Spray-Lock®
CONCRETE PROTECTION

SCP Tech Brief: SCP Technology versus Common Topically Applied Silicates

Chemical Reactivity

Common topically applied silicates are composed of Sodium (Na), Potassium (K), or Lithium (Li) chemically bonded to silica (Si). Spray-Lock Concrete Protection (SCP) products are classified as colloidal silica, consisting of a stable dispersion of nano-sized particles of amorphous silica. The colloidal particles consist of a charged nucleus which is surrounded by an extended diffuse ionic atmosphere. The colloidal state of subdivision consists of particles with a size sufficiently small ($\leq$ 1 μm) not to be affected by gravitational forces but sufficiently large ($\geq$ 1 nm) to show marked deviations from the properties of true solutions. Colloidal silica is one of the best sources of the pozzolanic reaction (conversion of calcium hydroxide to calcium silicate hydrate (C-S-H)) known to man. The colloidal silica reacts with calcium hydroxide in the pore space to form secondary C-S-H, reducing the size of capillary voids and pores, which leads to a denser and more homogenous structure, greatly improving the mechanical properties of the concrete.

The common topically applied silicates already have a cation (sodium, potassium, etc.) bound to the silica to form a silicate. One of the results of this form of silica being used in concrete is that the resultant C-S-H formed after reaction with calcium hydroxides is a shorter chain morphology, leading to an unstable nature that is inferior to Portland cement/ water - formed C-S-H. Common topically applied silicates also produce potassium, sodium, or lithium hydroxides as byproducts. Conversely, colloidal silica has been shown to produce long chain C-S-H, sufficiently more stable than even the "natural" C-S-H formed during the hydration of the cement.

Penetrating Ability

Common topically applied silicates react and harden typically in only the top 1/16 to 1/8 in. (1 to 3 mm) of normal concrete surfaces. Because of its small particle size and dispersion package, SCP's colloidal silica penetrates deeply into the concrete, typically in excess of 2 in. (50 mm) or more. This deep penetrating ability can provide a long-lasting and resilient reaction product that fills capillary voids and providing associated benefits to hardened concrete.

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Conclusion

SCP's colloidal silica differs in form and function from conventional common topically applied silicates. Extensive academic publications have demonstrated the scientific differences between the two classes of products.

Summary

	Na, K, Li Silicates	SCP's Colloidal Silica
Deep Penetration (> 1")	NO	YES
Deleterious Reaction Products	YES	NO
Stable Long-Chain C-S-H Development	NO[1]	YES
Extensive Academic Literature Demonstrating Hardened Concrete Improvements	NO	YES

[1] Na, K, and Li Silicates have been shown to produce unstable, short-chain calcium silicate hydrate (C-S-H).

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