

What is Relative Humidity (RH) Testing? *Information for Architects*

Most U.S. producers of floor coverings, adhesives and resinous coatings have historically looked to the calcium chloride method of testing concrete slabs to determine dryness and suitability for the installation of their products. The American Society for Testing and Materials (ASTM) has written a standard for the use of anhydrous calcium chloride when testing dryness of concrete. The standard is also known as ASTM F-1869-09. The Maple Flooring Manufacturers Association (MFMA) suggests the use of in-situ relative humidity data as the preferred method of determining concrete dryness. ASTM has also published a standard test method for the use of in-situ relative humidity probes, the test designation is ASTM F-2170-02. ASTM F-710 offers recommendations regarding the suitability of a concrete slab for the installation of resilient floor coverings based on results achieved by these test methods. This standard states that moisture vapor emission, per ASTM F 1869, should not exceed 4.5 pounds per 1,000 square feet per 24 hours. MFMA traditionally has recommended 4.5 pounds per 1,000 square feet per 24 hours. MFMA recommends the relative humidity level for a concrete slab for a non glue-down maple floor system is 80% or lower and for glue down systems the relative humidity should be 75% or lower before installation.

Calcium Chloride or “Moisture Dome” Tests

Advantage *Disadvantage*

√		Results for calcium chloride testing are accepted and commonly used for concrete dryness and suitability for the installation of maple sports floors.
√		Testing is relatively easy to perform and no major investment in equipment is required.
	√	The building <u>must</u> be acclimated at or near the temperature and relative humidity levels anticipated during occupancy or use.
	√	Calcium chloride tests reflect moisture vapor emission from the surface of the concrete. It has been suggested that the test reflects moisture in the top 1/4 to 1/2 inch of the slab's thickness. If ambient environmental conditions immediately preceding testing has been extremely dry or wet, the concrete surface may be affected and test results may be skewed accordingly.
	√	Testing on an open, or breathing, concrete surface may not reflect moisture deep within or directly below the concrete slab.
	√	"Home-made" calcium chloride test kits are being used and some of these kits do not meet the apparatus requirements of ASTM F-1869-09 and are delivering questionable results.
	√	Too many tests are being set without floor preparation as required by ASTM F-1869. Surface contaminants and residue from paint, adhesive, curing or parting compounds can reduce vapor emission at the test site and produce inaccurate test results. Some penetrating parting compounds (tilt-up construction) or penetrating cure and seal products are difficult to detect and impossible to remove. They restrict moisture release and result in reduced vapor emission test results.

In-situ Relative Humidity (RH) Testing

Advantage

Disadvantage

√		Minimizes the potential of moisture related problems that can occur with the installation of sports flooring systems by increasing accuracy and less susceptible to ambient job site conditions.
√		Results are less impacted by ambient temperature and relative humidity conditions than calcium chloride test, for both slab-on-concrete and suspended concrete. Concrete slabs in contact with the earth are a heat sink and their internal temperature is affected by both the sub-slab soil temperature and by the temperature of the air space above. Whereas, the internal temperature of suspended concrete will be driven by temperature of the air space above and below the slab.
√		Most resilient floor covering manufacturers recognize ASTM F-710-03, which states in Section 5.2.2 "In accordance with Test Method ASTM F 2170, the relative humidity in a concrete floor slab shall not exceed 75% at the time of testing, unless otherwise specified by the flooring or adhesive manufacturer."
√		Effective October 1, 2011, MFMA will only recognize RH testing as the standard method for reading concrete moisture levels in a slab.
√		Embedded testing permits a profile of moisture conditions through the thickness of a concrete slab. This information permits the user to make a more informed decision regarding the installation of a maple sports flooring systems or the need to consider other moisture barrier alternatives.
√		Test results appear to be less impacted by the type of, or lack of, floor coverings in place prior to testing.
√		After the initial purchase of a RH reader, the cost to perform a RH test is comparable or less expensive than conducting calcium chloride testing.
	√	Testing with re-usable probes requires a minor initial investment in tools and equipment.
	√	Without temperature equilibration of the test site and test apparatus, the data generated may be skewed high or low relative to the direction of inequity, thus rendering data collected misleading or meaningless. For example, if someone takes a test probe from a hot or cold automobile and drops it into a test hole for only a few minutes the error factor can become significant and the data collected is meaningless.

It is MFMA'S opinion in-situ relative humidity (RH) tests are the best pre-installation predictor of potential moisture related to maple floor installations.

If you have any questions please contact MFMA's Technical Director at 888-480-9138.