

15 • What is the Ringelmann Chart Method of comparing smoke densities?

See Chapter 43. The Ringelmann Chart consists of four cards ruled with lines having different degrees of blackness. These cards, together with a white card and a black one, are hung in a horizontal row 50 ft from the observer. At this distance the lines become invisible and the cards appear to be different shades of gray, ranging from white to black. The observer, by matching the cards against the shades of smoke coming from a stack, is able to estimate the blackness of the smoke as compared with the chart.

Chapter 16

AIR CLEANING DEVICES

Requirements of an Air Cleaner, Types, Air Washers and Scrubbers, Viscous Type Filters, Dry Air Filters, Air Filter Installations

THE removal of impurities from air brought into a building for ventilating or air conditioning purposes is the function of any air cleaning or filtering device. These impurities include carbon (soot) from the incomplete combustion of fuels burned in furnaces and automobile engines, particles of earth, sand, ash, automobile tires, leather, animal excretion, stone, wood, rust and paper, threads of cotton, wool and silk, bits of animal and vegetable matter, bacteria and pollen. Microscopic examination shows that the character of the impurities varies with the locality, but as a rule carbon forms the greater part of them while the total is somewhat proportional to the state of industrial activity and the wind intensity. Additional information on sources of air pollution will be found in Chapter 15.

Observations have shown that practically all atmospheric impurities are less than 5 microns in size. (One micron equals 0.001 millimeter or approximately 0.00004 in.) The size and composition of each individual particle determines its buoyancy and consequently the length of time it will remain in suspension. The chart, Fig. 1, shows graphically the sizes of impurities found in the air, and other related data.

To estimate the probable dust load for air filter installations, the following approximate averages of atmospheric dust concentration may be used (7000 grains equal 1 lb):

Rural and suburban districts.....	0.2 to 0.4 grains per 1000 cu ft
Metropolitan districts.....	0.4 to 0.8 grains per 1000 cu ft
Industrial districts.....	0.8 to 1.5 grains per 1000 cu ft

REQUIREMENTS OF AN AIR CLEANER

To fulfill the essential requirements of clean air, an air cleaner should:

1. Be efficient in the removal of harmful and objectionable impurities in the air, such as dust, dirt, pollens, bacteria.
2. Be efficient over a considerable range of air velocities.
3. Have a low frictional resistance to air flow; that is, the pressure drop across the filter, measured in inches of water, should be as low as possible.
4. Have a large dust-holding capacity without excessive increase of resistance, or have ability to operate so as to keep the resistance constant automatically.
5. Be easy to clean and handle, or clean itself automatically.
6. Leave the air passing through the cleaner free from entrained moisture or charging liquids used in the cleaner.