



Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using *in situ* Probes¹

This standard is issued under the fixed designation F 2170; 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 in concrete slabs for field or laboratory tests.

1.2 The values given in parentheses are for information only.

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.*

Specific warnings are given in Section 7, 10.3.2, and 10.4.4.

2. Referenced Documents

2.1 ASTM Standards:

C 511 Specification for Moist Cabinets, Moist Rooms, and Water Storage Tanks²

E 104 Practice for Maintaining Constant Relative Humidity by Means of Aqueous Solutions³

F 710 Practice for Preparing Concrete Floors to Receive Resilient Flooring⁴

3. Terminology

3.1 Definitions:

3.1.1 *relative humidity, n*—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.

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

4. Summary of Test Method

4.1 This test method comprises two procedures for forming holes in concrete into which a relative humidity probe is

placed. Procedure A for hardened concrete involves drilling a cylindrical hole in concrete with a rotary hammerdrill, then placing a hollow sleeve to line the hole. Procedure B is an alternative procedure for fresh concrete, which involves forming a cylindrical hole in concrete by placing a hollow cylindrical tube in the formwork, then placing and consolidating concrete around the tube. The liner or tube permits measurement of RH at a specific, well-defined depth in the concrete.

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

5. Significance and Use

5.1 Moisture permeating from concrete floor slabs affects the performance of flooring systems such as resilient and textile floor coverings and coatings. Manufacturers of such systems generally require moisture testing to be performed before installation on concrete. Internal relative humidity testing is one such method.

5.2 Excessive moisture permeating from floor slabs after installation can cause floor covering system failures such as debonding and deterioration of finish flooring and coatings and microbial growth.

5.3 Moisture test results indicate the moisture condition of the slab only at the time of the test.

6. Apparatus

6.1 *Humidity Probe and Digital Meter*, with relative humidity and temperature sensors in cylindrical probe, with external diameter less than approximately 0.75 in. (20 mm), and accuracy ± 2 -3 % from 0 to 100 % relative humidity. Obtain probes from a manufacturer with a NIST-traceable calibration certificate stating the range of calibration and the accuracy over that range. Probes shall be calibrated at 95 % relative humidity or higher, in addition to lower relative humidity levels.

NOTE 1—Calibration by end-users using saturated salt solutions in accordance with Practice E 104 is not recommended due to the technical difficulties of maintaining sufficiently accurate reference standards. Checking with salt solutions is an acceptable method of assessing probe performance.

6.2 *Hole Liners*, plastic or non-corroding metal tubes, inside diameter not more than 0.04 in. (1 mm) greater than the probe's external diameter, of sufficient length to seal the hole to the desired depth.

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 *Annual Book of ASTM Standards*, Vol 04.01.

³ *Annual Book of ASTM Standards*, Vol 11.03.

⁴ *Annual Book of ASTM Standards*, Vol 15.04.