of intersection of the lines. The observed dry bulb and wet bulb is also indicated by an angle (thus L). The difference between the *desirable* wet bulb and the *observed* wet bulb is plotted in the first column of the air chart marked Wet Bulb Difference.

Number and Location of Stations.—The number of stations where samples are to be taken shall be determined from the floor area in the room. One station should be allowed for each 200 sq. ft. of floor space. In no case shall less than four samples be taken. The room should be divided equally into imaginary areas and a station located in the center of each area. All samples are to be taken in the breathing zone which is from 2 to 6 ft. from the floor.

RECORDING THE RESULTS

To illustrate the method of determining the Percentage of Perfect Ventilation, consider the results of a test as given below. The average results in a room are found as follows:

Dry Bulb temperature	72 deg.
Wet Bulb temperature	58 deg.
Air Motion	20 ft. per min.
Physical State	Light work
Dust	10,000 particles per cu. ft.
Bacteria	10 colonies on a 2-min. plate
Odors	90 per cent free from
CO_2	7 parts per 10,000
Other injurious substances	None
Distribution	81.4

These values are now represented on the chart by a 1/8-in. vertical line drawn in the center of each of the respective columns. The proper wet-bulb temperature is determined by noting the point of intersection of the "light work line" and the 20-ft. air motion line; this is 55 deg. wet bulb. Since the actual wet-bulb temperature as determined by the test is 58 deg. then the wet bulb difference is 3 deg. This value is plotted in the first column and the penalization as read in the "$-\%$" portion is $-5\frac{3}{8}$ per cent. For the 10,000 particles of Dust, the penalization is a -1 per cent; for the Bacteria, -1 per cent; for the Oders, $-1\frac{1}{2}$ per cent; for the CO_2, $-\frac{7}{8}$ per cent; for Other Injurious Substances, -0 per cent, and for Distribution, $-5\frac{5}{8}$ per cent. The sum of all these penalizations is $-15\frac{3}{8}$ per cent. Therefore the Percent of Perfect ventilation in the room is $100-15\frac{3}{8}=84\frac{5}{8}$ per cent. This value is then plotted in the last column marked Percent of Perfect.

DETERMINING EQUAL COMFORT LINES

THE sense of warmth experienced by the human body is not due alone to the temperature indicated by the dry bulb thermometer, neither does it depend solely upon the wet bulb temperature. Dry air at a relatively high temperature may feel cooler than air of considerably lower temperature with high moisture content.

Human comfort or discomfort depend largely on body temperature and therefore on the relation between the rate of heat production and dissipation. By the process of metabolism heat is constantly generated within the body, while on the other hand, loss of heat is constantly occurring from the surface of the body by radiation, convection and evaporation. To maintain a constant body temperature the loss of heat must equal the heat produced. It is therefore apparent that any interference with the elimination of heat from the body is accompanied by a rise in temperature and a feeling of discomfort.

There are three principal factors affecting loss of body heat:

1. Temperature.
2. Humidity.
3. Air motion..

As the temperature of the air and surrounding objects rises, the loss of heat by convection and radiation decreases. When the temperature reaches that of the body, the loss by radiation and convection ceases. Finally as the air temperature exceeds that of the body, heat passes from the air to the body.

If on the other hand, the relative humidity is increased the heat loss by evaporation decreases. If while the dry bulb temperature increases, the wet bulb temperature decreases sufficiently, the increase in loss of heat by evaporation may be made equal to the decrease in loss of heat by radiation and convection, resulting in no change in body temperature or comfort.

From the above, it is concluded that there must necessarily exist certain combinations of temperatures and humidities, which produce the same total body heat loss by radiation, convection and evaporation and therefore the same feeling of comfort or discomfort. Lines passing through such air conditions may be called equal comfort lines. The fact is further substantiated by the general experience of heating engineers in observing that the lower the humidity the higher the temperature required for the same degree of comfort.

A series of tests have been made in the two psychrometric rooms of the Research Laboratory of the AMERICAN SOCIETY OF HEATING, VENTILATING ENGINEERS, in order to locate these lines on the psychrometric chart. In making such tests a high dry bulb temperature and low

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