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## Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride<sup>1</sup>

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 ( $\epsilon$ ) 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 test shall not be used to evaluate the rate of moisture vapor emitted by lightweight or gypsum concrete floors containing lightweight aggregate.

1.3 This test shall not be used to evaluate moisture vapor emissions over coatings on concrete or through reactive penetrants or over patching or leveling compounds.

1.4 This quantity of moisture shall be expressed as the rate of moisture vapor emission, measured in pounds of moisture over a 1000 ft<sup>2</sup> area during a 24-h period.

~~1.5 This test shall not be used to evaluate moisture emissions over gypsum concrete.~~

~~1.6 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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1.5 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.6 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:~~<sup>2</sup>

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

~~E1745 Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs~~

~~E1993 Specification for Bituminous Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs~~

~~F141 Terminology Relating to Resilient Floor Coverings~~

2.2 ~~Resilient Floor Covering Institute Standard:~~

~~Recommended Work Practices~~<sup>3</sup>

Recommended Work Practices

2.3 ~~Military Standard:~~

~~Mil Spec B-131H Type I, Class III Military Standard:~~<sup>4</sup>

MIL-PRF-131 Barrier Materials, Waterproof, Greaseproof, Flexible, Heat-Sealable

2.4 ~~ICRI Guide:~~

~~Guideline No. 03732: Selecting and Specifying Concrete Preparation for Sealers, Coatings, and Polymer Overlays~~<sup>5</sup>

ICRI Technical Guideline 310.1-1997 Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee F06 on Resilient Floor Coverings and is the direct responsibility of Subcommittee F06.40 on Practices. Current edition approved July 1, ~~2010~~2011. Published ~~July 2010~~ August 2011. Originally approved in 1998. Last previous edition approved in ~~2009~~2010 as ~~F1869-09~~F1869-10. DOI: 10.1520/F1869-10.

<sup>2</sup> 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.

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

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

<sup>5</sup> Available from International Concrete Repair Institute, International Concrete Repair Institute 3 166 S. River Road, Suite 132, Des Plaines, IL 60018; www.icri.org

### 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 ft<sup>2</sup> area of concrete flooring during a 24-h period (multiply by 56.51 to convert to μg/s m<sup>2</sup>).

### 4. Significance and Use

4.1 Use this test method to obtain a quantitative value indicating the rate of moisture vapor emission from the surface of a concrete floor and 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 ft<sup>2</sup> 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 surface at that time. The time of testing and may not indicate future conditions.

### 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. Cylindrical Plastic Dish with Lid Containing Anhydrous Calcium Chloride, heat sealed in a heat sealable bag meeting the latest version of MIL-PRF-131, Class 1 or 2, 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  $16 \pm 1$  g.

5.1.1.2 ~~Dish shall be made of a material that does not absorb moisture. Dimensions of the dish shall be  $69 \pm 1$  mm outside diameter,  $16 \pm 1$  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.~~

5.1.1.2 Dish shall be made of a material that does not absorb moisture. Dimensions of the dish shall be  $2.7 \pm 0.08$  in. ( $69 \pm 2$  mm) outside diameter as measured at the bottom area of the dish that contacts the floor, 0.6 to 0.8 in. (15 to 20 mm) height without cover, wall thickness less than 0.08 in. (2 mm). Dish shall be supplied with a tight-fitting lid. The lid shall be secured to the dish with pressure-sensitive adhesive backed vinyl tape that does not absorb moisture, or a mechanical seal shall be provided such as a screw-top or snap-top lid.

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 ft<sup>2</sup> ( $460 \pm 46$  cm<sup>2</sup>), as measured between the inside of the flanges, is required to seal the test area of the floor. ~~The plastic transparent cover shall have a depth greater than the height of the container dish of anhydrous calcium chloride. The height of the container-transparent cover shall be  $1 \pm 1.5$  in.  $\pm 0.125$  ( $38 \pm 3.2$  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 transparent~~ cover as a protective warning while the test is being conducted.

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

5.2 *Gram Scale*, capable of measuring  $\pm 0.1$  g. This scale will be used to weigh the calcium chloride ~~container dish~~ 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  $50 \pm 10\%$  relative humidity. Maintain these conditions 48 h prior to, and during testing.~~ The test site should be at the same temperature and humidity expected during normal use. If this is not possible, then the test conditions shall be  $75 \pm 10^\circ\text{F}$  ( $23.9 \pm 5.5^\circ\text{C}$ ) and  $50 \pm 10\%$  relative humidity. Maintain these conditions 48 h prior to, and during testing. For floors intended to be used at high or low temperatures or humidity (such as cold storage rooms), the test site must be within the temperature and humidity range given above, not at the anticipated service temperature or humidity.

6.2 Prior to placement of the anhydrous calcium chloride tests, the actual test area shall be clean and free of all foreign