range is extended appreciably beyond that of the conventional cyclone. Pressure losses of collectors in this group range from 3 to 8 in. water column.

3. *Dry Type Dynamic Precipitator*. In this type, dust is precipitated by centrifugal force upon specially shaped blades of an exhauster wheel, and then conveyed through a dust circuit in the fan casing to the dust storage hopper.

4. *Cinder Catching Fan*. This is a special type of collector in which removal of solids is effected by a slotted scroll. It is a fan unit which is often used for the dual purpose of dust removal and induced draft service.

SETTLING CHAMBERS

While it would be possible in theory to remove dust by settling in a large chamber when conveying velocities are reduced to the point where the particles would no longer be held in suspension, such devices have little practical application in dust collecting equipment. Extreme space requirements and the presence of eddy currents may nullify the effective velocity. The settling chamber type of collector can therefore be used only for removal of extremely coarse particles. Pressure drop should be ¼ to ½ in. water column, plus that necessary to accelerate the air motion to the required conveying velocity at discharge of the settling chamber.

SONIC AGGLOMERATORS

Sonic agglomerators, now in an early stage of development, may prove to be valuable accessories in the dust collecting field. High-intensity sound can be utilized to coagulate low-micron and sub-micron sized aerosols such as smoke, fumes, or very fine dusts into resultant particles which are large enough to be collected efficiently with several of the types of dust collecting equipment previously described.

This high-intensity sound can be created by various means such as piezo-electric crystal generators, magneto-striction units, or high-powered sirens which are practical at present for units with greater air flow capacities.

For effective coagulation, a minimum sound level of 155 to 160 decibels[6, 7, 8] is required. The sound frequencies used are dependent on the size of the particles to be coagulated, and may vary from 1000 cycles per second for larger particles to far into the ultrasonic region for smaller particles. Fairly high dust concentrations, on the order of one grain per cubic foot of gas, are required for effective coagulation. Neither operating temperatures in the range of 0 F to over 1000 F, nor electrical properties of the aerosols,[6] have any apparent effect on agglomeration efficiencies

TESTING METHODS

Methods of determining the performance of industrial air cleaning devices will depend upon the nature of the air contaminant, its quantity, the required accuracy of the test, and the type of air cleaning device. The technics used in collecting the samples are the same as those utilized in the field of industrial hygiene.

The tests may be facilitated by feeding, uniformly, a known amount of the material to be removed. The performance efficiency may be calculated from the amount of material introduced, the quantities of air involved, the amount of material intercepted, and the quantity that escapes. When it is necessary to test the device under actual use, the material entering and leaving must be sampled simultaneously over a sufficiently long period of time to collect an adequate amount for analysis. If feasible, the quantity

of material removed by the cleaning device during the test period should also be determined.

Unusual care must be exercised in collecting the samples to insure that the sampling areas selected are actually representative of the material entering and leaving the cleaning device. With gases, vapors and fresh fumes, this problem is not great. On the other hand, mists, dusts and aged fumes may present considerable trouble. When the material is confined in a duct system, it is common practice to collect the sample along the center line. The sampling tube is located parallel with, and facing, the flow. The sampling velocity should be approximately the same as the air velocity in the duct. With large ducts it may be desirable to make traverse tests to locate an optimum sampling position.

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