Humidity / Dampness Measurement

Introduction:

The amount of water vapour contained in air or gas is called as humidity. This humidity affects human comforts and many industrial process as in case of chemical industries, garments industries, paper industries, food industries, leather industries, pharmaceutical industries, precision equipment manufacturing, etc. hence, study of humidity is important. Let us define some common terms related to humidity measurement.

Humidity

The amount of water vapour contained in air or gas is called as humidity. It is usually measured as absolute humidity, relative humidity or due point temperature.

Dry air

When there is no water vapour contained in the atmosphere, it is called dry air.

Moist air

When there is water vapour present in the atmosphere, it is called moist air.

Saturated air

Saturated air is the moist air where the partial pressure of water-vapour equals the saturation pressure of steam corresponding to the temperature of air.

Absolute humidity

It is the mass of water vapour present per unit volume. In other words, it is the quantity of the water vapour present in air and its unit is grams per cubic meter of air.

Relative humidity RH

Relative humidity = (water vapour pressure actually present)/(water vapour pressure

required of saturation) at a given.

Here a comparison is made between the humidity of air and humidity of saturated air at the same temperature and pressure.
It should be noted that if relative humidity is 100%, it is saturated air. That is, the air contains all the moisture it can hold.
It should also be noted that the degree of saturation (percentage of relative humidity) of air keeps on changing with temperature.

Humidity ratio or specific humidity

For a given volume of air water vapour mixture,

Humidity ratio = (mass of water – vapour)/mass of dry air

Dew point temperature

By continuous cooling at constant pressure if the temperature of air is reduced, the water-vapour in the air will start to condense at a particular temperature. The temperature at which the water vapour stats condensing is called as dew point temperature.

Dry-bulb temperature

When a thermometer bulb is directly exposed to an air-water vapour mixture, the temperature indicated by the thermometer is the dry-bulb temperature.
This dry-bulb temperature is not affected by the moisture present in the air, that is, the temperature of air is measured in a normal way by the thermometer.
The dry bulb is used to distinguish the normal temperature measured from the temperature measured by the wet-bulb.

Wet-bulb temperature

When a thermometer bulb is covered by a constantly wet wick, and if the bulb covered by the wet wick is exposed to air-water vapour mixture, the temperature indicated by the thermometer is wet-bulb temperature.

When air is passed on the wet wick present on the bulb of the thermometer, the moisture present in the wick strats evaporating and this creates a cooling effect at the bulb. The bulb now measures the thermo dynamic equilibrium temperature reached between the cooling effected by the evaporation of water and heating by convection.

Wet-bulb depression

Wet-bulb depression = (dry bulb temperature) – (wet bulb temperature)

Always dry-bulb temperature is higher than the wet bulb temperature.

Percentage humidity

Percentage humidity = weight of water vapour in a unit weight of air/ weight of water vapour in same weight of air if the air were completely saturated at the same temperature.

Source:

http://instrumentationandcontrollers.blogspot.in/2010/12/humidity-dampness-measurement.html