

AMERICAN SOCIETY of HEATING and VENTILATING ENGINEERS GUIDE, 1931

- Determining the Quantity of Dust in Air by Impingement*, by F. B. Rowley and John Beal (A.S.H.V.E. TRANSACTIONS, Vol. 35, 1929).
- Determining Lines of Equal Comfort*, by F. C. Houghten and C. P. Yagloglou (A.S.H.V.E. TRANSACTIONS, Vol. 29, 1923, p. 361).
- Cooling Effect on Human Beings Produced by Various Air Velocities*, by F. C. Houghten and C. P. Yagloglou (A.S.H.V.E. TRANSACTIONS, Vol. 30, 1924, p. 193).
- Practical Application of Temperature, Humidity and Air Motion Data to Air Conditioning Problems*, by F. C. Houghten, W. W. Teague, W. E. Miller (A.S.H.V.E. TRANSACTIONS, Vol. 33, 1927).
- Some Physiological Reactions to High Temperatures and Humidities*, by W. J. McConnell and F. C. Houghten (A.S.H.V.E. TRANSACTIONS, Vol. 29, 1923, p. 122).
- Air Motion, High Temperatures and Various Humidities-Reactions on Human Beings*, by W. J. McConnell, F. C. Houghten (A.S.H.V.E. TRANSACTIONS, Vol. 30, 1924, p. 167).
- Heat and Moisture Loss from the Human Body and Its Relation to Air Conditioning Problems*, by F. C. Houghten, W. W. Teague, W. E. Miller and W. P. Yant (A.S.H.V.E. TRANSACTIONS, Vol. 35, 1929).
- Low Humidity Psychrometric Charts*, by M. C. W. Tomlinson (A.S.H.V.E. TRANSACTIONS, Vol. 25, 1929).

Chapter 27

VENTILATION SYSTEMS

Motive Forces in Natural Ventilation; Natural Ventilation Systems; Mechanical Ventilation Systems; Combined and Split Systems; Upward and Downward Systems of Air Distribution; Inlets and Outlets; Designing a Ventilating System; Equipment for Obtaining Synthetic Air Chart Percentages.

IN the advance of civilization man has changed from an outdoor to an indoor creature. As construction methods have improved, buildings have become *tighter*, and methods of renewing the air in occupied spaces have been developed. Likewise, as the art of creating and maintaining satisfactory atmospheric conditions indoors has progressed, modern systems of air conditioning, which involve the control of temperature and humidity as well as the factors of air distribution and the rate of air change, have become fixed in the lay mind as systems of ventilation. These newer developments are treated in Chapter 29, Air Conditioning of Buildings, whereas this chapter deals primarily with the general methods whereby air change is effected in confined spaces.

Ventilation systems may be classified as *natural* and *mechanical*. Natural systems are those which employ natural forces *only* to bring about the desired air change, whereas mechanical systems are those in which air motion is obtained by mechanical means.

MOTIVE FORCES IN NATURAL VENTILATION

The forces employed in natural ventilation for the displacement of air in buildings, are the wind and gravity. The action of the wind in inducing air change is obvious. In gravity systems the movement of air is produced by the head or pressure difference resulting from the difference in density between the air in ducts or flues and that of the outside air.

If such forces were constant and not variable it would be easy to design satisfactory systems of natural ventilation which would employ the wind or gravity either singly or in unison. Since atmospheric conditions are varying constantly, the results are not readily susceptible of control. Before the necessity for exact control of ventilation was appreciated, and before the methods of exercising such control were discovered or applied, advantage was taken of these natural forces, whenever they were favorable, to improve conditions.

Thus, if the wind is blowing, windows opened on the windward and leeward sides of a room will effect an air change, even though there be no difference in temperature between outdoors and indoors. On the other hand, if appropriate openings for ingress and egress be provided, even