MOISTURE TESTING
FOR RESILIENT FLOORING
VITAL DOCUMENTS FOR THE FLOORING INDUSTRY

ASTM F1869
ASTM F2170
ASTM F2420
ASTM F2659
ASTM F710
ICRI CERTIFICATION
Moisture Testing Per ASTM’s

- **ASTM F1869 – Calcium Chloride**
  - Determines value expressed in MVER
    - Lbs. water weight/24 hours/1000 square feet
    - See ASTM F710 for more detailed information

- **ASTM F2170 – In-Situ Probe Testing**
  - Determines value expressed in % Relative Humidity by volume
  - Probe depth generally 40% the depth of the slab to be tested
Moisture Testing Per ASTM’s

- **ASTM F2420 – Dome Hood/Probe Testing**
  - Determines value expressed in % Relative Humidity by volume
  - Dome is placed above the slab similar to a Calcium Chloride kit.
  - Probe is the same as the F2170.
  - Offers value of what the surface’s RH is.

- **ASTM F2659 – Non-Invasive Meter**
  - Generally offers a value of RH in % by weight.
  - Non-invasive and immediate results of slab’s surface condition
CALCIUM CHLORIDE

ASTM F1869
CALCIUM CHLORIDE
WHAT DOES THIS TEST REALLY TELL US?

CALCIUM CHLORIDE
5.1 Concrete floors to receive resilient flooring shall be free of sealers, coatings, finishes, dirt, film-forming curing compounds, or other substances which may affect the rate of moisture dissipation from the concrete or the adhesion of resilient flooring to the concrete. Non-chemical methods for removal, such as abrasive cleaning or bead-blasting, including methods described in Practice D 4259 may be used on existing slabs with deleterious residues to achieve an appropriate state for testing. Cleaning shall take place a minimum of 24 h before 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.
Do not dry grind suspected asbestos containing materials.
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 shall be 75 ± 10°F (23.9 ± 5.5°C) and 50 ± 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.
7.7.1 Three test locations for areas up to 1000 ft² (100 m²).
7.7.2 Add one additional test for each 1000 ft² (100 m²) or fraction thereof.

Note 4—When conducting moisture emission tests, the test units should not be concentrated in an area but shall be located in various parts of the floor area. Tests shall be placed using the testing agent’s judgment to represent areas of potential concern including the perimeter and center of the floor area.
**ASTM F710**

**REPORTING**

**ASTM F1869**

**DOCUMENT ALL INFORMATION**

**CRITICAL INFORMATION CAN BE:**

- TEST DATA AND CALCULATIONS
- INDOOR TEMPERATURE
- INDOOR HUMIDITY
- SLAB TEMPERATURE
- SLAB CONDITION
- DATE S AND TIMES
- PERSON PERFORMING TESTS
- CERTIFICATIONS

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**REPORTING**

**ASTM F1869**
IN SITU PROBE

ASTM F2170
IN SITU PROBE TESTING

PER ASTM F2170
CONDITION REQUIREMENTS
PER ASTM F2170

CLEAN THE HOLE!
9. Conditioning

9.1 Concrete floor slabs shall be at service temperature and the occupied air space above the floor slab shall be at service temperature and service relative humidity for at least 48 h before making relative humidity measurements in the concrete slab.
10. Procedure

10.1 Number of Tests and Locations:
10.1.1 Perform three tests for the first 1000 ft\(^2\) (100 m\(^2\)) and at least one additional test for each additional 1000 ft\(^2\) (100 m\(^2\)).

10.1.2 Select test locations to provide information about moisture distribution across the entire concrete floor slab, especially areas of potential high moisture. For slabs on-grade and below-grade, include a test location within 1 m (3 ft) of each exterior wall.
10.2 Determine the appropriate depth for probe holes from the following table:

<table>
<thead>
<tr>
<th>Drying Conditions</th>
<th>Drill-to Depth from Top of Slab</th>
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<tbody>
<tr>
<td>Slab drying from top only</td>
<td>40 %</td>
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<tr>
<td>(Example: slab on ground with vapor</td>
<td>(Example: 1.5 in. (40 mm) deep</td>
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<td>retarder below, or slab on metal deck)</td>
<td>in 4-in. (100-mm) thick slab)</td>
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<tr>
<td>Slab drying from top and bottom</td>
<td>20 %</td>
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<td>(Example: elevated structural slab not</td>
<td>(Example: 0.75 in. (20 mm) deep</td>
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<tr>
<td>in metal deck)</td>
<td>in 4-in. (100-mm) thick slab)</td>
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**Note 3**—Testing at these depths will indicate the potential equilibrium relative humidity that will be established within the concrete slab after a low-permeability floor covering is applied.

**DETERMINING DEPTH**

**PER ASTM F2170**
**REPORTING ASTM F2170**

**DOCUMENT ALL INFORMATION**

**CRITICAL INFORMATION CAN BE:**

- TEST DATA AND CALCULATIONS
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- SLAB TEMPERATURE
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- PERSON PERFORMING TESTS
- CERTIFICATIONS

**REPORT OF RELATIVE HUMIDITY IN CONCRETE**

<table>
<thead>
<tr>
<th>Test Location (use room numbers or building grid)</th>
<th>Depth from top of slab, in.</th>
<th>Relative Humidity in concrete, %</th>
<th>Temperature in concrete, °F</th>
<th>Air Temperature, °F</th>
<th>Air Relative Humidity, %</th>
<th>Notes</th>
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</tbody>
</table>

**Instrument Used**

- Make, Model, Serial number
- Last calibration date

**Tests performed by**

- Name
- Date
- Company name, address
ALTERNATIVE MOISTURE TESTING
FOR RESILIENT FLOORING

ASTM F2420
ASTM F2659
**Non-Destructive Approach: Dome Hood**

**Probe (Sensor) is often constructed to be used for both in situ (within the slab) and for surface RH testing using a hood. (Similar to Calcium Chloride)**

**ASTM F2420**
NON-DESTRUCTIVE APPROACH: ELECTRONIC METER

FIG. 1 Typical Non-destructive Electronic Moisture Meter for Concrete

NOTE 1—Not to scale.
Concrete Moisture Testing Technician
Grade 1
INTRODUCTION:

There are two tiers to the program

*Tier 1: Educational Program Only*

*Tier 2: Full Certification*
What’s included in the Educational Program?

TRAINING SEMINAR:
3 to 4 hours (mandatory)

MOISTURE TESTING CERTIFICATION PROGRAM

ICRI
What’s included in the Educational Program?

Written Examination:

• One hour to complete
• All questions are multiple choice
• Total of 40 questions
• Four sections - must pass each section with 60% correct
• Overall passing grade of 70%
What’s included in the full Certification Program?

- The Educational Program
- The Written Exam +
- Performance Examination

- 4 ASTM Test Methods:
  - F1869 CaCl MVER
  - F710 pH
  - F2170 Concrete in-situ RH
  - F2420 Concrete Surface RH
What is certification based on?

Questions and performance requirements based on ASTM test methods, annexes, appendices, and related documents
RELATED DOCUMENTS

ASTM DOCUMENTS CAN BE PURCHASED AND DOWNLOADED AT:
www.astm.org

ACI DOCUMENTS CAN BE PURCHASED AND DOWNLOADED AT:
www.concrete.org

For more information go to:
www.americansportsbuilders.com
WHEN IN DOUBT, ASK
CLOSING SLIDE
QUESTIONS & ANSWERS