7 ● Why do cooling towers give best results when the humidity of the air is low?

The cooling of the water by dropping it through the air depends mostly upon the evaporation of the water. If the relative humidity of the air is low, the water vapor will be readily absorbed and carried away, while if the relative humidity is high, its capacity to pick up water vapor is less and the water is cooled less with the same exposure to the air.

8 ● What are some of the advantages and disadvantageous of a forced draft cooling tower compared with a natural draft wind tower?

Advantages: a. Does not depend on wind, *b.* Less space required, and *c.* Less drift loss and less make-up.

Disadvantages: a. Higher first cost, and *b.* Higher maintenance cost.

9 ● What wet-bulb temperature for outside air is usually selected in air conditioning design when cooling is to be accomplished?

One which is not exceeded more than 5 to 8 per cent of the time in the locality where the plant is situated.

10 ● Where should the suction connection be placed in a cooling pond?

As far below the surface as possible and as far away from the discharge as practicable.

11 ● What chemical is used to kill algae formation in spray ponds?

Potassium permanganate.

12 ● What is the usual amount of spray water delivered to a cooling pond per square foot of area?

From 0.1 gpm on small sizes to 0.8 gpm on large sizes.

13 ● About how much water is lost by evaporation in atmospheric cooling?

About 1 gal per 1000 gal for each degree of cooling range.

14 ● How is freezing obviated in cooling pond sprays?

The pressure and quantity of water is lowered so that the drops become larger in size and do not freeze so readily.

Chapter 26

AIR CLEANING DEVICES

Air Cleaner Requirements, Classifications, Viscous Type Filters, Unit Filters, Automatic Filters, Dry Air Filters, Air Washers, Methods of Installation, Stack Gases, Settling Chambers, Centrifugal Separators, Industrial Filters, Electrical Precipitators, Exhaust Systems, Air Scrubbers

THE removal of impurities from air brought into a building, or from air recirculated in a building for ventilating or air conditioning purposes is the function of any air cleaning or filtering device. These impurities include carbon (soot) from the incomplete combustion of fuels burned in furnaces and automobile engines, particles of earth, sand, ash, automobile tires, leather, animal excretion, stone, wood, rust and paper, threads of cotton, wool and silk, bits of animal and vegetable matter, bacteria and pollen. Microscopic examination shows that the character of the impurities varies with the locality, but as a rule carbon forms the greater part of them while the total is somewhat proportional to the state of industrial activity and the wind intensity. Additional information on sources of air pollution and the particle sizes of atmospheric impurities will be found in Chapter 4.

AIR CLEANER REQUIREMENTS

To fulfill the essential requirements of clean air, an air cleaner should:

1. Be efficient in the removal of harmful and objectionable impurities in the air, such as dust, dirt, pollens, bacteria.
2. Be efficient over a considerable range of air velocities.
3. Have a low frictional resistance to air flow; that is, the pressure drop across the filter should be as low as possible.
4. Have a large dust-holding capacity without excessive increase of resistance, or have ability to operate so as to keep the resistance constant automatically.
5. Be easy to clean and handle, cleans itself automatically, or else be inexpensive enough to replace when dirty.
6. Leave the air free from entrained moisture or charging liquids used in the cleaner.

The SOCIETY has developed a code[1] which explains how such devices are rated by (1) capacity in cubic feet of air handled per minute, (2) resistance in inches of water at rated capacity, (3) dust arrestance, the

[1] A.S.H.V.E. Standard Code for Testing and Rating Air Cleaning Devices Used in General Ventilation Work (A.S.H.V.E. TRANSACTIONS, Vol. 39, 1933, p. 225).