12 ● Can a cooling and dehumidifying coil be selected for any arbitrarily specified conditions of entering and leaving air?

No. Although sensible and latent cooling effects may be obtained simultaneously, and in varying ratios, there is a limiting ratio of total to sensible cooling effect, for any given entering air conditions which cannot be exceeded without the use of reheat regardless of the coil design or refrigerant temperature.

13 ● What precautions must be taken in selecting a condensing unit and cooling coil to operate together?

The total refrigerating capacity and the ratio of total to sensible heat load will be determined by the evaporating temperature at which the coil and condensing unit balance. It is possible that, unless a check is made at this balance point, the resultant ratio of total to sensible may differ considerably from that required. An oversized coil, for instance, is likely to result in the desired dry-bulb temperature but excessive relative humidity of the air discharged.

14 ● What precautions as to the air circuit should be taken to assure the proper performance of a coil?

The air conditions should be adjusted to obtain those upon which the selection was based; the filters should be kept clean, and the incoming air should be distributed evenly over the coil face.

15 ● What are the usual causes of freezing in the case of a volatile refrigerant coil?

Freezing is caused by a reduction or stoppage of air flow due to dirty filters, clogged coil or sticking of automatic dampers. Or the selection of equipment may have been made for so low an evaporating temperature at peak load that the balance between condensing unit and coil at light loads causes the coil temperature to fall below 32 F.

Chapter 25

SPRAY EQUIPMENT FOR HUMIDIFICATION AND DEHUMIDIFICATION

Air Washers, Apparatus for Direct Humidification, Spray Generation and Distribution, Self-contained Humidifiers, Atmospheric Water Cooling Equipment, Design Wet-bulb Temperatures, Cooling Ponds, Spray Cooling Towers, Natural Draft Deck Type Towers, Mechanical Draft Towers, Winter Freezing

AIR humidification is effected by the vaporization of water which always requires heat from some source. This heat may be added to the water prior to the time vaporization occurs or it may be secured by a transformation of sensible heat of the air being humidified to latent heat as the vapor is added to the air. The thermodynamics of the process are discussed in Chapter 1. Dehumidification consists of the removal of moisture from air and may or may not involve the removal of heat from the air-vapor mixture. With spray equipment dehumidification of air necessitates the removal of heat.

AIR WASHERS

Air washers may be used as either humidifiers or dehumidifiers depending upon the method of their operation and the temperature of the spray water. The functions of an air washer are to regulate the moisture and heat content of air passing through it and to remove dust and dirt from the air. As cleaning devices air washers are not as effective as air filters in the removal of dust and dirt.

The construction of commercial air washers is indicated in Figs. 1 and 2. Any air washer consists essentially of a chamber through which the air passes and comes in intimate contact with water. This chamber may be built of either wood, stone, or sheet metal; the latter being the almost universal material of construction. The lower portion of the washer chamber serves as a sump for the water passing to its bottom.

Contact between the air and the washer water is secured: (1) by breaking the water into a very fine mist, (2) by passing the air over surfaces which are continuously wetted by water, or (3) by a combination of water sprays and wetted plates. Scrubber-plate types of washers are