PCWI
PRECISION INSTRUMENTATION

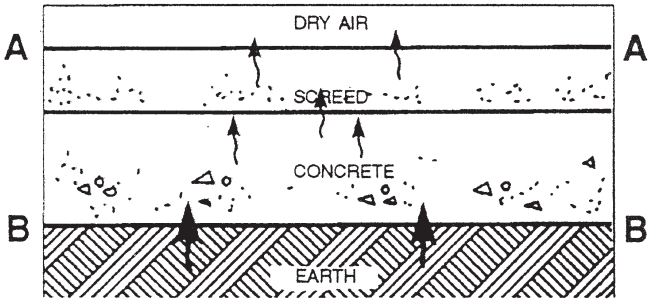
DAMPNESS PROBLEMS WITH SOLID FLOORS

IS A SOLID FLOOR DRY ENOUGH FOR FLOORCOVERINGS?

Dampness in an OLD covered solid floor in contact with the ground

If a floor and/or floor-screed in contact with the ground is covered with a substantially waterproof covering, the moisture content of the floor below this covering will normally rise above the 'air-dry' condition. This is correctly shown by a moisture meter if the pins are pushed through the covering. **Unless very high readings are obtained this is of no significance and failure of the inserted damp-proof membrane is not indicated.** The explanation of this phenomenon is as follows:

When a damp-proof layer is placed on the top of a porous floor (concrete, flagstones, brick, etc.) the effect is to prevent evaporation from the surface and to duplicate the existing damp-proof membrane that is within or at least at the base of the floor. Thus two damp-proof membranes are placed in series between the high moisture of the soil and the relatively low moisture in the air. Unless the lower membrane is perfect, the very slow movement of moisture (in vapour form) which it permits meets further resistance at the floor covering so that a water potential develops across it. The material below the floor covering must be wetter than the air above. Frequently a contributing factor is impervious floor covering laid before a new screed has had time to dry sufficiently. Moisture thus sealed in will dry out only very slowly indeed.



A Waterproof floor covering
B Damp-proof membrane

If, instead of a waterproof floor covering, the floor was left bare or even covered with a carpet and underlay (provided these allow the passage of water vapour) or with wood boards, the resistance to water movement which these provide is negligible and the floor surface will remain perfectly 'air-dry' because of the action of the built-in damp-proof membrane. This is its function; it is neither expected nor practicable that it should do more.

Normally no action is required when dampness is detected in the screed below a waterproof floor covering. Concrete, flagstones or bricks can remain wet indefinitely without deterioration, as they do in the foundations of a building below the damp-proof course.

If the moisture becomes exceptionally high (showing a practically saturated condition) this would indicate either residual moisture of construction or a built-in damp-proof membrane which is very inadequate, and could lead to lifting and curling of floorcoverings and efflorescence through joints. Worse is the case where the skirting board is in contact with the screed and may become damp enough to decay. Such a condition will be detected at once with a moisture meter used directly on the skirting.

The instructions given with these instruments warn that as a rule any reading which indicates an above-average 'air-dry' condition is a cause for concern. **Solid** ground floors and screeds are an exception to this; in their case the warning can be disregarded, and a degree of moisture tolerated provided four conditions are met:

1. The floors are in contact with the ground and covered with an impervious covering.
2. No decayable material (such as wood) is in contact with the damp floor.
3. No visible deterioration (such as tiles lifting) has been experienced over a period of several years.
4. There is no route by which water in the concrete slab can reach the walls. This can happen if damp proof membranes are omitted or wrongly placed, or if plaster is carried down to the base concrete.

Finally, it must be repeated that for all decayable materials such as wood (or building materials in contact with decayable materials) any moisture meter reading above the 'air-dry' level must give rise to apprehension. Its cause must be investigated and clearly understood. Unless this investigation shows that the cause is transient, any decayable materials must be isolated, preserved or otherwise removed from risk.

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Dampness in NEW solid floors prior to floorlaying

A solid floor is often the slowest part of a building to dry out. The rate of drying for a 50mm screed is about 1mm per day. For thicker screeds or screeds which are directly bonded to the stab and for power-floated floors it can take as long as a year.

There are two test methods recommended in British Standard Codes of Practice BS 8201:1987 and BS 5325:1983. Both can now be satisfied using the **ConcreteMaster III.** The two test methods are:

The Conductivity Test

This is a method for the **rapid** determination of moisture in new cement/sand screeds formed in 1:3, 1:4, 1:5 mixes.

The **ConcreteMaster III** is calibrated to give the average percentage moisture content of the screed to a depth of 100mm within the range 3.5% to 12%. The moisture content is the weight of water expressed as a percentage of the dry weight of the screed; the calibration being based on oven drying at 105°C to constant weight.

The instrument can be used in two ways:
i) The Gel Bridge method; and
ii) The Steel pin method.

For the **Gel Bridge method** (which gives a more reliable result) two holes are drilled 6mm in diameter, 25mm deep and 150mm apart. The holes are filled with the special conductive gel and the electrodes inserted.

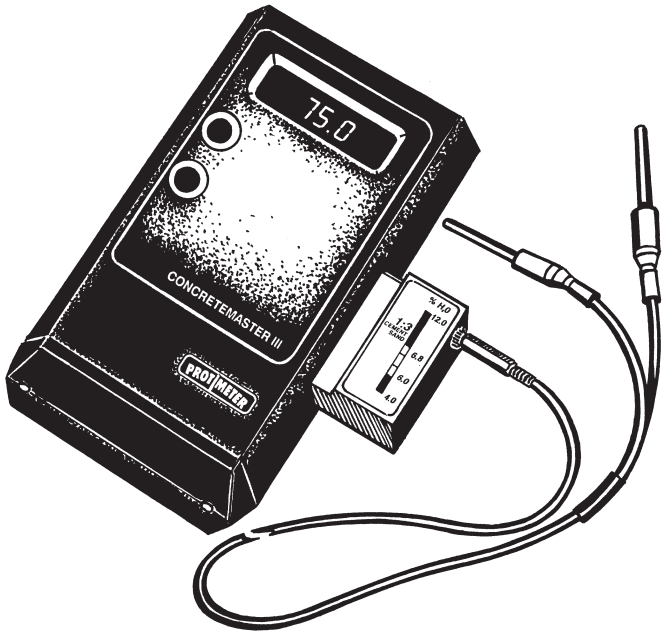
The colour coding on the **ConcreteMaster III**'s screed key shows immediately if a screed is dry enough for floor laying: Green for 'SAFE', Yellow for 'BORDERLINE' and Red for 'EXCESS MOISTURE'.

For the **Steel Pin method** (which is a little faster but less accurate) masonry pins only should be used, size 20mm long x 2.5mm in diameter. These are driven into the screed 150mm apart. The readings are taken by pressing the electrodes against the pinheads.

The hygrometry test

The purpose of this test is to establish the equilibrium relative humidity (erh) or the Water Activity (symbol Aw) of a solid floor **at depth**. When a reading not exceeding 75%erh, i.e. 0.75Aw, is obtained in a solid floor, that floor is **dry enough** for floor laying.

To obtain this measurement, it has been customary to cover a representative area of the floor with a waterproof 'tent' of polythene or foil, sealed firmly to the floor, with a hygrometer underneath it. When the entrapped air reached moisture equilibrium with the floor, the erh was measured. This showed how damp the floor was. Floor layers have been reluctant to leave hygrometers on site unattended, however.



The **ConcreteMaster III** offers a reliable substitute. The method described can still be used but with a more reliable **hygrometer probe** taking the place of the hygrometer inside the 'tent' (the probe is plugged into the meter, which is *not* left on site, upon the completion of the test).

Holes are drilled in the floor, about 12mm in diameter and 45mm deep, and the **sealed** sleeves are inserted. After about twelve hours, readings are taken by inserting the tip of the **hygrometer probe** into the sleeves. A reading of 75%rh (0.75Aw) means that a floor covering can be laid. If the reading exceeds this safe humidity it follows that a longer test would only result in an even higher reading. A great deal of unnecessary waiting for a result is avoided.

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