

Air supply is not the all important factor in ventilation, but the amount of air to be supplied per person, or the number of air changes to be furnished for any particular space, may be considered the starting point, for the air supply may be used as a means to an end in providing the conditions desired.

AIR SUPPLY FOR VENTILATION

A comparatively small quantity of air supply is required to take care of the needs of the lungs. A large quantity of air is required to meet the needs of the outside of the body and to provide the heat control necessary for the maintenance of health and comfort. In order to provide the necessary air movement to maintain uniform temperature conditions, remove odors and provide comfort, in spaces of considerable occupancy, the delivery by the ventilating plant of the following quantities of air, have been general practice and Table 1 gives the quantities of air required on the basis of occupancy and air changes:

The laws of many States require 30 cu. ft. of air per minute per pupil in classrooms. At the instance of Investigators who feel that this may be unnecessary, studies of this subject are being made.

TABLE 1. QUANTITIES OF AIR REQUIRED FOR VENTILATION

SCHOOLS:		
Classrooms.....	30 cu. ft. of air per person per minute	
Assembly rooms.....	15 to 25 " " " " " "	
Gymnasiums.....	12 changes per hour.	
Picture Machine Booth.....	30 " " " " " "	
Dining rooms.....	12 to 20 " " " " " "	
Kitchens.....	20 to 60 " " " " " "	
Wardrobes and lockers.....	5 to 10 " " " " " "	
Toilet, Bath, etc.....	10 to 20 " " " " " "	
THEATRES:		
Seating spaces.....	30 cu. ft. of air per person per minute	
Toilets, etc.....	20 to 30 changes per hour.	
HOTELS:		
Assembly rooms.....	30 cu. ft. of air per person per minute	
Dining rooms.....	10 to 20 changes per hour.	
Kitchens and Laundries.....	20 to 60 " " " " " "	
Toilets and Service rooms.....	12 " " " " " "	
HOSPITALS:		
Wards.....	40 to 60 cu. ft. of air per person per minute	
Dining rooms.....	12 changes per hour.	
Toilets and Service rooms.....	12 to 20 " " " " " "	
Kitchens and Laundries.....	20 to 60 " " " " " "	

These quantities assume the introduction of air of proper quality and they may be subject to change as may be indicated by local or special conditions. Many other spaces will be found in which ventilation is required.

See Code of Minimum Requirements for the Heating and Ventilation of Buildings, adopted by A. S. H. & V. E. in 1925, also Chapters XXIV and XXV.

AIR TEMPERATURE

It has been the experience of accredited engineers that overheating is detrimental to the quality of ventilation, and more harmful to human beings, than any other one thing.

Dry bulb temperatures are customarily required as given in Chapter I under Inside Temperatures.

Methods of controlling air temperature in ventilating plants are discussed under Automatic Heat Control, Chapter XVI and Air Conditioning and Cooling, Chapter XXV.

Freedom from injurious substances, such as gases and fumes, may be of the utmost importance. These are handled usually by mechanical exhaust ventilation with effective distribution of inlets to the exhaust ducts. This phase of ventilation involves, in one way or another, nearly all of the other items. See Chapter XXXII Dust, Exhaust and Collecting Systems.

Relative humidity bears an intimate relationship to air supply and air temperature. These relations are described under Physiological Effects of Ventilation in this Chapter.

The effective temperature index fixes no limits for relative humidity. Two practical limits are 30 to 60 per cent, the lower to hold during the winter season and the higher in the summer.

Air motion is most important and is intimately associated with the temperature and humidity, all of which enter into the Comfort Zone term, which has been designated Effective Temperature; as discussed under Physiological Effects of Ventilation.

Air purity has to do with human health, both from the standpoint of freedom from dust and other suspended substances, and from the standpoint of freedom from bacteria and other infectious media carried along with the dirt in air. Methods of cleaning air are treated in Chapter XXIX.

Freedom from odors is often accomplished by plentiful air supply and efficient distribution. In special cases this may be facilitated by other means, among which are Ozone, treated in Chapter XXX of THE GUIDE.

Air distribution is of the utmost importance, and is closely correlated with effective temperature. Chapter XXIV, Systems of Ventilation, has much to do with the effectiveness of air distribution, as also does Chapter XXVIII, Design and Construction of Air Ducts.

VENTILATION DESIGN

In the practical work of engineers who design mechanical ventilating systems, and of architects and owners who have to pass upon these systems, the one item which is the basis of all calculations and layouts, is the quantity of air to be handled by the ventilating system to produce the results desired. The functions of the air handled in connection with ventilated spaces are: (1) to supply the necessary oxygen for respiration, (2) to keep the dilution of objectionable substances down to the proper proportion, and (3) to maintain the proper effective air temperature. It has been estimated that an adult at rest will breathe 0.25 cu. ft. of air per minute and exhale 0.01 cu. ft. of CO in the same period, or at the rate of 0.6 cu. ft. per hour, thus removing about 5 per cent of the