

## TECHNICIAN'S ADVISORY

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### THE CHALLENGES OF INTERPRETING RELATIVE HUMIDITY MEASUREMENTS

**M**any water damage technicians regard Equilibrium Relative Humidity (ERH) as a reliable moisture measuring method. Recommended target moisture levels for floor screeds in British Standards, such as BS8203, are given as an ERH value.

#### WHERE DO WE BEGIN?

We can measure the ERH within hygroscopic material by measuring the Relative Humidity (RH) of a small pocket of air, within the material, or on the surface. The moisture content of a screed, for example, can be inferred by measuring the ERH within a hole drilled below the surface or in a surface mounted box fixed to the screed surface.

Always remember, it's essential that you allow sufficient time for equilibrium to be reached – about 2-4 days.

While you can infer the moisture content, in order to comply with the British Standards you only need to know the ERH of the material.<sup>1</sup>

So imagine that you set up your measuring points, you allow enough time to equilibrate and you return to site to take a set of RH readings. What level of trust can you have in the accuracy of those readings? Will they be Equilibrium Relative Humidity values?

#### UNDERSTANDING THE CHALLENGE

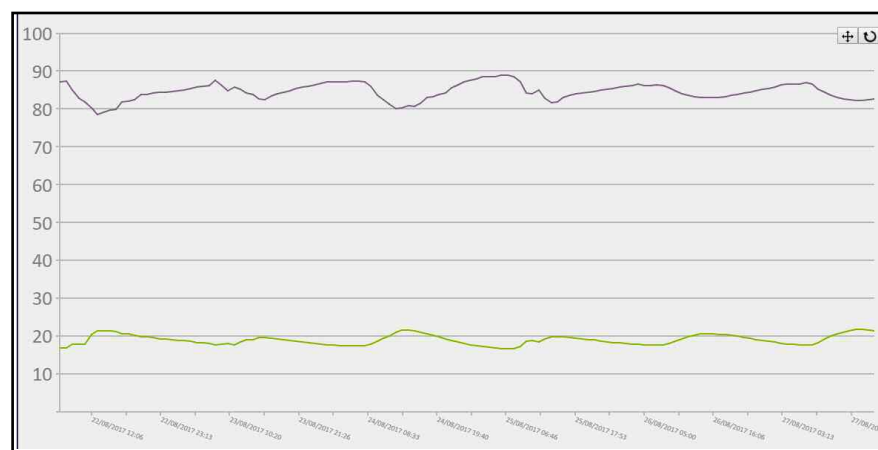
I recently noted some observations that may help you answer that question. Automatic data logging of ERH values was set up in a series of surface mounted boxes, taking readings every hour. The results (see *Figure 1 below*) indicate the challenge we face when using this method of measurement.

The lower green line is the ambient temperature. The upper line plots the average RH within all the surface mounted boxes.

*Always remember, it's essential that you allow sufficient time for equilibrium to be reached – about 2-4 days*

There is a daily fluctuation in temperature between nighttime and daytime values. The difference is at least 2°C and up to 4°C.

During this cycling of the temperature the ERH responds by fluctuating as well. In this instance data logging shows this is to be as much as 9%. Therefore the value a technician would measure when visiting site to take an ERH at breakfast time could be 9% higher than when visiting after lunch.



**Figure 1:** Top line = average RH within all surface mounted boxes  
Bottom line = ambient temperature

*The Technicians' Advisory column is intended to add to a technician's existing knowledge base and offer alternative solutions to specific issues.*

*It is not intended as a definitive tutorial, nor to imply the recommendation of a particular methodology, since all situations must be assessed individually and any action taken is entirely the responsibility of the technician or organisation involved.*

*ERH values, when in an environment with fluctuating ambient temperatures, even of a few degrees, require interpretation*

#### WHAT DATA DO YOU NEED?

The temperature differential causes the change in RH within the small airspaces being measured. Yet remember that the ERH quoted in the British Standard is independent of temperature.

The relative humidity in that small space will reach equilibrium with the moisture content of the material, regardless of temperature.

The problem is that this change to reach equilibrium takes several days, while these temperature fluctuations are happening at a much faster rate.

This all means that ERH values, when in an environment with fluctuating ambient temperatures, even of a few degrees, require interpretation.

If you are able to data log the readings or use remote monitoring systems you will have a clearer view of what is happening.

#### ARE THERE ALTERNATIVES?

It is because of this difficulty with RH that some promote the use of 'radio' or 'impedance' moisture meters. These are designed to electronically measure moisture content and provide a result of moisture content by weight.

We will look at these instruments in more detail in the next Technician's Advisory.

<sup>1</sup> To infer the moisture content of a material from the ERH you need to refer to a sorption isotherm –for more information on this see *Technician's Advisory – Examples of Sorption Curves and Moisture Measurement* in the Winter 2017 issue of the magazine or on the BDMA website at [www.bdma.org.uk/technical\\_papers/sorption-curves-moisture-readings-ta18-1](http://www.bdma.org.uk/technical_papers/sorption-curves-moisture-readings-ta18-1).

You would need the sorption graph for the actual material in question as the curve varies from material to material. However the argument is that if you are able to measure the ERH successfully then you don't need to do these calculations.

If you are going to set a target ERH value then the materials will be in equilibrium with that. They will reach their equilibrium moisture content, but you don't need to know what it is.