Information Sheet for Damage Management Technicians

BRITISH DAMAGE MANAGEMENT ASSOCIATION

THE PROCESS OF DRYING – Humidity (Part 3 of 3)

This third and final information sheet in the 'science of drying' series looks at how evaporated moisture is measured

HUMIDITY plays an important role in damage management restorative drying and the amount of moisture in the air will directly affect the amount of moisture in materials and vice versa.

Humidity also influences the rate at which materials will gain or lose their moisture and the relationship, between moisture in the air (humidity) and moisture in material, is both relative and specific.

Humidity is the amount of water vapour in the air, expressed through two different definitions – Relative Humidity (RH) and Specific Humidity (SH), which is sometimes referred to as Absolute Humidity (AH).

Relative Humidity is defined as the ratio of the actual pressure of water vapour in a gaseous mixture of air and water vapour, at a given temperature, compared to the vapour pressure of water at saturation point. In other words, RH is the amount of water vapour which is in the air at a specific temperature, expressed as a percentage, compared to the maximum amount of water vapour the air could hold at that temperature without the water condensing.

Specific Humidity is the quantity of water in a specific volume of air. This is most commonly described in grams per kilogram of water in a cubic meter of air, although any mass unit and any volume unit could be used. Pounds per cubic foot are common in the U.S. and occasionally units mixing the imperial and metric systems are used.

If all the water in one cubic meter of air were condensed into a balloon, the balloon could be weighed to determine the exact amount of humidity within that cubic metre of air. Therefore the amount of water vapour in that cube of air is the specific/absolute humidity of that cubic metre of air. Hence the term Specific Humidity (SH), which is widely used in the damage management industry. This can also be referred to as Absolute Humidity (AH).

More technically, Specific Humidity on a volume basis is the mass of dissolved water vapour (m_w) per cubic meter of total moist air (V_{net}), thus:

$$SH = \frac{m_w}{V_{net}}$$

Associated with Relative Humidity is Dew Point (referred to as the frost point if it is below freezing). The Dew point is the temperature at which water vapour saturates from an air mass into liquid or solid. Dew point occurs when a mass of air has a Relative Humidity of 100%. This happens in the atmosphere as a result of cooling through a number of different processes, usually forming rain, snow, frost, or dew.

The air's capacity for moisture increases as the temperature increases. Changes in temperature will therefore change the Relative Humidity, so the same amount of moisture will represent a smaller percentage of the total capacity. Thus Relative Humidity will decrease as the air temperature increases.

The opposite is also true. As the air temperature decreases the same amount of water will represent a greater percentage of the total capacity, so Relative Humidity will increase as the air temperature decreases.

However if no evaporation is taking place then any air temperature increase or decrease does not affect the Specific Humidity as this remains constant.

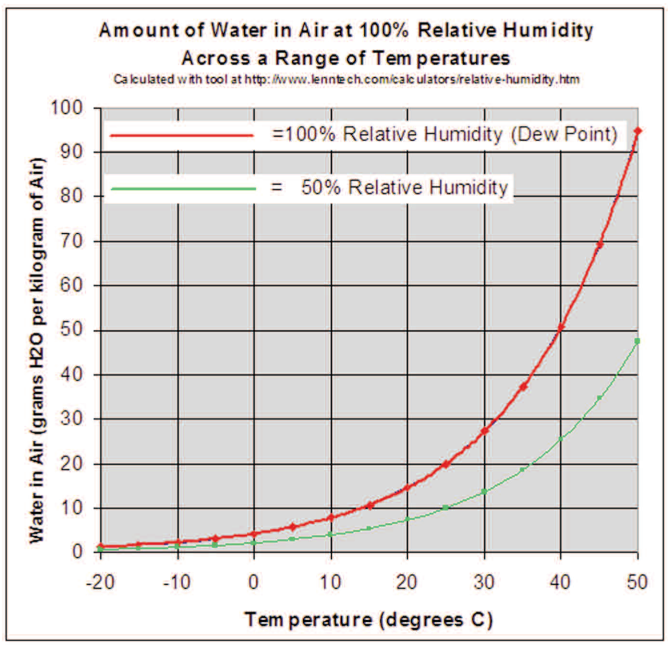


Chart shows Relative Humidity compared to the Dew Point across a range of temperatures

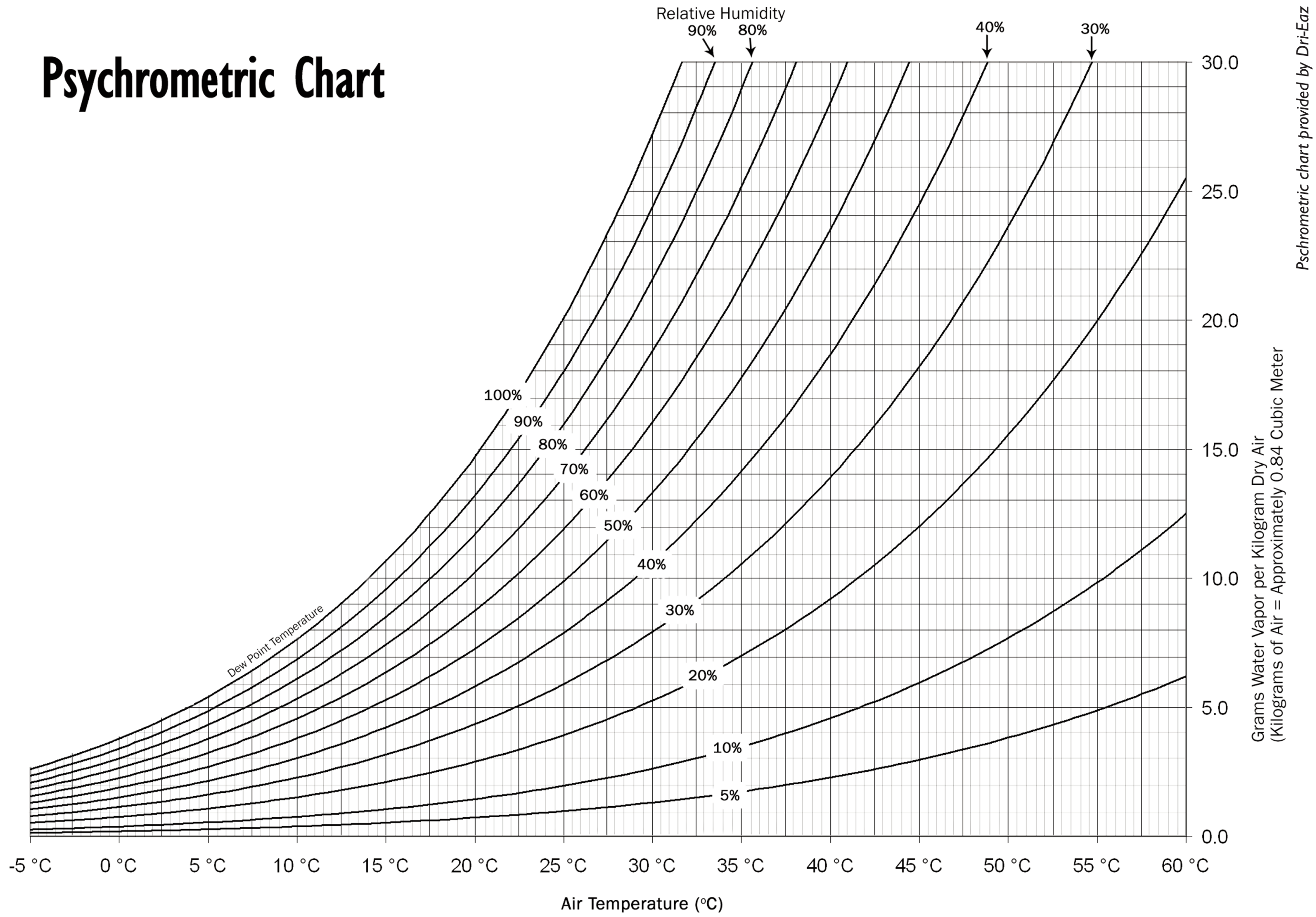
MEASURING HUMIDITY

Damage management technicians can use 'Hygrometers' to measure the amount of humidity in the air, but humidity levels alone do not give them all the information they need.

To be able to more accurately use the humidity information, temperature is also taken, with an instrument called a 'Thermo-hygrometer'.

These measurements are recorded on a Psychrometric chart, where other information such as Specific Humidity, dew point and vapour pressure can also be plotted using the temperature and humidity readings.

Psychrometric Chart



The information gained from the Psychrometric chart helps assist the Damage Management technician in his or her decision making on the type of drying process required and ultimately what results are being achieved by the drying process installed.

CONCLUSION

The use of Psychrometrics in the damage management industry is important in making the correct decision on what drying regime is appropriate in order to achieve the most efficient drying time. Psychrometrics also enables the effects of the drying regime to be measured once installed.

It is an important tool in the drying process and, when understood and used properly, can assist the damage management company to ascertain when and if the drying regime needs to be adjusted or changed, thus maintaining drying efficiency at all times.