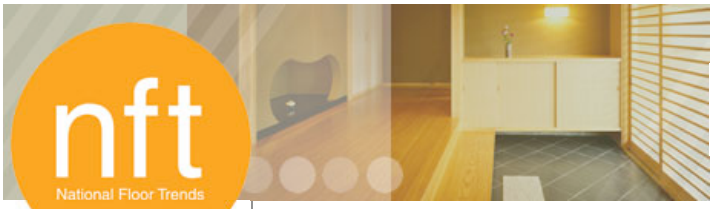

Grappling with Concrete Moisture Problems: Don't Buy into False Assumptions!

by Christopher Capobianco
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Buckled carpet, VCT adhesive oozing, sheet vinyl showing wheel marks, floors lifting, mold, mildew -- these are all examples of what can result when floor coverings are installed over damp concrete. The stakes are considerable when you consider the high cost of repairing moisture-related failures, the liabilities associated with mold intrusion and any variety of other woes than can affect a building with a concrete moisture problem.

Unfortunately, far too many construction and floor covering professionals adhere to fallacious assumptions regarding concrete and moisture-related problems. In this article, I'll identify some common misconceptions about concrete that can really get you into trouble.

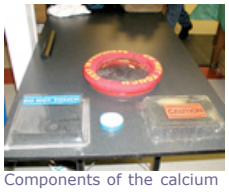
It's the concrete guy's fault. The concrete contractor usually follows the specification written by the architect, so blaming the contractor for a moisture problem is really unfair -- unless the driver of the cement mixer adds excessive water to the mix or the finisher pokes holes in the vapor retarder, which are two practices that occur often and can cause moisture-related failures. Instead, today's fast-track construction practices are most often to blame because the buildings are completed before the slab has had a chance to dry sufficiently. Often, floor coverings are installed over concrete that is not yet dry. Frequently, flooring is laid before the heating and ventilation system is operational, which can lead to problems later when the excess water vapor in the concrete is drawn upward through the slab surface by the dry conditioned air.

Concrete cures in 28 days, so it's is ready for flooring, right? According to ASTM F 710-03, Standard Practice for Preparing Concrete Floors To Receive Resilient Flooring, "New concrete slabs shall be properly cured and dried before installation of resilient flooring. Drying time before slabs are ready for moisture testing will vary depending on atmospheric conditions and mix design."

Notice that this specification uses the terms "cured" and "dried" in the same sentence. "Cured" does not mean "dry." Drying (excess water evaporation) occurs after curing (the chemical reaction that bonds together the ingredients in concrete). True, most concrete floor slabs require approximately 28 days to cure. But another month or two may need to elapse for standard-mix concrete to fully dry. And lightweight concrete slabs above grade need even more time to dry.

Curing compounds are necessary. Initially, the water in concrete needs to be kept within the slab so that the necessary chemical reaction can occur. Traditional concrete curing employed wet burlap on top of the new concrete surface to keep it wet for about seven days.

This method has been replaced by sprayed-on curing compounds, which are formulated to seal the surface and allow construction to begin on top of the new slab a day or two after it is poured. Curing compounds may not be compatible with certain floor covering adhesives and even so-called "dissipating" compounds may remain on the surface much longer than necessary for curing, thus preventing the moisture from getting out of the slab as quickly.



Components of the calcium chloride testing method,

one of two approved by ASTM for determining the moisture content of a concrete slab.

ASTM F 710-03 says, "Concrete floors to receive resilient flooring shall be free of… 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." Therefore, curing compounds should be removed soon after the slab is placed to open up the pores of the concrete and help it dry faster.

A better option is a "cover cure." This requires that the concrete be covered with waterproof paper or plastic sheeting for several days to hold in the water needed for the initial cure. This faster variation on the burlap method is beginning to gain acceptance, so if you have any input into the design of a new building, ask the architect or the general contractor to consider this method.

You don't have to worry about moisture problems in slabs above grade. It is true that many flooring-related problems occur in slabs on or below grade because ground water vapor passes thorough concrete and softens the adhesive. Again, according to ASTM F 710-03, "Every concrete floor slab on- or below-grade to receive resilient flooring should have a moisture retarder (often improperly called a vapor barrier) installed below the slab."

The vapor retarder is often left out in the interest of saving money, and its absence may make the concrete easier to finish. But, the use of such a moisture vapor retarder, provided its integrity has not been compromised, reduces the potential severity of moisture vapor penetration.

However, don't make the mistake of assuming that everything from the second floor up will be problem free. Some of the worst moisture failures occur above grade because, as noted in ASTM F 710-03, "lightweight concrete, floors containing lightweight aggregate or excess water, and those that are allowed to dry from only one side, such as concrete on metal deck construction, may need a much longer drying time."

Concrete used to be hauled by cranes to upper floors in giant buckets filled with "standard mix" concrete. Today, it is pumped. The pumpable, lightweight concrete of today has more water in it so it may take as much as three times longer to dry, which is why above-grade slabs are very suspect for moisture related problems.

You don't have to worry about a moisture problem in the desert. Tell that to the thousands of building owners in the Southwest who have had moisture-related failures. In reality, they have as many or more problems than the rest of the nation! Why? Vapor retarders are left out of their buildings even though there is often a high water table in the desert. Or extra water is added to keep the mix "alive" in the desert heat, and so on. Don't assume that, because you are in a dry climate, you are immune to moisture-related failures.

Don't worry -- it's a 30-year old building! "Adaptive re-use" is a leading cause of moisture failures. Warehouses are changed to shops or offices, garages are changed to living space, basements are converted, etc. One of the worst moisture problems I've ever seen was in a 30-year-old warehouse building that was converted to a furniture store.

Because the slab was not designed to be covered, there was no vapor retarder in place beneath the concrete. For 30 years, ground water vapor moved through that slab unnoticed, until the floor was covered with sheet vinyl and the adhesive turned to mush.

There was no moisture problem with the old floor! Although some experts don't agree, many feel that the old flooring types "breathed" more than the current generation of products. And some feel that the old solvent-based adhesives better resisted moisture.

The jury is still out on these points but the fact is that flooring and adhesives are not the same today as they were 15 years ago. So, moisture may have been moving unnoticed through the older floor covering types. Cover that floor with resilient tile or sheet, or vinyl-backed carpet, and the vapor has nowhere to go but into the adhesive.

It didn't look, smell or feel wet. I tested with a moisture meter. I tested with a sheet of plastic. We've never had a moisture problem, so we don't test. If you are going ahead with a floor covering installation based on any of these assumptions, you are asking for trouble! The first defense is detection. You need to understand what you're facing every time you start a flooring installation over concrete.

Here's a simple rule: IF IT'S CONCRETE, TEST IT!! This applies whether the concrete in the basement or on the 50th floor, and whether it's brand new or 50 years old. Looking at it, smelling it or touching it tells you nothing about the invisible water vapor that may be migrating out of that concrete slab. If you have never tested and never experienced a moisture-related failure, then you've been very lucky!

Meters yield a momentary snapshot of the moisture situation but the rate of concrete

vapor emissions can fluctuate from day to day. The plastic sheet test has proven unreliable and is being removed from a number of industry standards.

There are now two different ASTM test methods for concrete floors -- F 1869 (Calcium Chloride test) and F 2170 (Internal Relative Humidity test). I'll cover proper concrete testing procedures in my next column.

In the final analysis, sufficient information is available on moisture-related failures as well as how, when and why to test. There really is no excuse for not testing.

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