

CI/SfB	(21)	(12)	DIGEST
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TESTING THE MOISTURE OF SURFACES

How to monitor the drying out of buildings

A great deal of water is introduced into a building during construction; some as mixing water for concrete, mortar or plaster; and some as rainwater due to the careless storage of building materials.

Floor Screeds

A major problem associated with the drying out of new buildings is the determination of the stage at which the floor screed is sufficiently dry to permit laying of a moisture sensitive floor covering. The rate of drying for a 50 mm screed is about 1 mm per day. Two methods are used to monitor the drying process.

Method 1. The Conductivity Test: A specialised instrument is the **Protimeter Concretemaster II** for floor screeds. Two holes 6 mm in diameter are drilled into the screed 25 mm deep and 150 mm apart. These are filled with an electrically conductive gel and the electrodes inserted. The instrument is calibrated to give the average moisture content of the screed of up to 100 mm in depth.

Method 2. The Hygrometer Test: This method is designed to measure the equilibrium relative humidity of a pocket of air at the same temperature as the screed and in equilibrium with it. In practice, this is achieved by placing a number of Protimeter **Humidity Boxes** on the screed and measuring the equilibrium relative humidity inside the boxes using a suitable Protimeter instrument such as the **Concretemaster II**, the **Condensator** or the **Digital Hygrometer**. When the reading does not exceed 75% relative humidity, the screed is said to be dry enough for flooring to be laid. Alternatively, erh readings can be taken beneath the surface by drilling holes 14 mm in diameter and 25 mm deep into the screed, inserting **Protimeter Humidity Sleeves** into the holes and to take readings using the humidity probe of the **Concretemaster II** or the **Condensator**. This technique is particularly suitable for situations where Humidity Boxes are impractical, but it is not a BSI test. For difficult investigations the **Protimeter Dewpoint Meter** with the special 220 mm long **Concrete Probe** is recommended. Its measurements are based on the opto-electronic detection of dew on an electrically chilled gold mirror. 23.6 mm Ø holes are drilled and the probe with a self-sealing device inserted.

Walls

To check whether a wall is dry enough to be painted, an impervious membrane (e.g. a plastic sheet about 300 mm x 300 mm) is placed on the wall surface. It is left in position for about 24 hours with the edges sealed with adhesive tape. To take a moisture reading the needle-electrodes of the **Protimeter Mini** or **Protimeter Surveymaster SM** are pushed through the membrane. The reading should be in the green zone of the meter for oil based paints and in the green or yellow zone for waterborne paints. Dampness below the surface can be measured using Deep Wall Probes or the **Protimeter Surveymaster SM**.

Wood

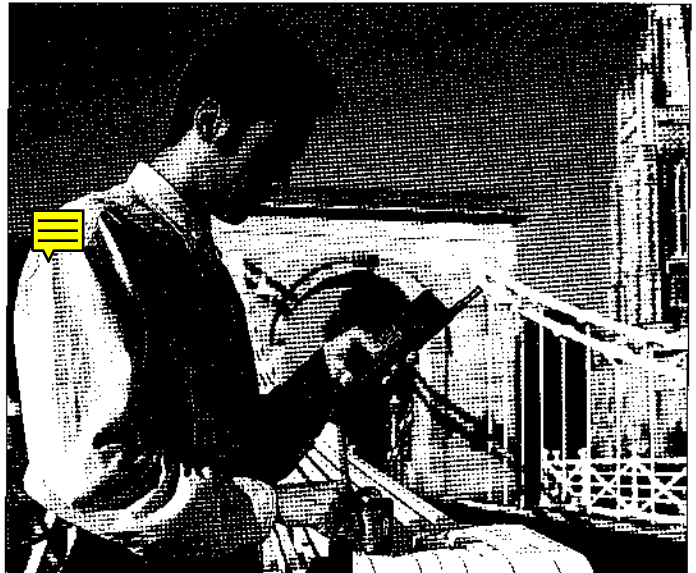
should be dry when painted. It is generally considered that before an application of oil based paints the moisture content of the wood as measured with a **Protimeter Mini** or **Protimeter Digital Timbermaster** should not be greater than 18% for exterior work and 12% for interior work. Higher moisture contents may result in blistering owing to evaporation of water from below the paint film and consequent shrinkage of the wood. Heavy wooden members should be checked below the surface using a **Protimeter Hammer Electrode** with insulated pins.

Condensation on (Metal) surfaces

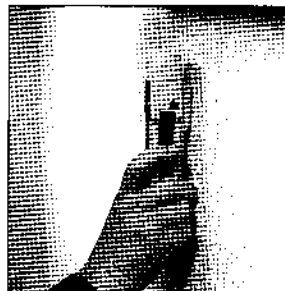
If a surface is at a temperature lower than the dewpoint temperature, condensation will take place. Both temperatures can be established easily and quickly with the **Protimeter Condensator** or the **Protimeter Digital Hygrometer** using the optional Surface Temperature Sensor which plugs into the instrument and the 'built-in' dewpoint slide-rule.

Salts

The **Protimeter Salts Detector** will tell if a surface is contaminated by salts (e.g. due to rising damp). With the **Protimeter Salts Analysis Kit** these can be analysed in situ.



Using the Protimeter Condensator on a metal surface



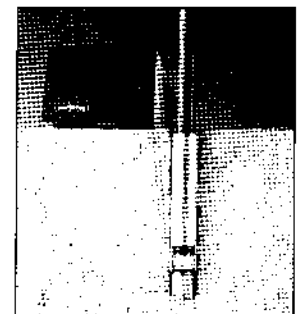
The Surveymaster SM used in search mode



Sub Surface screen erh readings with Concretemaster II



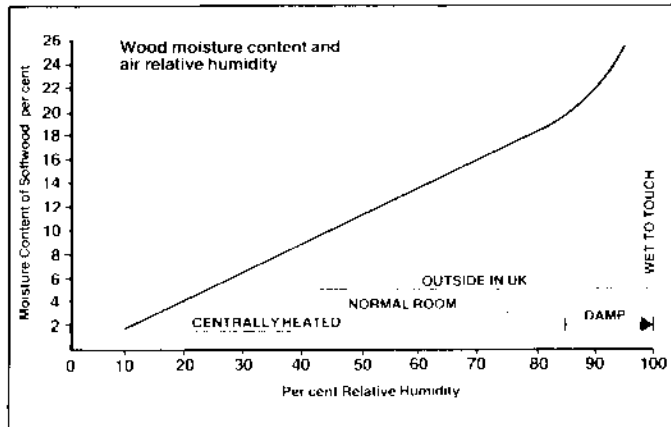
Protimeter Digital Timbermaster



Protimeter Dewpoint Probe

PROTIMETER READINGS ARE MEANINGFUL

The theoretical ideal is to measure the equilibrium relative humidity (e.r.h.) of a material.



This graph shows the approximate relationship between the relative humidity (r.h.) of air and the moisture content of typical softwoods. Graphs could also be drawn for every other building material.

Materials at an e.r.h. of 75% or below are safe from decay. It is equivalent to 16% - 18% moisture content in wood. It is the relative humidity which determines whether or not moulds will grow, decay fungi develop in wood or decorations be damaged. But to measure relative humidity is cumbersome and time consuming.

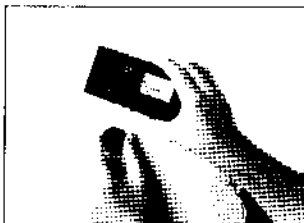
Fortunately e.r.h is not the only method.

The relative readings of a Protimeter moisture meter measure only the free water in a material; therefore they closely indicate the relative dampness of different materials. Although they do not measure relative humidity, their indications are a fairly close representation of it; and their results are available immediately. A high reading on such a meter (in the absence of contaminating salts and carbonaceous materials) indicates a damp condition of equal significance in wood, brick or plaster, regardless of their different moisture contents.

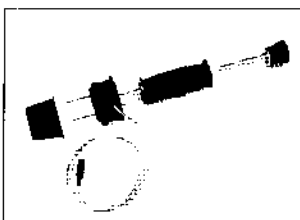
The **Protimeter** colour coding is as follows:

To about 75% erh: **Green = Safe**
 between 75% + 85% erh: **Yellow = Investigate further**
 above 85% erh: **Red = Danger**

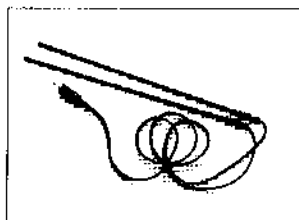
With a Protimeter moisture meter it is easy to keep out of trouble: Stay green.



Protimeter Salts Detector



Protimeter Hammer Electrode



Protimeter Deep Wall Probes

% MOISTURE CONTENT READINGS ARE NOT MEANINGFUL, BECAUSE THEY DO NOT TELL YOU IF A MATERIAL IS DRY OR DAMP. (Except in wood and in floors).

They are computed as follows:

$$\frac{\text{wet weight} - \text{dry weight}}{\text{dry weight}} \times 100 = \% \text{ m.c.}$$

It is obvious that a heavy material will have a much lower % moisture content than a light material which has the same amount of water in it, because the divisor is a larger number.

For example:

Question: **Is 5% dry or wet?**

Answer:

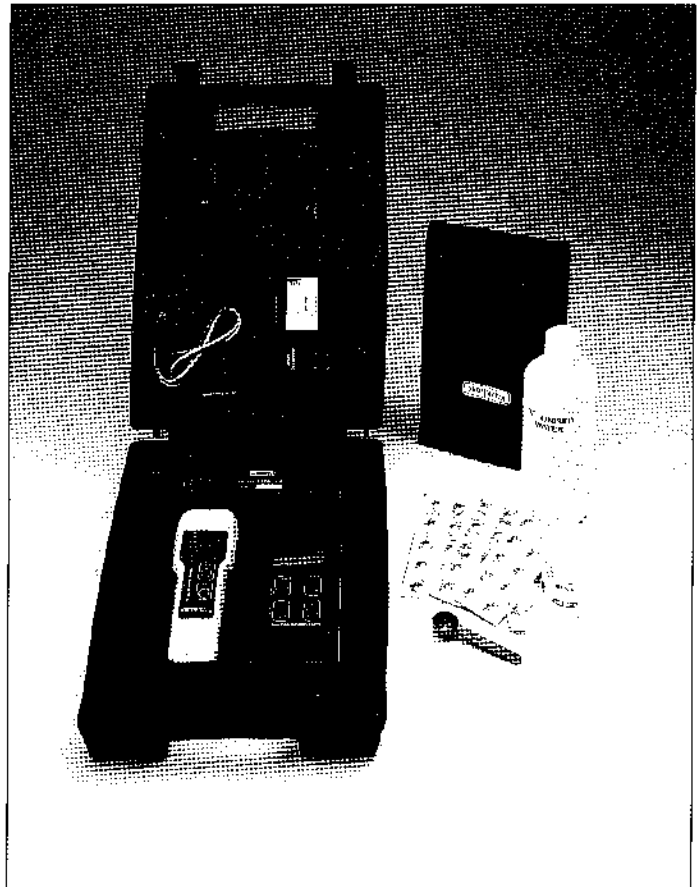
In wood it is **very dry.**

In mortar it is **fairly dry.**

In brick it is **damp.**

In plaster it is **wet.**

But it is even worse. Building materials are immensely variable - so that similar materials can be dry or wet at the same % moisture content depending upon their exact composition.



A complete diagnostic system: Protimeter 'Compleat' Kit Mk.II

Protimeter and Surveymaster are Registered Trade Marks

Protimeter plc has been making moisture meters for nearly 40 years. In 1957 it invented the first damp meter for professional surveyors and architects. Today most of these professionals in Britain use Protimeter instruments in their daily work, as do their colleagues in many countries overseas



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