THE COMMERCIAL FLOORING REPORT
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CONCRETE CURING ADMIXTURES, ADDITIVES AND TOPICAL APPLICATIONS - AGAIN

Installing floor covering materials of any kind and floor preparation treatments such as leveling agents and feather finishes is challenging enough without impeding their effectiveness with a barrier. We've discussed before the use of Fly Ash in concrete and how, if in high enough quantity it can prevent anything from bonding or sticking to concrete substrates. http://www.lgmandassociates.com/wp-content/uploads/2008-03-CFR-Volume-8-BE-AWARE-OF-DANGEROUS-SITUATIONS.pdf The flooring industry, and anyone else involved in flooring which includes the General Contractor, Architect, Designer, Facilities Managers and owners are facing another obstacle to successful floor covering installations due to the use of concrete admixtures, additives and topical applications. Unfortunately this action has moved us from the frying pan into the fire. Worse yet a bill of goods on these systems are being sold to Architects and General Contractors and the systems are being written into the construction specs. This forces the flooring contractor to either install the flooring material and face imminent failure or not do so and face legal action.

The basic components of a concrete mix is; Portland Cement, Water, and Aggregates. Admixtures or additives are additions to the mix to reduce cost; improve workability and plasticity. The main admixtures are; Air Entraining, Plasticizer, Accelerator, Water Repellant and Fly Ash, Slag, Silica Fume, and Natural Pozzolans. Polozzolans and slags are categorized as supplementary cementitious materials or mineral admixtures. Fly ash is the most widely used supplementary cementitious material in concrete, it is the byproduct of the combustion of pulverized coal in electrical power generating plants. Fly ash can replace approximately 15%-30% of the cement in the mix. Cement and fly ash together in the same mix make up the total cementitious material. ASTM C 618 (AASHTO M 295) Class F and Class C fly ashes are commonly used as pozzolanic admixtures for general purpose concrete.

Table 3-1. Specifications and Classes of Supplementary Cementitious Materials

Ground granulated iron blast-furnace slags—ASTM C 989 (AASHTO M 302)
Grade 80
Slags with a low activity index
Grade 100
Slags with a moderate activity index
Grade 120
Slags with a high activity index
Fly ash and natural pozzolans—ASTM C 618 (AASHTO M 295)
Class N
Raw or calcined natural pozzolans including: Diatomaceous earths, Opaline cherts and shales, Tuffs and volcanic ashes or pumicites, Calcined clays, including metakaolin, and shales
Class F
Fly ash with pozzolanic properties
Class C
Fly ash with pozzolanic and cementitious properties
Silica fume—ASTM C 1240

The successful installation of any type of flooring material, underlayment or smoothing compound continues to be far more challenging than it needs to be. As stated, in previous issues we have discussed the challenge of bonding any type of flooring material to the surface of concrete mixtures containing very high levels of fly ash or slag.

In this issue we look at another all too common practice that while proper in intent often results in flooring problems or installation failures. The practice we refer to is that of curing. Proper curing is absolutely necessary for hydration of the cement used in the concrete mixture. However the curing process need only be maintained for a period of 7 days.

Curing Compounds:

Curing compounds are fluid applied, spray or rolled on thin mil membranes designed to slow down the loss of moisture from the slab surface. While it is most important to maintain moisture in the slab for the first 7 days after placement, the use of a curing compound will slow down the drying of the slab over time and in many cases the material will act as a bond breaker. ASTM F 710 does not specifically prohibit the use of curing compounds but it does require that the material be completely removed from the slab surface before moisture testing is performed or any type of floor covering material is installed. Removal often requires shot blasting which can be a very expensive process at later stages in the project.

There are a number of chemical formulations and variations in solids content used to produce membrane forming curing or curing and sealing compounds. Curing compounds that are also sealing compounds will remain on the surface permanently until continuous abrasion wears them off of the slab surface. There are also several hydrocarbon formulations that will break down over time with either exposure to ultraviolet light or high pH. While this class of curing compounds will chemically break down over time, abrasion is still required to remove the resin residue from the floor surface. The challenge this poses is that if there is not traffic on the entire substrate or exposure to UV, the compounds will not break down. Whatever residual material remains can and will compromise the installation of floor covering materials.

Over the past decade the use of so called; “Chemical Curing Compounds” has gained great popularity in this country. These non-membrane forming, water-based materials typically use one form of silicate or another in an attempt to densify the slab surface and slow down the loss of moisture in a

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slab. Some manufacturers of these compounds go so far as to suggest that applying this type of material to a freshly finished concrete surface will mitigate potential moisture-related floor problems. Oh that it could be that easy.

In the professional opinion of all of our LGM staff and consultants chemical curing, and chemically reactive topical moisture mitigation treatments have too many issues working against them to be relied upon. As one member of our group suggests the use of these types of materials as a moisture mitigation strategy basically amounts to Russian Roulette.

The challenges to the topical application of a chemically reactive material intended to provide moisture mitigation are many. First of all, applying a water-based material to the surface of a freshly finished concrete slab means that the chemical compound is being applied to the slab surface when it is at its wettest state which significantly limits the depth of penetration. Secondly if fly ash or slag was used in the mix the chemical reaction of the sprayed on compound may not take place completely as the ash and slag compete for the calcium hydroxide necessary to complete the chemical reaction. When this occurs all of chemically reactive surface treatment may not properly react and a bond breaking material can be formed. Having said this there is one unique product available which does work and we'll share that information with you in a near future issue of the newsletter.

Chemically reactive materials do not always result in a flooring problem however the seriousness of the issues associated with their failure preclude acceptance of the approach by all of us at LGM and Associates. When a silicate-based, chemically reactive material fails to protect the flooring installation it may require removal of more than 1/8" of the concrete surface to effectively correct the problem.

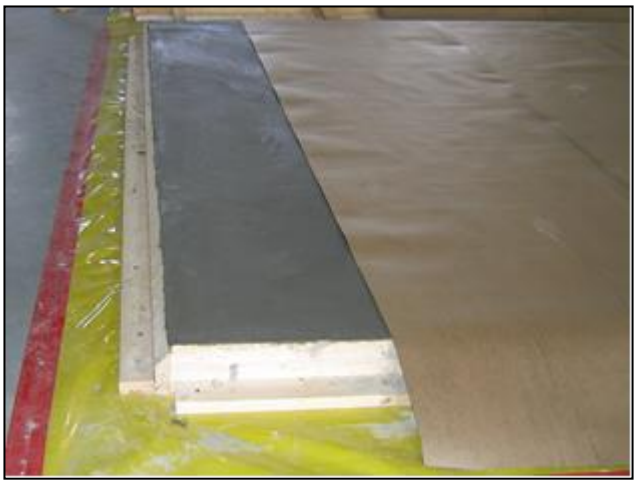
As stated, all of these systems are supposed to break down or traffic off the concrete. The catch is fast tracked construction which speeds the job along not giving the topical treatment time to break down and, even if given time, all of the substrate is not going to get traffic enough to wear the topical treatment off. Finally, in theory this works, in practice not so much. So the topical application remains on the floor, the installation fails and the arguments begin as to whether the treatment was used and who was at fault for the failure. The hot potato usually winds up in the hands of the flooring contractor who has to prove it was not his installation that failed but the substrate which he was given causing the failure – nothing will stick to it. This is usually visibly evident when the flooring material is lifted up, which it does effortlessly, and the adhesive on the back of it is still tacky and the adhesive on the substrate, or what's left of it, has broken down and powdered.

The shade of the concrete also gives an indication something was put on/in it and the surface ph will be close to neutral. How these products get sold or worse yet, specified, when nothing will stick to them is beyond comprehension. Worse yet, the

insistence by architects these systems be used and the massive failures that will result is inexcusable. Not only won't flooring materials bond to substrates treated with curing compounds but neither will patching and leveling materials. Architects are being sold a bill of goods with products containing silicates and believing they will work while giving the General Contractor and the Flooring Contractor fits. The failures that will occur should be the responsibility of the architect at that point. The architect need only follow the flooring industry guidelines when writing the specs and not buy into treatments that are hyped by marketing that doesn't fit the science.

It may sound old fashioned but the prescription for a successful flooring application follows a back to basics formula;

A. The use of a low-permeance vapor retarder placed in direct contact with the underside of the slab.
B. Low water-to-cement ratio concrete.
C. The use of continuous reinforcing steel to help mitigate slab curl and eliminate joints.
D. Concrete finished to a smooth, but non-burnished finish.
E. Cover curing of the finished slab with dry, wet-strength curing paper for 7 days.
F. Use of sweeping compounds that do not contain oil or wax.
G. Condition the ambient environment to warm the slab and reduce ambient relative humidity to below 50%.



Be wary also of adhesive products or topical applications that are said to be cures for concrete curing compounds or high moisture and alkalinity in concrete. They are likely to fail overtime. You can't put a bandage on a hemorrhage. And above all read the warranties which always have some limiting condition hidden in the text.

We've only seen the beginning of what we fear is going to be an escalating number of flooring installation failures that will cost everyone involved millions of dollars in losses. You're going to need guidance to help you steer clear of the danger or correct it when it occurs. LGM & Associates has the ability to provide the help you'll need. We'll also keep you posted in this newsletter of what actually works.

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Carpet Fibers & Their Characteristics
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Dyeing Processes
Tufting Processes
Carpet Finishing/Backing Systems
Lab and Mill Tours
Installation
Adhesives
Maintenance
Testing Methods
Chemicals and Machines
Industry Overview

AGENDA

Day One
8:00 AM to 5:00 PM
Introduction and Opening Remarks
Carpet Construction & Industry Statistics
Carpet Fibers & Their Characteristics
Carpet Yarn Manufacturing
Pre-Dyeing
Post-Dyeing
Tufting

Day Two
8:15 AM to 5:00 PM
Finishing/Installation Prep
Moisture and pH
Lab and Mill Tours

Day Three
8:15 AM to 1:00 PM
Modular Carpet Installation
Adhesives
Maintenance
Discussions

PRACTICAL / IMPARTIAL / OBJECTIVE

The New LGM Carpet Seminar is a one of a kind educational experience. The seminar places emphasis on explaining the more technical aspects of fiber, yarn, dyeing, backing systems and carpet manufacturing in an easy to understand format. We'll address new state of the art technical developments and their effects on carpet as well as information on installation, maintenance and testing. The mill tours will bring to life the information learned in the classroom. The curriculum is up to the minute, impartial, objective, and unbiased, giving participants the necessary facts to more fully understand the product and make better and more profitable business decisions.