

unit air filter varies from $\frac{1}{16}$ in. to $\frac{1}{4}$ in. water gage when clean, depending upon its design, at the rated capacity of 800 cfm. (See Fig. 1). As dust accumulates in any filter of this type, the resistance rises as shown in Fig. 2.

The efficiency of the unit is usually highest after it has accumulated a certain portion of its maximum load of dirt. The dust collected in the cell acts as an efficient medium for the further collection of solids from the air.

In order to maintain a practically constant resistance and air volume a certain number of cells is removed at regular intervals and the dust deposit is cleaned off. The cells are then recharged with the proper viscous liquid and put back in service. By thus progressively cleaning a pre-determined number of cells every week—or every month as the case may be—the resistance and consequent air volume can be held at any desired figure.

Under actual operating conditions, one pound of dust represents about

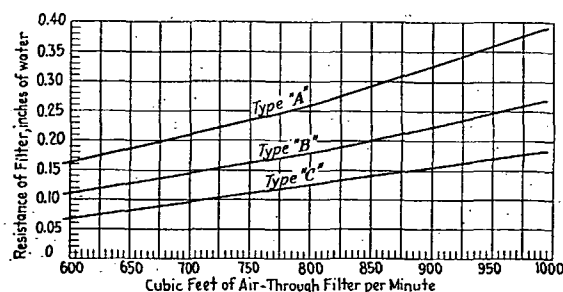


FIG. 1. RESISTANCE TO AIR-FLOW OF A TYPICAL UNIT AIR FILTER

eight weeks of normal service. The resistance of the filter installation shown in Fig. 2, could be held at any point between 0.15 in., the resistance of the clean filter, and 0.27 in., the resistance after accumulating one pound of dust, by cleaning a sufficient number of cells each week to maintain the desired average.

To make sure of proper periodic cleaning of the units the installation of a standard draft gage is recommended. Proper washing, draining and recharging equipment should be installed as convenient to each group of cell filters as possible.

VISCOUS AUTOMATIC FILTERS

The principle of air cleaning used in the viscous automatic filters is the same as in the cell filters. The removal of the accumulated dust, however, is done automatically instead of by hand. The automatic cleaning and recoating of these filters is based on the principle that the viscous fluid itself will perform the cleaning function, thereby eliminating a separate washing agent. The dust collected by the filter thus is deposited finally in the bottom of the viscous fluid reservoir from where it may be removed by different methods, depending on the design of the filter.

There are three general types of automatic filters. They are differentiated from each other according to the process of self-cleaning and renewing of the viscous coating used by each type, as follows:

1. The filter medium has the form of an endless curtain suspended vertically, with its lower portion submerged in a viscous fluid reservoir. The curtain rotates slowly through this bath, thus performing the cleaning and recoating of the filter medium.
2. The filter screen is arranged in the form of shelves or cylinders and the viscous fluid is flushed through all parts of the medium in a direction opposite to the air flow.
3. The filter medium is arranged vertically and is stationary. The viscous fluid is flushed from above over the medium, while the air flow is stopped.

The washing and renewing process in automatic filters usually is intermittent. It is accomplished by an electric motor or by other motive power and is controlled by manual or by automatic timing devices. The operating cycle is of a pre-determined frequency and should be so timed as to insure a constant static pressure drop across the filter. The customary

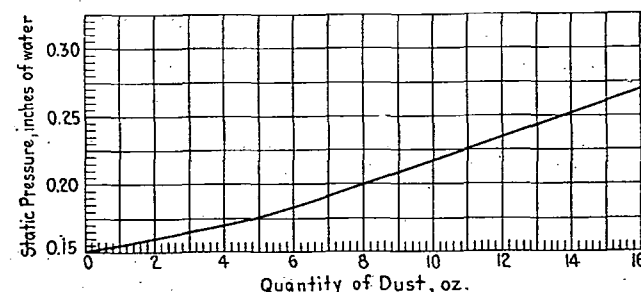


FIG. 2. CHART SHOWING CHANGE IN RESISTANCE DUE TO DUST ACCUMULATION

resistance to air flow is $\frac{3}{8}$ in. water gage at an air velocity of 500 fpm, measured at the filter entrance. Automatic viscous filters are made up in units which are delivered either fully assembled or in parts to be assembled at the point of installation.

DRY AIR FILTERS

Dry-air filters, in which dust is impinged upon or filtered through screens made of felt, cloth, cellulose, etc. are available in various types. These filters require no adhesive liquid, but depend on the straining or screening action of the filtering medium.

Dry-air filters are reconditioned by vacuum cleaning or by vibrating the filter sheets. Practically all of the various types of dry filter media have a definite length of useful life depending upon the nature and strength of the texture. Dry filters, as a class, therefore, differ from the all-metal, viscous type in that their filtering media must be replaced periodically.

Because of the close texture of the filtering media used in most of the dry filters, the surface velocity, or velocity of the air entering the media, is considerably lower than in the viscous types and ranges between