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Ames Research Center



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Psychrometric Chart for Physiological Research

The problem:

To facilitate the use of graphical techniques for solving problems involving the thermodynamic properties of moist air. Previously, charts designed for engineering applications were used, and were supplemented by the conversion of units from the engineering system to the metric system.

The solution:

A chart which incorporates the standard system of units formulated for thermal physiology.

How it's done:

The chart shows graphically the quantitative interrelationships among the thermodynamic properties of a given sample of moist air. Only those items of interest to physiologists are presented, and each item is carefully defined.

The coordinates are standard for a psychrometric chart. The ordinate is the humidity ratio scale, and the abscissa is the dry bulb temperature scale. The properties presented, and their units of measurement, are as follows:

- (1) Humidity ratio grams water per gram dry air
- (2) Dry bulb temperature Celsius
- (3) Water vapor pressure millimeters of mercury
- (4) Dew point Celsius
- (5) Wet bulb temperature Celsius (Wet bulb lines are identically equal to sigma function lines.)
- (6) Enthalpy joules per gram of dry air (The

scale is shown, but the lines are not drawn. For easier reading, the wet bulb temperature lines are used and a correction is applied from the enthalpy deviation curves.)

- (7) Specific volume liters per gram of dry air
- (8) Relative humidity percent
- (9) Sensible heat factor dimensionless
- (10) Moisture ratio joules per gram.

The most useful chart is the one which presents conditions at the standard atmosphere pressure at sea level. Similar charts can be constructed for any desired total pressure.

Reference:

Chambers, A. B.: A Psychrometric Chart for Physiological Research. *J. Appl. Physiology*, vol. 29, no. 3, 1970, p. 406.

Note:

Requests for further information may be directed to:

Technology Utilization Officer
Ames Research Center
Moffett Field, California 94035
Reference: TSP71-10470

Patent status:

No patent action is contemplated by NASA.

Source: A. B. Chambers
Ames Research Center
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