Why Densi-Proof™ works and sodium silicates (and other look a likes) don't

All look-alike products do not perform alike even though they are making similar claims. How can you tell which one to believe?

We will explain in the following paragraphs how our product, **Densi-Proof™**, a silicate, is different from the current popular sealers on the market (which are **sodium** silicates). Because it is different, it also acts differently, and that's why **Densi-Proof™** is able to penetrate 100 to 150 mm or more when the look-a likes can only sit on the surface.

About Silicates

Silicates are plentiful in nature, constituting the greater number of the minerals that compose the crust of the Earth. They are compounds containing silicon (next to oxygen, Earth's most abundant element) with oxygen and a metal. Man-made silicates are used for a wide variety of purposes, from glass making to water treatment, plus the major ingredients of Portland cement are silicates.

Silicate materials are used as waterproofing agents in concrete because of their solubility in water. The waterproofing concept ideally is: water soluble silicates contact and react with certain common ingredients which are always available inside Portland cement concrete (such as one or all of the available hydroxide materials, soluble calcium compounds or free and unused alkalis) to form insoluble precipitates. This process allows the **Densi-Proof™** to densify and waterproof the concrete at the same time with a single application.

The fact is, with the exception of the **Densi-Proof™**, most, *if not all*, silicate products formulated and marketed to date, begin to react with the ever present calcium hydroxide residue immediately upon contact with the concrete's surface.

This generates a thixotropic, sparsely distributed crystalline precipitate gel, which very much hinders or prevents further silicate solution penetration. The resultant hydroxide precipitated gel is not of uniform composition. It consists of variable-sized pores, ranging from very small to very large. This causes the precipitate to only be temporary at best. As water migrates through the gel's larger pores, the gel erodes and eventually will fail. How quick will depend on the volume of water and its driving force passing through the concrete. The silicate solution's immediate surface reaction can also cause ineffective, incomplete thixotropic gel to be generated. Since the reaction begins immediately upon contact with the concrete's surface, there is a tendency for there to be more silicate solution available in the application than there is hydroxide material in the concrete to react with. This causes varying portions of the thixotropic gel deposited inside the concrete to not be completely reacted, becoming what is considered an incomplete gel. Incomplete gel contains reaction sites that remain available for reactions. These unfulfilled reaction sites will eventually react with atmospheric carbon dioxide and form carbonates. The carbonates then can eventually migrate to the surface and cause damage to the concrete that it was meant to protect.

There are some silicate solutions, such as **Densi-Proof™**, that are able to penetrate very deeply into concrete and form precipitate, a gel-like compound, in the pores upon contact with the always present free unused alkalis. However, type and uniformity of this internally produced compound can vary greatly, and can be the most important factor as to whether the silicate solution became beneficial to concrete or not, and to what degree. Unlike **Densi-Proof™**, some silicate products form gel that will absorb internal moisture and begin swelling and continue swelling whenever moisture becomes available. This can produce extreme internal pressures and stresses, even to a point where concrete's integrity could be damaged quite severely (similar to an alkali-aggregate reaction).

Densi-Proof™ is successful in overcoming such problems and is a superior product very beneficial to concrete. Since **Densi-Proof™** goes into concrete as a unique precision-blended colloidal liquid, it's internally generated compound or precipitate, is designed to be very superior when compared to other existing look-alike products. The precipitate packing density is very precise and creates pore networks of extremely uniform-sized porosity with pore sizes smaller than a molecule of water, or free moisture. As **Densi-Proof™** precipitate is being formed, it involves special ingredients to cause polymer cross linking and branching, encouraging polymer particle and strand connection. It creates extraordinarily strong polymer chains, which provide the extra strength and durability to truly become permanent and insoluble. Furthermore, the polymer chain and pore configuration cause **Densi-Proof™** gel compound's residual water or free moisture to remain in a stretched position with a density similar to that of ice. Should a hard freeze occur, this water or moisture does not expand further to cause freeze-thaw cycle damage, as does the gel compounds of some look-alike products. Look-alike products, making similar claims, usually only form shallow, weakly linked short chain gel polymer compounds. They may or may not hold up for an appreciable length of time. They are entirely dependent on the harshness of the concrete installation's surrounding environment. Plus, there is always the possibility that incomplete gel may migrate back to the surface, creating surface traction problems in products other than **Densi-Proof™**.

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This letter was written in response to a distributor's enquiry regarding a product being proposed as a substitute for Densi-Proof™. The actual commercial name has been deleted.

Dear Andrew

Sorry for the delay in getting you this information. Below I explain some of the differences between Densi-Proof™ and ———————— . Also I have attached a document "WHY DENSI-PROOF™ WORKS AND SODIUM SILICATES DO NOT".

A sodium silicate formula that has been around since the early 1950's, and was originally used as a concrete floor hardener. Since it is a sodium silicate formula it would form a thixotropic weakly-linked crystalline structured gel in and just beneath the large surface porosity of concrete. This sodium silicate product has large normal-sized sodium silicate molecules that would cause it to be unable to penetrate past concrete's surface porosity bottom. Also, it begins to gel as soon as it contacts concrete. This is because it is activated by available hydroxides of concrete. So without brooming and diluting with water, in attempting to make it penetrate, it still probably doesn't penetrate more than 1/16th of an inch, and most likely will not anyway, unless the treated concrete is extremely porous.

Sodium silicate solutions have a place in the concrete treatment arena. However, their role should only be limited as surface hardeners. Sodium silicate solutions historically perform very poorly and ineffective as sealers since they react with any and/or all of the hydroxides associated with concrete. Some of these hydroxides are calcium, magnesium and potassium. Since sodium silicates, contact one or more hydroxides immediately upon coming into contact with Portland cement concrete their depth of penetration is severely limited due to the immediate formation of an incompletely transformed (thixotropic) gel. Plus this solution is unable to pass through its own self. Due to the created thixotropic incompletely transformed gel mass carbon dioxide becomes more prolifically absorbed from the atmosphere into the incomplete gel. This eventually forms carbonates which promote carbonization that may detrimentally affect the surface integrity of the concrete it was supposed to help.

Since Densi-Proof™ is an especially-blended colloidal silicate, and not a sodium silicate, its molecule sizes are very tiny, plus their molecular size is even controlled while penetrating concrete. Densi-Proof™'s internal reactions are activated by concrete's free alkali and/or alkaline hydrates. Densi-Proof™ initially encounters free alkali between surface porosity and concrete's matrix component; this is also the transition zone. Free alkali is then available throughout the remainder of the concrete. Densi-Proof™ has the unique ability to penetrate extraordinarily deep into the interior of the concrete, permeating through its many paths of reticulation. This is due to Densi-Proof™'s ability to control the molecule size and also its ability to pass through its own self along with certain other special ingredients.

Unlike shallow acting thixotropic gel producing sodium silicates, Densi-Proof™ penetrates ultra deep into concrete. As Densi-Proof™ penetrates the concrete it integrally seals it, as well as supplements, densifies, hardens and strengthens it. Densi-Proof™ has unique ability to render harmless existent internal corrosive activity by neutralizing acids and etc., which may already be attacking the integrity of concrete's embedded steel.

Densi-Proof™ unlike shallow-depth penetrating sodium silicates treats virtually every ailment or potential ailment associated with concrete, even to the point of increasing its compressive and flexural strengths, in most cases. Also unlike other products, Densi-Proof™ benefits are innumerable, benefits not realized from sodium silicate based products.

If you should have any further questions, please do not hesitate to contact me.

Ensure you contact your nearest PROTECT CRETE office for full technical bulletins and latest application procedures.