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CHAPTER 8

AIR CLEANERS

Types of Air Washers; Temperature and Humidity Control and Steam Requirements Thereof; Viscous, Unil Viscous, Automatic Viscous and Dry Air Filters; Dust Removal Efficiency; Air Cleaner Testing Code.

EFFICIENT air cleaning devices are essential to good ventilation. The selection of such equipment is governed to a large extent by the character and amount of impurities to be removed. The most objectionable impurities in the air are soot, flue dust and carbon and its related elements. These may be classified as dusts, fumes and smokes.

Dusts are particles which are large and heavy enough to fall with increasing rapidity due to gravity in still air. For instance, particles of flying sand or grit, such as are blown about on a windy day, the average diameter of which would be approximately 0.01 cm, are called dust.

Fumes are smaller particles which fall with constant velocity due to gravity in still air. The solid particles from atmospheric fog, for instance, are called fumes and have an average diameter of about 0.0014 cm.

Smokes are particles which do not settle at all in still air, which diffuse constantly, and which are actuated by the Brownian motion, rather than by gravity. An example of this type would be certain smokes, the average diameter of the particles of which is about 0.000015 cm.

RATING OF AIR CLEANERS

Air washers and filters are rated as follows:

1. Capacity in cubic feet of air handled per minute.
2. Resistance in inches of water which the cleaner offers to the flow of air at its rated capacity.
3. Percentage of dust removal at its rated capacity.
4. Percentage of entrained moisture remaining in the air after passing through the cleaner while operated at its rated capacity.
5. If considered as a humidifying agent, the humidifying and dehumidifying efficiency.

The first attempt at air cleaning for general ventilation work was probably by the use of dry screens. Since ordinary Portland cement passes a screen having 100 mesh to the inch, it is apparent that much dust may pass the finest mesh screen. When a screen as fine as this is moistened, not only the dirt ceases to pass but also the air passages clog so that the filter becomes ineffective. Fine cloth filters are very effective, except that they also clog rapidly and soon become impervious to air. These considerations led many years ago to the development of the air washer types of air cleaners which use water.