Psychrometry

Branch of engg science which deals with study of Moist air i.e dry air mixed with water vapours or humidity.

Psychrometric Terms:-

Dry Air:-

Pure dry air is a mixture of a # of gases such as N_2, O_2, CO_2, H_2, Ar, Ne, He etc.
Maj portion

Moist Air:

Mix of Dry Air and water vapours

Amount of water vapour present in the air depends upon Absolute pr and Temp of the Mixture.

Saturated Air:-

Mixture of dry air and water vapour, when the air has diffused the maximum amount of water vapours into it.

Degree of Saturation:-

It is the ratio of actual mass of H_2O vapour in a unit mass of dry air to the mass of H_2O vapour in the same mass of dry air when it is saturated at the same temp.

Humidity: (W)

Mass of H_2O vapour present in 1 kg of Dry air.
g/kg of Dry air, Specific Humidity or Humidity ratio.

Absolute Humidity:

Mass of H_2O vapour present in $1 m^3$ of Dry air.
(g/m^3 of Dry Air)

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Relative Humidity:- (RH)

The ratio of actual mass of water vapour in a given volume of moist air to the mass of water vapours in the same volume of saturated air at the same temp & pressure.

Dry Bulb Temp:- (DBT)

Temp of air recorded by thermometer, when ~~the~~ it is not affected by the moisture present in the air.

Wet Bulb Temp:- (WBT)

Temp " " " " " "

its bulb is surrounded by a wet cloth exposed to air.

<u>Wet Bulb Thermometer</u>

Wet Bulb Depression:-

Difference b/w DBT and WBT at any point.

Wet Bulb Depression indicates RH of air.

How we measure the DBT and WBT

Devices which is used to measure DBT and WBT are

→ Lab Psychrometer

→ Aspiratedly "

→ Sling Psychrometer

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Dalton's Law of Partial Pressures

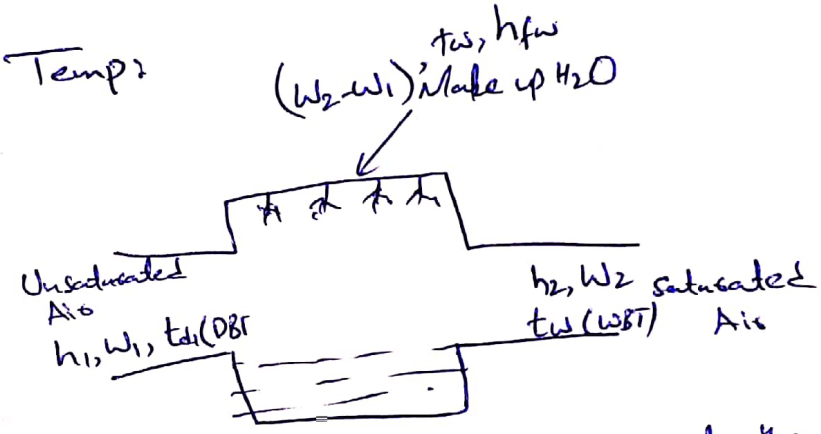
The total pressure exerted by the mixture of air and water vapour is equal to the sum of the pressures which each constituent will exert, if it occupied the same space by itself.

$$P_b = P_a + P_v$$

P_b → Barometric Pressure, P_a → Dry Air, P_v → water vapour

Adiabatic Saturation Temp:

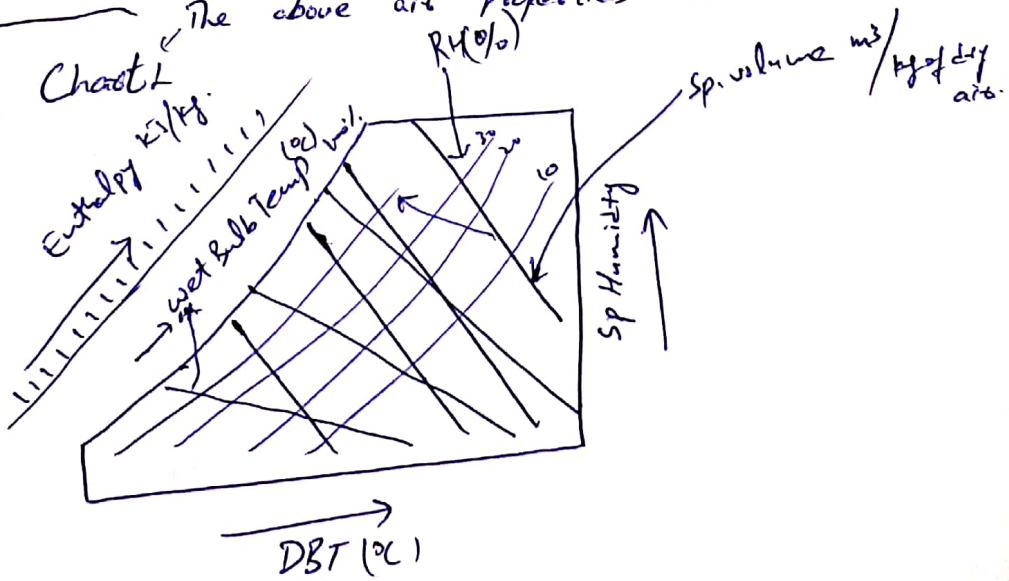
It is also known as thermodynamic Wet Bulb Temp



Adding the moisture in unsaturated air until air becomes saturated, adiabatically, by the evaporation of H_2O into the flowing air.

Psychrometric Chart

The above air thermodynamic properties are found as follows



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Enthalpy of Air.

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Heat

There are two types of Heat

Sensible Heat of Air

Quantity of heat that can be measured by measuring the DBT of Air.

Total heat of Air.

It is measured by measuring the WBT of Air

Air Conditioning (A/C)

Condition the air for providing the comfort for human beings.

Comfort Zone

Temp Range — 22–27°c

Relative Humidity — 35%–65%

Area of psychrometric chart bounded by comfort conditions

A/C Processes

1. Sensible heating
2. " Cooling
3. Humidification
4. Dehumidification
5. Cooling with Dehumidification
6. Heating with Humidification
7. Evaporative Cooling.

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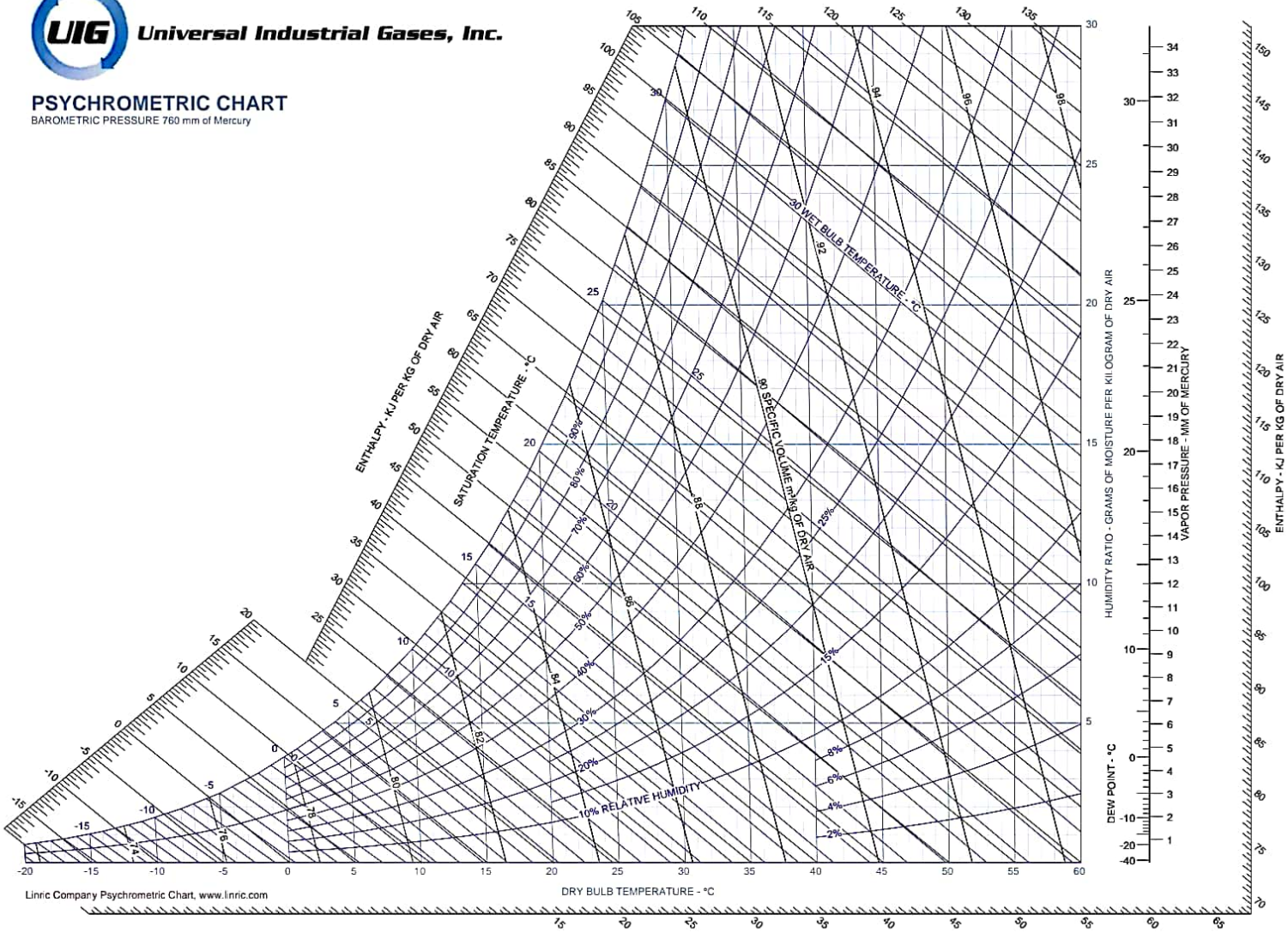
Universal Industrial Gases, Inc.

PSYCHROMETRIC CHART

BAROMETRIC PRESSURE 760 mm of Mercury



Linric Company Psychrometric Chart, www.linric.com

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