USING MOISTURE METERS CORRECTLY

There is a range of commonly available moisture meters. Using them correctly is vital to getting a meaningful result.

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Resistance meters, and the odd capacitance meter, used to be the norm for detecting moisture, but on-site equipment has recently expanded to include more powerful capacitive/dielectric constant and microwave type meters. Meters fall into two basic types – invasive and non-invasive resistance. Costs can range from under $100 to over $2,000. There is plenty of room for misuse, no matter the type of meter.

Non-invasive meters

Non-invasive meters include:

- capacitance meters, which are designed for use on uncovered timber and normally have a search depth of 16–25 mm, but some dielectric constant types can search to depths of 100 mm or more
- microwave-type unit signals, which can penetrate to depths of up to 300 mm and even claim to profile moisture levels at various depths.

These meters detect moisture in underlying substrates like framing, but results must be treated with caution.

READINGS USEFUL FOR COMPARISON ONLY

Using moisture meters on materials other than exposed timber is not a reliable indication of the amount of moisture below the surface. The information gained can only be useful in comparative terms, not in absolute terms – when readings in known dry areas are low but are higher in a suspect location of similar construction, there may be elevated moisture levels.

Capacitance signals lose strength rapidly as penetrative depth increases. Therefore the readings tend to provide more information about the cladding, or lining, than the underlying framing. They are also affected by density changes in the material, for example, knots in timber.

Other issues that need to be considered when using these meters include:

- a low level of penetrative depth gives an increased likelihood of false negatives, missing moisture
- nails, metal strapping and hold-down bolts can give false positives, such as metal components grouped at lower corners of large wall openings
- units are often held incorrectly — check instructions
- inherent material conductivity – lightweight concrete componentry, including aluminium compounds, cause some non-destructive (NDT) meters to give exceptionally high readings. Glues, preservatives and other compounds may similarly affect readings. Anecdotal observations suggest some surface preservative salt deposits may be quite conductive and possibly hygroscopic, giving false high readings.

A range of resistance meter pins. From left deep wall pins with additional shrink wrap insulation, single pin with worn insulation over most of shank, short sliding hammer pins with compromised insulation and fixed uninsulated pins.

Resistance/pin meters

These are viewed as having the ability to provide evidential levels of proof of moisture, but even experienced users often get it wrong.

REMEMBER THE CORRECTION FACTORS

Individual manufacturers generally include instructions on how to adjust readings for temperature and timber species. This may only change readings by 1–4% for timber or temperature, which seems insignificant. However, it becomes complicated when the correction factors for preservative type need to be added to the mix. Both Scion and BRANZ have published such correction factors, requiring indicated readings to be adjusted by 1–15% or more.

The difficulty is that preservatives are made by a variety of manufacturers. Each type of preservative may have been chemically altered over the years as manufacturers strive to remove certain compounds from the environment or reduce costs.

INFORMATION NEEDED

Consider a building inspector who hammers probes into a stud on a winter's morning and obtains a reading of 24% when 18% is the preline figure. The inspector has to know the:

- temperature of the wood (not the air)
- timber species
- brand and type of preservative.

Then they have to apply the correction figures and, if challenged, explain their results. There is a possible liability issue either way if their readings

are incorrect. If they think it's dry and it's not, resultant shrinkage and popping results. If they think it's wet and it's really dry, a job is closed down, time is lost and there is the cost of another inspection.

MEASURING COMPLIANCE WITH AS/NZS 1080.1

Moisture readings are often taken by inserting short pins into the surface of frames or driving pins in with a sliding hammer. This practice is not in accordance with the standard, AS/NZS 1080.1:1997 *Timber – Methods of test – Method 1: moisture content,* which recognises that moisture levels near the surface area of, say, a 100 × 50 mm stud may be misleading. A rain shower or moist air may cause the top few millimetres of timber to stay wet for some time depending on position, ambient temperature, wind and humidity, but that moisture is not considered by the standard as representative of the overall moisture level of that piece of framing.

The standard addresses this issue by requiring moisture readings to be taken at depth, but simply avoiding the short pins and sticking to sliding hammers to take deeper readings doesn't automatically fix the problem. Instructions with sliding hammers usually state that the long pins must be replaced as soon as insulation is compromised. This happens quickly when pins are driven to any depth, often on the first hammering.

GETTING ACCURATE RESULTS ON SITE

Taking readings from the bottom of holes is the best way of obtaining accurate results. Readings should be reasonably accurate by following these steps:

- Ensure the meter has a current calibration certificate, is adjusted for species and the long probes have pristine insulation.
- Make two marks on the surface with points of the probes – having accurately spaced and slightly oversized holes prevents the probe insulation being damaged during testing.
- Drill two holes to the same depth using a depth-limiting device so the points of both probes will be in good contact.
- Insert probes and use the sliding hammer just enough to bed the uninsulated tips.
- Take reading.

Consequences of misuse

Misusing moisture meters can have significant consequences, from incorrect prepurchase reports giving false negative or false positive indications and the liability that comes from doing so, to new construction being held up for several weeks at lining out stage.

Always follow the instructions from meter manufacturers and use the principles of AS/NZS 1080.1 to measure moisture. Getting it right could save time and money down the track.