

# THE COMMERCIAL FLOORING REPORT

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## Moisture Testing and Protect the Installation

### Guest Article by Wagner Meters RH vs. MVER: Is There a Connection?

#### RH and MVER: Is There a Correlation?

When looking to determine if a concrete slab is dry enough to proceed with a finish, flooring or occupancy, there are several methods commonly specified for testing the relative humidity (or moisture content) of the slab. A dry slab is never at 0% humidity, but determining the level of moisture still held in the concrete can be the difference between a successful flooring installation and a problem-prone floor system.

The two most frequent test methods specified in the industry today are MVER testing (with results expressed as pounds/1000 square feet) and relative humidity testing with in situ probes (with results expressed as a percentage). When faced with the two options, contractors and other industry professionals often ask, "What is the correlation between RH and MVER?" Simply stated...there isn't one.

While it might seem logical that there would be some relationship between the two, the reality is that there is nothing more than an imprecise use of the term "moisture test" that links the two test methods.

#### Surface Similarities

Beginning around the 1940s, moisture levels were tested by placing an enclosed amount of desiccant on a slab's surface for a period of time. Calcium chloride, or CaCl<sub>2</sub>, was the most common desiccant used for this type of moisture testing and it is often referred to as the anhydrous calcium chloride test. Any subsequent change to the weight of the desiccant was thought to indicate the amount of water vapor that had left the slab to be absorbed by the desiccant. That weight was represented as a ratio of the total moisture content within the slab, and is referred to as Moisture Vapor Emission Rate, or MVER, expressed in terms of "pounds/1000 square feet".

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Extensive research done by the CTLGroup in the 1990s showed several problems with the CaCl test:

- MVER test kits cannot be calibrated.
- The test measures, at most, the top ½ - ¾ inch of the slab, but not deeper.
- Surface treatment, including trowelling practices, curing agents, ambient conditions and more, can skew MVER test results. In fact, calcium chloride testing has been specifically disallowed for lightweight concrete applications because the lightweight aggregate can impact results for false high or low results.
- The limits set for the test (i.e. 3 lbs/1000 sq ft) were somewhat arbitrarily chosen and published.
- There is no scientific backing for the test method as either a qualitative or a quantitative measure of concrete moisture. (1)

The real difficulty of MVER or CaCl testing lies in the fact that it primarily tests only the surface conditions of the slab. Drying concrete tends to have a gradient effect—moisture levels are higher deeper in the slab. As moisture evaporates from the surface of the drying slab, it then allows additional moisture to rise through the natural capillaries of the concrete in a progressive cycle until the moisture content in the slab reaches a balance with conditions around it. MVER is incapable of providing accurate readings of those internal levels.

A traditional “moisture test”, MVER is still regulated by ASTM F1869. Ultimately, though, it has proven to be an unscientific and problematic test method, plagued by subsequent moisture-related flooring problems.

### Deep Down Differences

Relative humidity (RH) testing for concrete, on the other hand, measures internal moisture levels of a concrete slab by placing sensors, or in situ probes, within the concrete slab itself. Testing that had begun in Sweden and elsewhere in the 1990s demonstrated that for slabs that dried from one side, placing the probes at 40% of the slab depth would give a reading that would reflect accurate moisture conditions of the slab if it were sealed (i.e. a floor covering installed) at that point in time. (For slabs drying from two sides, the correct depth is 20% of the slab depth.)

Based on the realities of moisture vapor’s distribution in drying concrete, RH testing can accurately determine the internal moisture levels, or relative humidity, of the concrete.



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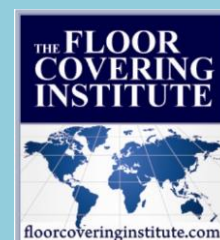
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Understandably, the difference between MVER and RH testing has had a significant impact on the flooring industry, allowing concrete and flooring installers to make informed decisions when choosing products that will tolerate the actual RH levels of the slab, or allowing them to make remediation choices before elevated moisture levels result in flooring problems. As concrete science changes with the additions of admixtures, new aggregates, and a variety of finish options in demand, RH testing continues to provide accurate concrete moisture measurement for industry professionals.

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Footnotes: (1) Howard Kanare, Concrete Floor Moisture Tests, August, 2007.  
<http://www.concreteconstruction.net/flooring/concrete-floor-moisture-tests.aspx> Sources:  
<http://www.concreteconstruction.net/flooring/concrete-floor-moisture-tests.aspx>

**Protect the Installation:** Too often flooring materials and installations are damaged as a result of being installed on a project too soon and not properly protected, that is before all trades have

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completed their work.

Flooring should be one of the last materials installed on a jobsite. Scheduling work and product completion is paramount on the general contractors and end users list of requirements to get a project completed, occupied and up and running so that business is not affected but some forethought, practicality and common sense should seep into this thought process. Installing flooring too soon that turns out to be a base for trades to work on will inevitably damage the material. And, if the flooring must be installed for whatever reason before substantial project completion or in lieu of something else just to get it done, none of which in my opinion could be argued as being correct, any damage incurred should not be attributed to the flooring contractor who was likely forced into installing or the end user who has no complicity in the premature installation unless they ordered it. Is this even important? Yes, it is.

We've had a couple of cases recently where the flooring material was installed prior to other construction phases being completed and the material was damaged. In addition, the flooring material was installed without adequate protection so that it was painted on and furnishings moved in without properly protecting the flooring material. In one of these cases the perimeter of a hard surface floor was affected by paint spray and the floor surface scratched by movers placing medical equipment. It was said that the floor could be sanded and the paint cleaned off it. This is absurd in this case because we are talking about a vinyl flooring material. You don't sand and refinish vinyl flooring, I don't care who tells you it can be done. And using cleaners strong enough to even begin to remove dried paint will also damage vinyl flooring. Don't you think it would be easier to cover the floor properly so nothing will happen to it, or does that seem like too simple a solution?

Common sense or lack thereof is exhibited daily in all forms of life so the absence of it in flooring related situations is not surprising. The difference is that in flooring installations leaving out the common sense factor tends to be very costly. How is it that there's time to do it wrong and no time to make it right until later? Almost nothing we get involved in that proves to be a situation or problem created on a job site couldn't have been prevented. And the costs associated with this type of a problem far exceed the decision, which is free and the inexpensive protection that would have prevented the damage. However, you think about the cost of not getting the job done and give no thought to what happens by forging ahead without taking the necessary precautions; that's how most accidents happen.



Systems like EnviroSTIX for hard surface and hard backed flooring materials are systems that will help prevent the failure of flooring installations. There is more technology coming, most of which we are involved with. We'll keep you informed to help you. In the meantime understand that moisture, temperature and humidity have a profound effect on flooring materials and the integrity of their installation.



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