

Control of Moisture in Concrete Slab Protects Flooring from Failure

When flooring fails in a surgical suite or patient care area of a hospital, it puts important critical resources out of commission and disrupts many health-critical operations. Moisture in the concrete slab that receives those floor coverings is most often to blame. Which is why controlling moisture levels in the ubiquitous span is a serious issue that a knowledgeable construction management firm addresses before it causes a serious problem. CG Schmidt is that firm for many healthcare organizations that expect flooring throughout a care facility to serve its purpose without interruption.

Understand Complexities

CG Schmidt's experience with concrete and managing this stage of construction goes back to its early work pouring slab for parking structures. The firm's expertise transferred seamlessly as CG Schmidt expanded into other areas of construction management including the construction of hospitals and clinics, which demands detailed working knowledge of new material technologies.

As the water-based flooring adhesives (formulated to meet EPA standards for lower volatility) that dominate the market became more sensitive to any trace of moisture in the concrete slab, it was clear construction teams needed more options to mitigate potential problems. Two of the most important are a strict regimen of moisture testing and choosing an installation method that ensures flooring materials adhere effectively.

Eric Schmidt, firm Managing Director, says CG Schmidt has made understanding how to manage the complexities of moisture in concrete a priority. Requests from new clients to correct flooring problems caused when a previous contractor with little knowledge of those complexities cut corners reinforces CG Schmidt's belief in its approach.

Among other matters, it makes issues related to flooring performance a topic project leaders cover in detail early in a project.

"We tell owners up front that the condition of the concrete slab will determine what approach the project team takes to install the floor materials and that we'll have plans in place but won't decide on an installation solution until we get to that stage," he explains. "It's important that owners know what to expect and be assured we will make the right call at the right time."

He routinely establishes a flooring allowance at the start of a project to offset costs associated with the eventual solution the construction team selects. This no-surprises policy connects owners more closely to stages of construction and protects the integrity of capital resources on both sides.

Value Impact

Two of the most important are a strict regimen of moisture testing and choosing an installation method that ensures flooring materials adhere effectively.



Monitor Each Step

Scheduling is critical throughout construction, doubly so when it comes to letting the concrete slab dry satisfactorily after installation. Poured concrete needs to stay wet, or hydrated long enough to achieve necessary strength. Under the best of controlled circumstances, the curing process is gradual and culminates in a surface dried to an acceptable level for effective flooring installation. Monitoring this and measuring the slab's readiness to receive the flooring material is central to CG Schmidt's quality control.

Mark Schmidt is Director of Field Operations for the firm and in charge of quality control. He says a primary goal is to enclose the building as soon as possible after pouring the slab, making it easier to control the environment and the curing process.

Staying on schedule also requires close monitoring of other potential threats. Schmidt does a weekly walk-through with the firm's superintendents on a hospital or clinic job as part of the quality assurance process, something he calls a continuous watch. He uses these visits to check for any problems and make sure the sequence of construction does not introduce any new ones down the line. Walk-throughs sometimes lead to changes on the job site, like creating a containment area for drywall contractors to mix drywall compound without spilling water onto the newly laid slab.

"Besides bringing a fresh set of eyes to what's going on at the site and spotting things that escape people's notice, the walk-throughs educate project teams about what they should look for on a day-to-day basis," notes Schmidt.

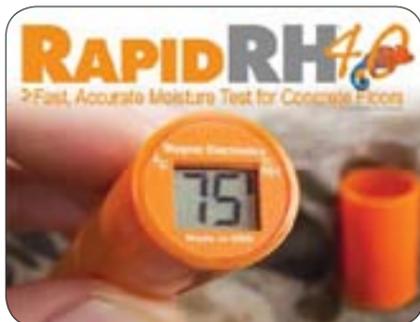
He also tracks the status of construction progress by sitting in on foreman meetings and staying informed about key installation milestones. Schmidt is on site to witness the start of many installations. "Timing is important and at certain critical points, like when we pour the slab or start to lay down flooring, it helps to be there."

Value Impact

"There are good reasons we check the condition of the slab carefully.

Flooring damaged by excessive moisture emissions from the slab is a huge setback for an owner and a serious call-back for us. Until it's resolved, we own that problem."

Mark Schmidt, CG Schmidt's Director of Field Operations



Objective Testing

CG Schmidt construction teams follow ASTM testing standards during the curing process to verify the concrete slab is at the state where subcontractors can install flooring materials. Periodic tests measure the rate of moisture vapor emissions from the surface of the concrete floor and relative humidity levels. The firm has dedicated testing agencies conduct these tests to provide objective and credible results. The numbers must meet manufacturers' specifications before the flooring is installed to protect the warranty and safeguard against failure.

Reliable testing takes time but Schmidt says some subcontractors prefer to ignore that and do less. "There are good reasons we check the condition of the slab carefully," he says. "Flooring damaged by excessive moisture emissions from the slab is a huge setback for an owner and a serious call-back for us. Until it's resolved, we own that problem."



Material Facts

CG Schmidt works closely with its subcontractors to ensure the integrity of the concrete slab from the start. Firm superintendents confirm the mix is the right consistency and poured under the optimal environmental conditions. They also time the activity as close as possible with plans to enclose the structure.

Under ideal drying conditions, a concrete slab will dry out at a rate of one inch per month. By those calculations, a 4-inch slab needs four months to dry, a 12-inch slab, close to a year. Time like that is impractical in most construction schedules, says CG Schmidt Project Manager Tony Buss. Those material facts are a major reason industry-proven measures are indispensable here. As is the pre-construction flooring allowance.

Once moisture tests satisfy the flooring manufacturer's specifications (i.e., humidity levels at or below 80 percent), the project team will decide on an appropriate technology to further protect selected flooring materials from any damaging moisture emissions after installation. Buss says the firm has reliable experience with three approaches, which rank in price from low to high.

- 1) Seal the concrete slab with a roll-on primer product before installation.
- 2) Apply a specially treated peel-and-stick product to back of flooring.
- 3) Roughen up the slab surface to accept layers of epoxy and aggregate materials that help flooring adhere.

Buss notes that environmental conditions, flooring type and flooring specifications help dictate which solution will deliver results without squeezing the schedule or exceeding the budget.

He points to a CG Schmidt-led hospital expansion project for the Monroe Clinic

1700-T-19

Relative Humidity and Moisture Content

It is the responsibility of the design professional to engineer the space in which fine woodwork (not to mention laminates, fabrics, and wall coverings) is to be installed with humidity controls required to maintain the optimum relative humidity as shown on the attached charts and tables. The following map shows the approximate average moisture content for interior use of finished woodwork recommended for general areas of the United States and Canada.

Geographical Location	Interior Use		Exterior Use Optimum Moisture Content (MC) of Wood
	Optimum Moisture Content (MC) of Wood	Indoor rel. humidity required to hold optimum MC	
Most of the U.S., Ontario and Quebec in Canada	5-10%	25-55%	9-15%
Damp Southern Coastal areas of the U.S., Newfoundland and Canadian Coastal Provinces	8-13%	43-70%	10-15%
Dry Southwestern U.S.	4-9%	17-50%	7-12%
Alberta, Saskatchewan, Manitoba in Canada	4-9%	17-50%	10-15%



in Monroe, Wisconsin, as an example of a tight timetable that demanded best practices on every level, including all structural elements that underpin a complex building.

Buss says getting the structure enclosed so they could begin to time the curing of the 12-inch slab and stay on schedule was paramount. By mid-November of 2010, all but a two-story front section of the addition had roof and walls in place. They enclosed the remaining space with plastic wall partitions and powered up portable heaters to create a controlled environment.

Testers took measurements once a month at first and then twice a week by the spring to record moisture levels in the concrete. "This gave us the information to judge which product to use for flooring installation," Buss recalls. When they saw the relative humidity remained too high for the roll-on primer, the CG Schmidt team

decided on a new technology with a higher threshold for traces of moisture, the peel-and-stick product.

The project team had researched the technology in advance to determine how effective the specially treated product really was against moisture and how it performed over time. What they learned made them confident it was the right method to use for the hospital expansion. The method also saved the owner approximately \$400,000 over the cost of a previously specified alternative.

"Knowing how concrete responds to different conditions and using the information we gathered on this installation method helped us honor the schedule and the bottom line," says Buss. "The project team did a good job of making sure this stage went smoothly and the owners tell us the flooring performs like it should."

Value Impact

CG Schmidt strikes a balance that produces the best outcome for owners and facility users in every aspect of a building project. Staying informed about all the variables that influence flooring failure and the best methods for factual monitoring of moisture in concrete demonstrates the firm's commitment to addressing a critical issue before it becomes a problem.

From the focus on quality control and having a top executive's active presence on the job site to a belief in communicating clearly with owners, CG Schmidt puts many resources into building a strong foundation. It is an area where the firm understands implicitly that every last detail counts, observes Mark Schmidt.

"Given the costly consequences for owners and the people they serve, we recognize that having expertise in controlling moisture in concrete is the best way to make sure floor materials in a healthcare setting do the job they were meant to do."