ASTM C309

Do Liquid Hardeners meet this standard?

This paper is written to clear up some confusion in the marketplace. A number of manufacturing companies have stated in their literature that their liquid hardeners meet ASTM C309. This paper will provide background information on what the ASTM C309 standard is, and how a product can meet or fail to meet that standard for curing concrete.

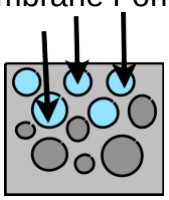
Do Silicates Meet ASTM C309

There are 2 things that have to be analyzed in order to determine if Silicates meet ASTM C309 as a cure and seal.

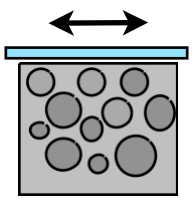
1. We need to have some background on silicates and liquid hardeners that are available in the market today.
2. What does ASTM C309 mean and the basic qualifiers of this standard.

1. Background on Silicates

Penetrating Liquid Hardeners
(No Membrane Formed)



Membrane Forming (Meets ASTM C309)



Non-penetrating product sits on top of concrete to form an external film on surface.

All silicates and liquid hardeners in the market place today are penetrating products. These products work by penetrating the concrete surface and chemically reacting with free lime. There is a number of terms used by the industry to say the same thing, such as alkali and calcium hydroxide. This reaction forms strong bonds in the concrete called CSH (Calcium Silicate Hydrate), also referred to in the industry as silica gel, colloidal gel, silicate hydrogel and insoluble precipitate.

All silicates and penetrating liquid hardeners in the market come from the following: Sodium Silicates, Potassium Silicates, Lithium Silicates, Colloidal Silicates, Lithium Polysilicates along with Protec III Chem RX and Protec III Restore. All of these products penetrate and react with the free lime to form CSH (Calcium Silicate Hydrate) within the concrete matrix. All liquid hardeners and densifiers are non-membrane forming.

If these products are forced to dry on the surface to try to create a membrane, the result will be an unsightly stained and very dusty concrete surface. This is very undesirable and visually unappealing and cannot be considered a surface membrane.

2. Qualifying for ASTM C309

The following is a quote from the ASTM C309 Standard

Note 2—Solutions of silicates are chemically reactive in concrete rather than membrane-forming; therefore, they do not meet the intent of this specification.

Definition of ASTM C309

ASTM C309 specification covers liquid membrane forming compounds suitable for application to concrete surfaces to reduce the loss of water during the early-hardening period.

Membrane Forming

The first and most important requirement in meeting ASTM C309 is the coatings needs to be able to make a membrane or even film over the concrete surface. All cure and seals, be it water based or solvent based are temporary membrane forming coatings, typically acrylics and hydrocarbon resins are highly desired for their ability to achieve and meet this standard.

Conclusion

If a product cannot leave a membrane on the surface of the concrete, then meeting ASTM C309 is impossible. Non membrane forming products made with sodium silicate, potassium silicate, lithium silicate, colloidal silicate or lithium polysilicate cannot and do not meet ASTM C309. Therefore none of these products should be used if the ASTM C309 specification is required. Using acrylics or hydrocarbon based products are the best choices.