headers, either furnished with the unit or constructed at the installation to meet the needs of the application under consideration. A system of ducts and distribution grilles may also be used, *similar* to the arrangement used when equipment is outside of the conditioned area. The problem of securing a supply of outside air is often a difficult one. The proper design of ducts is of major importance for good air distribution. Chapters 31 and 32 are devoted to these subjects.

In the analysis of any large structure to be air conditioned which is divided into small spaces, such as an office building or hotel, a comparison should be drawn between the use of units and a central plant system. This study is one of economics, and should include such factors as first cost, installation costs, obsolescence, depreciation, maintenance costs, return on investment, flexibility, time of installation and possible loss of useful space during installation.

This same analysis should be extended to include a comparison of remote units with self-contained units. Self-contained units are possible where short term leases are involved, or where wiring can readily be brought to location or where existing water and drain facilities are adequate to handle the increased demand of water-cooled models. On the other hand, remote type room units contain less mechanical machinery, avoid the operating cost penalty of an air-cooled condenser, as in the case of the self-contained, air-cooled room units, and seldom require heavy wiring to handle the fan load. In general, the smaller remote units are more suitable for use with new construction, where the units will probably remain during their useful life. This condition may change where larger, ceiling mounted units are compared with the floor mounted self-contained units. Controls are essential in unit application and range from the simple snap switch of a room unit to elaborate means of controlling temperature, humidity and air movement in laboratory and testing room application. The criterion of a well controlled installation is one which has neither too few nor too many controls. (See Chapter 34).

With the expansion of cities during the past decade, the problem of water supply has become a costly and ever present problem[5]. Consequently, laws are appearing designed to restrict the usage of water wherever possible, particularly when substitute means are available. Evaporative condensers and cooling towers (described in Chapters 25 and 27) are means devised to save large quantities of water in this connection. Most manufacturers furnish equipment designed for use in combination with these water savers.

Municipal plumbing, heating, electrical and refrigeration codes, as well as fire underwriter restrictions, are likewise having their effects on the application of unit air conditioners. Meeting municipal and national code requirements should be an important item in connection with the installation of any unit equipment.

## Ratings

There are two codes governing the rating and testing of unit air conditioners. The first code, Standard Method of Rating and Testing Air

[5]Concerning Conservation of Underground Water with Suggestions for Control, by Noel E. Porter (A.S.H.V.E. TRANSACTIONS, Vol. 47, 1941, p. 309).





Conditioning Equipment[6], covers all types of air conditioning units except the self-contained type. The latter is covered by the second code, The Standard Method of Rating and Testing Self-Contained Air Conditioning Units for Comfort Cooling[7]. The two codes are necessary because of the basic difference caused by the heat given up by the self-contained units. The standard rating conditions for self-contained unit air conditioners, as given in the code, are set forth in Table 1.

The standard rating of a self-contained unit for the conditions specified in Table 1 include all items which apply to the function of a unit as: (1) name of unit, (2) functions which unit performs, (3) data on cooling, (4) data on heating, (5) data on air flow, and (6) data on humidification.

TABLE 1. STANDARD RATING BASIS FOR SELF-CONTAINED AIR CONDITIONING UNITS

| FUNCTIONS | TYPES OF UNITS | RATING CONDITION | | |
|---|---|---|---|---|
| | | Item | Description | Value |
| All | All | a | Barometric Pressure | 29.92 in. Hg. |
| Cooling | Water-Cooled, Air-Cooled and Evaporatively Cooled Condensers | b | Unit Ambient and Air Entering Room—Air Inlet<br>(1) Dry-Bulb<br>(2) Wet-Bulb | <br>80 F<br>67 F |
| | | c | Ventilation Air | See Note |
| | Water-Cooled Condensers | d | Water Temperature Entering Unit | 75 F |
| | | e | Water Temperature Leaving Unit | 95 F |
| | Air-Cooled and Evaporatively Cooled Condensers | f | Air Entering Outside Air Inlet<br>(1) Dry-Bulb<br>(2) Wet-Bulb | <br>95 F<br>75 F |
| Heating | All Types Provided with Heating Function | g | Unit Ambient and Total Air Entering Unit | 70 F |
| | | h | Heating Medium, Pressure or Temperature<br>(1) Dry Saturated Steam<br>(2) Water In<br>(3) Water Out | <br>16.7 lb per sq in. abs.<br>180 F<br>160 F |
| Humidifying | All Types Provided with Humidifying Function | i | Unit Ambient | 70 F |
| | | j | Total Air Entering Unit<br>(1) Dry-Bulb<br>(2) Wet-Bulb | <br>70 F<br>53 F |
| Air Circulation | All | k | Filters | New and Clean |

*Note:* Rating shall be based on both ventilation and recirculated room air entering at 80 F dry-bulb and 67 F wet-bulb temperature. (The *Note* as given in the code has been condensed in order to remove material not pertinent to this chapter).

[6]Loc. Cit. Note 1.
[7]Loc. Cit. Note 2.