

TECHNICAL BULLETIN

Understanding Moisture Content for Painting

Before starting any painting project, it is important for a painting contractor to consider the moisture content of any substrate to be coated. Whether the substrate is wood, concrete, stucco, masonry units, or metal, it is important that the amount of moisture present be measured and accommodated. Moisture content of various substrates can be measured using a moisture meter, a plastic sheet test for concrete, or a calcium chloride test for horizontal concrete.

Type of Moisture Meters

A moisture meter is an essential instrument in the coatings industry, allowing users to detect moisture content in material. There are three common types of moisture meters available for measurements: Pin-Type, Pin-less, and All-in-One moisture meter.

Pin-Type Moisture Meters, or destructive/invasive moisture meters, measure percent moisture content (%MC) with two contact pins which are used to penetrate the surface at a desired depth. The reading of %MC is determined by measuring the electrical resistance between the tips of the two pins. This type of moisture meter can be used for, but is not limited to, wood, concrete, and drywall.



Pin-less Moisture Meters, or non-destructive/non-invasive moisture meters, operate on the surface without penetrating it. This type of moisture meter provides measurements for wood and other substrates, such as concrete and gypsum. Pin-less moisture meters are commonly used on concrete subfloors and flooring, and other areas to identify possible moisture buildup behind finished surfaces.



All-in-One Moisture Meters utilizes both previous types of moisture meters. This type of moisture meter gives the user the capability of identifying problem areas and pinpoint the exact location where moisture damage or buildup is occurring. %MC measurements can be taken on wood and non-wood substrates.



Alternative Tests for Concrete

ASTM Standard D4263, or Plastic Sheet Method, describes a test for indicating the capillary moisture present in concrete. In this method, a piece of plastic sheet (approx. 18 in. x 18 in.) is tightly taped to the concrete surface and allowed to remain in place for a minimum of 16 hours. After the time has elapsed, the plastic is removed and the underside of the sheet and the concrete surface is visually inspected for moisture.



ASTM Standard F1869, is used to measure the moisture vapor emission rate of concrete subfloors using anhydrous calcium chloride. This method is appropriate only for horizontal concrete, particularly floors. In summary, a canister containing calcium chloride is weighed and placed on bare concrete, and then covered with a plastic dome and sealed. After three days, the canister is re-weighed to determine the moisture emission rate.



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Acceptable Moisture Content

The moisture content of various paintable substrates is given as a percentage when using any of the different types of moisture meters. The following are generally accepted percentages of moisture content by The Master Painters Institute:

Concrete: Moisture content should be under 12% for coatings work to proceed. Excess moisture can lead to issues associated with high alkalinity and efflorescence, as well as adhesion issues and delamination.

Clay and Concrete Masonry Units: Surfaces should contain no more than 12% moisture before paint application. As with concrete, issues related with high alkalinity and efflorescence can arise. The entrapment of moisture by the paint film can potentially affect the curing, adhesion, and the overall integrity of the paint film.

Wood: Interior wood should contain no more than 12% moisture prior to painting. Exterior wood may be allowed to contain no more than 15% moisture. When it comes to wood furniture or cabinetry, the moisture content must be as low as 6%. Painting over wood with excessively high moisture content can result in loss of adhesion, blistering, peeling, cracking, and discoloration.

Dressed Lumber, Wood Paneling/Casework: The moisture content shall not exceed 12% for interior applications, and 15% for exterior applications.

Drywall: As drywall is very sensitive to moisture, drywall can be considered “moisture-compromised” when the % moisture content exceeds 1%. Excessive moisture in the drywall can lead to discoloration of the coating, as well as growth of mold or mildew.

Plaster: Moisture readings must be taken to assure that no more than 12% moisture content is in the plaster prior to the application of any coating.

Stucco: An acceptable moisture content for stucco is 12% or less. Elevated moisture can lead to discoloration of the coating, as well as delamination and loss of adhesion.

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