Concrete sealer

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Concrete sealers are applied to concrete to protect it from surface damage, corrosion, and staining. They either block the pores in the concrete to reduce absorption of water and salts or form an impermeable layer which prevents such materials from passing.[1]

Research from major concrete authorities, including American Concrete Institute, Portland Cement Association, and National Ready Mix Concrete Association; confirm that most concrete damage is attributable to surface moisture intrusion. The most pervasive form of concrete damage is surface scaling from freeze/thaw. Other forms of damage include alkali-silica reaction (ASR), chemical intrusion, and corrosion of steel reinforcements.

Types

In past decades attempts to protect concrete have included sealers ranging from wax to linseed oil. Today, high quality concrete sealers can block up to 99% of surface moisture. There are two main sealer categories: topical sealers (coatings) and penetrating sealers (reactive).

Topical Sealers: Topical Sealers can provide visual enhancement as well as topical protection from stains and chemicals. They require a dry, clean surface during application to gain adhesion. Topical sealers may alter the coefficient of friction which can make substrates slick when wet – a condition that can be remedied by adding anti-skid materials. Life span is generally 1-5 years, although high-end epoxy/urethane systems can last significantly longer.

Penetrating Sealers: Penetrating sealers can be applied to dry or damp surfaces and should be properly matched with substrate porosity in order to effectively penetrate the surface and react. The chemical reaction bonds active ingredients within the substrate blocking surface moisture. Penetrating sealers generally do not significantly modify substrate appearance or traction. Lifespan is generally 5 years or more.

Major concrete sealer chemistries commonly used in 2014

Acrylic Resins: Acrylic resins form a topical film membrane on the substrate surface. They are available in both water-based and solvent-based formulas, affordable, and generally simple to apply. They are well known to increase perceived visual enhancement (sometimes described as a “wet look”) and can provide good UV protection for colored substrates. Despite being the softest and least lasting of the major sealer categories, price and convenience make acrylic resins a very popular choice for decorative concrete such as stamped concrete and exposed aggregate. Acrylic resins are also commonly used as curing agents for new concrete, and many comply with ASTM C309.

Epoxy/Urethane Systems: Epoxy/urethane systems are also topical film membranes. They share many of the same characteristics as acrylics, but the performance levels and life span are superior and commensurately more costly with more complex installation requirements. Novolac epoxies are

particularly noted for chemical resistance and acid resistance. High-end urethanes are known to be extremely abrasion resistant. Epoxy/urethane systems are frequently used in demanding applications such as factory floors, garage floors, and restaurants, and water-based versions are often used to seal concrete countertops. Epoxy/urethane systems are generally applied only to fully cured existing concrete, although certain epoxy products can comply with ASTM C309.

Silane: Silane is the smallest molecular compound of commonly available penetrating sealers. Chemically, Silane forms a covalent bond within porous masonry that clots surface pores. Silane is known to be hydrophobic and oleophobic and will only wear away if the concrete surface itself wears away. Noted for very low viscosity, silane is frequently used for sealing dense concrete, such as parking decks, concrete facades, and dense brick. Silane is generally applied only to fully cured existing concrete.

Silicates: Silicates are another small molecular compound ranging from premium lithium silicates to economical sodium silicates. Chemically, silicates form calcium-silicate hydrate crystals which can densify concrete surfaces and be burnished to develop a polished appearance. Silicates are known to be hydrophobic and oleophobic and will only wear away if the concrete surface itself wears away. Noted for crystallization, silicates are frequently used for polishing concrete floors popular in large format retail outlets. Silicates can be applied to new and existing concrete, although they do not comply with ASTM C309 as a curing agent.

Siliconates: Siliconates are moderate-size molecular compound. Chemically, Siliconates form a repellent cross-linking membrane barrier within the surface of porous concrete and other masonry. Siliconates are known to be hydrophobic and oleophobic and will only wear away if the concrete surface itself wears away. Noted for extreme water repellence and stain repellence siliconates are frequently used for sealing exterior concrete such as roads and driveways, tilt-up walls, porous brick, and porous stone. Siliconates and organo-siliconates have also been shown to be affective as curing agents for new concrete and certain products can comply with ASTM C309.

Siloxane: Siloxane is the largest molecular compound of commonly available penetrating sealers. Although not highly reactive, chemically siloxane forms a bond within porous masonry that clots surface pores. Siloxane is known to be hydrophobic. Noted for large molecular structure, siloxane is frequently used for sealing exterior concrete, porous concrete block and porous brick. Siloxane is generally applied only to fully cured existing concrete.

In summary, all major concrete sealer chemistries can have valuable and practical applications. Topical sealers generally require higher application standards and maintenance, but the decorative appeal and potential stain and chemical resistance can make them a superior choice for many applications. Penetrating sealers should be matched with substrate porosity for long lasting low maintenance water repellence and freeze/thaw protection.

1. Caijun Shi, Y. L. Mo (2008), *High-performance construction materials*, p. 335, ISBN 978-981-279-735-3

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