

The corresponding velocities for each of these readings should be determined and an average taken of all of these velocities in order to compute the air quantity. Inasmuch as the velocity varies as the square root of the pressure, accurate results cannot be obtained by averaging the pressure readings and taking the corresponding velocity as the average.

The velocity may be determined from the velocity pressure by use of the formula.

$$V = 1096.5 \sqrt{\frac{P_v}{W}}$$

V = velocity in feet per minute.

P_v = pressure in inches of water.

W = weight of air in pounds per cubic foot under the existing conditions of temperature, barometer and humidity.

With dry air at 70 deg. and 29.92 in. barometer $W = 0.0749$ whence the formula becomes:

$$V = 4005 \sqrt{P_v}$$

With saturated air at 70 deg. and 29.92 in. barometer.

$$W = 0.0735$$

$$V = 4046 \sqrt{P_v}$$

(4) SYNTHETIC AIR CHART

Ventilation Standards and Synthetic Air Chart. Presented at the semi-annual meeting 1917. See A. S. H. & V. E. TRANSACTIONS, Vol. XXIII, p. 607.

The following gives a brief description of the Synthetic Air Chart and method of using same. The form of this Chart has been slightly modified since it was adopted by the Society and the form here presented is the one in use at the present time.

Description of the Chart

The Synthetic Air Chart is designed for measuring the air conditions maintained in a room. Instead of speaking of the ventilation of a room as good, bad or indifferent, the results of tests are plotted on a chart, and the air conditions as a whole determined on a percentage basis. (Fig. 1.)

This is done by plotting test data for all known factors that make up the air conditions. These factors with their proper weights are arranged in vertical columns across the chart.

The base of each column represents ideal conditions, or 100 per cent perfect. The columns are seven in number, and the first six are indicated by the capital letters, A, B, C, D, E, F.

- A = the Effective Temperature Difference, or the amount of variation from the ideal effective temperature.
- B = Dust Particles per Cu. Ft.
- C = Bacteria.
- D = Percentage of freedom from objectionable odors.
- E = Carbon Dioxide, parts per 10,000.
- F = the Distribution Percent.

The last column is the Percent of Perfect column used for plotting the final percentage.

Each of these main columns is further divided into three smaller columns, the center one of which is left blank for recording the test data. To the left of this is the scale for the individual factor, effective temperatures in degrees, dust in particles per cubic foot, carbon dioxide in parts per 10,000, etc. On the right of each central column is the penalization scale. This is arranged with main graduations of 1 per cent which are numbered. Each graduation is further subdivided into 5ths so that the scale may be read to 0.2 of 1 per cent on the scale, or by interpolation to 0.1 per cent.

The chart gives not only final percentage of the test as a whole, but also indicates at a glance which factors are satisfactory and which at fault. In this way it is a convenient guide in correcting bad conditions, and bringing the final percentage up to the point desired.

Making the Test

In making a Synthetic Air Chart test the observer first divides the room by imaginary lines into small sections, each section having an area of approximately 200 sq. ft. of floor space. He locates an observation station in the center of each section. Taking a

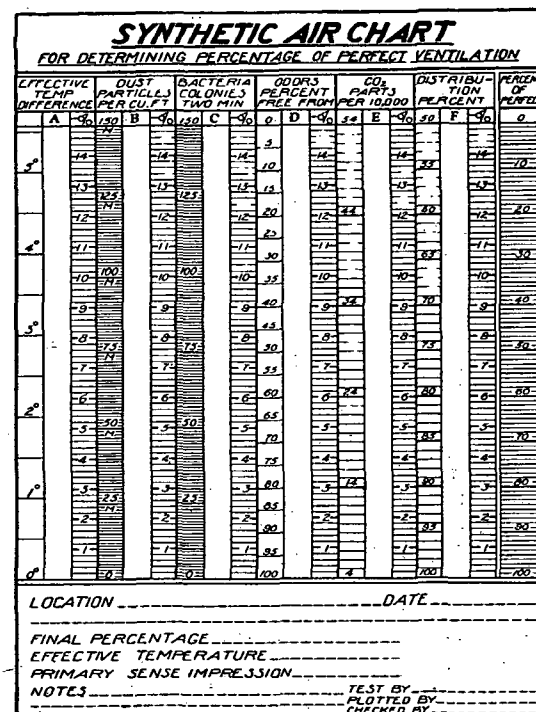


FIG. 1. SYNTHETIC AIR CHART

school classroom for example, the room should first be divided into four equal rectangular areas by imaginary lines bisecting at right angles through the center of the room. (See Fig. 2.) Four stations are now selected, one at the center of each rectangle. These stations are numbered 1, 2, 3 and 4. It is always well to use a standard method of numbering stations, so that whoever reads the report can visualize each location.

Standing at the rear of the room facing the teacher's desk No. 1 is the station nearest the teacher at her right. No. 2 is the one directly back of No. 1. No. 3 is the station nearest the teacher at her left, and No. 4 the remaining station.

The tests are conducted in the following manner:

Column A.—A Psychrometer reading is taken at each station beginning with 1, following with 2, 3 and 4. The wet and dry bulb readings are separately recorded on the data sheet, Fig. 3, for each station.