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 Technical Services TECH Note RILEM Tube Test Procedures

 Product Data literature for all products evaluated

Submitted Information

For: James Holt
Deborah Brooks

Subject: Horizon Stone
Chattanooga, TN

Date: December 16, 2008

Project: 0811-01 PTP

Samples Submitted: 5 types of concrete pavers

Sample	Color	Size
"Buckskin"	Gray	8" x 8" x 1 ¼"
"Ivory"	Buff	8" x 8" x 1 ¼"
"Mocha"	Brown	8" x 8" x 1 ¼"
"Oyster"	Buff	8" x 8" x 1 ¼"
"Sahara Blend"	Brown/Red	8" x 8" x 1 ¼"

Submitted by: James Holt

Introduction

Architectural Materials Testing (AMT) Laboratories is a Boyer Industries company that provides laboratory testing and consulting services for the construction industry. Laboratory testing includes evaluating chemical cleaning products and protective treatments for a variety of new and existing architectural materials.

This report includes descriptions of the PROSOCO, Inc. products and test methods that were used. Following test results and conclusions, the report provides recommendations for the most effective products and procedures.

Purpose of Testing

Five types of concrete paver samples were submitted to AMT Laboratories by PROSOCO, Inc. with a request to determine if application of the products evaluated will produce any surface alterations during new construction cleaning operations. Additionally, the effectiveness of water repellent, color and sheen enhancement, and stain repellent products suitable for the concrete paver samples were evaluated.

New Construction Cleaning – Paver Kare[®] Cleaner/Brightener and Sure Klean[®] Vana Trol[®] were evaluated at various dilutions to determine the optimal concentration of cleaner for removal of applied Type S mortar from the submitted concrete pavers while limiting surface alterations. The surface alteration evaluation was visually determined based upon perceived discoloration or erosion/etching of the samples.

To simulate new construction soiling, the samples were placed on a bench with finished surface facing upward. Hollow cylinders measuring 50 mm in diameter and 75 mm tall were positioned on top of the samples and filled with a wet mixture of Type S cementitious mortar. The wet mortar-filled cylinder was allowed to remain in contact with the samples for 10 minutes before removal.

Heavy deposits of mortar were removed with dry scraping after 24 hours. Prepared cleaning solutions were then evaluated for their effectiveness in removing residual Type S mortar after 3, 7, and 14 days of curing. A visual examination was also made to determine if the tested cleaners caused any surface alterations to the submitted samples based on the following:

Surface Finish Removal is the visual examination of the sample comparing the surface finish of the untreated control surface to the surface finish cleaned with selected product(s) at given dilutions.

Substrate Deterioration is the visual examination of the sample comparing the surface of the untreated control to surfaces cleaned with selected product(s) at given dilutions looking for any potential erosion/digestion of the sample.

Color Change is the visual examination comparing the color of the untreated control surface to color of surfaces cleaned with selected products at given dilutions.

Staining is the visual examination for changes that are the result of a chemical reaction that leaves a staining precipitate.

The following is the scale used for reporting results of both categories:

0 – No Change

1 – Change – Slight

2 – Change – Moderate

3 – Change – Heavy

4 – Change – Excessive

Products Evaluated

Protective Water Repellents – Paver Kare® Paver Enhancer, Consolideck® Saltguard®, Stand Off® SLX100™ Water & Oil Repellent, and Stand Off® Stone, Tile & Masonry Protector (STMP) were evaluated for their ability to provide water repellency to the submitted samples.

Color and Sheen Enhancement – Paver Kare® Paver Enhancer was evaluated on the submitted samples for its ability to provide color and/or sheen enhancement.

Stain Repellency – Stand Off® SLX100™ Water & Oil Repellent and Stand Off® Stone, Tile & Masonry Protector (STMP) were evaluated for their ability to repel stains from the submitted samples.

Products Evaluated**New Construction Cleaning Products Evaluated**

Sample	Product	Dilution
All Submitted Concrete Pavers	Paver Kare® Cleaner/Brightener	1:2, 1:3
	Sure Klean® Vana Trol®	1:8, 1:10

Protective Water Repellent Products Evaluated

Sample	Product	Dilution
All Submitted Concrete Pavers	Paver Kare® Paver Enhancer	Concentrate
	Consolideck® Saltguard®	Concentrate
	Stand Off® SLX100™ Water & Oil Repellent	Concentrate
	Stand Off® Stone, Tile & Masonry Protector (STMP)	Concentrate

Color and Sheen Enhancement Products Evaluated

Sample	Product	Dilution
All Submitted Concrete Pavers	Paver Kare® Paver Enhancer	Concentrate

Stain Repellency Products Evaluated

Sample	Product	Dilution
All Submitted Concrete Pavers	Stand Off® SLX100™ Water & Oil Repellent	Concentrate
	Stand Off® Stone, Tile & Masonry Protector (STMP)	Concentrate

New Construction Cleaning

These cleaning trials were conducted to determine the optimal cleaning/cure time combination to most efficiently remove Type S from the submitted concrete pavers while limiting surface alterations to the concrete paver surface during new construction operations.

Type S cementitious mortar was prepared in compliance with the manufacturer's instructions, applied to the concrete paver and allowed to cure. Mortar removal was accomplished using chemical assistance and a high-pressure water rinse with pressure rinsing equipment. The removal of Type S cementitious mortar was visually evaluated after 3, 7, and 14 days of curing.

Description of Products Evaluated – New Construction Cleaning

Paver Kare® Cleaner/Brightener – removes common construction and atmospheric staining from custom masonry and other architectural concrete surfaces. This general-purpose, non-etching, acidic cleaner removes rust, mud, oil, atmospheric dirt, mortar smears and other stains without altering the surface texture. Cleaner/Brightener adds depth to colors and brightens white matrices and exposed aggregate.

Sure Klean® Vana Trol® – a concentrated acidic cleaner for new masonry surfaces that are subject to vanadium, manganese and other metallic stains. Vana Trol® is designed to simplify rinsing and reduces potential for efflorescence.

Test Method – New Construction Cleaning

Chemical cleaners were evaluated using the following procedure:

1. Pre-wet the surface with water.
2. Apply at the appropriate dilutions.
3. Allow appropriate dwell time, as specified.

Paver Kare® Cleaner/Brightener	5 minutes
Sure Klean® Vana Trol®	5 minutes
4. Reapply the product and moderately agitate with a brush.
5. Pressure rinse thoroughly.*
6. Allow the sample to dry for at least 18 hours and visually examine.
7. Visually evaluate any surface alterations to the decorative finish.

*Pressure Rinsing Equipment – Masonry washing equipment generating approximately 700-800 psi with a water flow rate of 8 gallons per minute delivered through a 45 degree fan spray tip was used for rinsing.

Test Results – New Construction Cleaning**Cleaning Effectiveness (% Type S Mortar Removal)**

“Buckskin”				
Product	Dilution	3 day	7 day	14 day
Paver Kare® Cleaner/Brightener	1:2	100 %	100 %	99 %
	1:3	100 %	100 %	99 %
Sure Klean® Vana Trol®	1:8	100 %	100 %	100 %
	1:10	100 %	100 %	100 %
“Ivory”				
Product	Dilution	3 day	7 day	14 day
Paver Kare® Cleaner/Brightener	1:2	100 %	100 %	98 %
	1:3	100 %	100 %	100 %
Sure Klean® Vana Trol®	1:8	100 %	100 %	100 %
	1:10	100 %	100 %	100 %
“Mocha”				
Product	Dilution	3 day	7 day	14 day
Paver Kare® Cleaner/Brightener	1:2	98 %	100 %	99 %
	1:3	100 %	100 %	99 %
Sure Klean® Vana Trol®	1:8	100 %	100 %	100 %
	1:10	100 %	100 %	100 %
“Oyster”				
Product	Dilution	3 day	7 day	14 day
Paver Kare® Cleaner/Brightener	1:2	100 %	100 %	100 %
	1:3	100 %	100 %	99 %
Sure Klean® Vana Trol®	1:8	100 %	100 %	100 %
	1:10	100 %	100 %	100 %
“Sahara Blend”				
Product	Dilution	3 day	7 day	14 day
Paver Kare® Cleaner/Brightener	1:2	98 %	97 %	98 %
	1:3	100 %	100 %	99 %
Sure Klean® Vana Trol®	1:8	100 %	100 %	100 %
	1:10	100 %	100 %	100 %

Test Results – Limiting Surface Alterations

“Buckskin”					
Product	Dilution	Surface Finish Removal	Substrate Deterioration	Color Change	Staining
Paver Kare® Cleaner/Brightener	1:2	0	0	1	0
	1:3	0	0	1	0
Sure Klean® Vana Trol®	1:8	0	0	0	0
	1:10	0	0	0	0
“Ivory”					
Product	Dilution	Surface Finish Removal	Substrate Deterioration	Color Change	Staining
Paver Kare® Cleaner/Brightener	1:2	0	0	0	0
	1:3	0	0	0	0
Sure Klean® Vana Trol®	1:8	0	0	0	0
	1:10	0	0	0	0
“Mocha”					
Product	Dilution	Surface Finish Removal	Substrate Deterioration	Color Change	Staining
Paver Kare® Cleaner/Brightener	1:2	0	0	1	0
	1:3	0	0	1	0
Sure Klean® Vana Trol®	1:8	0	0	0	0
	1:10	0	0	0	0
“Oyster”					
Product	Dilution	Surface Finish Removal	Substrate Deterioration	Color Change	Staining
Paver Kare® Cleaner/Brightener	1:2	0	0	0	0
	1:3	0	0	0	0
Sure Klean® Vana Trol®	1:8	0	0	0	0
	1:10	0	0	0	0
“Sahara Blend”					
Product	Dilution	Surface Finish Removal	Substrate Deterioration	Color Change	Staining
Paver Kare® Cleaner/Brightener	1:2	0	0	1	0
	1:3	0	0	1	0
Sure Klean® Vana Trol®	1:8	0	0	0	0
	1:10	0	0	0	0

0 – No Change **3 – Change – Heavy**
1 – Change – Slight **4 – Change – Excessive**
2 – Change – Moderate

Photographs – New Construction Cleaning

“Sahara Blend”; Type S Mortar

3 Day Cleaning



Paver Kare® Cleaner/Brightener (1:2)	Uncleaned Surface	Paver Kare® Cleaner/Brightener (1:3)
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7 Day Cleaning



Paver Kare® Cleaner/Brightener (1:2)	Uncleaned Surface	Paver Kare® Cleaner/Brightener (1:3)
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Photographs – New Construction Cleaning

“Sahara Blend”; Type S Mortar

14 Day Cleaning

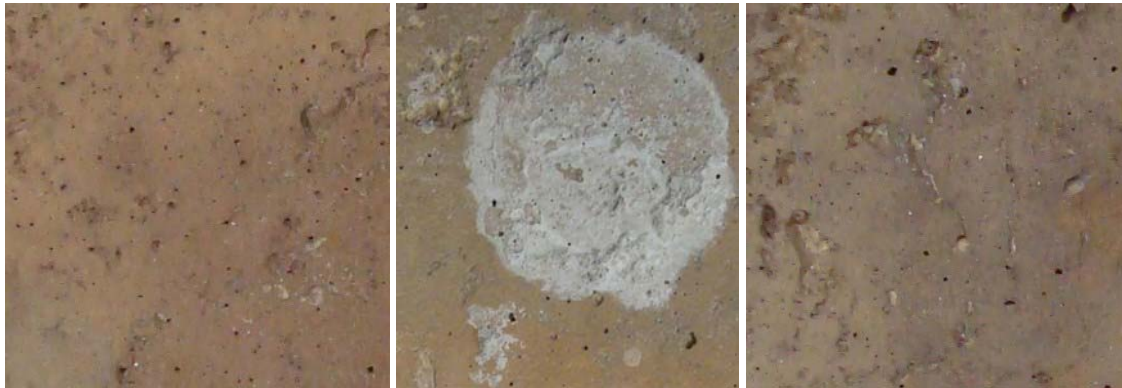


Paver Kare® Cleaner/Brightener (1:2)	Uncleaned Surface	Paver Kare® Cleaner/Brightener (1:3)
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Photographs – New Construction Cleaning

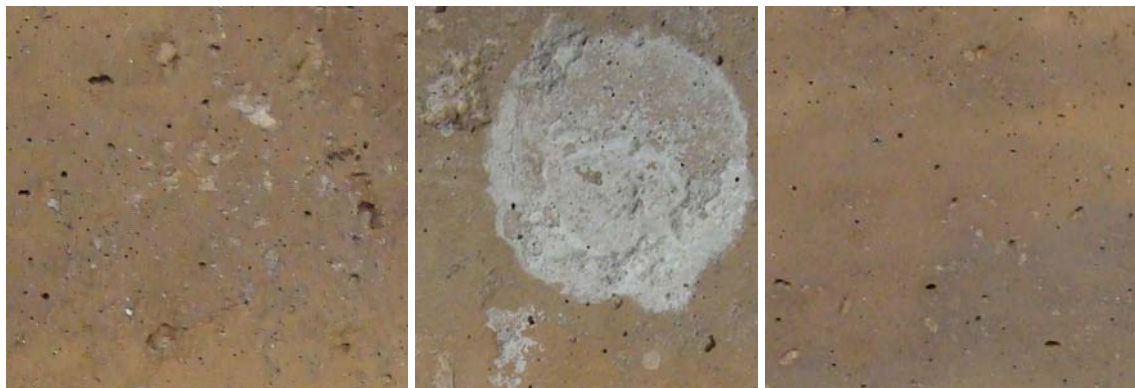
“Sahara Blend”; Type S Mortar

3 Day Cleaning



Sure Klean® Vana Trol® (1:8)	Uncleaned Surface	Sure Klean® Vana Trol® (1:10)
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7 Day Cleaning



Sure Klean® Vana Trol® (1:8)	Uncleaned Surface	Sure Klean® Vana Trol® (1:10)
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Photographs – New Construction Cleaning

“Sahara Blend”; Type S Mortar

14 Day Cleaning



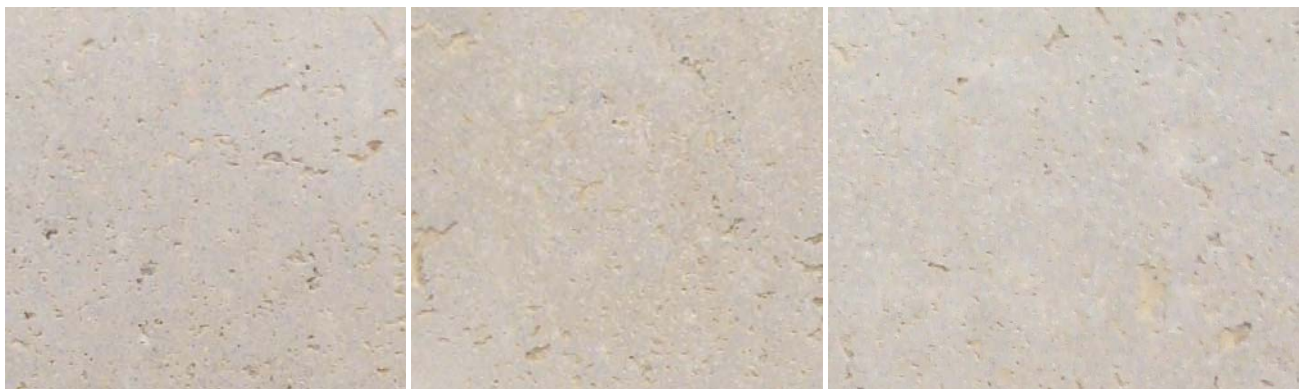
Sure Klean [®] Vana Trol [®] (1:8)	Uncleaned Surface	Sure Klean [®] Vana Trol [®] (1:10)
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Photographs – Limiting Surface Alterations

“Oyster”



Paver Kare® Cleaner/Brightener (1:2)	Uncleaned Control	Paver Kare® Cleaner/Brightener (1:3)
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Sure Klean® Vana Trol® (1:8)	Uncleaned Control	Sure Klean® Vana Trol® (1:10)
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Photographs – Limiting Surface Alterations

“Buckskin”



Paver Kare® Cleaner/Brightener (1:2)	Uncleaned Control	Paver Kare® Cleaner/Brightener (1:3)
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Sure Klean® Vana Trol® (1:8)	Uncleaned Control	Sure Klean® Vana Trol® (1:10)
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Conclusions – New Construction Cleaning

Based on the test results, all of the submitted samples were efficiently cleaned with Sure Klean® Vana Trol® and Paver Kare® Cleaner/Brightener. There were no limiting surface alterations to the samples when cleaned with Sure Klean® Vana Trol®. Paver Kare® Cleaner/Brightener exhibited a slightly white appearance when applied to the samples of “Buckskin”, “Mocha”, and “Sahara Blend.”

Recommendations – New Construction Cleaning

Recommendations for cleaning for each type of concrete paver submitted by Horizon Stone, Chattanooga, TN are provided in the chart below. Recommendations are based on the optimum dilution for complete removal of mortar while limiting surface alterations of the submitted samples.

Sample	New Construction Cleaning (Type S mortar, 7 day cleaning)
“Buckskin”	Sure Klean® Vana Trol® (1:10)
“Ivory”	
“Mocha”	
“Oyster”	
“Sahara Blend”	

The most appropriate cleaner and dilution should be determined on the specific job-site, and will be dependent primarily on the nature and severity of soiling present at that location.

Apply all products in accordance with the manufacturer's recommendation provided on container labels and product data sheets. On-site testing should be conducted to determine the most appropriate cleaning product and procedures for a particular project. See product literature for additional application and product information.

Protective Water Repellents

The testing described below evaluates the suitability of water repellent treatments.

The surface treatments evaluated were selected for their suitability for application based on the following selection criteria:

1. Weatherproofing properties
 2. Color change
 3. Ease of application
-

Description of Products Evaluated – Protective Water Repellents

Consolideck® Saltguard® – a general-purpose silane/siloxane water repellent and chloride screen for concrete and masonry. Saltguard® protects horizontal and vertical surfaces from moisture intrusion and chemical attack of chloride salts, reducing rebar corrosion and surface spalling. Saltguard® may be used on horizontal surfaces such as sidewalks, tile and brick pavers. It also provides excellent protection for retaining walls, bridge pilings and other vertical areas. In coastal areas, Saltguard® protects against salt air by reducing chloride penetration. Saltguard® also prevents deep-seated staining by mud splashes and other waterborne contaminants.

Paver Kare® Paver Enhancer – a solvent-based blend of high-quality siloxanes modified to provide excellent water repellency and color enhancement to interlocking concrete, fired clay, porous tile and many types of natural stone surfaces. Paver Enhancer penetrates and reacts with the surface to form a chemical bond, providing long-term durability, alkali resistance and superior breathability.

Stand Off® SLX100™ Water & Oil Repellent – combines water and oil repellency on most substrates to prevent staining by waterborne and oily substances. This modified “neat” silane system offers invisible protection and low volatility. The small molecular structure of SLX100™ allows for maximum penetration at coverage rates higher than that of conventional silanes. Depth of penetration is controlled by the application rate (loading rate). This makes SLX100™ ideal for protecting granite and other dense, color-sensitive surfaces.

Stand Off® Stone, Tile & Masonry Protector (STMP) – a penetrating water, oil and stain repellent. This easy-to-use, low-odor protective treatment improves stain resistance and simplifies maintenance cleaning of interior and exterior stone, quarry tile, concrete and masonry surfaces. Surfaces treated with STMP resist staining from oil, food and waterborne matter while retaining their natural color, texture, and breathability.

Sample Preparation – Protective Water Repellents

The submitted concrete pavers were cut and allowed to dry for 24 hours prior to treatment. The treatments were applied by brush in accordance with the current PROSOCO, Inc. Product Data Sheet application instructions. The treatments were allowed to cure for at least 72 hours prior to testing.

Test Methods – Protective Water Repellents**Water Absorption Tube Test: Horizontal RILEM II.4, 5.0 milliliters, 20 minutes**

The water absorption tube test simulating wind driven and wind-blown rain conditions was performed. Tests were run with horizontal 5.0-milliliter head pressures. Filled to 5.0 milliliters, a water absorption tube produces a 103 mph dynamic wind pressure. See RILEM II.4 Tech Note for additional information.

The ranking system used to evaluate the effectiveness of the products applied to each submitted sample is as follows:

AA = "Above Average" correlates to less than or equal to 20% of the maximum untreated absorption.

A = "Average" correlates to less than or equal to 50% of the maximum untreated absorption.

BA = "Below Average" correlates to greater than 50% of the maximum untreated absorption.

EXAMPLE: If RILEM tubes applied to an untreated sample result in loss of 5.0 mL of water or more, then:

A rating of **AA** *Above Average* water repellent performance would be reported for treatments which result in a loss of no more than:

$$5.0 \text{ mL} \times 20\% = \mathbf{1.0 \text{ mL}}$$

A rating of **A** *Average* water repellent performance would be reported for treatments which result in a loss of no more than:

$$5.0 \text{ mL} \times 50\% = \mathbf{2.5 \text{ mL}}$$

A rating of **BA** *Below Average* water repellent performance would be reported for treatments which result in a loss of more than:

$$5.0 \text{ mL} \times 50\% = \mathbf{2.5 \text{ mL}}$$

Test Results – Protective Water Repellents**Water Absorption Tube Test: Horizontal RILEM II.4, 5.0 milliliters, 20 minutes****AA = Above Average****A = Average****BA = Below Average**

“Buckskin”	Results in mL loss	Ranking
Untreated Control	- 0.4	--
Consolideck® Saltguard®	- 0.3	<u>BA</u>
Paver Kare® Paver Enhancer	- 0.2	<u>A</u>
Stand Off® SLX100™ Water & Oil Repellent	- 0.3	<u>BA</u>
Stand Off® Stone, Tile & Masonry Protector (STMP)	- 0.3	<u>BA</u>
“Ivory”	Results in mL loss	Ranking
Untreated Control	- 0.3	--
Consolideck® Saltguard®	- 0.1	<u>A</u>
Paver Kare® Paver Enhancer	- 0.2	<u>BA</u>
Stand Off® SLX100™ Water & Oil Repellent	- 0.2	<u>BA</u>
Stand Off® Stone, Tile & Masonry Protector (STMP)	- 0.2	<u>BA</u>
“Mocha”	Results in mL loss	Ranking
Untreated Control	- 0.3	--
Consolideck® Saltguard®	- 0.4	<u>BA</u>
Paver Kare® Paver Enhancer	- 0.1	<u>A</u>
Stand Off® SLX100™ Water & Oil Repellent	- 0.1	<u>A</u>
Stand Off® Stone, Tile & Masonry Protector (STMP)	- 0.4	<u>BA</u>
“Oyster”	Results in mL loss	Ranking
Untreated Control	- 0.4	--
Consolideck® Saltguard®	- 0.3	<u>BA</u>
Paver Kare® Paver Enhancer	- 0.0	<u>AA</u>
Stand Off® SLX100™ Water & Oil Repellent	- 0.2	<u>A</u>
Stand Off® Stone, Tile & Masonry Protector (STMP)	- 0.2	<u>A</u>
“Sahara Blend”	Results in mL loss	Ranking
Untreated Control	- 0.4	--
Consolideck® Saltguard®	- 0.2	<u>A</u>
Paver Kare® Paver Enhancer	- 0.1	<u>A</u>
Stand Off® SLX100™ Water & Oil Repellent	- 0.3	<u>BA</u>
Stand Off® Stone, Tile & Masonry Protector (STMP)	- 0.1	<u>A</u>

Photographs – Protective Water Repellents

“Sahara Blend”; Horizontal RILEM II.4, 5.0 milliliters, 20 minutes



Stand Off [®] Stone, Tile & Masonry Protector (STMP)	Stand Off [®] SLX100 [™] Water & Oil Repellent	Untreated Control	Consolideck [®] Saltguard [®]	Paver Kare [®] Paver Enhancer
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Conclusions – Protective Water Repellents

Based upon laboratory evaluations, at least one of the products tested provided average to above average water repellency to the submitted samples. In addition, Paver Kare[®] Paver Enhancer provided a slight to significant color enhancement to the submitted concrete paver samples. The other water repellent treatments did not alter the appearance of the concrete paver samples.

Recommendations – Protective Water Repellents

Recommendations for water repellency for each concrete paver submitted by Horizon Stone, Chattanooga, TN are provided in the chart below. Recommendations are based on the treatment that proved most effective and can provide water repellency on all types submitted.

Sample	Protective Water Repellents
"Buckskin"	* Paver Kare® Paver Enhancer
"Ivory"	* Consolideck® Saltguard®
"Mocha"	Paver Kare® Paver Enhancer or * Stand Off® SLX100™ Water & Oil Repellent
"Oyster"	* Paver Kare® Paver Enhancer or * Stand Off® SLX100™ Water & Oil Repellent or Stand Off® Stone, Tile & Masonry Protector (STMP)
"Sahara Blend"	* Consolideck® Saltguard® or * Paver Kare® Paver Enhancer or Stand Off® Stone, Tile & Masonry Protector (STMP)

* **NOTE:** Consolideck® Saltguard®, Paver Kare® Paver Enhancer, and Stand Off® SLX100™ Water & Oil Repellent are manufactured and marketed in compliance with VOC regulations. These products may not be suitable for sale in states and districts with more restrictive regulations.

The ability of a water repellent treatment to prevent the ingress of water is affected by a variety of factors. Therefore, on-site testing should be carried out for all installations with the recommended systems to ensure job site workmanship yields equivalent results.

Apply all products in accordance with the manufacturer's recommendation provided on container labels and product data sheets. On-site testing should be conducted to determine the most appropriate water repellent product and procedures for a particular project. See product literature for additional application and product information.

Color and Sheen Enhancement

This evaluation compares the effectiveness of the evaluated product in providing color and/or sheen enhancement to the submitted samples.

Description of Products Evaluated – Color and Sheen Enhancement

Paver Kare[®] Paver Enhancer – a solvent-based blend of high-quality siloxanes modified to provide excellent water repellency and color enhancement to interlocking concrete, fired clay, porous tile and many types of natural stone surfaces. Paver Enhancer penetrates and reacts with the surface to form a chemical bond, providing long-term durability, alkali resistance and superior breathability.

Test Method – Color and Sheen Enhancement

Paver Kare[®] Paver Enhancer was applied by brush in accordance with the current PROSOCO, Inc. Product Data Sheet application instructions. After 24 hours, a visual evaluation was made comparing the untreated surfaces to the treated surfaces.

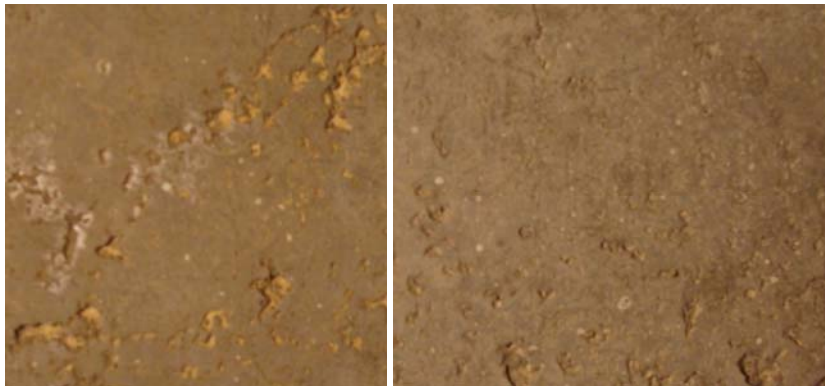
Test Results – Color and Sheen Enhancement Products Evaluated

“Buckskin”		
Product	Color Enhancement	Sheen Enhancement
Untreated Control	--	--
Paver Kare® Paver Enhancer	1	1
“Ivory”		
Product	Color Enhancement	Sheen Enhancement
Untreated Control	--	--
Paver Kare® Paver Enhancer	2	1
“Mocha”		
Product	Color Enhancement	Sheen Enhancement
Untreated Control	--	--
Paver Kare® Paver Enhancer	2	1
“Oyster”		
Product	Color Enhancement	Sheen Enhancement
Untreated Control	--	--
Paver Kare® Paver Enhancer	2	1
“Sahara Blend”		
Product	Color Enhancement	Sheen Enhancement
Untreated Control	--	--
Paver Kare® Paver Enhancer	3	2

Scale: 0 – No Enhancement; Dull
1 – Slight Enhancement
2 – Moderate Enhancement
3 – Significant Enhancement

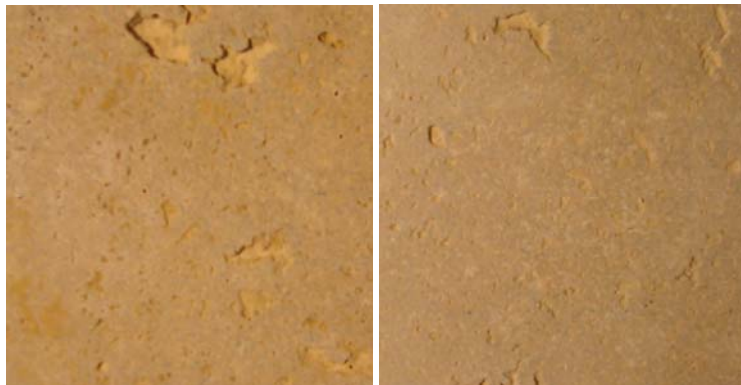
Photographs – Color and Sheen Enhancement

“Buckskin”; Treatments Applied



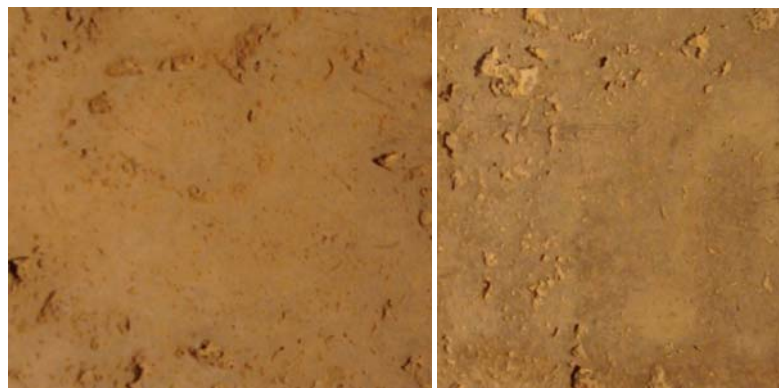
Paver Kare® Paver Enhancer	Untreated Control
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“Ivory”; Treatments Applied



Paver Kare® Paver Enhancer	Untreated Control
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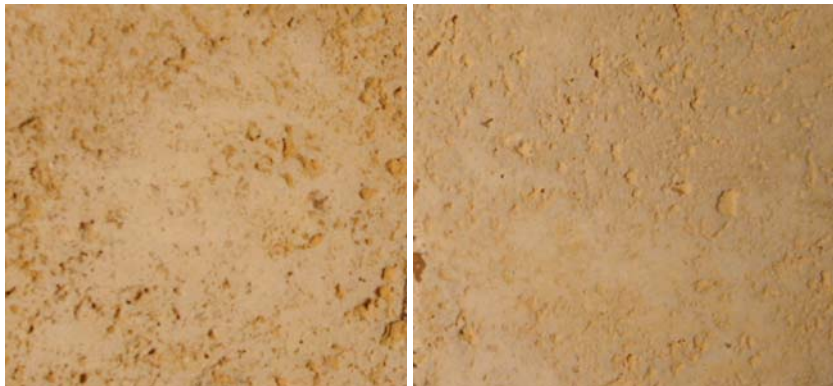
“Mocha”; Treatments Applied



Paver Kare® Paver Enhancer	Untreated Control
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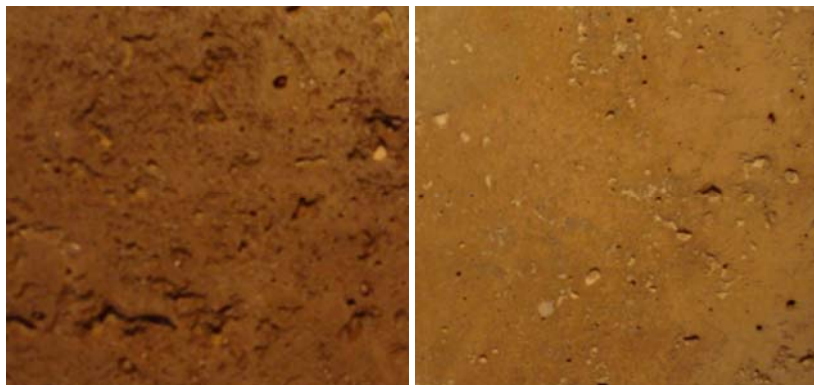
Photographs – Color and Sheen Enhancement

“Oyster”; Treatments Applied



Paver Kare® Paver Enhancer	Untreated Control
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“Sahara Blend”; Treatments Applied



Paver Kare® Paver Enhancer	Untreated Control
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Recommendations – Color and Sheen Enhancement

Recommendations for color and sheen enhancement for the concrete paver samples submitted by Horizon Stone, Chattanooga, TN is provided in the chart below. Recommendations are based on the treatment that proved most effective in providing color and/or sheen enhancement to the submitted samples.

Sample	Color Enhancement	Sheen Enhancement
“Buckskin”	* Paver Kare® Paver Enhancer	* Paver Kare® Paver Enhancer
“Ivory”		
“Mocha”		
“Oyster”		
“Sahara Blend”		

* **NOTE:** Paver Kare® Paver Enhancer is manufactured and marketed in compliance with VOC regulations. This product may not be suitable for sale in states and districts with more restrictive regulations.

Apply all products in accordance with the manufacturer's recommendation provided on container labels and product data sheets. On-site testing should be conducted to determine the most appropriate water repellent product and procedures for a particular project. See product literature for additional application and product information.

Stain Repellency

These trials were conducted to determine the effectiveness of treatments in preventing food and oil staining on the concrete paver samples.

Description of Products Evaluated – Stain Repellency

Stain Repellent Treatments

Stand Off® SLX100™ Water & Oil Repellent – Combines water and oil repellency on most substrates to prevent staining by waterborne and oily substances. This modified “neat” silane system offers invisible protection and low volatility. The small molecular structure of SLX100™ allows for maximum penetration at coverage rates higher than that of conventional silanes. Depth of penetration is controlled by the application rate (loading rate). This makes SLX100™ ideal for protecting granite and other dense, color-sensitive surfaces.

Stand Off® Stone, Tile & Masonry Protector (STMP) – A penetrating oil and stain repellent that is an easy-to-use, low-VOC, low-odor protective treatment improves the stain resistance and simplifies maintenance cleaning of interior and exterior stone, quarry tile, concrete and masonry surfaces.

Maintenance Cleaner

Enviro Klean® 2010 All Surface Cleaner – A “next-generation” product for cleaning and degreasing light-to-heavily soiled stone, tile, masonry and much more. Powerful enough for industrial use, flexible enough for jobs around the home, space-saving EK 2010 replaces a host of individual cleaning agents. It is suitable for home-use on windows, bathroom tub and tile, counter tops and more when diluted with water. It's concentrated enough for the toughest industrial cleaning jobs on concrete, metal and many other plant and warehouse surfaces. EK 2010 also removes Sure Klean® Weather Seal Siloxane PD overspray from windows.

Staining Agents Evaluated

<u>Products</u>	<u>Temperature</u>
Coca Cola	ambient (~70°F)
Ketchup	ambient (~70°F)
Mustard	ambient (~70°F)
Red Wine	ambient (~70°F)
Balsamic Vinegar	ambient (~70°F)
Soy Sauce	ambient (~70°F)
Olive Oil	ambient (~70°F)
Wesson Oil	(~250°F)
Coffee	(~120°F)

Sample Preparation – Stain Repellency

The protective treatments were applied by brush in accordance with the current PROSOCO, Inc. Product Data Sheet application instructions. The treatments were allowed to cure on the samples for at least 72 hours before testing.

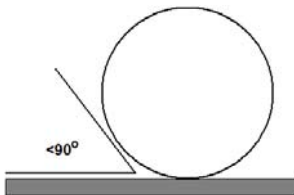
Surface Beading Evaluation

The food and oil products were applied to the test areas by using a dropper creating a bead 0.5 – 1.0 cm in diameter. The beading properties of the oils and liquids were visually evaluated within two minutes after application. The results are reported as a rating based on the angle of contact between the base of the droplet and the substrate. A rating of “1 or 2” indicated the smallest angle of contact (<90°) which correlates to “above average” repellency. A rating of “3 or 4” indicates “average” repellency. A rating of “5 or greater” indicated that the food or oil quickly absorbed into the substrate and correlates to “below average” repellency.

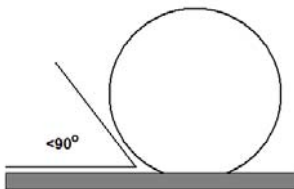
Note: Non-free flowing staining agents such as ketchup and mustard are applied in a globular fashion and therefore are not evaluated for their beading properties.

Rating System (1-5)

1. No wetting of contact area (no darkening); angle less than 90°.



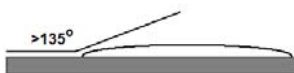
2. Wetting contained to the contact area (slight darkening); angle is less than 90°.



3. Wetting contained to the contact area (slight darkening); angle is greater than 90°, but less than 135°.



4. Wetting beyond the contact area (darkening); angle is greater than 135°.



5. Wetting beyond the contact area (darkening); angle is flat.



Stain Removal Evaluation

The soiling agents were allowed to dwell on the treated and untreated substrates for times of 24 hours, 4 hours, 1 hour, and 10 minutes. The test areas were then cleaned with Enviro Klean® 2010 All Surface Cleaner diluted 1 part concentrate to 10 parts fresh water and scrubbed under a stream of running water from a faucet. Samples were allowed to dry for 24 hours. Evaluation consisted of a visual examination of the tested areas to determine the percentage of staining removal.

Test Results – Surface Beading

“Buckskin”									
Treatment	Coco-Cola	Ketchup	Mustard	Red Wine	Balsamic Vinegar	Soy Sauce	Olive Oil	Wesson Oil	Hot Coffee
Untreated Control	4	--	--	4	4	4	5	5	5
Stand Off® SLX100™ Water & Oil Repellent	2	--	--	3	3	3	3	3	3
Stone, Tile & Masonry Protector (STMP)	3	--	--	3	3	3	3	3	3
“Ivory”									
Treatment	Coco-Cola	Ketchup	Mustard	Red Wine	Balsamic Vinegar	Soy Sauce	Olive Oil	Wesson Oil	Hot Coffee
Untreated Control	4	--	--	5	4	4	5	5	5
Stand Off® SLX100™ Water & Oil Repellent	2	--	--	3	3	3	3	3	3
Stone, Tile & Masonry Protector (STMP)	3	--	--	3	3	3	3	3	3
“Mocha”									
Treatment	Coco-Cola	Ketchup	Mustard	Red Wine	Balsamic Vinegar	Soy Sauce	Olive Oil	Wesson Oil	Hot Coffee
Untreated Control	4	--	--	4	4	4	5	5	5
Stand Off® SLX100™ Water & Oil Repellent	2	--	--	3	3	3	3	3	3
Stone, Tile & Masonry Protector (STMP)	3	--	--	3	3	3	3	3	3
“Oyster”									
Treatment	Coco-Cola	Ketchup	Mustard	Red Wine	Balsamic Vinegar	Soy Sauce	Olive Oil	Wesson Oil	Hot Coffee
Untreated Control	5	--	--	4	4	4	5	5	5
Stand Off® SLX100™ Water & Oil Repellent	2	--	--	3	3	3	3	3	3
Stone, Tile & Masonry Protector (STMP)	3	--	--	3	3	3	3	3	3

Test Results – Surface Beading

“Sahara Blend”									
Treatment	Coco-Cola	Ketchup	Mustard	Red Wine	Balsamic Vinegar	Soy Sauce	Olive Oil	Wesson Oil	Hot Coffee
Untreated Control	5	--	--	4	4	4	5	5	5
Stand Off® SLX100™ Water & Oil Repellent	3	--	--	3	3	3	3	3	3
Stone, Tile & Masonry Protector (STMP)	4	--	--	3	3	3	3	3	3

Test Results – Stain Repellency**% Stain Removal**

“Buckskin”									
Untreated Control									
	Coco-Cola	Ketchup	Mustard	Red Wine	Balsamic Vinegar	Soy Sauce	Olive Oil	Wesson Oil	Hot Coffee
24 hr	100%	**	**	90%	**	90%	<1%	<1%	*
4 hr	90%	**	**	80%	**	80%	<1%	<1%	*
1 hr	100%	**	**	40%	**	100%	<1%	<1%	80%
10 min	100%	**	**	80%	**	100%	<1%	<1%	95%
Stand Off® SLX100™ Water & Oil Repellent									
	Coco-Cola	Ketchup	Mustard	Red Wine	Balsamic Vinegar	Soy Sauce	Olive Oil	Wesson Oil	Hot Coffee
24 hr	100%	**	**	70%	**	100%	90%	85%	100%
4 hr	100%	**	**	70%	**	98%	98%	90%	90%
1 hr	100%	**	**	60%	**	**	95%	95%	100%
10 min	100%	**	**	80%	**	**	95%	95%	100%
Stand Off® Stone, Tile & Masonry Protector (STMP)									
	Coco-Cola	Ketchup	Mustard	Red Wine	Balsamic Vinegar	Soy Sauce	Olive Oil	Wesson Oil	Hot Coffee
24 hr	**	**	**	80%	**	**	70%	90%	85%
4 hr	**	**	**	40%	**	**	80%	100%	100%
1 hr	100%	**	**	40%	**	**	60%	80%	100%
10 min	100%	**	**	85%	**	**	85%	90%	100%

* Indicates the % stain removal cannot be determined due to saturation of the oil stain.

** Indicates etching upon the surface.

Test Results – Stain Repellency**% Stain Removal**

“Ivory”									
Untreated Control									
	Coco-Cola	Ketchup	Mustard	Red Wine	Balsamic Vinegar	Soy Sauce	Olive Oil	Wesson Oil	Hot Coffee
24 hr	95%	**	**	90%	**	90%	<1%	<1%	100%
4 hr	95%	**	**	90%	**	95%	<1%	<1%	100%
1 hr	100%	**	**	90%	**	**	<1%	<1%	100%
10 min	100%	**	**	90%	**	**	90%	80%	100%
Stand Off® SLX100™ Water & Oil Repellent									
	Coco-Cola	Ketchup	Mustard	Red Wine	Balsamic Vinegar	Soy Sauce	Olive Oil	Wesson Oil	Hot Coffee
24 hr	90%	**	**	85%	**	100%	100%	90%	100%
4 hr	100%	**	**	85%	**	100%	85%	85%	100%
1 hr	100%	**	**	80%	**	**	100%	95%	100%
10 min	100%	**	**	95%	**	**	85%	90%	100%
Stand Off® Stone, Tile & Masonry Protector (STMP)									
	Coco-Cola	Ketchup	Mustard	Red Wine	Balsamic Vinegar	Soy Sauce	Olive Oil	Wesson Oil	Hot Coffee
24 hr	95%	**	**	90%	**	100%	100%	90%	100%
4 hr	98%	**	**	85%	**	100%	85%	85%	100%
1 hr	100%	**	**	80%	**	**	90%	90%	100%
10 min	100%	**	**	95%	**	**	90%	90%	100%

* Indicates the % stain removal cannot be determined due to saturation of the oil stain.

** Indicates etching upon the surface.

Test Results – Stain Repellency**% Stain Removal**

“Mocha”									
Untreated Control									
	Coco-Cola	Ketchup	Mustard	Red Wine	Balsamic Vinegar	Soy Sauce	Olive Oil	Wesson Oil	Hot Coffee
24 hr	95%	**98%	<1%	70%	**	90%	<1%	<1%	85%
4 hr	80%	**	**	75%	**	60%	<1%	<1%	85%
1 hr	95%	**	**	60%	**	**	<1%	<1%	85%
10 min	98%	**	**	90%	**	**	<1%	<1%	85%
Stand Off® SLX100™ Water & Oil Repellent									
	Coco-Cola	Ketchup	Mustard	Red Wine	Balsamic Vinegar	Soy Sauce	Olive Oil	Wesson Oil	Hot Coffee
24 hr	100%	**	**	70%	**	**	100%	100%	**
4 hr	100%	**	**	70%	**	**	100%	100%	**
1 hr	95%	**	**	70%	**	**	100%	100%	**
10 min	100%	**	**	90%	**	**	100%	100%	**
Stand Off® Stone, Tile & Masonry Protector (STMP)									
	Coco-Cola	Ketchup	Mustard	Red Wine	Balsamic Vinegar	Soy Sauce	Olive Oil	Wesson Oil	Hot Coffee
24 hr	90%	**	**70%	60%	**	**	40%	30%	70%
4 hr	80%	**	**	70%	**	**	90%	90%	70%
1 hr	60%	**	**	70%	**	100%	60%	60%	90%
10 min	100%	**	**	90%	**	**	60%	60%	60%

* Indicates the % stain removal cannot be determined due to saturation of the oil stain.

** Indicates etching upon the surface.

Test Results – Stain Repellency**% Stain Removal**

“Oyster”									
Untreated Control									
	Coco-Cola	Ketchup	Mustard	Red Wine	Balsamic Vinegar	Soy Sauce	Olive Oil	Wesson Oil	Hot Coffee
24 hr	98%	**	<1%	90%	90%	98%	<1%	<1%	*
4 hr	95%	**98%	80%	90%	60%	90%	<1%	<1%	*
1 hr	95%	**	85%	70%	90%	90%	70%	70%	95%
10 min	95%	**	85%	75%	90%	**	70%	70%	95%
Stand Off® SLX100™ Water & Oil Repellent									
	Coco-Cola	Ketchup	Mustard	Red Wine	Balsamic Vinegar	Soy Sauce	Olive Oil	Wesson Oil	Hot Coffee
24 hr	100%	**	90%	50%	**	100%	70%	70%	85%
4 hr	100%	**	60%	50%	**	100%	80%	70%	85%
1 hr	100%	**	85%	80%	**	**100%	85%	85%	85%
10 min	100%	**	85%	80%	**100%	100%	90%	90%	100%
Stand Off® Stone, Tile & Masonry Protector (STMP)									
	Coco-Cola	Ketchup	Mustard	Red Wine	Balsamic Vinegar	Soy Sauce	Olive Oil	Wesson Oil	Hot Coffee
24 hr	100%	**	85%	65%	**	100%	100%	95%	80%
4 hr	100%	**	85%	60%	**	100%	100%	85%	80%
1 hr	98%	**	85%	**	**	100%	100%	90%	90%
10 min	90%	**	98%	**	**	100%	100%	90%	90%

* Indicates the % stain removal cannot be determined due to saturation of the oil stain.

** Indicates etching upon the surface.

Test Results – Stain Repellency**% Stain Removal**

“Sahara Blend”									
Untreated Control									
	Coco-Cola	Ketchup	Mustard	Red Wine	Balsamic Vinegar	Soy Sauce	Olive Oil	Wesson Oil	Hot Coffee
24 hr	85%	85%	**75%	<1%	50%	<1%	<1%	<1%	70%
4 hr	85%	**	**	<1%	**	<1%	<1%	<1%	90%
1 hr	90%	**	**	40%	60%	<1%	<1%	<1%	90%
10 min	100%	**	**	80%	**70%	<1%	<1%	<1%	90%
Stand Off® SLX100™ Water & Oil Repellent									
	Coco-Cola	Ketchup	Mustard	Red Wine	Balsamic Vinegar	Soy Sauce	Olive Oil	Wesson Oil	Hot Coffee
24 hr	100%	**	<1%	70%	**	**	<1%	<1%	75%
4 hr	100%	**	**	70%	**	**	<1%	<1%	70%
1 hr	**	**	**	70%	**	**	60%	60%	90%
10 min	100%	**	**	90%	**	**	60%	60%	100%
Stand Off® Stone, Tile & Masonry Protector (STMP)									
	Coco-Cola	Ketchup	Mustard	Red Wine	Balsamic Vinegar	Soy Sauce	Olive Oil	Wesson Oil	Hot Coffee
24 hr	70%	**	**	70%	**	85%	80%	<1%	70%
4 hr	70%	**	**	70%	**	80%	80%	80%	75%
1 hr	**95%	**	**	80%	**	**	85%	**	100%
10 min	**100%	**	**	100%	**	**	40%	40%	60%

* Indicates the % stain removal cannot be determined due to saturation of the oil stain.

** Indicates etching upon the surface.

Photographs – Stain Repellency

Untreated Control



24 hours	4 hours	1 hour	10 minutes
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Stand Off® Stone, Tile & Masonry Protector (STMP)



24 hours	4 hours	1 hour	10 minutes
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Stand Off® SLX100™ Water & Oil Repellent



24 hours	4 hours	1 hour	10 minutes
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Conclusions – Stain Repellency

Based upon laboratory evaluations, both of the treatments evaluated improved the surface beading of the samples. In addition, Stand Off® Stone, Tile & Masonry Protector (STMP) and Stand Off® SLX100™ Water & Oil Repellent were effective in improving the concrete paver samples' resistance to the applied stains. Neither treatments enhanced the color or sheen of the concrete paver samples.

Recommendations – Stain Repellency

Recommendations for stain resistance treatment for the concrete pavers submitted by Horizon Stone, Chattanooga, TN are provided in the chart below. Recommendations are based on the treatments that proved most effective for providing stain repellency on the submitted samples.

Sample	Stain Repellent	Maintenance Cleaner
"Buckskin" "Mocha" "Sahara Blend"	Stand Off® SLX100™ Water & Oil Repellent	Enviro Klean® 2010 All Surface Cleaner
"Ivory" "Oyster"	Stand Off® SLX100™ Water & Oil Repellent or Stand Off® Stone, Tile & Masonry Protector (STMP)	

***NOTE:** Stand Off® SLX100™ Water & Oil Repellent is manufactured and marketed in compliance with VOC regulations. This product may not be suitable for sale in states and districts with more restrictive regulations.

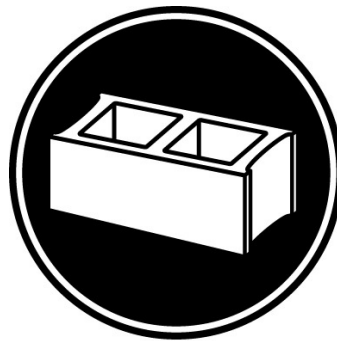
The ability of a stain repellent treatment to prevent staining is affected by a variety of factors. Therefore, on-site testing should be carried out for all installations with the recommended systems to ensure job site workmanship yields equivalent results.

Apply all products in accordance with the manufacturer's recommendation provided on container labels and product data sheets. On-site testing should be conducted to determine the most appropriate stain repellent product and procedures for a particular project. See product literature for additional application and product information.



PALLET TAG PROGRAM
Laboratory Report

Horizon Stone
2515 E 43rd St. Ste A
Chattanooga, TN 37407



Project No. 0811-01 PTP

Prepared For:
PROSOCO
SINCE 1939

Prepared By:
AMT Laboratories
December 2008