



Making Concrete Better

armourtech

The Chemistry

The mission of a densifier is adding silica to the surface of concrete. Lythic Densifier with Reactive Colloidal Silica is 99.5% pure silica, suspended by charge repulsion in an ultra-low surface tension liquid by a proprietary, “green” manufacturing process.

It increases the density of the concrete surface, making it less permeable to liquids. It increases the surface hardness, making it withstand abrasion and take a better polish.

Lythic’s nano-sized silica particles react highly effectively with lime in concrete, **and bond directly to silica** already in the slab.

Lythic densifiers are made from nano-scale amorphous silica particles mechanically suspended in water rather than chemically tied up in a compound.

Reactive Colloidal Silica – nano-sized particles in an aqueous suspension – are the heart of the 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.)

Reactive Colloidal Silica even bonds to and hardens decorative cementitious overlays that are low-lime and do not react with silicate densifiers.

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

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

Chemically reacts with concrete to produce **insoluble tri-calcium silicate hydrate**, making it harder and less permeable.

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

It allows Reactive Colloidal Silica to build up more density in the surface. 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.



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It has a pH similar to baking soda. Conventional sodium silicate densifiers are far more caustic and produce lye (sodium hydroxide) as a by-product. 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.

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.**

Colloidal silica works by reacting with lime in concrete. During hydration, approximately 20 percent of a concrete mixture’s Portland cement is converted to lime, which has no structural value in concrete. However, colloidal silica reacts with lime to form calcium silica hydrate (CSH) crystals, the same type of mineral compound that acts as the binder in concrete and imparts strength.

Additional CSH fills the pores in concrete and increases the hardness and stain resistance of the surface.

Products that react with lime in this manner are called ‘pozzolans.’ Colloidal silica produces a similar reaction to pozzolans added to concrete mixes—such as fly ash or silica fume—to increase their strength.

Colloidal silica is a flowable, water-borne mixture. The colloidal silica particles can readily penetrate the slab’s pore structure and reach depths of up to about 6.4 mm (0.25 in.).

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

There is no removal step, and consequently no caustic slurry to dispose of—only a small amount of dry powder residue that is vacuumed up during the polishing.

Colloidal silica densifiers are compatible with integrally colored concrete, as well as concrete stains and dyes.

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