TECHNICIAN'S ADVISORY

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SORPTION CURVES & MOISTURE READINGS

IN MOST WATER DAMAGE INCIDENTS the floor is affected and, as a result, we often need to measure moisture in floor screeds. Usually these are either a cementitious (sand and cement) screed or a gypsum (anhydrite) screed.

The types of floor covering that will be laid over the screed - for example sheet vinyl or timber - will each have their own moisture specification. This is the Equilibrium Relative Humidity (ERH) that they can tolerate. For many floor covering systems this is an ERH of 75% RH, although some require a lower value and some can tolerate a much higher value.

So this means that if we are drying a screed we are very interested in the ERH value for the screed, either measured within the screed or in a Surface Mounted Box.

As screeds dry out after a flooding event we will experience very different sets of moisture readings for a cementitious screed compared to a gypsum (anhydrite) screeds. This is due to their differing sorption curves.

The sorption curve plots the relationship between the moisture content by weight and the ERH value (see *Fig 1* below).

Let's assume you are monitoring the drying of two screeds - one sand & cement and the other gypsum (anhydrite) and that you are monitoring ERH in both. In addition, suppose you were measuring the actual moisture content by weight using one of the standard methods (for example, a carbide - Speedy Meter - test or measuring the weight of a small sample before and after drying).

You will see from the illustrative graph (*Fig. 1*) that as the moisture content by weight of the cementitious screed drops from 5% to 4% and then 3% the ERH starts to drop, reaching around 88% RH.

Compare that in the illustration with the gypsum screed. As the actual moisture content by weight drops from 5% to 4% to 3% and then 2% the ERH doesn't fall below 97% RH.

Even at 1% moisture by weight the ERH of the gypsum screed could remain at 92%.

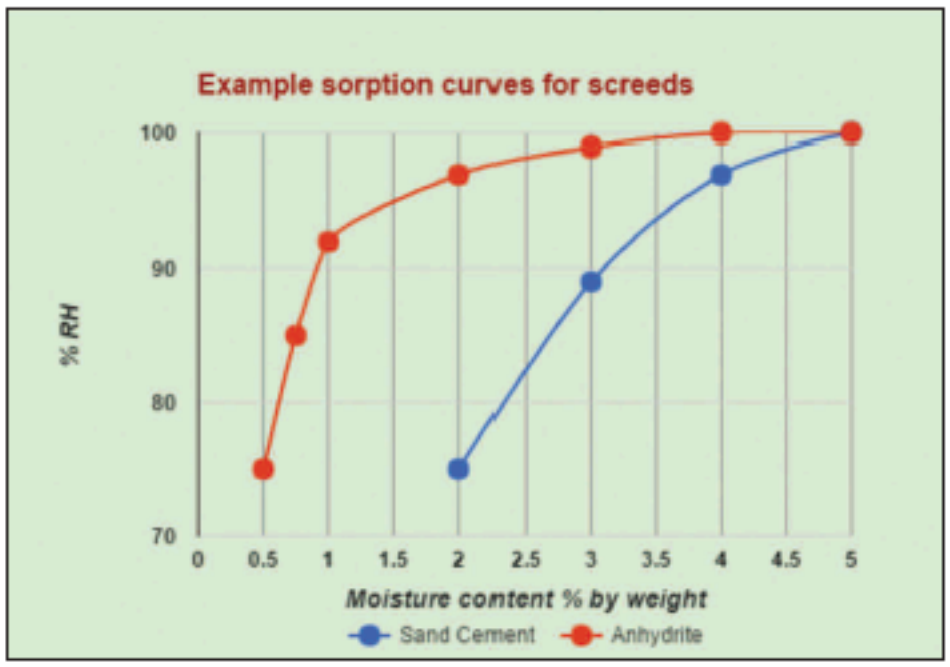

Fig 1 - this graph is indicative only - an illustration of general differences between the screed types, and for the purpose of this article, and not meant as a precise set of values for these types of screeds - for example desorption and adsorption curves will differ (a phenomenon known as hysteresis), and cement mixes vary

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.

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In this case you may be doubting if you were ever going to reach the target ERH value - which is typically 75% ERH (although, as stated above, the target depends on the floor covering to be used). However, once the gypsum screed moisture content by weight drops well below 1% the ERH then starts to drop very quickly.

MATERIAL PROPERTIES

These two screeds are made of very different materials.

WIth cementitious screeds portland cement is the 'binder' or the adhesive that sticks everything together. When water is added to the dry mixture it starts a complicated chemical reaction known as an hydrolysis reaction. "Hydro" means water and "lysis" a breaking apart - so the cement is broken apart by the water.

As it breaks up it releases chemicals into the water that then start to react with each other to form this glue like material that we are familiar with - that quickly hardens into a solid mass.

Gypsum is a very different product. Gypsum is a single salt, Calcium Sulphate, which is mined as such and subjected to heat to remove the water bound to it. This water is added back when laid as a screed.

It is a very different hygroscopic chemical compound and as a result has a very different sorption curve.

Understanding the different sorption curves for these screeds may help you make sense of some of the moisture reading variations you obtain on drying projects.