

Misuses of the Moisture-Vapor Emission Test

The test for moisture-vapor emission rate (MVER) is widely used in the flooring industry and is described in ASTM F 1869-04, “Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride,” and cited in ASTM E 1907-97, “Standard Practices for Determining Moisture-Related Acceptability of Concrete Floors to Receive Moisture-Sensitive Finishes.” Floor installers are typically required by Division 9 specifications to take moisture tests in accordance with the manufacturer’s recommendations. The test currently specified by most floor covering and adhesive manufacturers is ASTM F 1869.

ASTM F 1869-04 states “Use this test method to obtain a quantitative value indicating the rate of moisture vapor emission from a concrete floor and whether or not that floor is acceptable to receive resilient floor covering.” ASTM F 1869-04 also states that “[The test] will produce quantified results directly applicable to flooring manufacturer’s specifications.” ASTM E 1907-97 includes quantitative procedures used to determine the amount of water or water vapor present in or emitting from concrete slabs, and criteria for evaluating the moisture-related acceptability of concrete slabs to receive moisture-sensitive manufactured finishing products. Although the ASTM standards specifically state that the test is used to determine whether or not a floor is acceptable to receive resilient floor covering, MVER is being incorrectly used by some to evaluate concrete properties or quality.

The test for moisture-vapor emission rate:

- **Can’t determine concrete quality.** “Use and Misuse of Moisture-Vapor Emission Tests on Concrete Slabs” (*Concrete International*, December 2003, pp. 82-87) gives the reasons. Water-cement ratio (w/c), one factor related to concrete quality, affects MVER. But MVER is

also influenced by the slab and air temperature, the surrounding relative humidity, and concrete surface rewetting. A concrete slab with a w/c as low as 0.40 can emit moisture at the same rate as a concrete with a w/c of 0.7 because of the influence of these factors.

- **Can’t determine concrete permeability.** Water flow through concrete is described by Darcy’s Law. The permeability described by Darcy’s Law represents a steady-state flow of water through the concrete. The moisture-vapor emission test does not measure the steady-state flow of water through concrete and thus does not measure the permeability described by Darcy’s Law.
- **Doesn’t measure a property of the entire concrete slab.** “Design of Slabs that Receive Moisture-Sensitive Floor Coverings, Part 2” (*Concrete International*, April 2003, pp. 85-91) discusses this. At any given drying duration, MVER test results for concretes with w/c of 0.31, 0.37, and 0.40 cast in slabs 2, 4, 6, and 8 in. (50, 100, 150, and 200 mm) thick were essentially the same for all concrete thicknesses. These results, plus moisture profiles from relative humidity measurements through the depth of the concrete, show that the MVER is only a measure of conditions at or near the concrete surface and is not an indicator of vapor flow through the entire concrete thickness.

It is not appropriate to use moisture-vapor emission test results to evaluate concrete properties or quality. The industry has other methods that properly evaluate concrete quality. ASCC concrete contractors will work with all parties to assess in-place concrete quality. If you have any questions, contact your ASCC concrete contractor or the ASCC Technical Hotline at (800) 331-0668.