



Designation: ~~F1869-04~~ Designation: F1869 - 09

Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride¹

This standard is issued under the fixed designation F1869; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method covers the quantitative determination of the rate of moisture vapor emitted from below-grade, on-grade, and above-grade (suspended) bare concrete floors.

1.2 This quantity of moisture shall be expressed as the rate of moisture vapor emission, measured in pounds of moisture over a 1000 ft² area during a 24-h period.

~~1.3 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.~~

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1.3 This test shall not be used to evaluate moisture emissions over gypsum concrete.

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1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices, and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ~~ASTM Standards:~~

~~C670~~ ASTM Standards:²

C670 Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials

F141 Terminology Relating to Resilient Floor Coverings

2.2 *Resilient Floor Covering Institute Standard:*

Recommended Work Practices³

2.3 *Military Standard:*

Mil Spec B-131H Type 1, Class III⁴

2.4 *ICRI Guide:*

Guideline No. 03732: Selecting and Specifying Concrete Preparation for Sealers, Coatings, and Polymer Overlays⁵

3. Terminology

3.1 *Definitions:* See Terminology F141 for definitions of the terms, above-grade (suspended), below-grade, concrete, on-grade, and resilient flooring.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *moisture vapor emission rate (MVER)*—amount of water vapor in pounds emitted from a 1000 ft² area of concrete flooring during a 24-h period (multiply by 56.51 to convert to $\mu\text{g/s m}^2$).

4. Significance and Use

4.1 Use this test method to obtain a quantitative value indicating the rate of moisture vapor emission from a concrete floor and

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from Resilient Floor Covering Institute, 966 Hungerford Drive, Suite 12-B, Rockville, MD 20850.

⁴ Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

⁵ Available from U.S. Department of Housing and Urban Development, Washington, DC. Use September 1990 or subsequent editions.

⁶ Available from International Concrete Repair Institute, International Concrete Repair Institute 3 166 S. River Road, Suite 132, Des Plaines, IL 60018; www.icri.org

whether or not that floor is acceptable to receive resilient floor covering. The moisture vapor emission rate only reflects the condition of the concrete floor at the time of the test. All concrete subfloors emit some amount of moisture in vapor form. Concrete moisture emission is a natural process driven by environmental conditions. All floor coverings are susceptible to failure from excessive moisture vapor emissions. The moisture vapor emitted from a concrete slab is measured in pounds. This measurement is the equivalent weight of water evaporating from 1000 ft² of concrete surface in a 24-h period. The calcium chloride moisture test has been the industry standard for making this determination and is a practical, well-established and accepted test of dynamic moisture. It will produce quantified results directly applicable to flooring manufacturer's specifications. The results obtained reflect only the condition of the concrete floor at that time.

5. Apparatus

5.1 Test Unit Contents:

5.1.1 *Cylindrical Plastic Dish Containing Anhydrous Calcium Chloride*, heat sealed in a heat sealable bag meeting Mil Spec B-131H Type 1, Class III, to protect from moisture intrusion.

5.1.1.1 Anhydrous calcium chloride shall be in the form of prilled beads and shall have a minimum purity of 94 %. Net weight of the anhydrous calcium chloride shall be 16 ± 1 g.

5.1.1.2 Dish shall be made of a material that does not absorb moisture. Dimensions of the dish shall be 69 ± 1 mm outside diameter, 16 ± 1 mm height, wall thickness less than 1 mm. Dish shall be supplied with a tight-fitting cover. The cover shall be secured to the dish with pressure-sensitive-adhesive backed vinyl tape.

5.1.2 *Pressure Sensitive Label*, to be used to identify the container of calcium chloride and to record the date, time, and container weight when the test is started and completed.

5.1.3 *Transparent Cover*, with 0.5 in. (12 mm) flanges around the perimeter, approximately 0.5 ft² (460 ± 46 cm²), as measured between the inside of the flanges, is required to seal the test area of the floor. The plastic cover shall have a depth greater than the height of the container of anhydrous calcium chloride. The height of the container shall be $1\frac{1}{2}$ in. ± 0.125 (38 ± 3.2 mm).

5.1.4 *Strip of Sealant*, to secure the plastic cover to the floor in an airtight fashion.

5.1.5 *Brightly Colored Warning Label*, to be placed on the plastic cover as a protective warning while the test is being conducted.

5.1.6 *Mailing Bag*, for the return of the sample to the party responsible for calculating the test results.

5.2 *Gram Scale*, capable of measuring 0.1 g. This scale will be used to weigh the calcium chloride container at the start and end of the test. On-site measurement is preferred to mailing the container back to the supplier for results.

5.3 *Thermometer*, capable of measuring room temperature.

5.4 *Hygrometer*, capable of measuring the relative humidity of the test site.

6. Conditioning

6.1 The test site should be at the same temperature and humidity expected during normal use. If this is not possible, then the test conditions should be $75 \pm 10^\circ\text{F}$ ($23.9 \pm 5.5^\circ\text{C}$) and 50 ± 10 % relative humidity. Maintain these conditions 48 h prior to, and during testing.

6.2 Prior to placement of the anhydrous calcium chloride tests, the actual test area shall be clean and free of all foreign substances. All residual adhesives, curing compounds, sealers, paints, floor coverings, etc. shall be removed. Removal shall be accomplished using approved OSHA work practices. For removal of existing resilient floorings or residual adhesive, strictly observe the Warning that follows and Notes 1 and 2. (**Warning**—Do not sand, dry sweep, dry scrape, drill, saw, beadblast, or mechanically chip or pulverize existing resilient flooring, backing, lining felt, or asphaltic cut-back adhesives. These products may contain either asbestos fibers or crystalline silica. Avoid creating dust. Inhalation of such dust is a cancer and respiratory tract hazard. Smoking by individuals exposed to asbestos fibers greatly increases the risk of serious bodily harm. Unless positively certain that the product contains non-asbestos material, presume it contains asbestos. Regulations may require that the material be tested to determine asbestos content. RFCI's recommended work practices are a defined set of instructions addressed to the task of removing all resilient floor covering structures whether or not they contain asbestos. When RFCI's recommended work practices are followed, resilient floor covering structures that contain (or are presumed to contain) asbestos can be removed in a manner that will comply with the current occupational exposure to asbestos standard's permissible exposure limits (PEL) issued by the Occupational Safety and Health Administrations (OSHA).

NOTE 1—Various federal, state, and local government agencies have regulations covering the removal of asbestos-containing material. If considering the removal of resilient floor covering or asphaltic cut-back adhesive that contains or is presumed to contain asbestos, review and comply with the applicable regulations.

NOTE 2—Certain paints may contain lead. Exposure to excessive amounts of lead dust presents a health hazard. Refer to applicable federal, state, and local laws and "Lead-based Paint: Interim Guidelines for Hazard Identification and Abatement in Public and Indian Housing"⁶ regarding: (1) appropriate methods for identifying lead-based paint and removing of such paint, and (2) any licensing, certification, and training requirements for persons performing lead abatement work. (Use only qualified or certified lead abatement contractors to remove lead-based paint.)

⁶ Available from U.S. Department of Housing and Urban Development, Washington, DC. Use September 1990 or subsequent editions.