Measuring Concrete Slabs with a Protimeter Hygromaster

Moisture Related Damage in Floors

Excessive moisture in concrete floor slabs and screeds can lead to the following types of failure or damage:

- Adhesion failure between floor covering and concrete slab. When the critical moisture level for a given covering / adhesive / concrete is passed, bond strength drops sharply.
- Vinyl floor covering movement. Dampness in concrete may aggravate alkali related dimensional changes in sheet vinyl.
- Emissions of harmful substances from floor covering materials. Examples include the emission of ammonia from some screeds, the emission of formaldehyde from chipboard and the degradation of certain plasticisers in sheet vinyl.
- Excessive expansion of solid wood floor coverings and the decay and degradation of wood based floorboards.

These problems tend to occur when the moisture content of the concrete or screed exceeds the critical moisture content of the materials that are in contact with it. A material's critical moisture content can be expressed as an equilibrium relative humidity (ERH) value or a moisture content (%mc) value. ERH values are particularly suitable for this purpose because they convey the moisture condition of the material in question – its degree of wetness. Whilst the critical moisture content values vary for different materials, the problems outlined above are avoided when substrates have an ERH below 75%.

Humidity and Relative Humidity (%rh)

Humidity denotes the presence of water vapour – the gaseous form of water – in air and other gases. The expression relative humidity (%rh) of air expresses the degree of saturation with water vapour at a given temperature. Saturated air – having 100%rh – contains its full capacity of water vapour. Relative humidity measurements are particularly appropriate for assessing the moisture condition of environments. Similarly, equilibrium relative humidity (ERH) measurements are very useful for assessing if materials are in wet or dry conditions. ERH values of materials are obtained by measuring the %rh of a pocket of air deemed to be in moisture equilibrium with the material under investigation.

1. Humidity Sleeves

- Drill 16mm (5/8”) diameter clearance holes to a nominal depth of 50mm (2”) at the required points of measurement (POMs).
- Position a plastic membrane over the hole and push a humidity sleeve through the membrane and into the hole. Ensure that the flange of the humidity sleeve is flush with the floor surface and that the humidity sleeve cap is firmly in position, to make an airtight seal.
- Leave for at least 24 hours to ensure moisture equilibrium conditions are reached with the humidity sleeve. If in use, switch off any accelerated drying apparatus for at least 4 days before taking final readings.
- The ERH reading is made with the Hygrostick sensor supplied with the GE Protimeter Hygromaster instrument. Hygrosticks are fitted with a soft conical sealing sleeve. Ensure that the tip of the Hygrostick protrudes fully from the narrow end of the sealing sleeve.
- Connect the Hygrostick to the GE Protimeter Hygromaster via the extension lead.
- Remove the humidity sleeve cap and push the Hygrostick assembly into the humidity sleeve and twist to seal. Ideally, leave the Hygrostick in the hole for at least 30 minutes before taking the first reading.
- Measure the %rh in the hole; this is the ERH value of the floor slab.

2. Humidity Box

The test procedure follows the guidelines given in the British Standards BS 5325 and BS 8203. If full BS procedure compliance if required, please refer to these standards for comprehensive details.

- Place the humidity box on the surface at the required point of measurement (POM) and put a brick or similar object on top to ensure it is not inadvertently moved. Ensure the plug is in the hole in the side of the box. If the surface is smooth, no additional sealing is required around the rim of the box. If the surface has a rough texture, seal the box-surface interface with an inert sealant such as Plasticine.
- If in use, switch off any accelerated drying apparatus at least 4 days before taking readings. Thereafter, for un-bonded screeds of thickness 50-75mm (2" – 3") where a damp-proof membrane has been placed between the base and screed, leave the humidity box in position for at least 24 hours to ensure moisture equilibrium is reached with the box before taking readings.
- For bonded screeds and direct finished base slabs allow a minimum of 72 hours to pass before taking readings. Note that it may take many weeks for equilibrium conditions to be reached within a humidity box on the surface when the slab thickness exceeds 200mm (8") and / or it has a power floated finish.

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- The ERH reading is made with the Hygrostick sensor supplied with the GE Protimeter Hygrometer instrument. Hygrosticks are fitted with a soft conical sealing sleeve. Ensure that the tip of the Hygrostick protudes fully from the narrow end of the sealing sleeve.
- Connect the extension lead to the Hygrostick and GE Protimeter Hygromaster.
- Remove the humidity box plug and push the Hygrostick assembly into the hole and twist. Ideally, leave the Hygrostick in the humidity box for at least 30 minutes before taking the first reading.
- Measure the %rh in the humidity box; assuming equilibrium conditions have been reached, this is the ERH value of the screed or slab.

The GE Protimeter Hygromaster (BLD7700) and the GE Protimeter MMS (BLD5800) instruments may be used to measure the ERH of screeds and floor slabs when they are used with a extension lead (BLD5802), Humidity box (BLD4711) or humidity sleeves (BLD4902).

Please refer to the operating instruction of the instruments for specific information on using these instruments.

The information contained in this leaflet is given in good faith. As the method of use of the instrument (and its accessories) and the interpretation of the readings are beyond the control of the manufacturers, they cannot accept responsibility for any loss, consequential or otherwise, resulting from its use.

Survey Express Services
020 8697 2725