

USES AND APPLICATIONS OF CONCRETE SEALER X-2

by Michael A. Parry

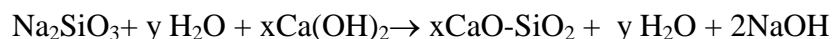
Stone Technologies Corp., PO Box 2161, Cleveland, TN 37320, Tel: (423) 503 4490

www.stonetechnologiesinc.com Page 1 of 3

Introduction

Concrete Sealer X-2 has been used as a low-cost sealer for concrete for many years. When applied to concrete or masonry it reacts with calcium hydroxide and reduces the porosity and permeability of the concrete matrix. This serves to increase the hardness and chemical resistance which, in turn, increases the service life of the surface.

Concrete Sealer X-2 is a silicate-based, water-soluble penetrating compound which will not scratch or peel off. Unlike other sealants, which either repel water (e.g. silanes, silicones, stearates) or function as a physical barrier coating (e.g. epoxies, polyesters, vinyls), Concrete Sealer X-2 sinks into the concrete surface and reacts with portlandite to form C-S-H gel according to the following reaction:



As a result, the surface has enhanced properties such as decreased permeability, increased hardness and overall increased durability.

How Does Concrete Sealer X-2 Function?

Concrete Sealer X-2 is an effective concrete sealant but like cement itself, it yields the best results to those who thoroughly understand how it works:

When dry cement is mixed with water, the cement particles begin to dissolve and react to form a calcium silicate hydrate (C-S-H). The volume of C-S-H is greater than the original unhydrated cement particles, so as C-S-H form it fills in porosity, providing strength and rigidity to the cement. Another by-product of cement hydration is calcium hydroxide. The presence of calcium hydroxide adversely affects the properties of cement because it is attacked by acids and other chemicals. It also tends to crystalize as hexagonal platelets near the paste/aggregate interface, resulting in a poorly packed (i.e. low density) weak area. Applying Concrete Sealer X-2, however, reduces the amount of calcium hydroxide near the surface because the silicate reacts with the calcium hydroxide to form C-S-H (see chemical equation below). As a result, the surface is less permeable, more resistant to chemical attack and overall more durable. The C-S-H gel formed from this reaction is insoluble in water and more resistant to acid and other chemical attack.

All concrete is porous, although the type and amount of porosity can vary greatly from one concrete to the next. These differences occur because of the water-to-cement ratio, amount of working, quantity and type of aggregate, temperature and various other factors. Depending on its quality, method of placement and curing, a standard concrete can contain a significant percentage of calcium hydroxide which also contributes to porosity when it dissolves. Therefore, it is essential to convert the calcium hydroxide to C-S-H in order to increase the life of the concrete.

The final strength and properties of concrete are impacted by the amount of C-S-H it contains relative to its porosity. Therefore, Concrete Sealer X-2 increases concrete strength by replacing soluble lime with the C-S-H. Concrete Sealer X-1 increases the density of concrete because C-S-H forms where the calcium hydroxide used to be and, since chemicals attack concrete (and rebar) by penetrating the pores, the presence of more C-S-H increases the durability of the substrate.

How to Use Concrete Sealer X-2 for Concrete Treatment

Fresh concrete should be properly cured for a minimum of seven days before Concrete Sealer X-2 is applied. The Concrete Sealer X-2 treatment may be satisfactorily applied to clean concrete at any later time.

Surface Preparation

Concrete Sealer X-2 should not be applied to any surface that has already been treated with compounds that might prevent penetration of the silicate (e.g. paint, oil) or that interfere with the conversion of free lime to C-S-H. Since Concrete Sealer X-2 may be less effective if there is no free lime near the surface, carbonated concrete should be abraded.

Before any concrete is treated, the area must be thoroughly cleaned. The surface should first be swept with a broom to remove any loose dirt. Then it should be scrubbed with soapy water. This will remove the film of consolidated dirt and expose the true wearing surface. To get the best penetration the floor should be allowed to dry thoroughly for a minimum of 24 hours after cleaning.

Coverage and Application

Each gallon of Concrete Sealer X-2 is expected to cover approximately 250 square feet of concrete with one coat but since the porosity of concrete varies greatly, the coverage will also vary. The solution may be applied with a brush, squeegee, sprayer, or scrubbing machine for several minutes to obtain an even penetration.

After the surface has dried, at least one more application is recommended. The final application is determined by the saturation of the substrate. This generally requires 2 - 3 coats and can be seen by a "blooming" or "frosting" of excess product on the concrete surface. Any excess Concrete Sealer X-2 should be removed with clean water.

Properly treated concrete may be painted without any difficulty. However, there should be no Concrete Sealer X-2 residue on the surface prior to painting. Washing with hot water will remove the alkalinity that may be due to the Concrete Sealer X-2. An alkali-resistant paint should be used.

Factors Affecting Concrete Sealer X-2 Penetration Depth

Penetration depth is a critical property for penetrating sealers, such as Concrete Sealer X-2, to function effectively. The deeper the penetration, the greater the thickness of concrete strengthened, thus improving wear resistance, the life span of traffic surfaces and durability.

The desirable depth is about ¼inch (6mm) with a minimum of about ⅛inch (3mm). However the regular attainment of such penetration will require considerable care in surface preparation and in assuring that the concrete is properly dry. The quality of the concrete will also be a major factor in the

depth of penetration obtained. Penetration depths may be greater with poor quality porous concrete while a 6mm depth may not be possible with high-quality dense concrete.

Substrates for Concrete Sealer X-2 Treatment

Concrete Sealer X-2 can be used to treat concrete walls and floors, storage tanks, building blocks, roadways, driveways, runways, warehouse floors, and other types of masonry surfaces.

Safety and Handling

Concrete Sealer X-2 constitutes a family of moderate to strongly alkaline products. As such, it warrants careful handling to prevent injury or discomfort. The Material Safety Data Sheets (MSDS) for this product list all handling precautions and required safety equipment and is available upon request from Stone Technologies. Concrete Sealer X-2 is completely inorganic and, as such, does not present a hazard such as low flash point or flammability. Please refer to the MSDS prior to handling and use.