## UNIT VISCOUS FILTERS

Unit viscous filters usually are made up of a number of separate filter units with a frame or frames designed to support them and arranged so that the filter units are easily removed from the frame for cleaning and recharging.

If the unit filters are cleaned "progressively" the resistance and volume of air delivered may be kept practically constant. By cleaning a predetermined number of filters every week—or every month, as the case may be, the resistance and consequent air volume can be held at any desired figure.

Obviously, the resistance and efficiency of a unit air filter of the adhesive impingement type depends upon the velocity at which the air

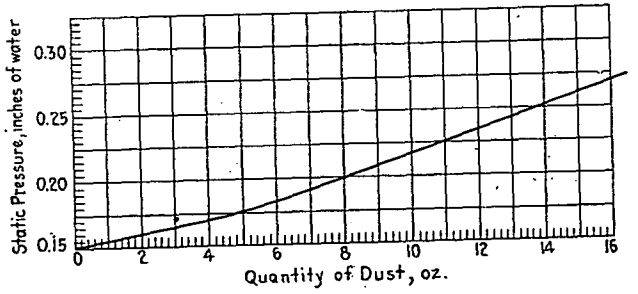


Fig. 2. Chart showing change in Resistance due to Dust Accumulation

is handled and the condition of the unit—that is, whether the unit is clean or dirty.

The efficiency of the unit is usually highest after it has accumulated approximately 75 per cent of its maximum load of dirt—as the dirt and dust accumulated in the cell usually offer highly efficient media for the further collection of solids from the air.

The resistance of the commercial unit air filter of the adhesive impingement type varies from $\frac{1}{16}$ to $\frac{3}{8}$ in. water gage when clean, depending of course upon the design selected. As dust accumulates in the filter, the resistance and cleaning efficiency usually rises, charts Figs. 1 and 2.

Fig. 1 shows the resistance to air flow of a typical unit air filter, which is built in three types, having respectively $\frac{1}{8}$, $\frac{1}{4}$ and $\frac{3}{16}$ in. water gage resistance when operated at a velocity of approximately 365 lin. ft. per minute. Fig. 2 shows the change in resistance due to dust accumulation. Under actual operating conditions one pound of dust represents about eight weeks of normal service. The resistance of an installation of filters under the above conditions could be held at any point between 0.15 in., the resistance of a 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, drying and recharging equipment should be installed as convenient to each set of filter as possible.

## AUTOMATIC VISCOUS FILTERS

Unit air filters have certain limitations in the amount of dirt which can be handled. If the dirt reaches the filter too rapidly, or in such quantities that the adhesive liquid does not have sufficient opportunity to soak through and wet the successive layers, the cleaning efficiency drops off. Removals for unit filter cleansing sometimes prove so frequent as to be objectionable or impracticable.

This fact, and perhaps the age-old effort to eliminate dependence where possible on the human element, brought forth the self-cleaning or automatic viscous filters, several distinct types of which are now available.

In the main these filters are based on the same fundamental principles as unit viscous filters. All utilize the principle of adhesive impingement. Various ingenious arrangements of struts, woven wires or foraminous metal sheets are arranged to move progressively through the bath of charging liquid, the dirt thus being flushed off, while in other types the filter media itself remains stationary, and the charging liquid moves over the dirt-collecting surfaces, flushing off the accumulated dirt at regular intervals, usually once in 24 hours.

## DRY AIR FILTERS

There are now available various types of unit and automatic air filters in which the dust is impinged upon or filtered out through felt, cloth or paper screens. These devices require no adhesive liquid of any kind, but depend on the straining or screening action of the filter media. The filters are cleaned by rapping, by reversing the air flow or by supplying new filter areas.

## EFFICIENCY IN DUST REMOVAL

The comparative efficiency in dust removal of various air-cleaning devices can be determined by means of standardized tests made with air at stated capacities and with dust of definite quantity and quality. There are a number of excellent commercial instruments available for this purpose. The percentage of dust removal for commercial air-cleaning devices should lie between 80 and 98 per cent, and the minimum removal under such conditions should be specified and guaranteed by the manufacturer.

## CODE FOR AIR CLEANERS

A Code for the Testing of Air Cleaning Devices is now being developed by a Committee of the American Society of Heating and Ventilating Engineers and considerable research is being carried on for this work.