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Attachments

Technical Services TECH Note RILEM Tube Test Procedures Product Data literature for all products evaluated

Submitted Information

For: Coburn Bond cc: Al Morris

Brian Koenings

Subject: Espinoza Stone Inc.

Jarrell, TX

Date: September 21, 2008

Project: 0807-04 PTP

Samples Submitted: 2 types of limestone, 1 type of sandstone, and one box of Lambert Texas Buff pigment

Name	Color	Туре	Size
* "Espinoza Sandstone"	Brown	Sandstone	10" x 10" x 2 ½"
* "Espinoza Sandstone"	Grey	Sandstone	10" x 10" x 2 ½"
"Espinoza Limestone"	Buff	Limestone	10" x 10" x 2 ½"
"Espinoza Rattlesnake"	Buff	Limestone	10" x 10" x 2 ½"

^{*} NOTE: "Espinoza Sandstone" was submitted in both grey and brown colors. Each color of "Espinoza Sandstone" was tested separately.

Submitted by: Coburn Bond

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.

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

Three samples of natural stone 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 products suitable for the natural stone was 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 and pigmented Type N mortar from the submitted natural stone while limiting surface alterations. The surface alteration evaluation was visually determined based upon perceived discoloration or erosion/etching of the samples.

Per request by Coburn Bond, Type N mortar was mixed with Lambert Texas Buff pigment. The pigment was mixed 1 gram pigment to 70 grams of Type N mortar.

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 or pigmented Type N 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 pigmented Type N Mortar after 7, 14, and 21 days of curing and 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:

<u>Surface Finish Removal</u> 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.

<u>Substrate Deterioration</u> 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.

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

<u>Staining</u> 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 and Sure Klean[®] Weather Seal Natural Stone Treatment WB were evaluated for their ability to provide water repellency to the submitted natural stone.

Products Evaluated

New Construction Cleaning Products Evaluated

Sample	Product	Dilution
"Espinoza Sandstone"	Sure Klean [®] Vana Trol [®]	1:8
"Espinoza Limestone" "Espinoza Rattlesnake"	Sure Klean [®] Vana Trol [®]	1:6, 1:8

Protective Water Repellent Products Evaluated

Sample	Product	Dilution
All Submitted Samples	Sure Klean [®] Weather Seal Natural Stone Treatment	Concentrate
All oubfillited Samples	Sure Klean® Weather Seal Natural Stone Treatment WB	Concentrate

New Construction Cleaning

These cleaning trials were conducted to determine the optimal cleaning/cure time combination to most efficiently remove Type S and pigmented Type N mortar from the submitted natural stone while limiting surface alterations to the natural stone surface.

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.

<u>Sample Preparation</u> – New Construction Cleaning

Type S and pigmented Type N Mortar were prepared in compliance with the manufacturer's instructions, applied to the samples and allowed to cure. Per request by Coburn Bond, Type N mortar was mixed with Lambert Texas Buff pigment. The pigment was mixed 1 gram pigment to 70 grams of Type N mortar. Mortar removal was accomplished using chemical assistance and a high-pressure water rinse with pressure rinsing equipment. The removal of Type S masonry mortar was visually evaluated after 3, 7, and 14 days of curing. The removal of pigmented Type N masonry mortar was visually evaluated after 7, 14, and 21 days of curing. A visual examination was also made to the natural stone to determine if the products tested caused any change to the surface of the stone.

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.
- 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.

<u>Test Results – New Construction Cleaning</u>

Cleaning Effectiveness (% Type S Mortar Removal)

"Espinoza Limestone"	Color: Bu	ıff		
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 %
"Espinoza Sandstone"	Color: Br	own		
Product	Dilution	3 day	7 day	14 day
Sure Klean® Vana Trol®	1:8	100 %	100 %	100 %
"Espinoza Sandstone"	Color: Gr	еу		
Product	Dilution	3 day	7 day	14 day
Sure Klean [®] Vana Trol [®]	1:8	100 %	100 %	100 %
"Espinoza Rattlesnake"	Color: Bu	ıff		
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 %

Cleaning Effectiveness (% Type N Mortar with Texas Buff Pigment Removal)

"Espinoza Limestone"	Color: Bu	ıff		
Product	Dilution	7 day	14 day	21 day
Sure Klean [®] Vana Trol [®]	1:6	100 %	100 %	100 %
Sure Klean [®] Vana Trol [®]	1:8	100 %	100 %	100 %
"Espinoza Sandstone"	Color: Br	own		
Product	Dilution	7 day	14 day	21 day
Sure Klean [®] Vana Trol [®]	1:8	100 %	100 %	100 %
"Espinoza Sandstone"	Color: Gr	rey		
Product	Dilution	7 day	14 day	21 day
Sure Klean [®] Vana Trol [®]	1:8	100 %	100 %	100 %
"Espinoza Rattlesnake"	Color: Bu	ıff		
Product	Dilution	7 day	14 day	21 day
Sure Klean [®] Vana Trol [®]	1:6	100 %	100 %	100 %
Sure Klean [®] Vana Trol [®]	1:8	100 %	100 %	100 %

<u>Test Results – Limiting Surface Alterations</u>

Type S Mortar

"Espinoza Limestone"	Color: Buff				
Product	Dilution	Surface Finish Removal	Substrate Deterioration	Color Change	Staining
Sure Klean [®] Vana Trol [®]	1:6	0	0	1	0
Sure Klean [®] Vana Trol [®]	1:8	0	0	0	0
"Espinoza Sandstone"	Color: B	Brown			
Product	Dilution	Surface Finish Removal	Substrate Deterioration	Color Change	Staining
Sure Klean [®] Vana Trol [®]	1:8	0	0	1	0
"Espinoza Sandstone"	Espinoza Sandstone" Color: Grey				
Product	Dilution	Surface Finish Removal	Substrate Deterioration	Color Change	Staining
Sure Klean [®] Vana Trol [®]	1:8	0	0	0	0
"Espinoza Rattlesnake"	Color: Buff				
Product	Dilution	Surface Finish Removal	Substrate Deterioration	Color Change	Staining
Sure Klean [®] Vana Trol [®]	1:6	0	0	2	0
Suie Riedii Valla 1101	1:8	0	0	2	0

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

Test Results – Limiting Surface Alterations

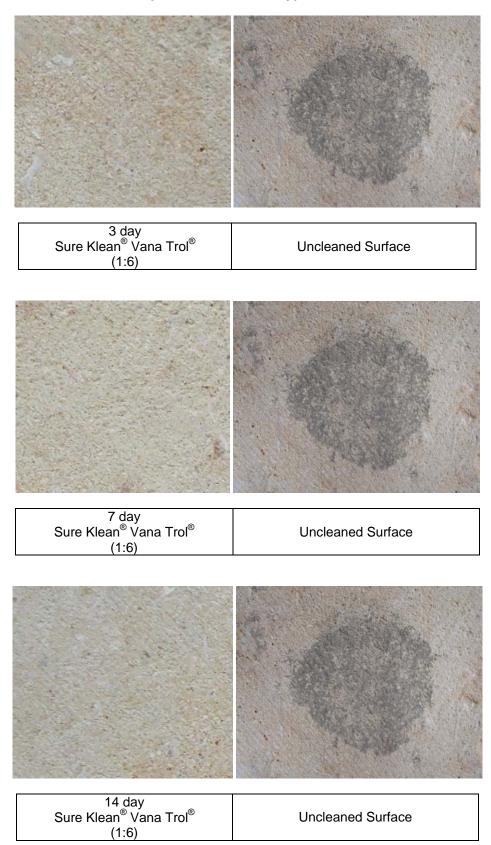
Type N Mortar with Texas Buff Pigment

"Espinoza Limestone"	Color: Buff				
Product	Dilution	Surface Finish Removal	Substrate Deterioration	Color Change	Staining
Sure Klean [®] Vana Trol [®]	1:6	0	0	1	0
Sure Klean [®] Vana Trol [®]	1:8	0	0	0	0
"Espinoza Sandstone"	Color: B	Brown			
Product	Dilution	Surface Finish Removal	Substrate Deterioration	Color Change	Staining
Sure Klean [®] Vana Trol [®]	1:8	0	0	1	0
"Espinoza Sandstone"	Color: Grey				
Product	Dilution	Surface Finish Removal	Substrate Deterioration	Color Change	Staining
Sure Klean [®] Vana Trol [®]	1:8	0	0	0	0
"Espinoza Rattlesnake"	Color: B	uff			
Product	Dilution	Surface Finish Removal	Substrate Deterioration	Color Change	Staining
Sure Klean [®] Vana Trol [®]	1:6	0	0	2	0
Sure Riedii Valla 1101	1:8	0	0	2	0

0 - No Change 3 - Change - Heavy 1 - Change - Slight 4 - Change - Excessive

2 - Change - Moderate

"Espinoza Limestone"; Type S Mortar



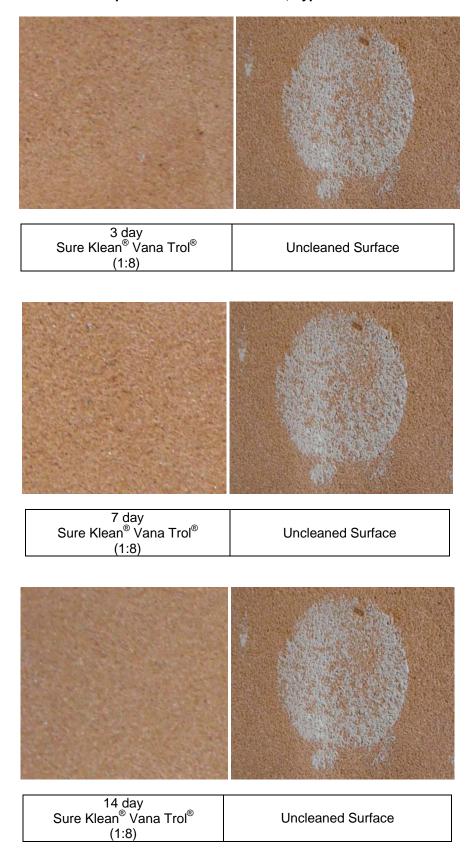
"Espinoza Limestone"; Type S Mortar



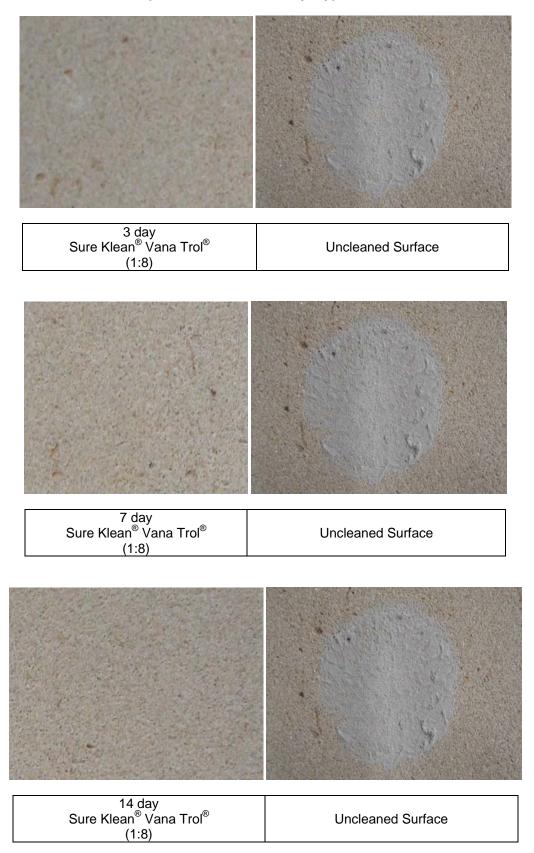
(1:8)

Uncleaned Surface

"Espinoza Sandstone"- Brown; Type S Mortar



"Espinoza Sandstone"- Grey; Type S Mortar

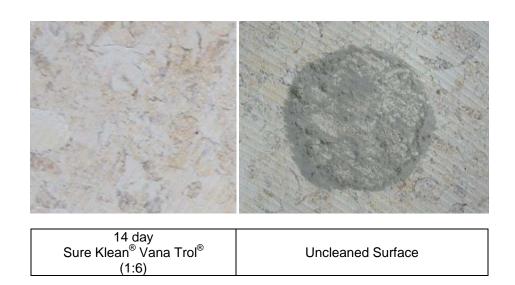


"Espinoza Rattlesnake"; Type S Mortar

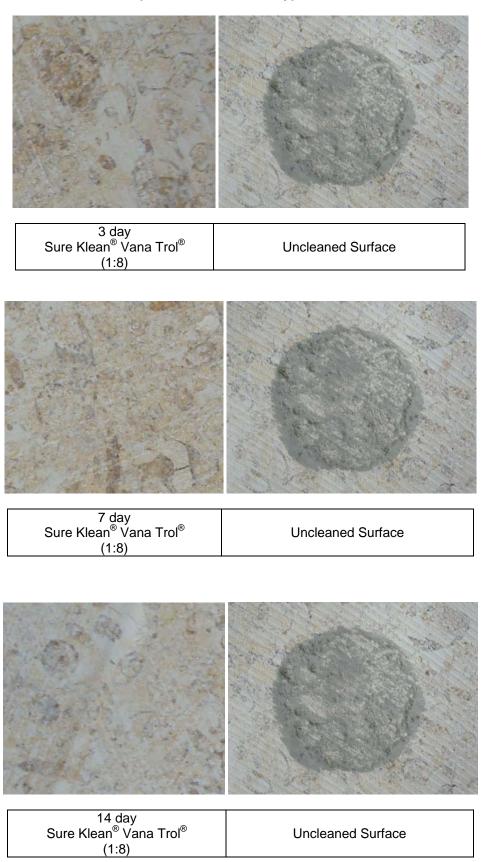




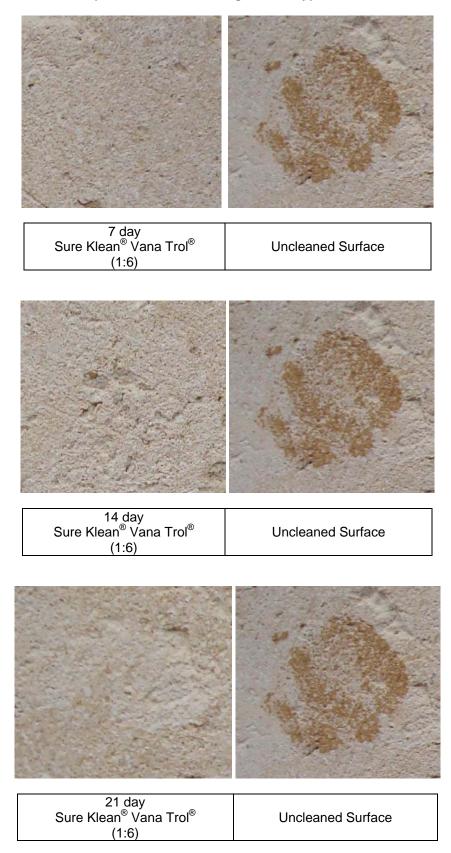
7 day
Sure Klean[®] Vana Trol[®]
Uncleaned Surface
(1:6)



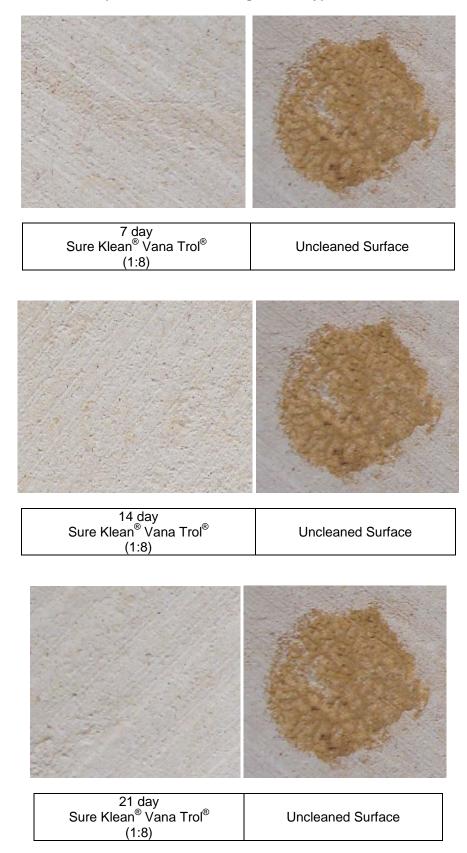
"Espinoza Rattlesnake"; Type S Mortar



"Espinoza Limestone"; Pigmented Type N Mortar



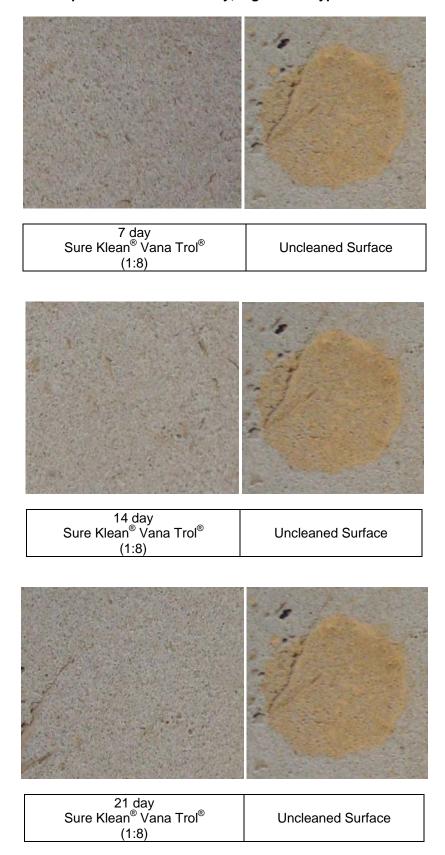
"Espinoza Limestone"; Pigmented Type N Mortar



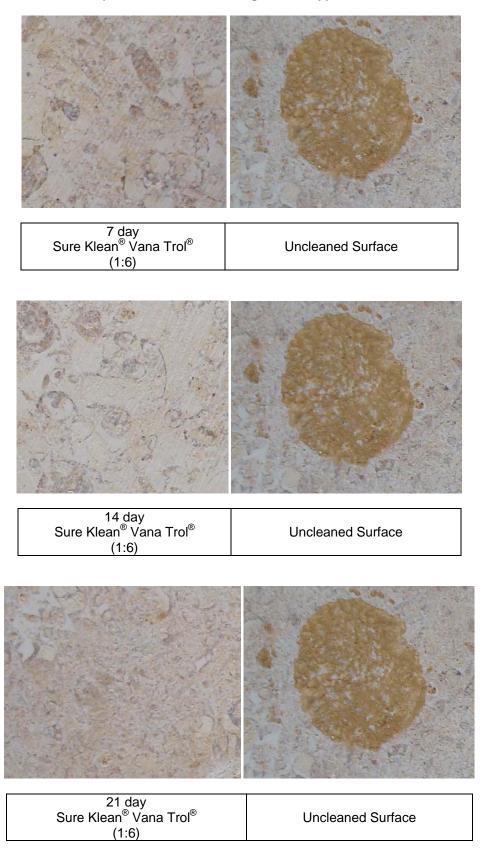
"Espinoza Sandstone"- Brown; Pigmented Type N Mortar



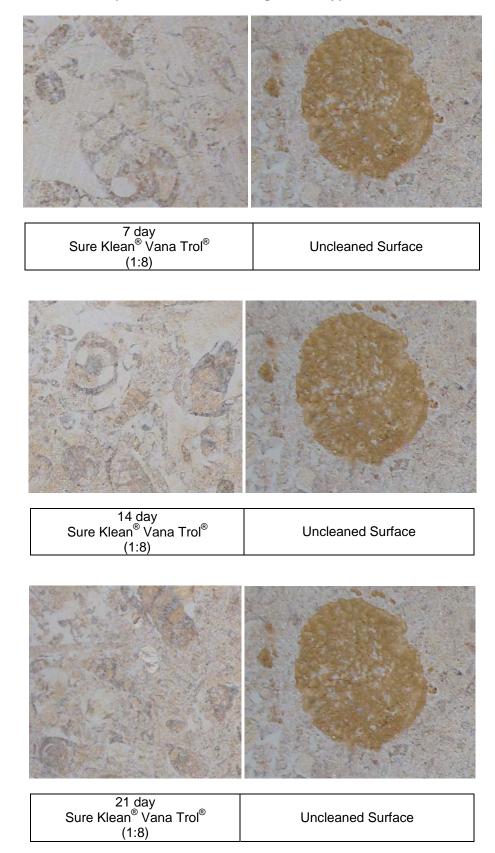
"Espinoza Sandstone"- Grey; Pigmented Type N Mortar



"Espinoza Rattlesnake"; Pigmented Type N Mortar



"Espinoza Rattlesnake"; Pigmented Type N Mortar



Photographs – Limiting Surface Alterations

"Espinoza Rattlesnake" Limiting Surface Alterations



Uncleaned Surface



Sure Klean[®] Vana Trol[®] (1:6)

Conclusions - New Construction Cleaning

Based on the test results, Sure Klean[®] Vana Trol[®] performed well in removing excess mortar from the submitted natural stone. Sure Klean[®] Vana Trol[®] removed the mortar even after allowing the mortar to remain on the surface of the samples for 14 days for Type S mortar and 21 days for pigmented Type N Mortar under ideal curing conditions. Sure Klean[®] Vana Trol[®] removed a moderate amount of surface pigment from the "Espinoza Rattlesnake" limestone, exposing more of the fossils in the stone and enhancing the color of the stone.

It is recommended that the selected cleaners always be used in the lowest possible concentration.

Recommendations – New Construction Cleaning

Recommendations for cleaning for the natural stone submitted by Espinoza Stone Inc., Jarrell, TX 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)
"Espinoza Limestone" "Espinoza Sandstone"- Brown/ Grey "Espinoza Rattlesnake"	Sure Klean [®] Vana Trol [®] (1:8)

Sample	New Construction Cleaning (Type N Mortar with Texas Buff, 21 Day Cleaning)
"Espinoza Limestone" "Espinoza Sandstone"- Brown/ Grey "Espinoza Rattlesnake"	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.

Sure Klean® Weather Seal Natural Stone Treatment WB – Sure Klean® Weather Seal Natural Stone Treatment WB is a low odor, water-based solution of potassium methyl siliconate developed to effectively treat a wide range of natural stone and masonry surfaces. Natural Stone Treatment WB provides long-lasting repellency without altering the natural appearance of the substrate. Natural Stone Treatment WB is used as a surface treatment on natural stone and masonry surfaces to impart a water-repellent surface and reduce water absorption into the substrate. Unlike conventional siliconate water repellents, Natural Stone Treatment WB has been developed to help prevent surface staining during application.

Sample Preparation - Protective Water Repellents

The submitted samples were cut and allowed to dry for at least 24 hours prior to treatment. Both 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 windblown 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.

 $\underline{\mathbf{A}}$ = "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 <u>AA</u> Above Average water repellent performance would be reported for treatments which result in a loss of no more than:

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

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

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

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

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

Test Results – Protective Water Repellents

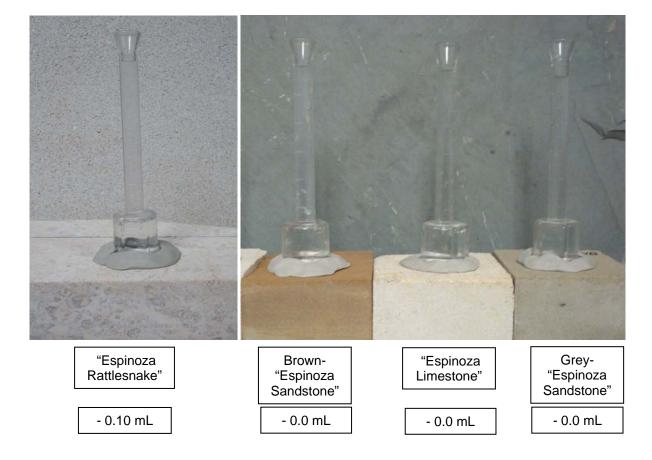
Water Absorption Tube Test: Horizontal RILEM II.4, 5.0 milliliters, 20 minutes \underline{AA} = Above Average \underline{A} = Average \underline{BA} = Below Average

"Espinoza Limestone"	Results in mL loss	Ranking
Untreated Control	-1.7	
Sure Klean [®] Weather Seal Natural Stone Treatment	-0.0	<u>AA</u>
Sure Klean® Weather Seal Natural Stone Treatment WB	-0.0	<u>AA</u>
"Espinoza Sandstone"- Brown	Results in mL loss	Ranking
Untreated Control	-3.3	
Sure Klean [®] Weather Seal Natural Stone Treatment	-0.0	<u>AA</u>
Sure Klean® Weather Seal Natural Stone Treatment WB	-0.0	<u>AA</u>
"Espinoza Sandstone"- Grey	Results in mL loss	Ranking
Untreated Control	-1.3	
Sure Klean [®] Weather Seal Natural Stone Treatment	-0.05	<u>AA</u>
Sure Klean [®] Weather Seal Natural Stone Treatment WB	-0.0	<u>AA</u>
"Espinoza Rattlesnake"	Results in mL loss	Ranking
Untreated Control	25	
Sure Klean® Weather Seal Natural Stone Treatment	05	<u>AA</u>
Sure Klean® Weather Seal Natural Stone Treatment WB	10	Α

Photographs – Protective Water Repellents

Horizontal RILEM II.4, 5.0 milliliters, 20 minutes

Sure Klean[®] Weather Seal Natural Stone Treatment WB



Conclusions – Protective Water Repellents

In the RILEM tests, results indicate that Sure Klean[®] Weather Seal Natural Stone Treatment and Sure Klean[®] Weather Seal Natural Stone Treatment WB provided above average water protection to all of the submitted natural stone. Sure Klean[®] Weather Seal Natural Stone Treatment and Sure Klean[®] Weather Seal Natural Stone Treatment WB exhibited slight color enhancement on "Espinoza Rattlesnake."

Recommendations - Protective Water Repellents

Recommendations for water repellent treatments for the natural stone submitted by Espinoza Stone, Inc., Jarrell, TX are provided in the chart below. Recommendations are based on the treatments that proved most effective at providing water repellency on the submitted samples.

Sample	Protective Water Repellents
"Espinoza Limestone" "Espinoza Sandstone"- Brown/Grey "Espinoza Rattlesnake"	Sure Klean [®] Weather Seal Natural Stone Treatment or Sure Klean [®] Weather Seal Natural Stone Treatment WB

*NOTE: Sure Klean[®] Weather Seal Natural Stone Treatment is 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.

Alia Bober

Project Testing Laboratory Technician

Alia Bober



Espinoza Stone Inc. P.O. Box 274 Jarrell, TX 76537



Project No. 0807-04 PTP

Prepared For: PROSOCO

Prepared By:
AMT Laboratories
September 2008