# Hard Facts About Concrete Moisture

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By Bill Imhoff

**This month's column outlines steps owners, general contractors and architects can take to help avoid moisture-related problems in their construction projects.**

**In recent years**, moisture-related building problems have become front-page news. In Texas, a Dripping Springs homeowner's battle with building mold was so severe it generated national television coverage. Just outside Austin, moisture-related problems found in one wing of the Lake Travis Elementary School forced the school's shut down and demolition. Millions of taxpayer dollars and two years later, the new school will open in the fall. Unfortunately, these aren't isolated cases.

Moisture-related flooring problems are estimated to have reached the billion dollar level annually in the U.S., according to independent concrete flooring expert Scott M. Tarr. Tarr addressed concrete moisture issues and their avoidance recently in workshops sponsored by StarNet Flooring Cooperative and hosted by Intertech Flooring.

"Moisture within and below concrete subfloors is at the heart of the problem," Tarr said.

**Moisture Concerns on the Rise** Why are we seeing an upswing in moisture-related flooring problems? Experts point to a rapidly changing and increasingly complex construction environment that includes:

- The loss of asbestos as an ingredient in resilient flooring
- The banning of solvents from adhesive and coating systems
- Increased use of water to allow easier placement of concrete
- Absorptive aggregate in lightweight concrete
- Fast-track construction schedules

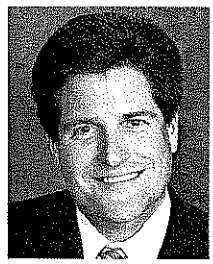
In its white paper on moisture emission testing, the World Floor Covering Association stressed the importance of measuring and testing concrete to minimize the potential for post-construction moisture issues.

"New innovative products, installation methods/materials and environmental regulations have created a more complex environment in which floor covering products are installed," according to the WFCA report.

There are two key steps general contractors, owners and architects can take to help avoid moisture-related problems in their construction projects. The first is testing.

**Importance of Independent Testing** "Testing by an independent specialist to determine the suitability for installation under current complex conditions is a prudent and necessary safeguard for general contractors, owners and architects," the WFCA report added.

Testing is best handled by an independent inspector or testing agency with in-depth understanding of the project, soil and underslab conditions, surrounding environment and concrete itself. A qualified inspector understands the chemical composition of concrete, environmental requirements and technological changes in formulations that may impact whether or not the concrete is suitable for floor-covering installation.



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All floors should be tested independently for moisture-related suitability in accordance with ASTM F-710. Concrete expert Peter Craig recommends using the calcium chloride moisture vapor emission rate method ASTM F 1869; and the concrete internal relative humidity testing ASTM F 2170.

**Selecting the Right Contractor** Once testing is complete, the second key step is to partner with a qualified, trusted flooring expert who is well-versed in the most suitable products for the particular situation. Look for a flooring contractor with extensive product knowledge as to the tolerable limits of moisture vapor emission for the installation of specified products. Ask about ongoing training and the team's product knowledge as it relates to moisture tolerance. Be sure installers are well-informed of the appropriate pH levels within which various adhesives will cure. Find out what steps the flooring company will take if moisture issues are uncovered later.

"Concrete is literally the foundation >>

### Tips for Avoiding Moisture-Related Flooring Problems

- When possible, include a capillary break layer in the geotechnical design of the base beneath the slab.
- Install low-permeance vapor barrier/retarder below the slab.
- Use a practical low water-to-cement ratio concrete mixture.
- Enclose and protect the slab from re-wetting.
- Test all floors independently for moisture suitability before installing floor covering.
- Include a contingency budget for applying a moisture and pH mitigation system prior to floor covering installation, if necessary.

of any structure. If moisture or structural issues arise, they can result in millions of dollars in damages for property owners, disrupt building operations and create a hazard for occupants," said John M. Sutton, president of the Building Owners and Managers Association, one of the leading commercial real estate associations in Austin. "Selecting a flooring contractor with extensive product knowledge, field experience and good business ethics is critical in today's market of tight margins and short timelines."

Sometimes, despite all the testing, problems arise. In 2000 Sid Peterson Memorial Hospital in Kerrville selected Intertech to install flooring in the hospital's pool treatment area where temperatures average 90 degrees and RH is approximately 85 percent.

The architect's original specified product was a 12 ft. by 12 ft. solid vinyl tile installed with a solvent-free two-part epoxy adhesive – the type of product with which Intertech has extensive experience. Not long after the project was completed, moisture problems began to appear. Although we already were six months past our warranty period, we spent nearly a year testing everything from the pool water and environmental moisture levels to the adhesive.

**Product Knowledge is Critical** We followed the process recommended by the manufacturer and determined that moisture was not coming through the slab and that the adhesive was breaking down due to the pool water. We knew we needed to change products. Intertech ultimately selected a sheet vinyl that can be heat welded and is self-coving, ensuring 100 percent moisture protection. The new flooring has proven an ideal choice for the pool area, where water penetration is no longer an issue. <<