the respirable size range that get *through* the filter (*See* Chapter 41, "Industrial Hygiene")

Sporadic attempts have been made for 30 years—at least to set up dust collector ratings and guarantees on the basis of dust counts made on the discharge air stream. They have been cooly received by equipment manufacturers—and for several good reasons. Such a count would depend on the analysis, number-concentration, and size frequency distribution of the incoming dust—all of which vary from plant to plant. The count itself is tedious to make—and inexact as there is no standard method for doing it.

Furthermore, as DallaValle points out, "efficiency" is merely one aspect on which the customer wants assurance. What he really seeks is a "performance rating," which would include not only efficiency expressed in terms of count instead of mass, but also these important factors: rate of resistance buildup, dust-holding capacity, and cleanability (in permanent filters) or "life" (in throwaway types).

No such performance rating has been developed. Whenever his plant purchases an air cleaner, however, the safety professional, if in on the project, should make certain that the vendor agrees to a proper performance guarantee as part of the purchase contract. Always, he should beware of that often misleading word *efficiency*.

A comparison of important filter characteristics of type is given in Table 29-E.

Dust arresters

Dusts are formed by disintegration processes like grinding, crushing, blasting, and drilling. Dusts already formed may be dispersed by the handling, conveying, and dumping of bulk materials, and their weighing, mixing, and packaging. Dust particles range in size from submicroscopic (below 0.5 micron), through the range of dusts most likely to cause lung injury (0.5 to 5 microns for free silica, for example), and up into the standard screen mesh sizes (325 mesh = 40 microns, approximately). Dust, of course, has many meanings. People speak of wood dust, house dust, highway dust, as well as industrial dust—and to some, dust loosely connotes dirt.

Centrifugal collectors. The commonest of all industrial dust collectors, the cyclone, belongs to a class which relies on centrifugal force to throw the dust out of the air stream (Fig. 29-12).

The low-pressure cyclone is a sheet metal cylinder set on top of a cone. Air enters tangentially on the side of the cylinder and swirls around inside, passing downward. It then rises through a center tube and passes out the top of the cylinder. Centrifugal force throws the particles out of the air stream to the bottom of the cone. Advantages are low cost, low maintenance, and low pressure drop (¾ to 1½ in. water gauge). The disadvantage is that the cyclone is incapable of collecting fine particles. In fact, it is only about 75 per cent efficient on particles that are as large as 40 microns. Its big uses are to collect woodworking dust (sawdust, shavings, and chips), paper scraps, bulk materials after being pneumatically conveyed, etc. The cyclone is worthless against dusts of hygienic significance (5 microns and under)—and, in fact, against any dust that remains airfloated for any time at all.

Collecting efficiency increases with increasing pressure drop, which comes from making the diameter of the cyclone smaller. Small diameter cyclones cannot carry large volumes of air, but this disadvantage is overcome if several are put in parallel.

High-efficiency cyclones are made by combining many small diameter, high resistance units. Efficiencies of 75 per cent against 10-micron particles, and 90 per cent against 15-micron particles can be obtained. However, efficiency is negligible against dusts of health importance (5 microns and under). Its pressure drop is high: 3 to 8 in. water gauge. With abrasive dusts, castings or heavy sheet metal of special alloy must be used to allow for the expected excessive wear.

Dry dynamic precipitators are a combined air cleaner and fan in one unit. They have a specially shaped impeller which precipitates the dust by centrifugal force, while inducing air flow. The collection efficiency is about the same as that of the high-efficiency or high-pressure cyclone.

With abrasive dusts, the impeller blades are

(Text continues on page 874.)