



RACHP Engineering Technicians Section Fundamentals and Theory series 7 (Revised June 2021)

Introduction to Psychrometry

Psychrometric charts help us to understand how air behaves when it is cooled. They can be used as a tool for the analysis and design of air conditioning and ventilation systems. They are also helpful in equipment selection for new systems and as a fault finding tool for existing systems.

What is a psychrometric chart?

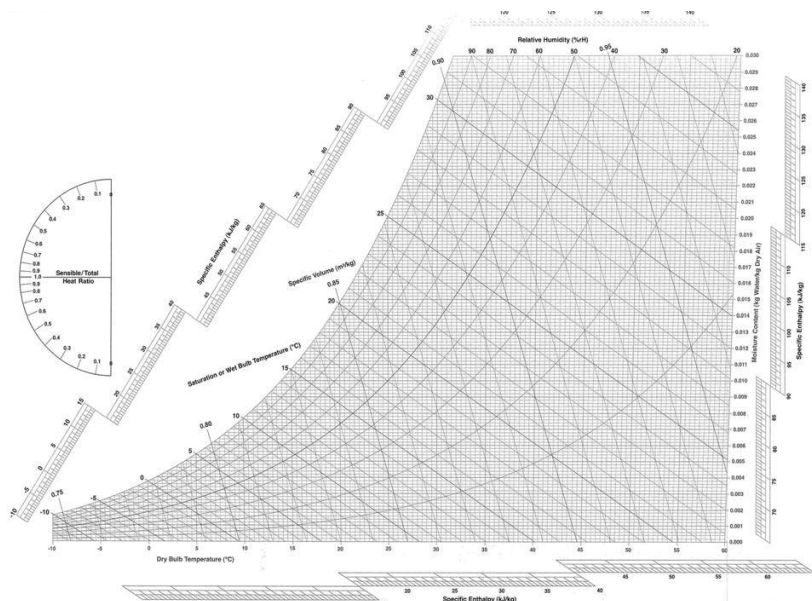
This is basically a graph, on which you can plot the properties of moist air. The lines of the graph show constant dry bulb temperatures, wet bulb temperatures, enthalpies, percentage saturation, moisture content and specific volumes.

The resulting chart gives all the properties of air on a single sheet. This helps the engineer to make air conditioning calculations and makes it possible to plot lines showing at a glance the changes in the condition of air as it passes through various processes.

A sample chart is overleaf with more sources of charts and explanation of terms.

Some potential uses of psychrometric charts

- Provide definitions and explanations of the operating characteristics of cooling coils.
- Determine the coil entering and leaving conditions and the air quantity required in order to meet the specific room conditions.
- Check the coil performance figures against the calculated loads.
- Calculate the re-heat capacities required for low sensible heat factor applications.
- Calculate the heating and humidification requirements for air conditioning systems.
- Determine the pre- and re-heat requirements for full outside air evaporative cooling systems.



Sample psychrometric chart — see overleaf for more sources of charts

Glossary of terms

Dry bulb temperature

The actual temperature of the air as measured by an ordinary thermometer.

Relative humidity or % saturation

Although different these terms are often inter used and relate to the amount of moisture actually contained in a sample of moist air compared to the amount of moisture the sample could hold if it were completely saturated with moisture at the same temperature.

Specific enthalpy

In this context; the total heat content of a sample of moist air per kg of its mass.

Saturation

Point at which a liquid in contact with its vapour.

Wet bulb temperature

Is measured by a wet bulb thermometer (an ordinary thermometer the bulb of which is wetted by surrounding it in a sheath of muslin kept wet by pure water).

Specific volume

The volume of unit mass of dry air plus its associated water vapour.

Sensible heat ratio

Ratio between the sensible heat load and total load (ie sensible heat plus latent heat)

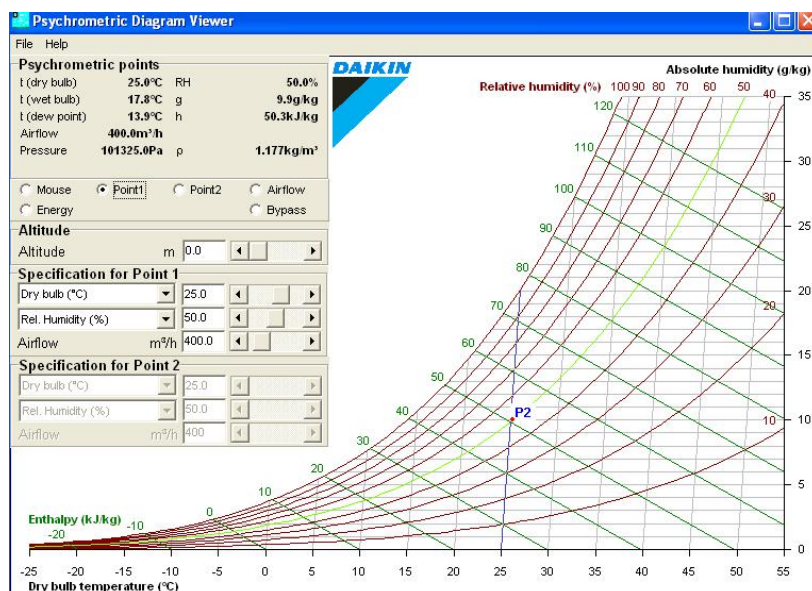
Moisture content

The quantity of moisture in kg contained in a sample of moist air per kg of dry air.

Where to obtain psychrometric charts

A recent online search for charts showed several possible sources including:

- <https://www.cibse.org> (A3 charts to purchase)
- ASHRAE Psychrometric Chart #1 (SI)
- <http://www.linric.com> (software to purchase)



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