Designation: F2420 – 05(Reapproved 2011)

Standard Test Method for Determining Relative Humidity on the Surface of Concrete Floor Slabs Using Relative Humidity Probe Measurement and Insulated Hood[1]

This standard is issued under the fixed designation F2420; 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 percent relative humidity above the surface of concrete floor slabs for field or laboratory tests.

1.2 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.

1.3 *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.* Some specific warnings are given in Section 7.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

E104 Practice for Maintaining Constant Relative Humidity by Means of Aqueous Solutions

F2170 Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes

NOTE 1—For additional references, see A1.2.

2.2 *Other Standards:*

Resilient Floor Covering Institute, Recommended Work Practices for the Removal of Resilient Floor Coverings[3]

U.S. Department of Housing and Urban Development, Lead-Based Paint: Interim Guidelines for Hazard Identification and Abatement in Public and Indian Housing[4]

3. Terminology

3.1 *Definitions:*

3.1.1 *dew point*—dew point temperature is the temperature at which air becomes saturated when cooled with no further addition of moisture or change of pressure. Condensation can occur when moist air is cooled to its dew point and below.

3.1.2 *relative humidity*—ratio of the amount of water vapor actually in the air compared to the amount of water vapor required for saturation at that particular temperature and pressure expressed as a percentage.

3.1.3 *service temperature and relative humidity*—average ambient air temperature and relative humidity that typically will be found in the building's occupied spaces during normal use.

4. Summary of Test Method

4.1 This test method covers a procedure where a purposely-made thermally insulated hood is placed on and sealed to the surface of a concrete floor slab. An entrapped and impervious air pocket or chamber is formed directly above and in contact with the surface of the bare floor slab. Through a lined access hole in the hood, a humidity probe can be inserted to measure the relative humidity (RH), temperature, and dew point within the air pocket.

4.2 Methods of probe calibration and factors affecting equilibration are described in Section 8.

4.3 The basis of this test is to use a Humidity Probe to determine the relative humidity, temperature and dew point of an air pocket within the air chamber formed under a thermally insulated hood sealed to the floor surface. This air chamber shall be located directly above the bare and clean surface of the concrete floor slab. Sufficient time as outlined under 10.1.6 and 10.1.7 should be allowed for moisture, humidity and temperature equilibrium to become established between the pocket of air and the floor slab before relative humidity readings are taken.

4.4 An example of a suitable hood is illustrated in Figs. 1-3. Calculation of the insulation value of the hood is shown in A1.3.

[1] 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.

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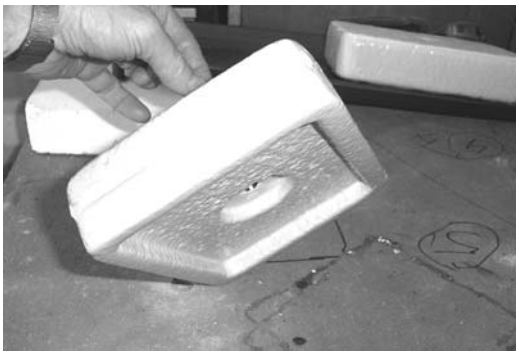
[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

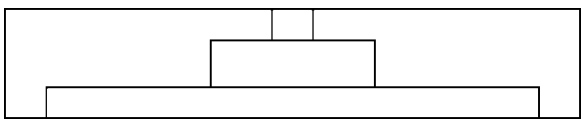
[3] Available from the Resilient Floor Covering Institute, 401 E. Jefferson Street, Suite 102, Rockville, MD 20850, www.rfci.com..

[4] Available from the U.S. Department of Housing and Urban Development, 451 7th Street SW, Washington, DC 20410.



NOTE 1—Fig. 1 not to scale.
FIG. 1 Typical RH Hood Showing Air Chamber

NOTE 1—Fig. 2 not to scale.
FIG. 2 Typical RH Hood Showing RH Probe Positioned in Hood



NOTE 1—Fig. 3 not to scale.
FIG. 3 Diagram of Typical RH Hood

5. Significance and Use

5.1 Moisture permeating from concrete floor slabs affects the performance of flooring systems such as resilient, wood, textile floor coverings and resinous coatings. Manufacturers of such systems generally require humidity/moisture testing be performed before installation over concrete floor slabs. The measurement of relative humidity (RH) directly above the porous surfaces of a floor slab is one such method.

5.2 Excessive moisture in or emitting from floor slabs after installation can cause floor covering system failures such as delamination, bonding failure, deterioration of finish flooring and coatings, and microbial growth.

5.3 The surface RH Hood (relative humidity) test method is intended to quantify the relative humidity condition that exists at the surface of a floor slab to which a floor covering or coating shall be applied. Results indicate moisture content conditions at the time of the test, as moisture movement within the slab is dynamic. See A1.4 for reference to some methods of determining moisture/humidity levels in a concrete slab.

6. Apparatus

6.1 *Humidity Probe and Digital Meter*—Probes shall have relative humidity and temperature sensors, cylindrical in shape and have an external diameter of less than 0.75 in. (20 mm). It is essential that the probe be designed so that it can be sealed within an access hole when positioned in the hood. Relative Humidity Probes should have an accuracy level within ±3 % from 25 to 98 % relative humidity, and be obtained from a manufacturer having a NIST or equivalent traceable calibration procedure. RH Probes should be calibrated at 90 % relative humidity or higher, in addition to lower humidity levels

6.2 An insulated impermeable box or hood shall be manufactured from rigid thermal insulation type material (for example, expanded polystyrene (EPS) or similar). The hood's design shall include a recessed pocket that creates an isolated air chamber directly above the concrete surface. The hood's design must permit it to be sealed to the concrete surface during testing. The hood should have a maximum insulation *U*-value of 1.0 W/(m^2·K). The air chamber should be lined or coated with a suitable vapor barrier material such as PVC so as to isolate the air pocket from the humidity and fluctuations in temperature of the air outside the hood. (See Figs. 1-3 for illustration of an example of a suitable apparatus.) The hood's insulated air chamber shall have a minimum area of between 30 and 40 $in.^2$ (200 and 260 cm^2) with a minimum depth of 0.25 in. (6.3 mm) positioned and directly above and exposed to the surface. This central area of air chamber shall be of sufficient dimensions to allow unrestricted movement of the entrapped air around the sensor end of the RH probe when it is in position within the hood. Provision shall be made so that the RH probe is sealed when positioned in the hood. It is essential that when the hood is sealed to the floor that readings can be taken without breaking the seal and releasing the air in the test chamber. To avoid equipment being left on site unattended, the hood should be designed so that the probe may be removed from the hood, and the access hole plugged while the hood is left sealed to the floor.

7. Hazards

7.1 *Silica and Asbestos Warning*—Do not sand, dry sweep, drill, saw, bead blast, or mechanically chip or pulverize existing resilient flooring, backing, lining felt, paint, asphaltic cutback adhesives, or other adhesives. These products may contain 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 is non-asbestos-containing material, presume that it contains asbestos. Regulations may require that the material be tested to determine asbestos content. The Resilient Floor Covering Institute's (RFCI) recommended work practices for removal of existing resilient floor coverings should be consulted for a defined set of instructions addressed to the task of removing all resilient floor covering structures. Various federal, state, and local government laws have regulations covering the removal of asbestos-containing materials. If considering the removal of resilient flooring or asphaltic