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 Technical Services TECH Note RILEM Tube Test Procedures

 Product Data literature for all products evaluated

Submitted Information

For: Brian Koenings
Cc: John Bourne
Subject: Buchheit Supply, Inc.
Troy, MO

Date:

Project: 0604-13 PTP

Samples Submitted: 1 type of limestone and 1 type of sandstone

Sample	Type	Color	Size
"Indiana Limestone"	Limestone	White/Gray	4" x 10" x 2"
"Savannah"	Sandstone	Tan/Gray	4" x 14" x 4"

Submitted by: Brian Koenings

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

One type of limestone and one type of sandstone 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 repellents, graffiti control products and stain repellents suitable for limestone and sandstone were evaluated.

New Construction Cleaning – Sure Klean® Vana Trol® was tested at various dilutions to determine the optimum cleaner/cure time combination for complete removal of laboratory applied Type S mortar from the submitted limestone and sandstone while limiting surface alterations to the decorative finish. 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.

Protective Water Repellents – Sure Klean® Weather Seal Natural Stone Treatment, Stand Off® Limestone & Marble Protector, and Sure Klean® Weather Seal Blok-Guard® & Graffiti Control were evaluated for their ability to provide water repellency to the submitted samples.

Graffiti Control – Sure Klean® Weather Seal Blok-Guard® & Graffiti Control was evaluated for its ability to repel graffiti from the submitted samples. Sure Klean® Fast Acting Stripper and Defacer Eraser® Graffiti Wipe were evaluated for their ability to remove graffiti from the submitted samples.

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

Products Evaluated**New Construction Cleaning Products Evaluated**

Sample	Product	Dilution
Submitted Limestone and Sandstone	Sure Klean® Vana Trol®	(1:6), (1:8)

Protective Water Repellent Products Evaluated

Sample	Product	Dilution
Submitted Limestone and Sandstone	Sure Klean® Weather Seal Natural Stone Treatment	Concentrate
	Stand Off® Limestone & Marble Protector	Concentrate
	Sure Klean® Weather Seal Blok-Guard® & Graffiti Control	Concentrate

Graffiti Repellent Products Evaluated

Sample	Product	Dilution
Submitted Limestone and Sandstone	Sure Klean® Weather Seal Blok-Guard® & Graffiti Control	Concentrate

Graffiti Removal Products Evaluated

Sample	Product	Dilution
Submitted Limestone and Sandstone	Sure Klean® Fast Acting Stripper	Concentrate
	Defacer Eraser® Graffiti Wipe	Concentrate

Stain Repellency Products Evaluated

Sample	Product	Dilution
Submitted Limestone and Sandstone	Stand Off® Stone, Tile & Masonry Protector (STMP)	Concentrate
	Stand Off® Limestone & Masonry Protector	Concentrate

Dilution ratios refer to mixtures of concentrated product : fresh water.

New Construction Cleaning

These cleaning trials were conducted to determine the optimal cleaning/cure time combination to most efficiently remove Type S mortar from the submitted samples while limiting surface alterations to the decorative finish.

Type S cementitious mortar was prepared in compliance with the manufacturer's instructions, applied to the natural stone surface and allowed to cure for 3, 7 and 14 days. 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

Sure Klean® Vana Trol® – A concentrated acidic cleaner for new masonry surfaces that are subject to vanadium, manganese and other metallic stains. Use on: gray, brown, white, and most light-colored brick; natural stone; cast stone. Dissolves mortar smears and construction dirt quickly, leaving the masonry clean and uniform with no acid burning or streaking. Liquid concentrate for dilution with 4-10 parts water. Apply by brush or low-pressure spray.

Test Method – New Construction Cleaning

New construction cleaners were evaluated using the following procedure:

1. Pre-wet the surface with water.
2. Apply the cleaner.
3. Allow the appropriate dwell time, as specified:
 Sure Klean® Vana Trol® 3-5 minutes
4. Pressure rinse thoroughly.*

***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)

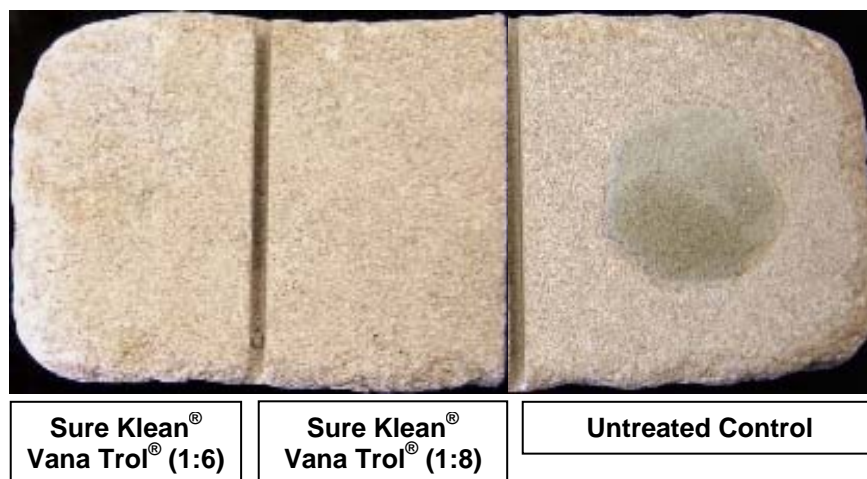
“Indiana Limestone”				
Product	Dilution	3 day	7 day	14 day
Sure Klean® Vana Trol®	1:6	100%	100%	100%
Sure Klean® Vana Trol®	1:8	100%	100%	100%
“Savannah”				
Product	Dilution	3 day	7 day	14 day
Sure Klean® Vana Trol®	1:6	100%	100%	100%
Sure Klean® Vana Trol®	1:8	100%	100%	100%

Test Results – Limiting Surface Alterations

Substrate: Limestone		Pigment Color: “Indiana Limestone”			
Product	Dilution	Surface Finish Removal	Substrate Deterioration	Color Change	Staining
Sure Klean® Vana Trol®	1:6	0	0	0	0
Sure Klean® Vana Trol®	1:8	0	0	0	0
Substrate: Sandstone		Pigment Color: “Savannah”			
Product	Dilution	Surface Finish Removal	Substrate Deterioration	Color Change	Staining
Sure Klean® Vana Trol®	1:6	0	0	0	0
Sure Klean® Vana Trol®	1:8	0	0	0	0

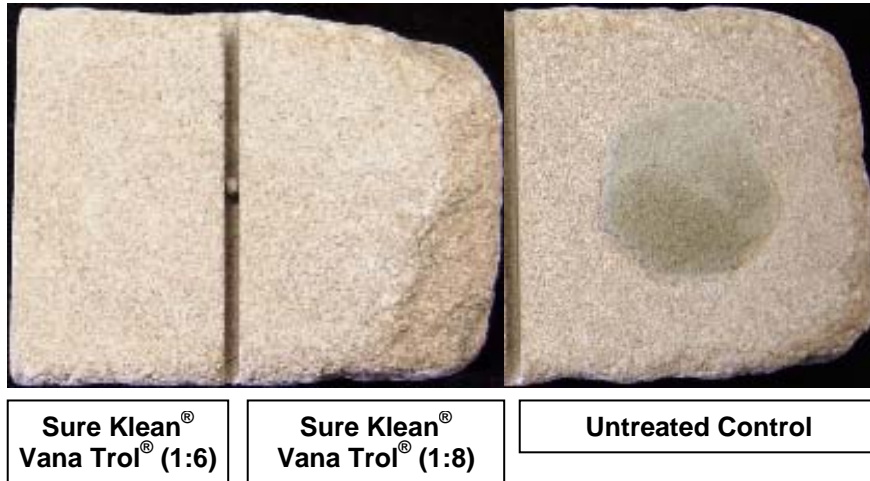
Photographs – New Construction Cleaning

“Indiana Limestone”; 3 Day Cleaning

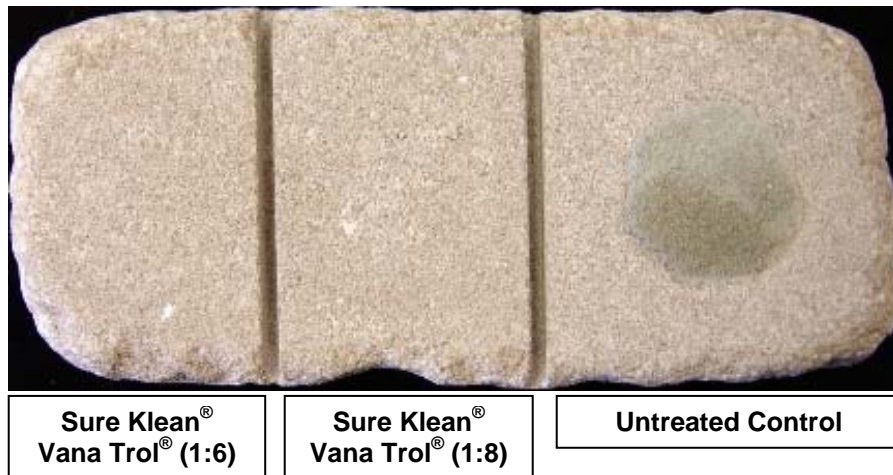


Photographs – New Construction Cleaning

“Indiana Limestone”; 7 Day Cleaning

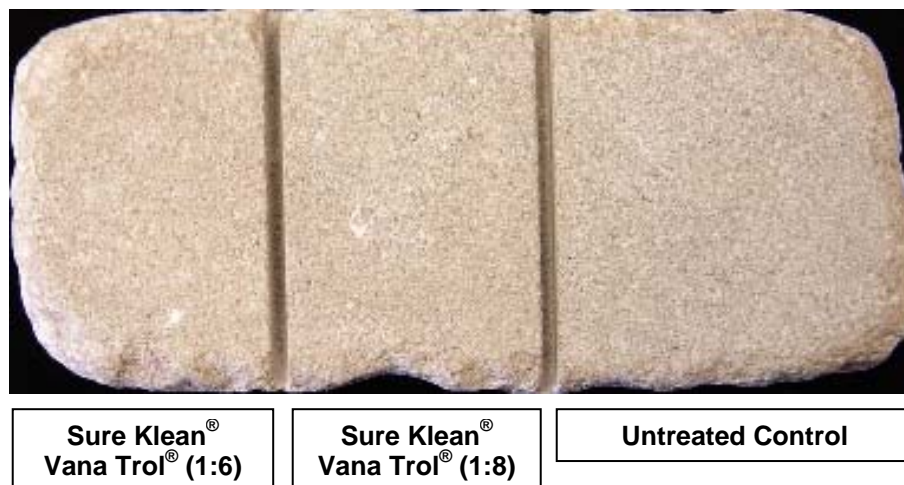


“Indiana Limestone”; 14 Day Cleaning



Photographs – Limiting Surface Alterations

“Indiana Limestone”; Limiting Surface Alterations



Conclusions – New Construction Cleaning

Based on the test results, Sure Klean® Vana Trol® performed well in removing excess mortar from the submitted samples. Sure Klean® Vana Trol® performed well in removing the mortar soils even after allowing the mortar to remain on the surface of the samples for 14 days under ideal curing conditions. In addition, Sure Klean® Vana Trol caused no noticeable surface alterations to any of the submitted samples.

It is recommended that the selected cleaners always be used in the lowest possible concentration. To facilitate easier removal of excess mortar and construction dirt while minimizing any potential surface alterations to the decorative finish, clean within 3 days of construction when using Type S mortar.

Recommendations – New Construction Cleaning

Recommendations for cleaning for the limestone and sandstone submitted by Buchheit Supply, Inc., Troy, MO are provided in the chart below. Recommendations are based on the optimum dilution for complete removal of mortar while limiting surface alterations.

Sample	New Construction Cleaning (Type S mortar, 14 day cleaning)
Submitted Limestone and Sandstone	Sure Klean® Vana Trol® (1:8)

Apply all products in accordance with the manufacturer's recommendation provided on container labels and product data sheets. On-site testing should always 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

Sure Klean® Weather Seal Natural Stone Treatment – A modified siloxane water repellent developed for limestone, marble and most other traditional masonry surfaces. Natural Stone Treatment penetrates deeply to provide long-lasting protection without altering the natural appearance of the substrate. Unlike conventional siloxane water repellents, Natural Stone Treatment is modified for effectiveness on most limestone, marble and other calcareous surfaces.

Stand Off® Limestone & Marble Protector – A clear, penetrating water and oil repellent suitable for use on interior or exterior calcareous surfaces such as limestone, marble and travertine. It's also suitable for many other types of masonry surfaces. Limestone & Marble Protector penetrates deeply to provide surface and subsurface protection without forming a glossy surface film. Treated surfaces retain their natural color, texture and appearance.

Limestone & Marble Protector combines high quality siloxane resins with “oleophobic” resins to produce a penetrating water and oil repellent ideal for long-term protection against food, oil and waterborne staining. Unlike conventional penetrating oil repellent products, Limestone & Marble Protector has been modified to ensure effectiveness on limestone, marble and other calcareous or neutral pH surfaces.

Sure Klean® Weather Seal Blok-Guard® & Graffiti Control – A clear, solvent-based silicone elastomer formulated to weatherproof concrete block and other porous masonry materials. Blok-Guard® & Graffiti Control protects masonry surfaces from repeated graffiti attacks without altering the natural appearance. Blok-Guard® & Graffiti Control penetrates and fills pores to prevent water penetration through exterior walls exposed to normal weathering. Graffiti removal is fast and easy using Defacer Eraser® Graffiti Wipe. Blok-Guard® & Graffiti Control is easy to apply with low-pressure spray, brush or roller.

Sample Preparation – Protective Water Repellents

The submitted samples were scored and allowed to dry for at least 24 hours prior to treatment. All treatments were applied by brush in accordance with the current PROSOCO, Inc. Product Data Sheet application instructions. All 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 vertical 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

“Indiana Limestone”	<u>Results in mL loss</u>	<u>Ranking</u>
Untreated Control	-1.5	--
Sure Klean® Weather Seal Natural Stone Treatment	-0.0	<u>AA</u>
Stand Off® Limestone & Marble Protector	-0.0	<u>AA</u>
Sure Klean® Weather Seal Blok-Guard® & Graffiti Control	-0.0	<u>AA</u>
“Savannah”	<u>Results in mL loss</u>	<u>Ranking</u>
Untreated Control	-0.7	--
Sure Klean® Weather Seal Natural Stone Treatment	-0.0	<u>AA</u>
Stand Off® Limestone & Marble Protector	-0.0	<u>AA</u>
Sure Klean® Weather Seal Blok-Guard® & Graffiti Control	-0.0	<u>AA</u>

Photographs – Protective Water Repellents

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



**Sure Klean®
Weather Seal
Blok-Guard® &
Graffiti Control**

Untreated Control

**Sure Klean®
Weather Seal
Natural Stone
Treatment**

**Stand Off® Limestone &
Marble Protector**

Conclusions – Protective Water Repellents

Test results indicate that all of the water repellents tested exhibited above average water repellency on the submitted samples. Sure Klean® Weather Seal Blok-Guard® & Graffiti Control exhibited a slight to moderate color change to each of the submitted samples. Neither of the other treatments tested caused any noticeable color change to either of the submitted samples.

Recommendations – Protective Water Repellents

Recommendations for water repellent treatments for the limestone and sandstone submitted by Buchheit Supply, Inc., Troy, MO are provided in the chart below. Recommendations are based on the treatments that proved most effective at providing water repellency on the submitted natural stone.

Sample	Protective Water Repellents
Submitted Limestone and Sandstone	*Sure Klean® Weather Seal Natural Stone Treatment OR *Stand Off® Limestone & Marble Protector OR *Sure Klean® Weather Seal Blok-Guard® & Graffiti Control

***NOTE:** Sure Klean® Weather Seal Natural Stone Treatment, Stand Off® Limestone & Marble Protector and Sure Klean® Weather Seal Blok-Guard® & Graffiti Control are manufactured and marketed in compliance with USEPA AIM VOC regulations (40 CFR 59.403). Not suitable for sale in states and districts with more restrictive AIM VOC regulations. Available in regulation-exempt small container sizes.

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.

Graffiti Control

This evaluation compares the effectiveness of graffiti control treatments in preventing staining of enamel spray paint and permanent markers.

Description of Products Evaluated – Graffiti Control

Products Evaluated for Graffiti Repellency

Sure Klean® Weather Seal Blok-Guard® & Graffiti Control – A clear, solvent-based silicone elastomer formulated to weatherproof concrete block and other porous masonry materials. Blok-Guard® & Graffiti Control protects masonry surfaces from repeated graffiti attacks without altering the natural appearance. Blok-Guard® & Graffiti Control penetrates and fills pores to prevent water penetration through exterior walls exposed to normal weathering. Graffiti removal is fast and easy using Defacer Eraser® Graffiti Wipe. Blok-Guard® & Graffiti Control is easy to apply with low-pressure spray, brush or roller.

Products Evaluated for Graffiti Removal

Defacer Eraser® Graffiti Wipe – An easy-to-use graffiti remover that does not contain methanol, methylene chloride or other “halogenated” solvents prohibited on many projects. Graffiti Wipe removes a variety of graffiti stains from most smooth masonry, wood and metal surfaces.

Sure Klean® Fast Acting Stripper – A thixotropic stripping compound formulated specifically for removal of high strength paints and coatings such as epoxies, polyurethanes, and floor enamels. Additionally, Fast Acting Stripper dissolves most spray paints, marking pens, lacquers and other graffiti.

Graffiti Agents

Interior/Exterior Spray Paint (Red)
Permanent Marker (Green)
Permanent Marker (Red)
Permanent Marker (Black)

Sample Preparation – Graffiti Control

Sure Klean® Weather Seal Blok-Guard® & Graffiti Control was applied in a wet-on-wet brushing application in accordance with the current PROSOCO, Inc. Product Data Sheet application instructions to sections of the natural stone samples. The samples were allowed to cure for at least one day. A visual adverse effects evaluation was made and then the graffiti agents were applied to the substrates.

Spray paint and markers were applied as graffiti agents to all treated surfaces no sooner than one day following application of Sure Klean® Weather Seal Blok-Guard® & Graffiti Control. Removal of the graffiti agents was attempted 24 hours after application of the graffiti agents, using Defacer Eraser® Graffiti Wipe and Sure Klean® Fast Acting Stripper.

Test Methods – Graffiti Control

Chemical cleaners were evaluated using the following procedure:

1. Apply the graffiti removal product to a dry surface, soiled with graffiti.
2. Allow appropriate dwell time:

Graffiti Wipe	5 minutes
Fast Acting Stripper.....	20 minutes
3. Pressure rinse thoroughly until water runs clear.*
4. Allow the surface to dry thoroughly and visually examine to determine effectiveness.

***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 – Graffiti Control

“Indiana Limestone”					
Untreated Control	Red Paint	Black Marker	Green Marker	Red Marker	% Avg. Removal
Fast Acting Stripper	80%	90%	30%	85%	71%
Graffiti Wipe	50%	10%	20%	40%	30%
Blok-Guard® & Graffiti Control	Red Paint	Black Marker	Green Marker	Red Marker	% Avg. Removal
Fast Acting Stripper	90%	90%	80%	90%	88%
Graffiti Wipe	100%	95%	95%	95%	96%
“Savannah”					
Untreated Control	Red Paint	Black Marker	Green Marker	Red Marker	% Avg. Removal
Fast Acting Stripper	95%	30%	40%	60%	56%
Graffiti Wipe	60%	10%	40%	40%	38%
Blok-Guard® & Graffiti Control	Red Paint	Black Marker	Green Marker	Red Marker	% Avg. Removal
Fast Acting Stripper	100%	90%	80%	90%	90%
Graffiti Wipe	100%	90%	80%	80%	88%

Photographs – Graffiti Control

“Indiana Limestone”; Before Graffiti Removal



**Sure Klean® Weather Seal
Blok-Guard® & Graffiti Control**

Untreated Control

“Indiana Limestone”; After Graffiti Removal



**Sure Klean® Fast
Acting Stripper**

**Defacer Eraser®
Graffiti Wipe**

**Sure Klean® Fast
Acting Stripper**

**Defacer Eraser®
Graffiti Wipe**

**Sure Klean® Weather Seal
Blok-Guard® & Graffiti Control**

Untreated Control

Conclusions – Graffiti Control

Based upon laboratory evaluations, graffiti removal was improved when the submitted samples were treated with Sure Klean® Weather Seal Blok-Guard® & Graffiti Control prior to graffiti application. In addition, Sure Klean® Weather Seal Blok-Guard® & Graffiti Control provided a slight to moderate color enhancement to the submitted samples.

Recommendations – Graffiti Control

Recommendations for graffiti control treatment for each type of limestone and sandstone submitted by Buchheit Supply, Inc., Troy, MO are provided in the chart below. Recommendations are based on the treatment that proved most effective for providing graffiti repellency and the product that was most effective at removing the graffiti on all types submitted.

Sample	Graffiti Repellency	Graffiti Removal
Submitted Limestone and Sandstone	*Sure Klean® Weather Seal Blok-Guard® & Graffiti Control	Sure Klean® Fast Acting Stripper OR Defacer Eraser® Graffiti Wipe

***NOTE:** Sure Klean® Weather Seal Blok-Guard® & Graffiti Control is manufactured and marketed in compliance with USEPA AIM VOC regulations (40 CFR 59.403). This product may not be suitable for sale in states and districts with more restrictive AIM VOC regulations.

Apply all products in accordance with the manufacturer's recommendation provided on container labels and product data sheets. Because the severity of graffiti varies from location to location, on-site testing should be conducted to determine the most appropriate graffiti control product and procedure for a particular project.

Stain Repellency

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

Description of Products Evaluated – Stain Repellency

Stain Repellent Treatments

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.

Stand Off® Limestone & Marble Protector – A clear, penetrating water and oil repellent suitable for use on interior or exterior calcareous surfaces such as limestone, marble and travertine. It's also suitable for many other types of masonry surfaces. Limestone & Marble Protector penetrates deeply to provide surface and subsurface protection without forming a glossy surface film. Treated surfaces retain their natural color, texture and appearance. Limestone & Marble Protector combines high quality siloxane resins with “oleophobic” resins to produce a penetrating water and oil repellent ideal for long-term protection against food, oil and waterborne staining. Unlike conventional penetrating oil repellent products, Limestone & Marble Protector has been modified to ensure effectiveness on limestone, marble and other calcareous or neutral pH 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

Samples were cleaned with Enviro Klean® 2010 All Surface Cleaner diluted with 10 parts water and allowed to dry for 24 hours prior to treatment. The protective treatments were then 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.

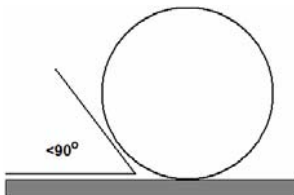
Test Method – Stain Repellency**Surface Beading Evaluation**

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 ($<90^\circ$) 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.

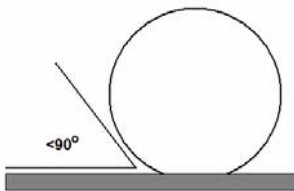
Note: Non-free flowing staining agents such as ketchup and mustard are applied in a globular fashion and therefore are not evaluated for their beading properties.

Rating System (1-5)

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



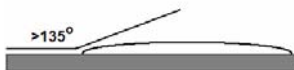
2. Wetting contained to the contact area (slight darkening); angle is less than 90° .



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

"Indiana Limestone"									
Treatment	Coco-Cola	Mustard	Ketchup	Red Wine	Balsamic Vinegar	Soy Sauce	Olive Oil	Wesson Oil	Hot Coffee
Untreated Control	5	-	-	5	5	5	5	5	5
STMP	3	-	-	3	3	3	3	3	3
Limestone & Marble Protector	2	-	-	2	2	2	2	2	2

"Savannah"									
Treatment	Coco-Cola	Mustard	Ketchup	Red Wine	Balsamic Vinegar	Soy Sauce	Olive Oil	Wesson Oil	Hot Coffee
Untreated Control	5	-	-	4	4	4	5	5	5
STMP	2	-	-	2	2	2	2	2	3
Limestone & Marble Protector	1	-	-	1	1	1	2	2	2

Test Results – Stain Repellency**% Removal**

"Indiana Limestone"										
Untreated Control										
	Coca-Cola	Mustard	Ketchup	Red Wine	Balsamic Vinegar	Soy Sauce	Olive Oil	Wesson Oil	Hot Coffee	
24 hr	100%	<1%	40%	100%	80%	80%	<1%	<1%	100%	
4 hour	100%	90%	95%	100%	80%	80%	<1%	<1%	100%	
1 hour	100%	90%	100%	100%	80%	80%	<1%	<1%	100%	
10 min.	100%	90%	100%	100%	80%	80%	<1%	<1%	100%	
Stand Off® Stone, Tile & Masonry Protector (STMP)										
	Coca-Cola	Mustard	Ketchup	Red Wine	Balsamic Vinegar	Soy Sauce	Olive Oil	Wesson Oil	Hot Coffee	
24 hr	100%	90%	100%	90%	90%	100%	80%	80%	100%	
4 hour	100%	100%	100%	90%	90%	100%	95%	95%	100%	
1 hour	100%	100%	100%	95%	100%	100%	100%	100%	100%	
10 min.	100%	100%	100%	100%	100%	100%	100%	100%	100%	
Stand Off® Limestone & Marble Protector										
	Coca-Cola	Mustard	Ketchup	Red Wine	Balsamic Vinegar	Soy Sauce	Olive Oil	Wesson Oil	Hot Coffee	
24 hr	100%	100%	100%	100%	100%	100%	100%	100%	100%	
4 hour	100%	100%	100%	100%	100%	100%	100%	100%	100%	
1 hour	100%	100%	100%	100%	100%	100%	100%	100%	100%	
10 min.	100%	100%	100%	100%	100%	100%	100%	100%	100%	

"Savannah"									
Untreated Control									
	Coca-Cola	Mustard	Ketchup	Red Wine	Balsamic Vinegar	Soy Sauce	Olive Oil	Wesson Oil	Hot Coffee
24 hr	100%	90%	<1%	60%	60%	60%	<1%	<1%	100%
4 hour	100%	100%	100%	60%	60%	60%	<1%	<1%	100%
1 hour	100%	100%	100%	60%	60%	60%	<1%	<1%	100%
10 min.	100%	100%	100%	60%	60%	60%	<1%	<1%	100%
Stand Off® Stone, Tile & Masonry Protector (STMP)									
	Coca-Cola	Mustard	Ketchup	Red Wine	Balsamic Vinegar	Soy Sauce	Olive Oil	Wesson Oil	Hot Coffee
24 hr	100%	100%	100%	80%	100%	90%	100%	100%	100%
4 hour	100%	100%	100%	80%	100%	95%	100%	100%	100%
1 hour	100%	100%	100%	100%	100%	100%	100%	100%	100%
10 min.	100%	100%	100%	100%	100%	100%	100%	100%	100%
Stand Off® Limestone & Marble Protector									
	Coca-Cola	Mustard	Ketchup	Red Wine	Balsamic Vinegar	Soy Sauce	Olive Oil	Wesson Oil	Hot Coffee
24 hr	100%	100%	100%	100%	100%	100%	100%	100%	100%
4 hour	100%	100%	100%	100%	100%	100%	100%	100%	100%
1 hour	100%	100%	100%	100%	100%	100%	100%	100%	100%
10 min.	100%	100%	100%	100%	100%	100%	100%	100%	100%

*Indicates etching occurred due to the acidic nature of the staining agents.

Photographs – Stain Repellency

“Savannah”; Stains Applied



Stand Off® Limestone & Marble Protector

Stand Off® Stone, Tile & Masonry Protector (STMP)

Untreated Control

“Savanna”; Stains Removed



Stand Off® Limestone & Marble Protector

Stand Off® Stone, Tile & Masonry Protector (STMP)

Untreated Control

Conclusions – Stain Repellency

Based upon laboratory evaluations, both treatments evaluated improved the surface beading of the samples. In addition, both treatments were effective in improving the samples' resistance to the applied stains, especially to the oils. Neither of the evaluated treatments caused any noticeable color change to either of the submitted samples.

Recommendations – Stain Repellency

Recommendations for stain resistance treatment for the limestone and sandstone submitted by Buchheit Supply, Inc., Troy, MO 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
Submitted Limestone and Sandstone	*Stand Off® Limestone & Marble Protector OR Stand Off® Stone, Tile & Masonry Protector (STMP)	Enviro Klean® 2010 All Surface Cleaner (1:10)

***NOTE:** Stand Off® Limestone & Marble Protector is manufactured and marketed in compliance with USEPA AIM VOC regulations (40 CFR 59.403). Not suitable for sale in states and districts with more restrictive AIM VOC regulations. Available in regulation-exempt small container sizes.

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.



Christopher A. Moore
Project Testing Laboratory Technician
CAM



PALLET TAG PROGRAM
Laboratory Report

Buchheit Supply, Inc.
97 Enterprise Way
Troy, MO 63379



Project No. 0604-13 PTP

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PROSOCO
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