favorable means, a method of either manual or automatic defrosting of the cooling surface.
8. Provide a neat appearing and sanitary apparatus for obtaining the temperatures and humidities desired.

Cooling units are suitable for operating on gas and liquid refrigerants such as ammonia, methyl chloride, sulphur dioxide, carbon dioxide or on brine or cold water. The choice of refrigerant is governed by the design, material and construction of the unit cooling coil.

CALCULATION OF THE COOLING LOAD

In estimating on the load that the unit air conditioning apparatus must meet a survey should be made of surrounding conditions and the heat losses calculated. The same factors of heat gains and losses are used for all types of comfort cooling.

The sensible heat gains may be summarized as follows:

a. Sunlight load.
b. Radiation load.
c. Infiltration load, depending on air changes.
d. People.
e. Lights.
f. Electrical motors and appliances.
g. Steam and gas appliances.
h. Miscellaneous heat sources.

The latent heat load must be determined separately. This latent heat comes from moisture loss from the drying of air, from people and materials. The heat losses occur through walls, windows, roofs, by infiltration of cold air and humidification. After this total heat has been calculated (see Chapter 8), units are selected from the manufacturers' lists in accordance with their rated capacity. Most units for comfort air conditioning have a cooling capacity ranging from 0.75 tons to 1.25 tons, approximately the amount required for one room of good size or an office, though machines up to 10 ton capacity can be obtained.

Example 1. A fur storage room is to be maintained normally at a temperature of 32 F, but at intervals, the room is to be lowered to 20 F, which temperature will be maintained for several days, after which 32 F will again be held. It is assumed that there is one air change every eight hours. What is the cooling load?

Data: The room is located in the basement of a building that has no outside exposure.