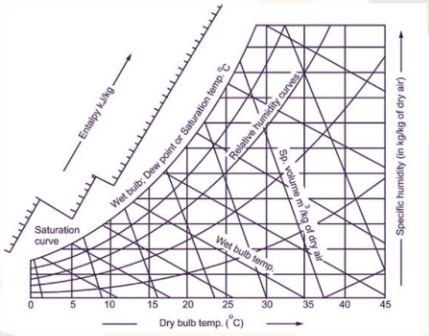
Psychrometric Chart in HVAC Design – *Part 1*

Psychrometric is a science that examines the thermal properties of humid air and studies the effect of ambient air humidity on air and human comfort. In many Heating, Cooling and Air-Conditioning (HVAC) processes, the existing air undergoes many energy changes. These changes in energy result from changes in temperature and humidity. The relationships between temperature, humidity and energy can be easily understood using a graphical representation called "**Psychrometric Chart**".

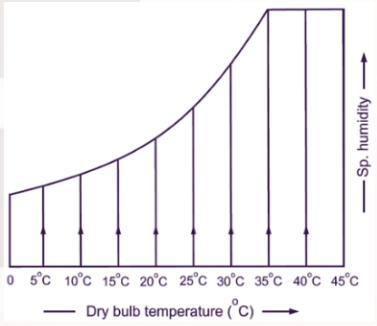
A psychrometric chart is a standard tool in the HVAC industry that is used to visualize the internal relationships between dry air, humidity, and energy. The use of psychrometric chart allows graphical analysis of psychrometric data and processes. If you are responsible for designing or maintaining any part of the HVAC system, a clear and easy-to-understand diagram will make your job easier.



The information in the psychrometric chart is as follows:

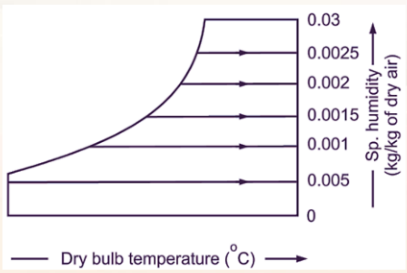
- Dry-Bulb Temperature - DBT

The dry bubble temperature is usually referred to as the air temperature in a normal state, which can be measured with a normal thermometer and away from radiation. This temperature expresses the amount of sensible heat of the air and is located at the bottom of the psychrometric chart on the horizontal axis.



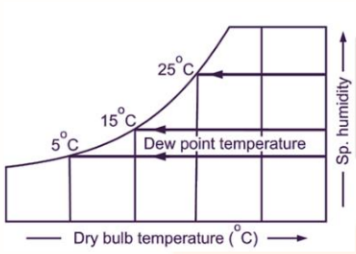
- Specific Humidity - W

The humidity ratio is the ratio of the mass of water in one kilogram of dry air, which is on the right side of the psychrometric chart on the vertical axis.



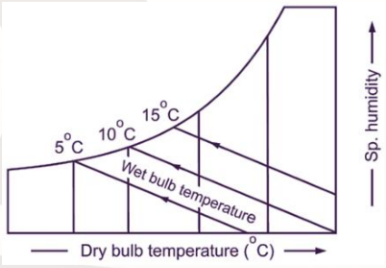
- Dew Point Temperature - DPT

The dew point temperature is the temperature at which the moisture in the air begins to condense or, in other words, condense. In other words, the dew point temperature is the temperature at which moist air must be cooled in order for its humidity to reach the saturation level (in other words, the relative humidity at the dew point temperature reaches 100%). The dew point temperature shows the humidity in the air and is the best indicator to reach comfortable conditions. The dew point temperature is read on the curve on the left side of the psychrometric diagram (or saturation curve).



- Wet-Bulb Temperature - WBT

The wet bulb temperature is the lowest temperature that can be reached by evaporation of water, as read by an ordinary bulb thermometer wrapped in a moist wick. The wet bulb temperature is mainly determined by the actual air temperature (dry bulb temperature) and the amount of moisture in the air (relative humidity). At a relative humidity of 100%, the temperature of the wet bubble is equal to the temperature of the dry air. When the relative humidity of the air is low, the temperature of the wet bubble must be lower than the temperature of the dry bubble, but higher than the dew point temperature. The lower the relative humidity, the greater the distance between these three temperatures will be. The wet bulb temperature is read as diagonal lines on the psychrometric chart.



- Specific Enthalpy - h

Enthalpy is one of the common thermodynamic quantities that is equal to the total amount of heat inside the system. Specific enthalpy is the amount of this energy per unit mass, which in more precise definition is the amount of heat that must be given to the unit mass of dry air to reach the desired temperature from zero degrees Celsius. In the metric system, the special enthalpy unit is kilojoules per kilogram of dry air. Enthalpy cannot be measured directly, but its changes can be measured. If the external pressure is held constant, a change in enthalpy requires a change in internal energy plus a change in the internal volume of the system.