

A series of tests have been made in the two psychrometric rooms of the Research Laboratory of the AMERICAN SOCIETY OF HEATING and VENTILATING ENGINEERS in order to locate these lines on the psychrometric chart. Complete reports of these studies for both still and moving

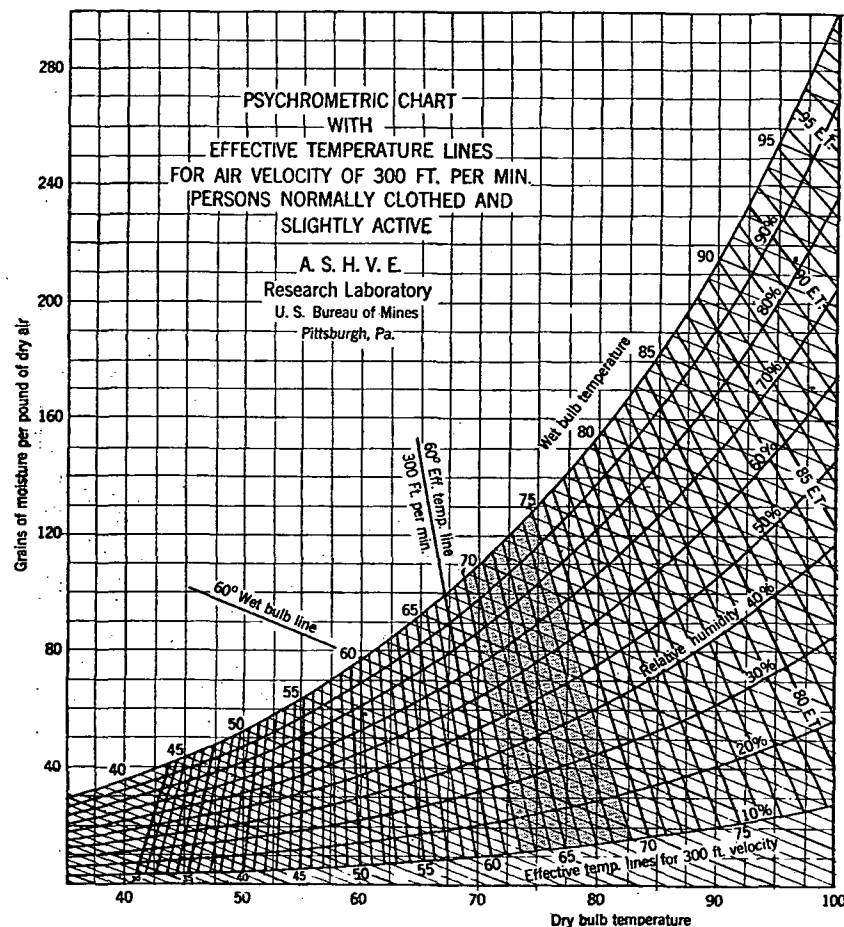


FIG. 3. PSYCHROMETRIC CHART WITH EFFECTIVE TEMPERATURE LINES FOR 300 FT. AIR VELOCITY. (SHADED AREA INDICATES THE COMFORT ZONE)

air are reported in the Society's TRANSACTIONS, Vols., 27-32 inclusive, and in the JOURNALS for 1926 and 1928.

The relation of temperature and humidity to comfort for persons normally clothed and at rest in still air, is given in Fig. 1, while the effect of air motion upon comfort or effective temperature for persons normally clothed is given in Figs. 2, 3 and 4.

HOW TO USE THE COMFORT CHARTS

In the Psychrometric Chart, Fig. 1, dry-bulb temperature is plotted as abscissae and grains of moisture per pound of dry air as ordinates. The maximum moisture which the air can hold at various temperatures gives the saturation, or 100 per cent relative humidity curve. Relative humidities between 0 and 100 per cent are given by a series of curved lines similar to the saturation curve. The wet-bulb temperatures for all atmospheric conditions are given by a series of nearly parallel oblique lines. Effective temperature is given by a series of oblique but not parallel lines which approach being parallel to the wet-bulb lines at high temperatures and humidities, and to the dry-bulb lines at low temperatures. The numerical values of the wet-bulb and effective temperature lines are given by the dry-bulb temperatures at their intersection with the saturation curve.

Dry-bulb temperature is the temperature of the air as determined by an ordinary dry-bulb mercury thermometer.

Wet-bulb temperature is the temperature as determined by a similar thermometer, except with its bulb encased in a fine mesh fabric bag moistened with clean water and whirled through the air until the temperature depression due to the cooling effect of evaporation from the moistened bag reaches equilibrium.

The conditions of comfort as shown by these charts are primarily for winter-time conditions in relatively cold climates, and what is hereinafter said relative to these charts pertains to such conditions. The conditions of indoor comfort corresponding to summer-time conditions or to conditions in the warmer climates are somewhat different. For data pertaining to this subject, see Inside Temperatures, Chapter 2, pp. 6 to 9.

Wet-bulb temperature corresponds to that which a thoroughly wet body will attain if the air passes over it for a sufficient length of time and with a high enough velocity. A person's body is not thoroughly wet and hence does not react entirely in accordance with either the dry or the wet-bulb temperature. At high temperatures when the body is moist with perspiration, it reacts more nearly in accordance with wet-bulb temperature; while at low temperatures when the body is comparatively dry, it reacts more nearly in accordance with the dry-bulb temperature.

Definition of Effective Temperature

Effective temperature is an experimentally determined scale which unlike the dry-bulb and wet-bulb scales is a true measure or index of a person's feeling of warmth in all combinations of temperature, humidity, and air motion. In other words, for any one given effective temperature a person will feel the same degree of warmth or coldness regardless of the dry-bulb temperature, wet-bulb temperature and velocity of the air required to produce that particular effective temperature.

The psychrometric charts for moving air (Figs. 2, 3 and 4), differ from the chart for still air (Fig. 1) only in that the effective temperature lines for any particular degree do not intersect the dry-bulb, wet-bulb or dew-point temperature lines at the same degree on the saturation or 100 per cent relative humidity curve; but are removed to the right so that the effective temperature for any dry and wet bulb temperature is lower