Ratings and Capacities

It is common practice to rate cooling units in Btu per hour at a given temperature of air entering the unit and at a given refrigerant temperature maintained within the coil. This Btu capacity may be either sensible or total heat capacity. Ratings are sometimes expressed as equivalent tons of refrigeration. No standard basis for rating has yet been adopted. The heat capacity for any given condition of room temperature and refrigerant temperature must be obtained from the manufacturers' tables. Ratings are on the basis of a coil flooded with refrigerant and with no frost (or but a light coating) on the coil. Suitable reduction in sensible heat capacity must be made for a heavy coating of frost. In the case of brine or cold water as the refrigerant, suitable correction must be made for the rate of flow through the coil.

Location of Units

The following considerations govern the location of cooling units within a room:

1. Arrangement of product within the room.
2. Air distribution.
3. Number of units required.
4. Convenience of piping connections.

The most important of these is air distribution. Units should be so located as to accomplish equal distribution of air to all parts of the room.

The discharge of cooled air in general should be above the product, in the free space between the ceiling and the product. The travel of the air through the substance cooled back to the inlet of the unit should be at low velocity.

Compressor Capacity

The machines producing refrigeration must be of sufficient capacity to absorb not only the sensible heat gain of the storage room but also the latent heat load which comes of moisture precipitation. The number of hours operation per day will depend entirely upon its capacity with relation to the requirements. It is presumed that the cooling unit capacity has been selected to coincide with the desired operation. It is best practice to choose a compressor which will produce a small temperature difference between the refrigerant and the room, sufficient however to obtain the desired capacity from the cooling unit.

Automatic Control

Cooling units are readily adaptable to thermostatic control. Several arrangements are as follows:

1. Room thermostat in conjunction with a magnetic or motor-operated valve to regulate the flow of refrigerant to coil. Usually the fans operate continuously.
2. Room thermostat to control operation of compressor. Fans operate continuously.
3. Room thermostat to control the operation of the fan motors.
4. Room thermostat to control the operation of fan motor and compressor motor simultaneously.
5. Room thermostat to control operation of the compressor with back pressure control to regulate the fans.

Chapter 38

SMOKE, DUST AND CINDER ABATEMENT

Definitions of Smoke; Dust and Cinders; Nature's Dust Catcher; Dust and Cinder Catchers; Disposal of Dust and Cinders; Testing of Dust and Cinder Catchers; Settling Chambers; Dust and Cinder Traps; Centrifugal Catchers; Electrostatic Precipitators; Gas Scrubbers; Filters.

THE concentration of industrial activity around the large cities of the world has resulted in the pollution of the air above these cities by smoke, dust and cinders. In those areas where large quantities of fuel of various kinds are burned in automobiles and other internal combustion engines and in the furnaces of space-heating and industrial boilers, large quantities of solid material are discharged into the atmosphere at relatively low levels.

The effect of this air pollution has been classified as medical, botanical and physical. Attempts have been made to express the damage in terms of dollars per year, but so far the medical profession has not agreed that this air pollution is responsible for ill health or a shorter life. The trees on city streets and the flowers and shrubbery in public parks grow vigorously, and buildings are torn down because of obsolescence long before the building materials show any serious signs of destruction by the foreign matter in the air. However, the smoke does discolor buildings and removal of the stains is a costly process. The dust and cinders make it difficult to keep offices clean and undoubtedly damage much merchandise.

In the large cities where the nuisance from smoke, dust and cinders is the most serious, limited areas obtain some relief by the use of district heating. The boilers in these plants are of large size designed and operated to burn the fuel without smoke and some of them are equipped with dust catching devices. The gases of combustion are usually discharged at a much higher level than is possible in the case of buildings that operate their own boiler plants.

SMOKE

Smoke is the finely divided solid matter formed by the incomplete or arrested combustion of the volatile hydro-carbons in fuel. (See definition of smoke on page 477, Chapter 33, Air Cleaning Devices). The smoke particles are extremely small and so light that they will not settle by gravity in still air.

By far the greater part of the smoke in the air comes from the exhausts of automobiles, and from the chimneys of dwellings, office buildings and industrial plants. The causes of smoke production are so numerous and varied that no general rule can be given to correct the trouble.