

FACILITIES & MAINTENANCE

Beyond Wood: Using a Moisture Meter on Luxury Vinyl Tile Floors and Other Building Materials

BY LINGOMAT

Moisture content is an important consideration not only for wood, but for all hygroscopic materials used in the building envelope. When moisture levels exceed the acceptable range for wood, it will shrink, warp, or cup, causing cracks and other visible deformations. Another consideration: when moisture levels get too high, mold can develop.

Mold not only affects the durability and quality of the material itself but can also compromise indoor air quality within a building. It is important to monitor moisture levels not only in wood but also in all other hygroscopic materials used in the building envelope.

Tracking moisture is especially important after moisture infiltration. This could be a leak from a broken pipe, a malfunctioning toilet or shower, faulty roof and wall construction, and, worst yet, flooding. You can track moisture in different materials with a moisture meter, typically used for wood. Here's how wood meters can be used for wood and building materials.

Measuring moisture percentages in wood and other materials with appropriate correction settings.

Using WME moisture percentages to check moisture levels.

Comparative measurements: no correction settings are available.

Measuring moisture in wood with a professional moisture meter is easy. Pin and pinless meters must be set to account for different wood species and, if using a pin meter, wood temperature. Wood moisture content is indicated as a percentage based on the material's dry weight. In this context, dry weight means the material's weight without water (moisture), determined with an oven test.

For most wood products, the recommended moisture content for wood floors and furniture ranges from 6% to 9%. Moldings could be up to 12%. Staying within this range helps prevent shrinkage, warping, cupping, twisting, and buckling. There are regional exceptions based on climate, as illustrated in the Moisture Map of North America.

When mold growth is the primary concern, the danger zone begins as low as 55% relative humidity.

According to the U.S. Environmental Protection Agency (EPA), "Mold thrives when indoor relative humidity (RH) reaches 60% or higher. While it can start growing slowly at 55%, the optimal conditions for mold to spread rapidly occur between 70% and 90% relative humidity."

These humidity levels can be translated into wood moisture contents using the

Equilibrium Moisture Content (EMC) Chart, which correlates relative humidity with the moisture content that wood will eventually reach if exposed to the corresponding relative humidity.

- At 55% RH, wood stabilizes at approximately 10% MC.
- At 60% RH, wood stabilizes at approximately 11% MC.
- At 70% RH, wood stabilizes at approximately 13% MC.
- At 90% RH, wood stabilizes at approximately 20.5% MC or higher.

For example, when wood is exposed to an environment with a relative humidity (RH) of 70%, it will gradually absorb or release moisture until it reaches an equilibrium moisture content (EMC) of approximately 13%. Because relative humidity and wood moisture content are directly related, building maintenance professionals should measure both to accurately assess environmental conditions and the potential for moisture-related problems.

A versatile instrument such as the Ligno-VersaTec is well suited for this purpose. It provides both pin-type and non-invasive moisture measurements while also measuring relative humidity (RH), temperature (T), dew point (DP), and grains per pound (GPP), giving professionals a comprehensive picture of both material moisture and ambient environmental conditions.

These same principles apply to wood-based panel products such as oriented strand board (OSB), plywood, and engineered flooring. Many moisture meter manufacturers, including Lignomat, provide correction settings for these materials. The recommended moisture ranges are essentially the same as those for solid wood products.

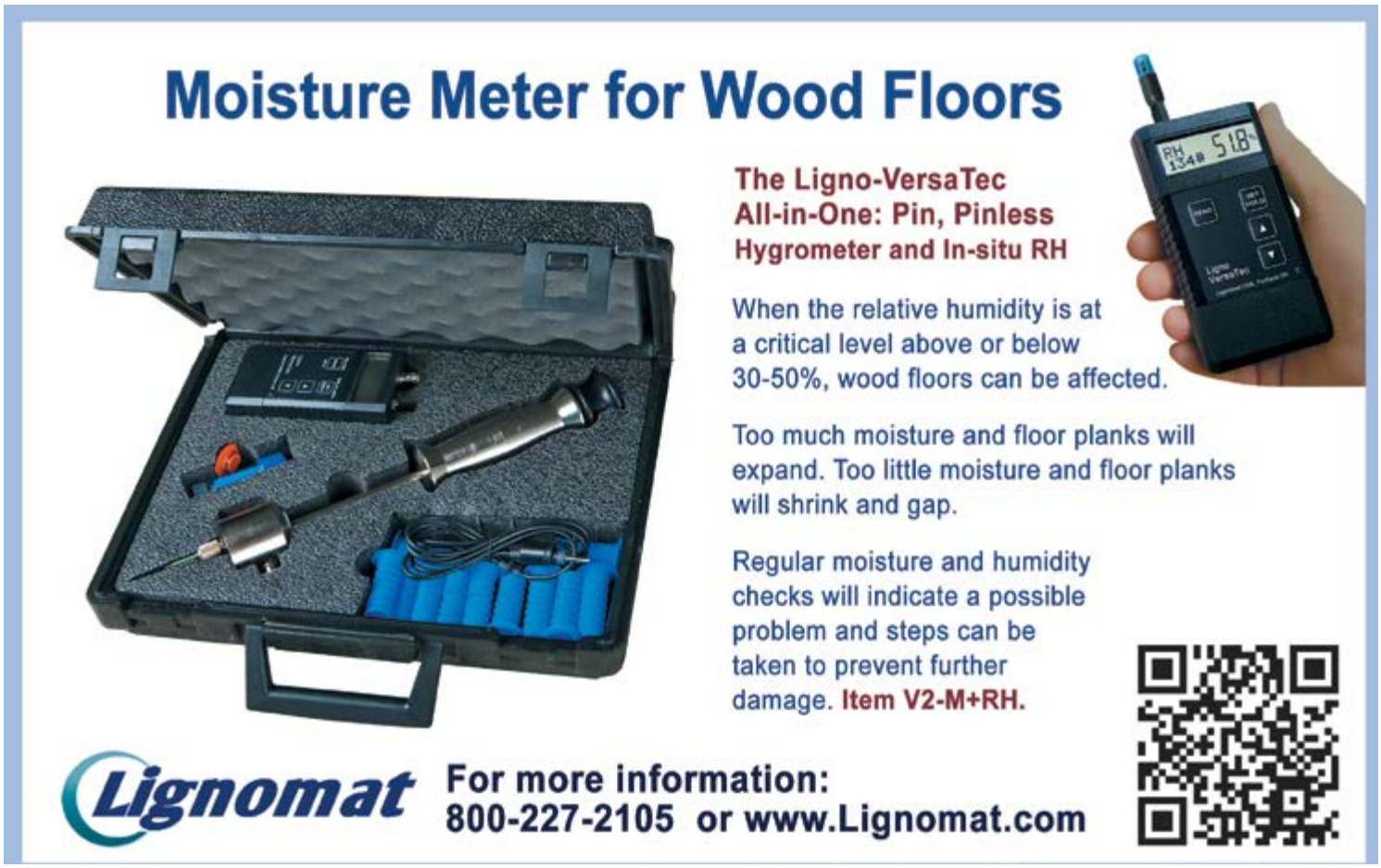
Beyond wood products, many other hygroscopic materials are commonly used in the building envelope, including concrete, drywall, insulation, and floor systems including luxury vinyl tile (LVT) installed over concrete substrates, as well as carpet. All these materials are hygroscopic and absorb moisture. When enough moisture is available, mold will grow.

Wood Moisture Equivalent (WME)

The second method is the Wood Moisture Equivalent (WME) scale.

WME values are expressed as equivalent wood moisture percentages based on the EMC relationship. They are not determined by oven-dry testing of the material itself. Instead, they represent the moisture condition of a material after it has acclimated to a given relative humidity.

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For example, drywall that has reached equilibrium at 50% relative humidity has a WME value of approximately 9%. At 50% RH, wood stabilizes at approximately 9% MC.

If that same piece of drywall were tested using the oven-dry method, its actual moisture content would be only about 0.4%. This seemingly low value reflects the large mass of gypsum compared to the relatively small amount of water contained within the material.

The WME method is often used because the person taking the measurements may not be used to these low moisture values; for instance, drywall at 2% is already wet to the touch. The corresponding WME value is 18%, which clearly indicates high moisture. WME values help identify good and bad moisture contents.

Both WME and oven-dry moisture content are useful measurements, provided the meter manufacturer supplies the appropriate calibration and acceptable moisture ranges for the material being tested.

Comparative Measurements

The third method is comparative, or relative, moisture measurement.

All Lignomat pin and pinless moisture meters include a relative measurement scale. Unlike the MC and WME scales, this scale does not display moisture as a percentage. Instead, it allows users to compare moisture levels in materials for which no specific calibration setting is available.

The principle is simple: Compare measurements taken from the same materials. Higher readings indicate more moisture, while lower readings indicate less moisture. For accurate comparisons, all measurements must be taken using the same meter, the same reference scale, the same material composition and the same measuring depth, then measurements can be truly compared.

Comparative measurements become even more valuable when a known dry sample of the material is available. First take measurements of the dry area. Then measure the questionable areas and compare measured values with the dry sample readings.

Even when a calibrated measurement scale is available, comparing readings with a known dry sample is an excellent way to confirm the moisture meter's findings.

A Complete Moisture Assessment

Properly evaluating moisture conditions requires two essential instruments: a moisture meter and a thermo-hygrometer. The moisture meter measures the moisture condition of building materials, while the thermo-hygrometer measures ambient temperature and relative humidity, allowing the user to evaluate environmental conditions that influence moisture movement and mold growth. The Ligno-VersaTec moisture meter (pin, pinless, and RH/Temp) from Lignomat includes all the functions needed to measure moisture and humidity.

Using both a moisture meter and a thermo-hygrometer allows building professionals to identify moisture problems early, verify drying progress, and prevent costly damage and mold growth before they become serious issues.

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ABOUT THE AUTHOR: Founded in 1979, Lignomat USA provides precision moisture meters, kiln controls, and monitoring systems for wood and building materials. Based in Portland, Oregon, the company serves woodworking, flooring, construction, and restoration professionals with reliable measurement tools backed by decades of engineering experience and a commitment to quality and customer service.

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