1 lb. of water, under the most favorable conditions, while the more usual figure for steam consumption is 2½ lb. of steam to 1 lb. of water evaporated. The principal losses in air drying are radiation and escape of unsaturated air, either through the usual vent ducts or by leakage through the kiln walls.

Practically every problem in air processing and drying presents its individual considerations which affect the over-all efficiency of the final installation. The peculiarities of the material to be dried, the allowable temperature and humidities, the most efficient means of handling the material, the speed with which the process must be effected, and the mechanical or physical limitations imposed by the plant conditions themselves are all factors which must be carefully considered in the design of air processing and drying equipment.

It is customary for engineers who specialize in the design of such equipment to treat each problem individually and develop the most efficient for the specific requirements of the client.

REFERENCES

THE AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS TRANSACTIONS, Vol. 22, p. 479; Commercial Drying Apparatus, L. P. Dwyer, Vol. 23, p. 255; Drying by Evaporation, F. R. Still, p. 265; Drying in Industrial Plants, J. O. Ross, p. 339, 511, 529, 537, 545; Food Drying, Vol. 24, p. 7; High Temperature Drying, Burt S. Harrison, p. 25; The Temperature of Evaporation, W. H. Carrier, p. 352; Bibliograph on Food Drying and Dryers, Vol. 26, p. 551; Commercial Dehydration, J. E. Whiteley, Vol. 27, p. 251; Drying as an Air Conditioning Problem, A. W. Lissauer, JOURNAL, AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS, October, 1921, p. 715; A Chronological Survey of Drying and Dryers, J. E. Bolling.

CHAPTER XXVI

DUST, EXHAUST AND COLLECTING SYSTEMS

PNEUMATIC exhaust and collecting systems may be classified in various ways. They may be classified by the economic purpose to be accomplished by the industries served, or by the type of system used.

Classifying exhaust systems by industries served, they fall in subdivisions such as, metal working, woodworking, leather and shoe manufacturing, rubber industry, flint grinding, pottery works, pulverizing works, celluloid manufacturing, printing establishments, felt hatting and fur manufacturing, textile mills, grain and cereal industry, etc.

TYPES OF SYSTEMS

The type of exhaust system to be used is determined by the industry served, kind of material handled, and the work to be accomplished. There are two general arrangements; the central and the group systems. In the central system a single or double fan is located near the center of the shop with a piping system radiating to the various machines to be served. In the group system, which is sometimes employed where the machines to be served are widely scattered, small individual exhaust fans are located at the center of the machine groups.

The group arrangement has the advantage of *flexibility*. It is, however, more difficult to balance than the central, and also the large number of small diameter trunk lines required show a much higher friction loss per foot of length than with the central system where one large main pipe serves a considerable number of machines.

Exhaust systems are also characterized by the means employed to collect the dust or other material handled. The dust or refuse may be collected and controlled by enclosing hoods, open hoods, inward air leakage or general room exhaustion.

With some classes of machinery it is not feasible to closely hood the machines and in these cases open hoods over or adjacent to the machines are provided to collect as much of dust and fumes arising as possible. In this class come such machines as rubber mills, package filling machinery, sand blast, crushers, forges, pickling tanks, melting furnaces, and the unloading points of various types of conveyors.

The open hoods should be placed as close to the source of dust or fumes as possible with due regard to the movements of the operator.

When the hood has to be placed at some distance above the machine it should be large enough to encompass an area of considerable extent as diffusion is usually quite rapid.

Material for this section originally prepared for THE GUIDE by H. M. Nichols, revised by R. E. Shaw, Boston, Mass.