What is Reactive Colloidal Silica and Why Is It Better for Concrete?

Reactive Colloidal Silica – nano-sized particles in an aqueous suspension – are the heart of the Lythic advanced concrete treatment system.

Reactive Colloidal Silica is 99.5% pure silica suspended in an ultra-low surface tension liquid. (A “colloid” is a suspension of solid particles in a liquid; the solids are not dissolved, but they do not sink to the bottom and separate, either, due to a special process.)

The 5-nanometer particles in their low-viscosity suspension penetrate quickly, deeply, and cleanly into concrete. They react very efficiently with lime in concrete. The tiny nanoparticles have a huge surface area – 400-500 m²/gr – and offer many more chemical reaction-sites, making them far more reactive than conventional silicate Densifiers. These reactions form cementitious compounds in the concrete’s pores that harden and Densify the surface with less wait and less waste.

Reactive Colloidal Silica also bonds to itself, a property not found in any silicate Densifier.

Silicate and lithium products require calcium hydroxide to trigger a reaction. Reactive silica does not need this component in order to react.

It allows Reactive Colloidal Silica to build up more density in the surface and provide a better polish.

It enables Lythic Densifier to bond to specialty cementitious products where silicates fail to react. Recently introduced self-levelling cementitious overlays are not made from ordinary Portland cement (OPC) and do not have the high lime content that Densifiers usually react with. Lythic Densifier can harden these overlays and make them able to take a diamond polish.

Lythic Solutions’ Reactive Colloidal Silica Densifier is far safer to handle than silicates. It has a pH similar to baking soda. Conventional sodium silicate Densifiers are far more caustic and produce lye (sodium hydroxide) as a byproduct. Lithium silicate is close in pH to lime itself.

Lythic Densifier contains less than one half of one percent metallic salts. Silicate Densifiers may have up to 25% metallic salts, and present a risk of leaving tightly bonded discolorations on the surface, a problem called “whiting.” Lythic Densifier eliminates the risk of whiting.

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The next generation

Lythic Densifier with Reactive Colloidal Silica is the next step beyond silicate Densifiers.

Reactive Colloidal Silica nanoparticles mean increased speed, economy, uniformity, density, sustainability and safety. The silica is more immediately available for reaction in concrete—the silica molecule makes the reaction begin quickly, within one to two minutes.

Additional CSH (calcium silica hydrate) fills the pores in concrete and increases the hardness and stain resistance of the surface. It can be used on freshly placed concrete, or slabs in place for decades.

Efficiency

Colloidal silica is a flowable, water-borne mixture. As concrete pores are pathways created by migrating water, the 5-nanometer colloidal silica particles in their low-viscosity suspension penetrate quickly, deeply, and cleanly into concrete. Can readily penetrate the slab’s pore structure and reach depths of up to about 6.4 mm (0.25 in.).

The silica is more immediately available for reaction in concrete—the molecule has more chemically reactive sites and the greater pH difference between colloidal silica and lime makes the reaction begin quickly, within one to two minutes. Offers many more chemical reaction-sites, making them far more reactive than conventional silicate Densifiers. These reactions form cementitious compounds in the concrete’s pores that harden and Densify the surface with less wait and less waste.

Colloidal silica produces a better polishing surface than silicates.

After the slab is allowed to dry for approximately an hour, it is ready for polishing.

Some applicators report the ability to achieve a gloss expected from 800-grit polishing with only 400-grit abrasives, which represents additional energy savings from reducing the use of polishing machines.

Lythic Densifiers are compatible with integrally colored concrete, as well as concrete stains and dyes.

Lythic Densifiers unique properties make possible a new, high-appearance, low-cost flooring process.

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Safer for Workers and Jobsite:
It is 100X-1000X times less caustic than silicates, making it safer for workers to handle and safer to use near other finished surfaces.

Speeds up project:
Unlike sodium- or potassium-silicate, there is no overnight curing required.

Safer for Environment:
It is more environmentally friendly. Unlike sodium- or potassium-silicate, there is no caustic residue to scrub off and dispose of as a hazardous material.

Works Well on Overlays, too:
Unlike silicates, Lythic Densifier will densify cementitious overlays that do not contain sufficient lime for silicate reaction. Reactive Colloidal Silica bonds directly to silica in the overlay cement and in its silica-sand aggregate. It makes overlays stronger and more Polishable.
HardWear Floor

It is a cost-effective alternative to diamond polishing. It provides a great-looking, low-maintenance floor without the costs and time of diamond polishing. Increase efficiency and saving on labour and consumables.

No scrub-in. No scrub off. No disposal. No overnight curing.

Save up to 90% on labor.

How the process compares to a true polish. A true polish will have more clarity and generally a higher gloss. The reflectivity produced by a full polish is the result of refined scratch patterns. There is no substitute for this quality of surface. The HardWear Floor seeks to achieve reflectivity by using the already-present hard troweled surface, impregnating it with silica, and burnishing the super densified surface. It is difficult to compare grit levels in this scenario. A HardWear floor can achieve a reflectivity equivalent to around an 800 grit shine, but it would not look as refined. This is why the HardWear floor is used as a lower cost alternative to a true polish in settings where a true polish isn’t necessary.

Exposed aggregate

Lythic Densifiers are designed to be used in a polishing protocol similar to the way other densifiers would be. They are traditionally applied at the 200 or 400 grits during a diamond polish. Densifier can also be applied when the concrete is green. Lythic Day1 is applied during the troweling passes for numerous benefits. XL Densifier can also be applied as a final step where a “guard” product would be applied, and burnished to produce a tight reflective surface. Regardless of the process, Lythic will more efficiently densify the surface and also save time and labor.

Although Lythic densifiers were originally designed to save time and money on polished concrete projects, the chemistry allows you to offer flexible alternatives such as the Hardwear Floor to produce finished concrete surfaces at a lower cost.

The Densifier is fast, safe, and environmentally friendly. It cuts steps on the job, bringing down cost. It improves the response of concrete and cementitious overlays to operations like diamond polishing or burnishing. The Densifier is part of a system of advanced Silica chemistry that establishes and maintains exposed concrete using on-going silica enhancement that becomes part of the floor structure.
New Finish Options using the Densifier

The Densifier's unique properties make possible a new, high-appearance, low-cost flooring process. Using two different particle-sizes of Silica, it creates a near-polished looking floor with all the performance advantages of polished concrete, but without the expense and time of diamond polishing.

Densifier XL

Densifier XL prevents dusting and increases durability in concrete floors. Engineered with a specifically sized silica particle, it is designed to strengthen soft porous concrete slabs. Floors treated with Densifier XL are durable and resistant to dusting and wear.

It is effective in restoring worn and damaged concrete, rehabilitating them and making it possible to effectively polish them. The larger silica molecule in Densifier XL is ideal for restoring the surface of old concrete slabs that have softened and lost surface strength. Densifier XL makes it possible to generate durable and reflective concrete floors.

New Concrete (Green)

Densifier may be applied to newly installed concrete after final trowel while slab is still Green. Slab must be clean and free of all materials such as curing compounds, bond breakers release oils, dust and debris, etc. Use a low-pressure sprayer to achieve a consistent, even application and consistent coverage of the surface. Reapply as necessary to keep surface wet for 20 minutes. Let surface dry. No cleaning, flooding, Neutralizing, or rinsing is necessary.

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Performance Advantages

- Fills capillaries of concrete creating a permanent bond that makes floors and walls harder,
- Water-based, Meets LEED qualifying standards, Meets all VOC regulations
- Resists penetration of many liquids including oils and many chemicals
- Helps minimize many rubber tire marks in warehouse applications
- Will not discolor or blush over time
- Not affected by bond breaker systems when used as directed
- Will not leave a white residue on floor if over used or not removed
- Reduces operating costs by increased ease of maintenance and cleaning
- Reduces dusting, will not peel can be applied to newly trowled green slabs
- Chemically reacts to produce insoluble tri-calcium silicate hydrate
- Permanent and durable surface resists marks, improves traction
- No sodium or potassium salts that contribute to surface crazing, efflorescence and surface ASR.
- Can be applied to newly trowled green slabs
- Works as an excellent primer and is compatible with most resilient tile carpeting adhesives.

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**The Densifier** is fast, safe, and environmentally friendly. It cuts steps on the job, bringing down cost. It improves the response of concrete and cementitious overlays to operations like diamond polishing or burnishing. **The Densifier** is part of a system of advanced Silica chemistry that establishes and maintains exposed concrete using on-going silica enhancement that becomes part of the floor structure.

**The Densifier's** unique properties make possible a new, high-appearance, low-cost flooring process. Using two different particle-sizes of Silica, it creates a near-polished looking floor with all the performance advantages of polished concrete, but without the expense and time of diamond polishing. **The process allows you to cut out 2 or 3 grinding passes.**

**Densifier XL** engineered with a specifically sized silica particle, it is designed to strengthen soft porous concrete slabs. Floors treated with **Densifier XL** are durable and resistant to dusting and wear. It is effective in restoring worn and damaged concrete, rehabilitating them and making it possible to effectively polish them. The larger silica molecule in **Densifier XL** is ideal for restoring the surface of old concrete slabs that have softened and lost surface strength. **Densifier XL** makes it possible to generate durable and reflective concrete floors.

The **Protector** is designed to provide initial protection allowing spills to be cleaned up, enhance colour and gloss. The quality of the polishing will be the most important factor in determining shine. The **Protector** will enhance your shine from that starting point.

**Cleaning**

Proper care for Densified and polished concrete floors requires frequent, thorough cleaning to remove contaminants and abrasive elements from the surface. Lythic **Cleaner** is formulated specifically to clean polished concrete and to fortify the surface with colloidal silica with each application. Concrete floors generally require very light maintenance, but proper maintenance is mandatory.

Any polished floor should be cleaned regularly – daily in many very high traffic circumstances – using mild cleansers to remove dirt, grit and debris that can abrade the stain protector layer and compromise the finish. Stain protector application should be renewed as needed, which varies depending on traffic.

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