Surface Preparation Guide for Protective Sealers and Stains

GUIDE G-807.03

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1. Purpose: **This guide describes methods for testing and preparing a concrete surface prior to applying a protective sealer or chemical stain. Items covered include strength verification, cleaning, removal of unsound concrete or foreign material, creating the correct Concrete Surface Profile and opening the surface. Failure to adequately address one or more of these issues is the most common reason for sealer or stain failure.**

2. Substrate Testing: Prior to the application of any sealer or chemical stain the substrate must be tested for surface durability and in some cases moisture vapor emission. If the surface cannot hold the sealer in place, failure will occur. One or more of the tests in the table below should be performed as applicable before and after the surface preparation steps.

FIELD TEST METHODS
1. Tape Adhesion Test — Using a razor knife, cut 6 parallel lines $^1/_8$" apart in the concrete surface. Make 6 additional cuts at 90° to and centered on the original cuts to form a grid of 25 squares. Place transparent tape on the grid and rub firmly with a pencil eraser. Pull the tape off rapidly at as close to an angle of 180° as possible. If less than 20 squares remain intact, additional surface preparation is required.
2. Scratch Test — Scratch the concrete surface with a sharp object (knife, screwdriver). If a powdery substance easily develops, additional surface preparation is required followed by Test Number 1.
3. Moisture Vapor Test — To quantitatively measure the Moisture Vapor Emission Rate (MVER), use a calcium chloride test kit as described in ASTM F-1869. If a test kit is not available, tape a section of polyethylene sheeting tightly to the concrete surface as described in ASTM D-4263. If the MVER is greater than 5 pounds per 1000 square feet per 24 hours (2.5 kg/100 m^2/24 hr) or if moisture is present on the underside of the polyethylene sheet after 24 hours, the MVER is too high for the application of SCOFIELD® Selectseal-W™ and certain LITHOCHROME® Chemstain™ Classic products. Note that the measurement obtained is indicative of the area tested at the time the test is performed. The MVER can change over a short period of time.

3. Objectives and Requirements: *Proper surface preparation is essential to successfully seal concrete surfaces*. The following factors must all be evaluated in order to achieve maximum results and longevity.

Substrate Condition

The strength of the concrete substrate will have a significant effect on the service life of the sealer. Contamination of the concrete substrate from oils, greases, chemical stain residue and other foreign material will cause bonding failure of the sealer. If the surface has not been adequately prepared prior to application of the sealer, bond failure is likely to occur. If the substrate is weak, the sealer can disbond or delaminate with cementitious matrix adhering to the downface of the sealer film. If the substrate is contaminated the disbonded sealer film may have oil, grease or other contaminants on its downface acting as a bond breaker.

Environmental Requirements

Effects generated by the surface preparation process such as dust, water, vibration, noise and access should all be considered when selecting the preparation method to be used. If the project will take place during normal business hours, there will be limitations placed on the choices available.

4. Preparation Method Selection: The method of surface preparation will be determined by several factors. These factors include but are not limited to: power source availability, access, sealer type, substrate, environmental factors (water and dust), noise levels and final appearance.

5. Removal of Curing Compounds and Coatings: All previously applied curing compounds, coatings, and sealers must be completely removed from the surface prior to performing any preparation procedures. LITHOCHROME™ Coating Remover will remove most Scofield curing and sealing materials. Refer to Scofield Tech-Data Bulletin *M-544 LITHOCHROME Coating Remover*. For removal of SCOFIELD® Selectseal-W™, use a commercial stripper formulated for urethane sealer removal following the manufacturer's instructions and safety requirements. For removal of SCOFIELD® Selectseal-S™ use mechanical means such as shot-blasting.

6. Technical Guidelines: The International Concrete Repair Institute (ICRI) has developed technical guidelines for surface preparation. In these guidelines the various levels of Concrete Surface Profile (CSP) have been classified with CSP 1 being the least aggressive and CSP 9 the most aggressive. In all cases refer to these guidelines for further information. Recommended surface preparation methods and the Concrete Surface Profile possible with each are listed below.

- DETERGENT CLEANING—Using a high alkaline, low foaming industrial cleaner (pH level 12.8–13.2), scrub the floor utilizing a low-speed floor machine with a black pad. Rinse several times with fresh water to remove suspended contamination, then wet vacuum the debris until all loose material is removed. Caution should be taken that the surface texture or appearance is not disturbed. This is only for deep cleaning. CSP 1

- WET/DRY LIGHT ABRASION—For dry screening use a low-speed floor machine with a 60 grit screen. If a more aggressive system is required, add water to the floor and abrade using a low-speed floor machine and a grit brush. After wet or dry light abrasion, vacuum the residue from the floor. If a wet system is used, follow up with a detergent cleaning, then rinse several times with fresh water and wet vacuum each time until all loose material is removed. CSP 1

- ACID ETCHING—Start by completely removing all existing coatings. Dilute the acid by adding 1 part by volume of muriatic acid to 10 parts by volume of water already in a container. Mix gently, taking proper safety precautions to avoid injury.

Proper protective gear and safety equipment as recommended by the acid supplier must be worn. Pre-wet the floor with water and generously apply the acid solution. Scrub the acid solution into the floor using a low-speed floor machine equipped with a grit brush. Neutralize the surface with a solution of 1 pound of household baking soda in 5 gallons of water and apply until the fizzing stops. Remove the debris and neutralized acid residue using a wet vacuum. Rinse and scrub several times with fresh water using a low-speed floor machine equipped with a grit brush, vacuuming up the water each time. A pH test of the remaining water on the substrate must be performed using pH paper, litmus paper or a properly calibrated surface pH meter. A pH value of 7 or higher indicates that all acid has been neutralized. If the tested pH value is below 7 the neutralization step outlined above must be repeated until a pH value of 7 or more is obtained. Failure to neutralize acid and completely remove all soluble salts, weakened cement paste and other debris prior to sealing the surface will cause appearance defects, adhesion loss or peeling, reduced durability, and possible bonding failure and delamination of the sealer. If the surface has a shine or does not have a uniform appearance, additional acid etching is required. CSP 1

• CHEMICAL STAIN REMOVAL—When LITHOCHROME® Chemstain™ Classic is used to stain a concrete surface complete neutralization, rinsing and cleaning of the concrete is required before a recommended Scofield sealer can be applied. Refer to Scofield's Tech-Data Bulletin *A-414 LITHOCHROME Chemstain Classic* for complete instructions. Surfaces treated with LITHOCHROME Chemstain Classic will not accept Scofield's compatible sealers unless the chemical stain residue is completely neutralized and removed.

• DIAMOND GRINDING—Using a grinding machine and no finer than a 50 grit metal bond diamond, grind the floor. If needed, water can be used to facilitate the process or minimize dust. Once the floor has no shine with a uniform appearance, follow up with a detergent cleaning, then rinse several times with fresh water and wet vacuum each time until all loose material is removed. CSP 1–2

• SANDBLASTING—Using a blasting media that is suitable for the concrete substrate, remove all contaminants and weak concrete cement paste. Vacuum dust from the surface. Rinse several times with fresh water and wet vacuum each time until all loose material is removed. CSP 2–3

• PRESSURE WASH—Using a minimum of 2500 psi, wash the surface without creating lap lines in the overlaps. Rinse several times with fresh water and wet vacuum each time until all loose material is removed. CSP 1

The information presented in the following chart is meant as a general reference guide only. For complete information on installation methods and other recommendations, refer to the appropriate Scofield Tech-Data Bulletins prior to use. Visit the Scofield website at* www.scofield.com *for the most recent Tech-Data Bulletins.

Recommended Preparation Methods for Various Scofield Coloring Systems

SYSTEM	SEALER OR TREATMENT	PREPARATION METHOD
CHROMIX® Admixtures for Color-Conditioned® Concrete LITHOCHROME® Color Hardener	CEMENTONE® Clear Sealer	Prior to sealer application: Detergent clean using a high alkaline, low foaming industrial cleaner following manufacturer's recommendations.
	SCOFIELD® Cureseal-W™	
	SCOFIELD® Cureseal-S™	
	SCOFIELD® Selectseal-W™	
	SCOFIELD® Selectseal-S™	
	SCOFIELD® Repello®	
LITHOCHROME® Chemstain™ Classic	CEMENTONE® Clear Sealer	Prior to Chemstain Classic application: • Wet/Dry Abrasion • Sandblasting • Diamond Grinding Prior to sealer application: Completely neutralize and remove residual acid. Refer to Tech-Data Bulletin A-414.
	SCOFIELD® Cureseal-W™	
	SCOFIELD® Cureseal-S™	
	SCOFIELD® Selectseal-W™	
LITHOCHROME® Tintura™ Stain	SCOFIELD® Selectseal-W™	Prior to Tintura Stain application: • Wet/Dry Abrasion • Diamond Grinding • Sandblasting • Acid Etching
	SCOFIELD® Selectseal-S™	
	SCOFIELD® Cureseal-S™	