

The tests are made at the center of each area so determined and the results plotted in the proper columns on the chart. Wet and dry bulb readings are first taken and air motion determinations made to determine the effective temperature. The difference between the effective temperature, so determined, and the ideal effective temperature, as shown by the comfort chart, is plotted in the first column.

Dust determinations are next made and the results plotted in the second column, and so on until all the observations have been made. When all the factors have been plotted as a shaded area in each column, a straight edge is laid across the chart and the penalization for each factor as determined by the height of the column on the shaded area is read from the scales on the border. The sum of all penalization factors is subtracted from 100 to obtain the final percentage of perfection of the ventilation as it appears in the last column.

CONDITIONS OF MAXIMUM COMFORT

Temperature Humidity and Air Motion.—A person's feeling of warmth is determined, by the temperature, humidity and motion of the air. A single index of a person's feeling of warmth is given by a scale of effective temperature, which takes into consideration these three factors. This scale of effective temperature (abbreviated E. T.) has been determined by the Society's Research Laboratory and is discussed in Chapter XVIII. For the average human being at rest an effective temperature of 64 deg. gives maximum comfort. Persons working at various rates are most comfortable at effective temperatures below 64 deg. The exact effective temperatures giving maximum comfort for persons working at various rates have not yet been determined by the Research Laboratory but from the best data available, they are as follows:—

At rest.....	64 deg. E. T.
Light Work.....	62.5 deg. E. T.
Moderate Work.....	62 deg. E. T.
Hard Work.....	59.5 deg. E. T.

One hundred per cent perfection in ventilation, for people at rest exists when the effective temperature is 64 deg. Life is impossible for any considerable length of time in an effective temperature of 97½ deg. and a condition having this effective temperature is therefore, rated zero per cent perfect, is penalized 100 per cent as regards this factor and 90 per cent for imperfection in ventilation. The penalization for variation in temperature from the ideal is therefore 3 per cent per deg. E. T. It will be noticed that this will give zero per cent perfection for 31 deg.—a condition nearly impossible for life for a person normally clothed and at rest.

Dust.—Dust is inimical to health and comfort. It is, however, more difficult to arrive at a basis of penalization since it is hard to say that any degree of dustiness is impossible for life. Dust-free air is 100 per cent perfect and 250,000 particles per cu. ft. of air as determined by the Hill counter is considered zero per cent perfect, or is penalized 100 per cent as regards the dust factor and 25 per cent for imperfection of ventilation. The percentage of perfection is reduced by 1 per cent for each 2500 particles.

FIG. 3. TAKING WET AND DRY BULB TEMPERATURE READINGS WITH PSYCHROMETER



FIG. 4. TAKING A DUST SAMPLE

Odors.—In the case of odors it is even more difficult to arrive at a basis for penalization. The following scale has been adopted:—

Free from odor.....	100 per cent perfect
Very faint odor.....	95 " " "
Faint odor.....	90 " " "
Noticeable odor.....	85 " " "
Distinct odor.....	80 " " "
Decided odor.....	75 " " "
Strong odor.....	70 " " "

Penalization for imperfection of ventilation is 0.15 of that for the odor factor.

Bacteria.—All bacteria are not harmful and some may be desirable; the number of bacteria in the air generally indicates the surrounding sanitary condition. According to the synthetic air chart, the percentage of perfection depends upon the number of bacteria in the air as determined by the number of colonies that develop on a culture plate which has been exposed for two minutes. A standard 4 in. Petrie dish, with agar-agar for a media, is used for this purpose. The plates are incubated from 24 to 48 hours at a temperature of 98 deg. fahr. At the end of this time the separate colonies have developed to a size which are easily