

Concrete Moisture Before Flooring Installation

Why testing and system selection matter

By **Henry Hunt**, Partner, Topcoat Services USA · For owners, facility managers, contractors and specifiers



18,000 SF Class 3 polished floor, L.L. Bean Outlet, Framingham, MA.

All concrete has water in it. What matters is how much, whether it's moving, and whether the floor going on top is rated for it. Moisture problems rarely show up on day one. They tend to show up months later as blisters, lifting and adhesive failure, usually after the warranty conversation has gotten complicated.

1 Where the moisture comes from

New concrete. A slab is placed with more water than the cement needs to hydrate, and the extra has to leave. The old “one month per inch” drying rule is unreliable. Drying depends on the mix, thickness, weather and whether the building is closed and conditioned.

The ground. Slabs on grade without an effective vapor retarder can keep picking up moisture from below. That's common in older New England buildings.

The building. Washdowns, leaks, wet weather during construction and a building with no heat or HVAC all keep a slab wet.

Older slabs aren't automatically dry

An old slab with no vapor retarder can still test wet. Put a low-permeability coating on it, and moisture that used to escape through the surface can build up beneath it.

2 How moisture contributes to failures

Moisture-related failures usually have more than one cause. Moisture moving up through the slab can carry alkalinity to the bond line. That can attack some adhesives and primers. Low-permeability coatings can trap moisture at the interface. Soluble salts and contamination can drive osmotic blistering. Cold surfaces can collect condensation during install. Which of these is at work, and how much, takes investigation, not assumption.

Polished concrete has no film to blister or debond, so it avoids several of these mechanisms. Moisture still needs evaluating there too. It can affect densifiers, guards, dyes and appearance, and it matters for any adhesive or coating used later in the space.

3 How to test

ASTM F2170 in-situ relative humidity testing is the method most manufacturers reference today. Its key requirements, summarized from the current edition (F2170-19a):

Requirement	What it covers
Building conditioning	The slab and the air above it at service temperature and humidity for at least 48 hours before testing.
Test depth	40% of slab thickness for slabs drying from the top only. Slabs drying from both sides use a different depth set by the standard.
Probe equilibration	At least 24 hours in the drilled hole before readings are taken.
Sampling frequency	Three tests for the first 1,000 SF, and one more for each additional 1,000 SF.
Reporting	Test locations, depths, readings, temperatures and dates, so results can be compared with each product's limits.

Summary for planning only. Use the full current standard for procedure, placement and reporting.

Other tests	What they measure	Notes
ASTM F1869-23 Calcium chloride	Moisture vapor emission rate at the surface, in lbs per 1,000 SF per 24 hrs	Reflects mostly the top of the slab. Not for lightweight-aggregate or gypsum concrete, or over coatings, penetrants or patching. Some manufacturers still publish limits based on it.
pH testing	Surface alkalinity	Often done alongside moisture testing. Some products have pH limits.
ASTM D4263-24 Plastic sheet	Whether capillary moisture is visibly present	Qualitative only. Not a basis for accepting a slab for resinous flooring.

4 Reading the results

There's no single "safe" number. The manufacturer of each product in the system sets its own limits, and they vary a lot. Some epoxies have fairly low RH limits. Moisture-mitigation primers are rated for higher levels, and many urethane cements tolerate more than standard epoxies. Sherwin-Williams describes the Poly-Crete SLB body coat as moisture mitigating in most environments, which is a product claim with conditions attached.

Installation can proceed when every relevant condition is satisfied: moisture and pH within the limits for each product, slab and air temperature in range, the dew point margin met, the surface profiled and clean, and anything else the data sheets require.

When results exceed limits, the realistic options are:

1. **Add a mitigation primer** rated for the measured conditions. Primers have their own limits and don't fix leaks, liquid water or hydrostatic conditions.
2. **Change the system** to one whose published limits cover the conditions, such as some urethane cements. No system tolerates every wet slab.
3. **Dry the slab** with heat, HVAC or dehumidification, then retest. This works when the schedule allows.

Installing outside published limits should only happen with a documented resolution the manufacturer supports in writing, including what it means for the warranty.

Testing costs a fraction of what a failed floor costs to tear out and redo.

5 Notes for new construction

Vapor retarders. Whether to use a below-slab vapor retarder, which class, and where it goes are design decisions for the project's design professionals, coordinated with the flooring requirements and applicable codes. ASTM E1745 is the material specification many projects reference.

Specify the testing. Write moisture testing into the flooring section, with a responsible party and timing. Carrying mitigation as a priced alternate keeps a bad result from stopping the job.

Curing compounds and sealers on new concrete can interfere with bond and may need to come off during prep. Coordinate with the concrete contractor early.



Slab prep before testing and install.

6 Questions to ask before you install

1. Has the slab been tested per ASTM F2170, under service conditions?
2. What are the moisture and pH limits for each product in the system?
3. Is there a vapor retarder under the slab, and is it intact?
4. If results are high, what's the plan and what does it cost?
5. Will the manufacturer warranty cover the floor at the measured conditions?

This paper summarizes general practice. Follow the current edition of applicable ASTM standards and each manufacturer's published moisture and pH limits.

About the author. Henry Hunt is a partner at Topcoat Services USA, a family-owned, veteran-owned commercial flooring contractor in Hyannis, Massachusetts, working across Cape Cod and New England. Topcoat self-performs resinous epoxy, urethane cement and polished concrete with its own crews and equipment. If you're not sure what's in your slab, call us before you spec the floor. We'll test it and talk through options.

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