

The Specific Characteristics of Fans, by M. C. Stuart and J. B. Lusk (A.S.H.V.E. TRANSACTIONS, Vol. 43, 1937, p. 57).

Non-Dimensional Fan Characteristics, by H. Carlton Moore (A.S.H.V.E. JOURNAL SECTION, *Heating, Piping and Air Conditioning*, September, 1937, p. 580).

Fans, by Theodore Baumeister, Jr. (McGraw-Hill).

Fan Engineering, Buffalo Forge Co.

Heating, Ventilating and Air Conditioning, by Harding and Willard, Revised Edition, 1932 (John Wiley & Sons).

The Centrifugal Fan, by Frank L. Busey (A.S.H.V.E. TRANSACTIONS, Vol. 21, 1915, p. 43).

The Theory and Performance of Axial-Flow Fans, by L. S. Marks and J. R. Weske.

The Axial Flow Fan and Its Place in Ventilation, by W. R. Heath and A. E. Criqui (A.S.H.V.E. TRANSACTIONS, Vol. 50, 1944).

The Centrifugal Pumps and Blowers, by A. H. Church (John Wiley & Sons).

Air Cleaning Devices

Air Cleaners, Dust and Lint, Classification of Air Cleaning Media, Viscous Impingement Type Cleaners, Automatic Viscous Filters, Dry Air Filters, Electric Precipitators, Performance and Testing, Selection and Maintenance, Safety Requirements, Adsorption of Vapors

FOR the purposes of this discussion, an air cleaner is defined as a device for capturing and removing solid matter from a stream of air. This solid matter includes fibrous material such as lint as well as particulate matter such as dust, fumes, smoke, cinders, etc. Air cleaning is distinct from air purification in that the latter deals with removal of harmful or unpleasant gases, vapors, or bacteria from an occupied space. Air pollution and purification are discussed in Chapters 10 and 12 and air sterilization in Chapter 13.

In general, air cleaners are not installed in buildings for the specific purpose of improving the health of the occupants. However, the removal of matter such as pollen, house dust and similar allergens which motivate attacks upon persons of allergic sensitivity¹, does have a beneficial effect on health. The toxic elements in some war gases are in reality fine particles capable of air flotation.

It is known by experience that air cleaners greatly reduce the rate of dirt accumulation in buildings, but, in the present state of knowledge, an exact numerical expression for the cleaning effect of the filter cannot be given because of the many unknown or variable factors involved. For this reason air cleaners are usually selected on a basis of experience or judgment, guided by the results of various test procedures.

AIR CLEANERS

A typical air cleaner consists of a frame, which may be of metal, wood, cardboard, etc., and a filtering medium. The frame is designed to support the medium in a duct or chamber forming part of the air conditioning or ventilating system, so that the air passes through the medium while en route to spaces to be ventilated.

Unit Air Cleaners or Filters

Many air cleaners are available in the form of units of convenient size for handling during installation, cleaning or replacement. Such units are usually designated as filters or unit filters. A typical unit filter may be 20 in. square and from one to several inches thick, depending on the manufacture and proposed use. In large systems, a number of such units are installed adjacent to each other and collectively called a bank of filters.

Air cleaners are commonly installed in the outdoor air intake ducts of buildings and, often, in the recirculating air ducts as well. Cleaners are logically placed ahead of heating or cooling coils and other air conditioning equipment in the system to protect them from dust. The character of the dust arrested by the filters in an air intake duct is likely to be mostly particulate matter of a greasy nature, while lint may predominate in dust from within the building.

Settling chambers, air washers and electrostatic precipitators are also