MIDCAL RESEARCH AND DEVELOPMENT

Here are some important differences between concrete sealers made from a sodium silicate (a.k.a. metasilicate) and MIDCAL'S DIS - a colloidal silicate.

Sodium silicate is a crystalline substance marketed in viscous liquid form, or as a powder, and is especially known for its powerful detergent and emulsifying properties. Sodium silicate is also sometimes know as "water glass", or "soluble glass", and has excellent adhesion, and is utilized in very large quantities, in water solutions, for industrial adhesives.

Since early to mid-fifties (probably even earlier than that), sodium silicate products have been utilized the Portland cement concrete industry, as floor hardeners / temporary surface sealers, and / or curing agents.

However, in recent years some sodium silicate products have begun making performance claims which common sodium silicate products cannot possibly live up to i.e., provide a permanent deep penetrating membrane seal in Portland cement concrete's deep interior.

Sodium silicates will probably always have use in the Portland cement industry; however, sodium silicate's current role should be limited to what it has been, in the past. In explanation, sodium silicate's transformation form liquid to gel, in concrete, is caused by contact with one or more of the hydroxides (at least three) that are associated with Portland cement concrete, i.e., calcium, magnesium, and potassium, and at the least, one of these hydroxides are always going to be present at the surface of concrete to immediately activate sodium silicate's formation of gel upon immediate contact with the concrete, not allowing penetration to any signification depth, as is sometimes claimed by sodium silicate sealer manufacturers. Furthermore, sodium silicate's gel formation always consists of a thixotropic weakly linked crystalline (fiber-like) causing deep concrete penetration to be extremely unlikely.

MidCal's DIS product however is produced from a precision-measured special blend of silicates that is very uniquely and effectively catalyzed, transforming it into a uniquely blended colloidal silicate base containing only natural, not chemical, ingredients. Its base is formulated to provide ultra-deep penetration into Portland cement concrete, with concrete's significant enhancement as its sole objective. On the other hand, sodium silicate solutions, applied to a concrete's surface only slightly hardens its surface, as it forms a weak still-soluble thixotropic gel in the concrete's shallow surface porosity. However, DIS, whose colloidal silicate molecule shape (spherical not fibrous) and sizes are strictly controlled, and are subsequently very tiny, as compared to sodium silicate's crystalline (fibrous) molecules, DIS's colloidal silicate hardens concrete's surface as well as, or even better than, sodium silicate, plus, provides numerous other benefits to concrete, as well. DIS's colloidal silicate easily penetrates very deeply into concrete, even its very tiny micro porosity, due to its ball-bearing molecular configuration and its composition, which is virtually unaffected by concrete's hydroxide content.

Due to the fact that sodium silicate solutions from a thixotropic-type gel, upon contact with Portland cement concrete, only the leading, razor-thin edge of the gel subsequently becomes fully-cycled, or fully-developed, due to the fact that there are only trace amounts of hydroxide in any one spot, in the concrete, and never enough hydroxide, in a given area, to fully-cycle or fully develop large portions of the thixotropic gel, the rest of it remains in various stages of underdevelopment, and underdeveloped thixotropic gel has great affinity for carbon dioxide, which means that the major portion of this gel, if not flushed out of the concrete's surface porosity with water pressure, within a day or two, will prolifically absorb carbon dioxide from the Earth's atmosphere, forming carbonates which effectively promote carbonation inside the concrete, potentially, over time, detrimentally affecting concrete's surface integrity, and etc.

In describing the structure of thixotropic gel, crystalline indicates that its structure has not developed to is final form or composition, because the term crystalline, in reference to this type of polymer, indicates it is still in its transitional form, This means it could, and probably will, evolve into another composition eventually. Tests have shown, crystalline structures, inside of concrete, tend to evolve into another composition eventually. Tests have shown crystalline structures, inside of concrete, tend to evolve into a mineral-looking particle, which only looks like, but does not act like a mineral, and the period of time for this to happen varies considerably, depending on the concrete's environmental factors. The descriptive term for this evolved particle is "pseudomorph". This evolved pseudomorph's biggest significance, is the water tightness of concrete through the crystalline process is that the evolved particle, which evolved from a crystal, is the fact that after evolvement, it becomes smaller and more buoyant that the original crystal which originally occupied the concrete pore, and will easily float out of the concrete, or allow free water to flow past it, once again leaving the concrete vulnerable to leakage and contaminant penetration. DIS's internally-generated precipitate formation, from colloidal silica, is activated entirely by internal concrete constituents which are always, without fail, available in Portland cement concrete, which are free alkali and / or free alkaline hydrates, DIS precipitate forms an especially-designed colloidal silicate barrier, immediately formed in its final composition, to never evolve into any other shape or size.

DIS's nil solids colloidal liquid internally transforms into a 100% solids precipitate / barrier deeply inside of the concrete, with out generating any heat nor expansive internal pressure, ever. DIS's initial encounter with free alkali / free alkaline hydrates is deeply inside of the concrete's interior, inside the transition zone between the concrete's upper surface porosity, and its matrix component, this is normally where the internal precipitate barrier begins. Only a small minute portion of DIS in its liquid form is used in each free alkali encounter as concrete's penetration occurs, meaning the balance of DIS's liquid just keeps penetrating deeper, and has the unique ability to pass through its own formed precipitate. There are three main reasons that ultra-deep penetration occurs with DIS (1) its colloidal base liquid consists of friction-reducing agents which coat the very tiny (10 angstroms) spherically-shaped molecules, which do not enlarge upon contacting concrete, as does silane's, the tiny molecules roll into concrete's paths of reticulation like tiny ball-bearings.

(2) The very tiny colloidal silica molecules are hydrophilic and have great affinity for concrete's internal moisture or free water. (3) DIS's unique colloidal silicate molecules have electrical affinity to move towards the Earth's magnetic pull, and even more attraction for concrete's embedded reinforcement steels (if any).

Unlike the concrete-surface-activated, thixotropic gel-producing sodium silicate solutions, DIS's colloidal silicate not only deeply integrally seals concrete, it supplements, densifies, hardens, and strengthens it as well. Furthermore, DIS has the unique ability to render harmless existent or potentially existent internal steel corrosive activity (if any), by neutralizing internal acids (if any), and removing electrolyte availability, and etc. DIS also has the unique ability to arrest or, at least significantly retard detrimental internal chemical reactions that may exist, or potentially exist, i.e., alkali-aggregate reaction, delayed etteringite formation, and etc. DIS addresses all ailments, or potential ailments, that are associated with Portland cement concrete, providing numerous benefits to the concrete, many more benefits than is derived from a sodium silicate solution.