TEMPERATURE AND HUMIDITY CONTROL

Temperature and humidity controlling devices usually act upon the control valves or dampers in the air-conditioning apparatus through the medium of compressed air or electricity. For larger installations pneumatic control practically is universal in use on account of simplicity and reliability; and also on account of the fact that it permits delicate graduation of the movement of the dampers or valves in proportion to the temperature or humidity changes.

In smaller humidifying devices electric controls are very serviceable and reliable. Electricity has an advantage, because with it there are no auxiliaries, such as air compressors, air tanks, air filters, relief valves, etc., required. In the larger systems such accessories are warranted by the greater size of equipment and by the increased number of controls operated from the same compressed air source.

For additional information on this subject, see Chapter 20, Automatic Heat and Humidity Control.

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Chapter 30

DRYING AND PROCESSING OF MATERIALS

Methods of Drying; Types of Dryer Construction; Mechanism of the Drying; Control of the Drying Operation; Dryer Design; Dryer Arrangement and Construction; Experimental Technique.

IN general, *drying* refers to the removal of water or other volatile liquids from gaseous, liquid or solid materials. The term is used in the case of solids where the water or other liquid removed is present in a relatively small amount. In the sense implied in this chapter, drying is the removal of water by vaporization from a non-volatile liquid or solid.

Where the solid material to be dried contains large amounts of free water, the actual drying process is frequently preceded by the removal of part of the water by filtration, settling, pressing, centrifuging, or other mechanical means. Removal of as much water as possible by such methods is usually advisable, as the cost of these operations, per pound of water removed, is in general much less than by vaporization.

METHODS OF DRYING

Classification of Methods According to Heat Supply

Drying methods may be classified basically in accordance with the means by which heat is supplied to the material to be dried. Thus, in some cases, as in *air current dryers*, the heat of vaporization is transferred to the material from the atmosphere surrounding it. In *natural air dryers*, this heat is merely the sensible heat of the outdoor atmosphere; while in so-called *artificial air dryers* heat is added to the air by means of radiators or the addition of a heated gas such as superheated steam or products of combustion, the air being almost entirely displaced by such gases in some drying processes. Where products of combustion can be used, a particularly high overall efficiency of the dryer is possible.

In other types of dryers, known as *contact dryers*, heat is supplied by direct contact between the material and a heated surface such as a pan or shelf, such surfaces being heated by products of combustion, steam, hot water, heated oil, electrical resistance, or latent heat of condensation. In both air dryers and contact dryers, additional heat may be supplied by direct radiation from hot surfaces which are *in sight* of the material. In the *sun drying* of raisins and other fruits, this radiant heat comes from the sun, while in artificial dryers it is derived from heated surfaces such as steam coils.