CFR The Commercial Flooring Report
For the Commercial Floor Covering Industry
Volume 198 - July 2025
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Type 1L Cement, The Challenging Green Alternative, What You Need to Know

As if there weren't enough challenges with commercial flooring installations such as moisture in the concrete subfloor, PVC free flooring products that don't want to stay stuck to the substrate, shortened project time lines, products that are supposed to work but don't, outrageous, unsupported, product marketing and sales claims, and adverse site conditions, you are now having to deal with new changes with the composition of the concrete itself. Changes that are introducing serious concerns that you need to be made aware of.

You might think that all concrete is the same, but such is not true. Concrete mixtures can vary considerably and even every load of concrete may have differences. There are also regional differences where the components and materials that make up the concrete such as aggregate type, gradations, and the content of secondary cementitious materials such as Fly Ash and Slag. Add to that the variety of admixtures introduced into the concrete and the flooring installer may find themselves having to deal with a concrete sub-floor that will require additional unanticipated treatment of the slab for the flooring materials to adhere properly. And those challenges are with traditional Portland cement concrete. Today to make things even more challenging, Portland cement concrete is quietly being replaced with the green alternative: Type 1L concrete.

So, what is concrete comprised of Type 1L cement and how is it different than concrete made with traditional Portland cement? Why is the concrete industry being forced to switch from Portland cement to Type 1L cement? What are the challenges with it?

Concrete is the most widely used building material on the planet. Producing it uses a tremendous amount of energy. Reducing energy consumption by 10% will lower the CO2 footprint significantly worldwide.

Flooring installation failure over Type 1L concrete

Type 1L Cement:

Type 1L cement, or Portland Limestone cement (PLC) is an eco-friendly alternative and a variation of Portland cement that includes a higher percentage of limestone (up to 15%) compared to the traditional Type I cement (which allows for up to 5% limestone). A concrete floor slab made with Type 1L cement has higher water demand, produces less bleed water, and introduces challenges to the finishing process. It can also have slow strength gain and softness.

The intended purpose of making the switch to Type 1L concrete is to reduce the carbon footprint of making the cement. Limestone, clay, silica and iron ore are super heated to form clinker. Clinker is finely ground with gypsum to form Portland cement. Raw, uncooked Limestone is being substituted for Portland cement in the 1L cement because it uses less energy in the production of cement, lowering the carbon footprint. To make matters worse, all types of Type 1L cement are not created equal. And then there's normal weight and light weight Type 1L cement floor slabs to contend with.

While reducing the carbon footprint is the objective, the challenges that a Type 1L concrete floor slab introduces to the designer, ready-mix producer, concrete contractor, and the flooring installer are many. Type 1L concrete floor slabs bleed less than traditional Portland cement based concrete slabs which can increase the risk of surface crusting, crazing, and pre-mature finishing. The surface of a Type 1L concrete slab can also end up being softer than a straight Portland cement slab which presents a serious challenge to the bond of flooring materials, or a polishing process.

On new building projects the project team needs to know what type of concrete they are getting and working with so there needs to be an open line of communication among all parties. The design team needs to understand the challenges associated with Type 1L concrete and make all members of the project team aware that Type 1L concrete will be used on the project. The concrete supplier also needs to provide all members of the project team with a copy of the approved Type 1L concrete mixture.

At the present time it is estimated that about 60% of the cement being used to make concrete in this country is Type 1L. It's important that you know how to read and understand the composition of the concrete mixture being used on your project – we can help you with that.

For years flooring installers have had to deal with trying to bond properly to concrete slab surfaces that are dense and non-porous due to finishing

THE COMMERCIAL FLOORING REPORT

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procedures and the addition of high percentages of secondary cementitious materials such as fly-ash and slab. Now add to that the introduction of Type 1L concrete and the ability to bond properly to a native concrete surface has been multiplied.

Concrete polishing contractors have reported weak concrete surfaces when polishing concrete containing Type 1L cement. It may take more time for the concrete to reach the appropriate strength. Testing with a Mohs Hardness testing kit should reveal the concrete surface hardness between 5 and 7. If the test is less than 4, remediation must be done to produce a harder surface. Correcting a weak concrete surface is not the responsibility of the flooring or concrete polishing contractor.

Adhesive bond tests have been performed on slabs comprised of both C150 Portland and Type 1L cement. Water-based adhesives bonded well over the Portland cement slab surface but demonstrated a lower standard of performance over Type 1L.

Adhesives also demonstrated different bond strengths to the three curing methods implemented on each slab. More information is available upon request as further testing is ongoing with the flooring manufacturers.

The bond of flooring adhesives is better to Portland cement-based concrete than to concrete comprised if Type 1L cement. Based on our joint findings, the Carpet and Rug Institute (CRI), and the Resilient Floor Covering Institute are both working on position papers, as they were never informed about the Type 1L changes. Both organizations and adhesive manufacturers now need to begin testing of their water-based adhesives on 1L.

Polishing schedules should be delayed by 30-60 days on Type 1L mixes due to delayed strengthening of the surface.

Always conduct mockups on projects using Type 1L to test for floor covering and polishing issues.

While it would seem that concrete is a simple combination of four basic materials (water, sand, stone & cement). In reality concrete it is a very complex material. Concrete mixtures can and will vary by design and from region to region. When you're installing flooring on a new concrete surface, it is important to find out what you're dealing with before there's a failure and you get blamed for something that was hiding behind the curtain to spoil your day. We are currently in uncharted waters with Type 1L cement and for that matter traditional concrete that has been a moving target for years.

So how do you install over Type 1L cement when mockup tests reveal that unacceptable bond can be achieved? We've found that taking down the top 1/8" to 1/4" inch with a concrete shaver and installing the right type of cementitious underlayment should take you out of harm's way. You still must account for any moisture in the slab which would have to be dealt with by applying a moisture mitigation system – not an additive to the concrete mix and not any product that contains a silicate. We have never seen credible scientific evidence, or proof that silicates can effectively solve a slab moisture problem. In addition, too often un-reacted silicate can act as a bond breaker. Despite what anybody may tell you, credible studies that have been performed on silicates as a form of moisture mitigation refute the pro-silicate marketing claims.

Odd appearance of this Type 1L concrete substrate

Not only should there be an awareness of Type 1L cement but also of the other constant changes in concrete, such as the use of all types of recycled materials being used, proposed to be used or being researched to use. They include ground up wind turbine blades, steel fragments, volcanic ash, seashells, textile materials, etc. There seems to be more and more combinations daily. In addition, as we mentioned, the materials in concrete will vary geographically and some of the mixture components used in the US are coming from other parts of the world. So, you must think that every new concrete substrate you install over is going to be different, no two are alike, and, as we've said before, every truck load can vary.

The flooring industry keeps getting more complex daily, not only with the variety and makeup of the flooring products themselves, but with the substrates they are installed on.

Keeping up with the changes that take place in our industry is something we do daily in order for us at LGM to be able to help you stay out of trouble or determine why you got in trouble and how to resolve the issue. Knowledge and information that the manufacturers of the products may not even be aware of.

Maximum hydration of Type 1L concrete

Type 1L concrete is tested for moisture with the same methods as normal concrete.

Here is a description of who we are. We are ***not inspectors***, ***We are Consultants***, and we are not listed on any flooring manufacturers approved list of 5 day wonder certified inspectors. Most of our team members come from flooring manufacturing backgrounds or are considered the leading experts in

their particular field, from concrete to carpet, with decades of experience. Our clients are not manufacturers but flooring contractors, general contractors, construction attorneys and major commercial end users. Our concentration is strictly in the commercial market, but we're here to help anyone. As was said by one of the leading flooring manufacturers years ago and still holds true today, "LGM are not the guys you want sitting on the other side of the table."

As professional industry consultants we are hired by clients to provide expert advice and guidance to solve specific flooring problems, prevent them or improve performance.

We have a deep knowledge, extensive experience, and a decades long proven track record in the flooring industry, earned through years of practice, leadership, and study.

Our team's experience and credentials in the flooring industry are irrefutable and second to none when the objective is to find out what went wrong, why, who's at fault and how do you fix it.

When you have a question on a flooring related issue, or a problem you need help with, we have the independent, objective, unbiased, correct information that can help you.

If you need help, have a question, aren't sure of a situation you're in, want to avoid a problem, or need guidance on a project or product, contact us. We always have the answers, always. It's what we do, from the substrate to what goes on it.

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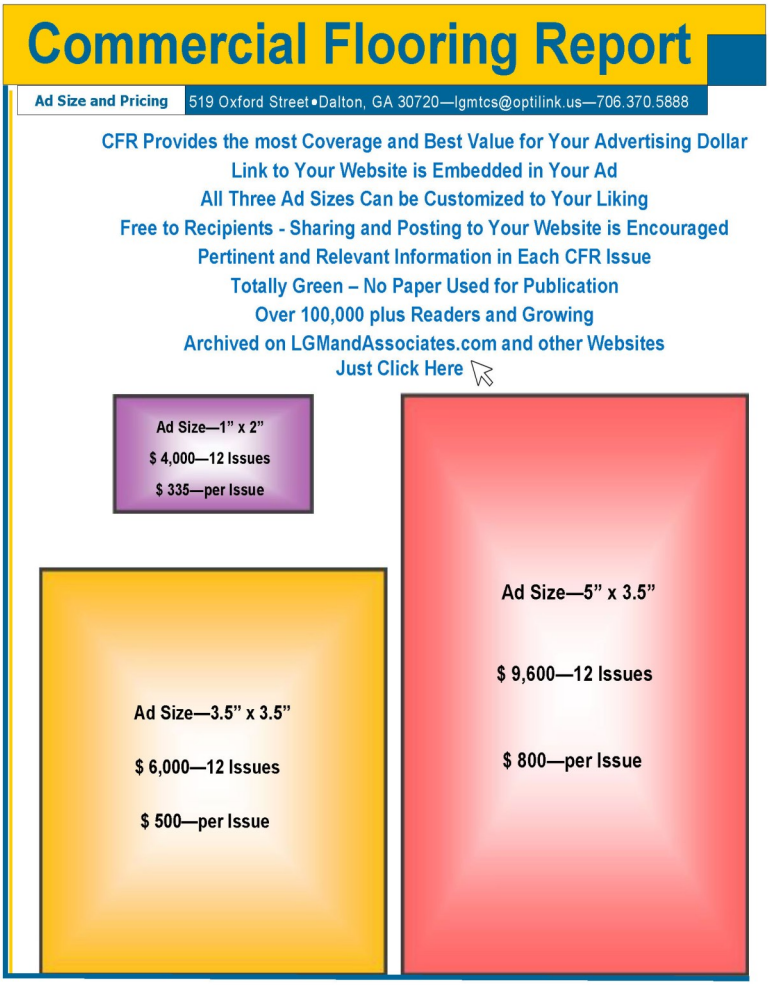

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