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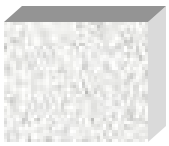


PROSOCO, Inc.

FOR: Chris Foisy
cc: Alan Stickler
Perry Surber
John Bourne

SUBJECT: Cleveland Quarries
Amherst, OH

DATE: June 6, 2001

PROJECT: 0104-17 BP

SAMPLES SUBMITTED: four sandstone tiles, 2 colors, 2 grain styles each

Block	Color	Size
sandstone tile (X-Grain)	“Amherst Gray”	12” x 12” x 2”
sandstone tile (Fluri)	“Amherst Gray”	12” x 12” x 2”
sandstone tile (X-Grain)	“Birmingham Buff”	12” x 12” x 2”
sandstone tile (Fluri)	“Birmingham Buff”	12” x 12” x 2”

Submitted by: Chris Foisy

PURPOSE OF TESTING:

Four sandstone tiles (two colors in two grains) were submitted for testing using PROSOCO's new construction cleaning and water repellent products.

A. New Construction Cleaning: Sure Klean® Vana Trol® and Sure Klean® 600 Detergent were evaluated for removal of laboratory applied mortar.

To simulate new construction soiling, the ability of each cleaner to remove hardened deposits of Ash Grove® Type S cementitious mortar was evaluated and is reported below. Mortar was applied by placing the sandstone cubes face down in a smooth-finished tray of prepared mortar for 10 minutes. The mortar-soiled cubes were cured at 75% ± 5% RH and 70°F ± 5°F before any cleaning tests were attempted.

Heavy deposits of mortar are removed with dry scraping after 24 hours. Sure Klean® Vana Trol® and Sure Klean® 600 Detergent were tested for removal of Ash Grove® Type S masonry cement mortar after 3, 7, and 14 days of curing.

B. Surface Alteration Testing - Sure Klean® Vana Trol® and Sure Klean® 600 Detergent were tested at various dilutions to determine if a cleaning program implemented to remove excess mortar and related new construction soiling would otherwise alter the appearance of cleaned surfaces. Surface Alterations were evaluated visually based upon perceived discoloration or erosion/etching of the masonry unit.

Visual Appearance Alteration is the visual examination of the stone 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 stone.

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 all categories:

0 – no change
1 – slight
2 – moderate
3 – heavy
4 – excessive

C. Protective Water Repellents – Sure Klean® Weather Seal Natural Stone Treatment, Sure Klean® Weather Seal Siloxane PD, and Sure Klean® Weather Seal Siloxane WB Concentrate were evaluated for their ability to provide water repellency to the submitted sandstone samples.

CLEANING PRODUCTS EVALUATED

SAMPLE	Vana Trol®	600 Detergent
All Colors and Grains of the sandstone Tiles	1:6	1:6
	1:8	1:8

SURFACE ALTERATION PRODUCTS EVALUATED

SAMPLE	Vana Trol®	600 Detergent
All Colors and Grains of the sandstone Tiles	1:6	1:6
	1:8	1:8

WATER REPELLENT PRODUCTS EVALUATED

SAMPLE	Product	Dilution
All Colors and Grains of the sandstone Tiles	Natural Stone Treatment	Concentrate
	Siloxane PD	Concentrate
	Siloxane WB Concentrate	1:9

SECTION A – CLEANING

DESCRIPTION OF PRODUCTS EVALUATED

These cleaning trials were conducted to determine the optimal cleaning/cure time combination.

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 4-25 parts water. Apply by brush or low-pressure spray.

Sure Klean® 600 Detergent – A general purpose, concentrated acidic cleaner for brick, tile and concrete surfaces. Dissolves mortar smears and construction dirt quickly, leaving the masonry clean and uniform with no acid burning or streaking. Liquid concentrate for dilution with 4-25 parts water. Apply by brush or low-pressure spray.

TEST METHOD – Cleaning

Dilution ratios refer to mixtures of parts concentrated cleaner : parts fresh water. Chemical cleaners were evaluated using the following procedure:

1. Pre-wet the surface with water.
2. Apply each cleaner at the appropriate dilutions.
3. Allow appropriate exposure time.
   Vana Trol® ..... 5 minutes
   600 Detergent ..... 5 minutes
4. Reapply the products and moderately agitate with a brush.
5. Pressure rinse thoroughly with plenty of fresh water.*****
6. Allow the surface to dry for at least 18 hours and visually examine.

***** Pressure rinsing was conducted at approximately 1300 psi with a warm water flow rate of 1.9 gallons per minute.

Test Results - New Construction Cleaning

% Removal

"Amherst Gray" (X-Grain)

	3 day	7 day	14 day
SK Vana Trol® (1:6)	100%	100%	100%
SK Vana Trol® (1:8)	100%	100%	100%
SK 600 Detergent (1:6)	100%	100%	100%
SK 600 Detergent (1:8)	100%	100%	100%

"Amherst Gray" (Fluri)

	3 day	7 day	14 day
SK Vana Trol® (1:6)	100%	100%	100%
SK Vana Trol® (1:8)	100%	100%	100%
SK 600 Detergent (1:6)	100%	100%	100%
SK 600 Detergent (1:8)	100%	100%	100%

"Birmingham Buff" (X-Grain)

	3 day	7 day	14 day
SK Vana Trol® (1:6)	100%	100%	100%
SK Vana Trol® (1:8)	100%	100%	100%
SK 600 Detergent (1:6)	100%	100%	100%
SK 600 Detergent (1:8)	100%	100%	100%

"Birmingham Buff" (Fluri)

	3 day	7 day	14 day
SK Vana Trol® (1:6)	100%	100%	100%
SK Vana Trol® (1:8)	100%	100%	100%
SK 600 Detergent (1:6)	100%	100%	100%
SK 600 Detergent (1:8)	100%	100%	100%

CONCLUSIONS - Cleaning:

Based on the test results, all cleaners and all dilutions performed extremely well in removing excess mortar smears on the submitted sandstone samples. The cleaners performed well in removing the mortar soils even after the mortar remained on the surface for 14 days under ideal curing conditions. Although it performed well in removing mortar, both dilutions of Sure Klean® 600 Detergent left a orange-brown metallic stain on both grains of the "Amherst Gray" sandstone, therefore it will not be recommended for that color. It did not cause any visual surface alterations to either grain of "Birmingham Buff".

It is also recommended that the selected cleaners always be used in the lowest possible concentration, typically a 1:8 dilution for Sure Klean® Vana Trol® and 1:8 dilution for Sure Klean® 600 Detergent. To facilitate easier removal of excess mortar and construction dirt while minimizing any potential adverse affects, clean within 7 days of construction.

RECOMMENDED PRODUCTS AND DILUTIONS - CLEANING:

Sample	Sure Klean® Vana Trol®	Sure Klean® 600 Detergent
"Amherst Gray" (X-Grain)	1:8	N/R
"Amherst Gray" (Fluri)	1:8	N/R
"Birmingham Buff" (X-Grain)	1:8	1:8
"Birmingham Buff" (Fluri)	1:8	1:8

N/R – Not Recommended

SECTION B – Surface Alterations:

DESCRIPTION OF PRODUCTS EVALUATED – Surface Alterations:

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 4-25 parts water. Apply by brush or low-pressure spray.

Sure Klean® 600 Detergent – A general purpose, concentrated acidic cleaner for brick, tile and concrete surfaces. Dissolves mortar smears and construction dirt quickly, leaving the masonry clean and uniform with no acid burning or streaking. Liquid concentrate for dilution with 4-25 parts water. Apply by brush or low-pressure spray.

TEST METHOD – Surface Alteration Testing:

Dilution ratios refer to mixtures of parts concentrated cleaner : parts fresh water. Chemical cleaners were evaluated using the following procedure:

1. Pre-wet the surface with water.
2. Apply each cleaner at the appropriate dilutions.
3. Allow appropriate exposure time.
   Vana Trol® ..... 5 minutes
   600 Detergent ..... 5 minutes
4. Reapply the products and moderately agitate with a brush.
5. Pressure rinse thoroughly with plenty of fresh water.*****
6. Allow the surface to dry for at least 18 hours and visually examine.

***** Pressure rinsing was conducted at approximately 1300 psi with a warm water flow rate of 1.9 gallons per minute.

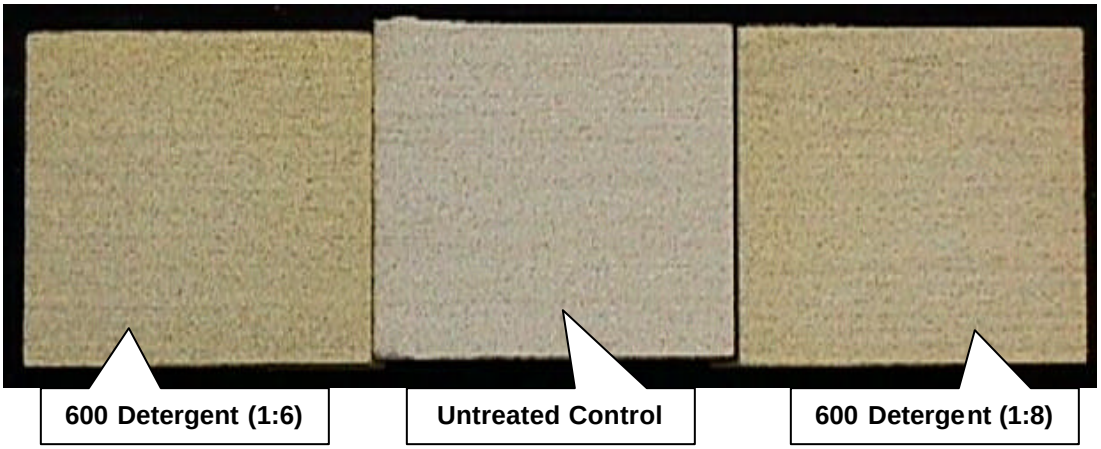
Surface Alteration Results:

Substrate: Sandstone Cube	**Pigment Color:** "Amherst Gray" (X-Grain)				
Product	Dilution	Visual Appearance Alteration	Comments	Staining	Comments
Vana Trol®	1:6	0		0	
Vana Trol®	1:8	0		0	
600 Detergent	1:6	1	Surface appears slightly darker	1	Slight orange metallic staining
600 Detergent	1:8	1	Surface appears slightly darker	1	Slight orange metallic staining
Substrate: Sandstone Cube	**Pigment Color:** "Amherst Gray" (Fluri)				
Product	Dilution	Visual Appearance Alteration	Comments	Staining	Comments
Vana Trol®	1:6	0		0	
Vana Trol®	1:8	0		0	
600 Detergent	1:6	2	Surface appears slightly darker	2	Slight orange metallic staining
600 Detergent	1:8	1	Surface appears slightly darker	1	Slight orange metallic staining
Substrate: Sandstone Cube	**Pigment Color:** "Birmingham Buff" (X-Grain)				
Product	Dilution	Visual Appearance Alteration	Comments	Staining	Comments
Vana Trol®	1:6	0		0	
Vana Trol®	1:8	0		0	
600 Detergent	1:6	0		0	
600 Detergent	1:8	0		0	
Substrate: Sandstone Cube	**Pigment Color:** "Birmingham Buff" (Fluri)				
Product	Dilution	Visual Appearance Alteration	Comments	Staining	Comments
Vana Trol®	1:6	0		0	
Vana Trol®	1:8	0		0	
600 Detergent	1:6	0		0	
600 Detergent	1:8	0		0	

Scale used for reporting results of all categories

0 – no change
1 – slight
2 – moderate
3 – heavy
4 – excessive

Photo of "Amherst Gray" (X-Grain) after cleaning with 600 Detergent:



CONCLUSIONS – Surface Alterations:

Test results show that Sure Klean® Vana Trol® caused no surface alterations on the submitted sandstone tiles. Sure Klean® 600 Detergent did however leave an orange-brown metallic stain on the "Amherst Gray" sandstone in both X-Grain and Fluri grain, but did not visually change the appearance of either grain of the "Birmingham Buff" sandstone.

RECOMMENDED PRODUCTS AND DILUTIONS – SURFACE ALTERATIONS:

Sure Klean® Vana Trol® can be recommended for job-site testing on all types of the sandstone tiles submitted by Cleveland Quarries, Amherst, OH. Sure Klean® 600 Detergent can only be recommended for both grain styles of "Birmingham Buff". Cleaners should be used in the lowest possible concentration. Conduct all cleaning within seven days of soiling to facilitate easier removal of excess mortar and construction dirt.

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.

SECTION C - 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

DESCRIPTIONS 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.

Sure Klean® Weather Seal Siloxane PD – A low odor, alkaline stable, water-based blend of silanes and oligomeric alkoxysiloxanes. Weather Seal Siloxane PD is supplied pre-diluted and is designed for use on concrete and clay masonry surfaces. Weather Seal Siloxane PD penetrates more deeply than conventional water or solvent-based water repellents.

Sure Klean® Weather Seal Siloxane WB Concentrate – A self-emulsifying water-repellent concentrate designed for dilution with fresh water at the job site. This solvent-free blend of silanes and oligomeric alkoxysiloxanes mixes easily with water to produce a penetrating water-repellent ideal for application to dense or porous masonry surfaces.

SAMPLE PREPARATION - Protective Water Repellents:

The submitted blocks were scored, allowed to dry, and to reabsorb atmospheric humidity for 24 hours prior to treatment. The treatment method consisted of a wet-on-wet brush application. All treatments were allowed to cure at least 14 days prior to testing.

TEST METHODS - Protective Water Repellents:

Water Absorption: ASTM C97, Immersion

Water absorption was determined by comparing the dry weight of the sample with its weight after immersion in water at 10-minute, 30-minute, 60-minute and 24-hour intervals. See ASTM C97 for additional information.

Reduced water absorption values – reported as effectiveness – measure the effectiveness of selected treatments in protecting samples from water penetration and water related decay mechanisms. Generally a reduction of approximately 80% is required to provide resistance to water intrusion under normal exposure conditions.

Water Absorption Tube Test: RILEM II.4, 5.0 milliliters, 20 minutes

The water absorption tube test simulating wind driven and wind blown rain conditions was also performed. Tests were run with 5.0-milliliter head pressures. Filled to 5 milliliters, a water absorption tube produces a 98 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 ml of water or more, then:

A rating of **AA** *Above Average* water repellent performance would require loss of no more than 5 ml X 20% = 1 ml.

A rating of **A** *Average* water repellent performance would require loss of no more than 5 ml X 50% = 2.5ml.

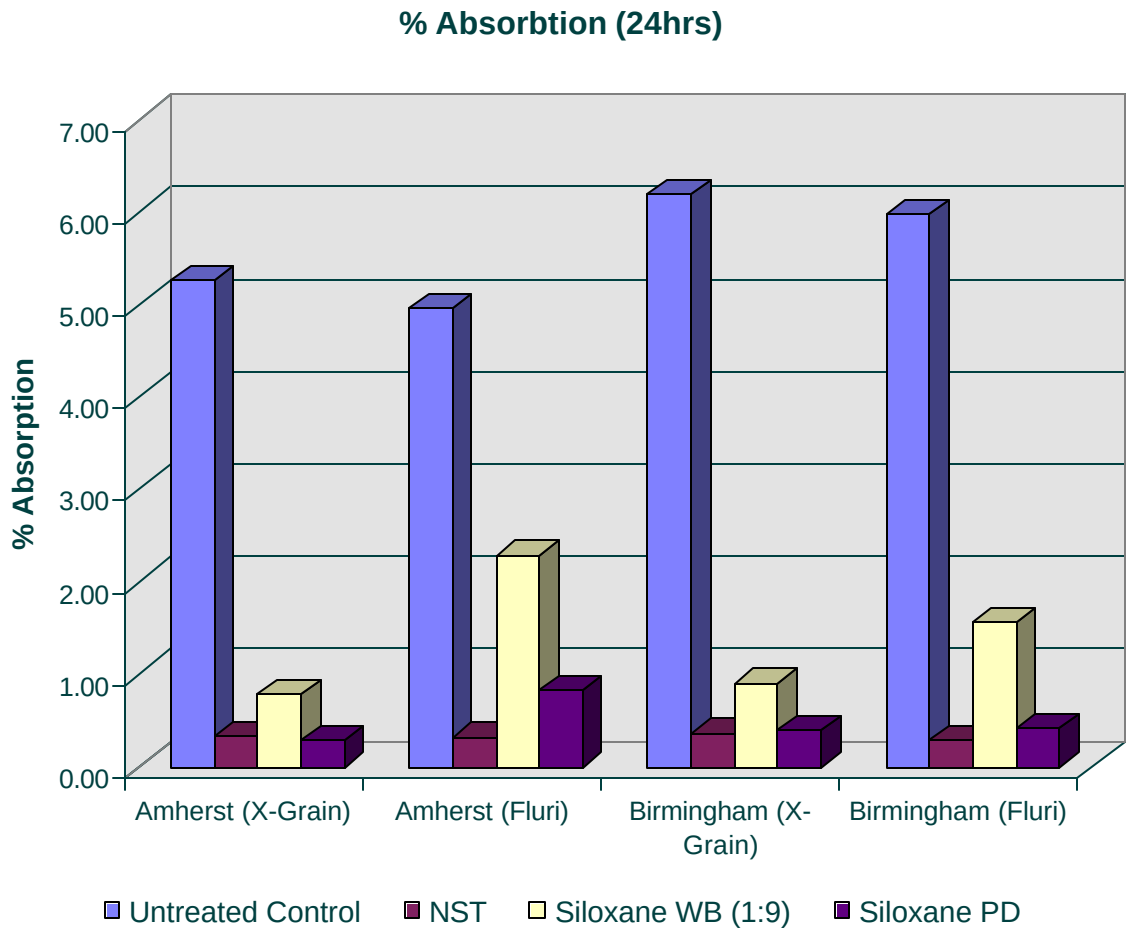
A rating of BA *Below Average* water-repellent performance would be reported for treatments which result in a loss of more than 50% X 5ml = 2.5ml+.

TEST RESULTS - Protective Water Repellents:

Water Absorption: ASTM C97, Immersion

"Amherst Gray" (X-Grain)	% Absorption	% Effectiveness
Untreated Control	5.27	--
NST	0.33	93.7%
Siloxane PD	0.29	94.5%
Siloxane WB (1:9)	0.79	84.9%
"Amherst Gray" (Fluri)	**% Absorption**	**% Effectiveness**
Untreated Control	4.96	--
NST	0.32	93.6%
Siloxane PD	0.83	83.3%
Siloxane WB (1:9)	2.29	53.9%
"Birmingham Buff" (X-Grain)	**% Absorption**	**% Effectiveness**
Untreated Control	6.20	--
NST	0.36	94.1%
Siloxane PD	0.40	93.6%
Siloxane WB (1:9)	0.90	85.4%
"Birmingham Buff" (Fluri)	**% Absorption**	**% Effectiveness**
Untreated Control	5.98	--
NST	0.29	95.1%
Siloxane PD	0.42	92.9%
Siloxane WB (1:9)	1.57	73.8%

Water Absorption: ASTM C97, Immersion



Graph 1

TEST RESULTS - Protective Water Repellents:

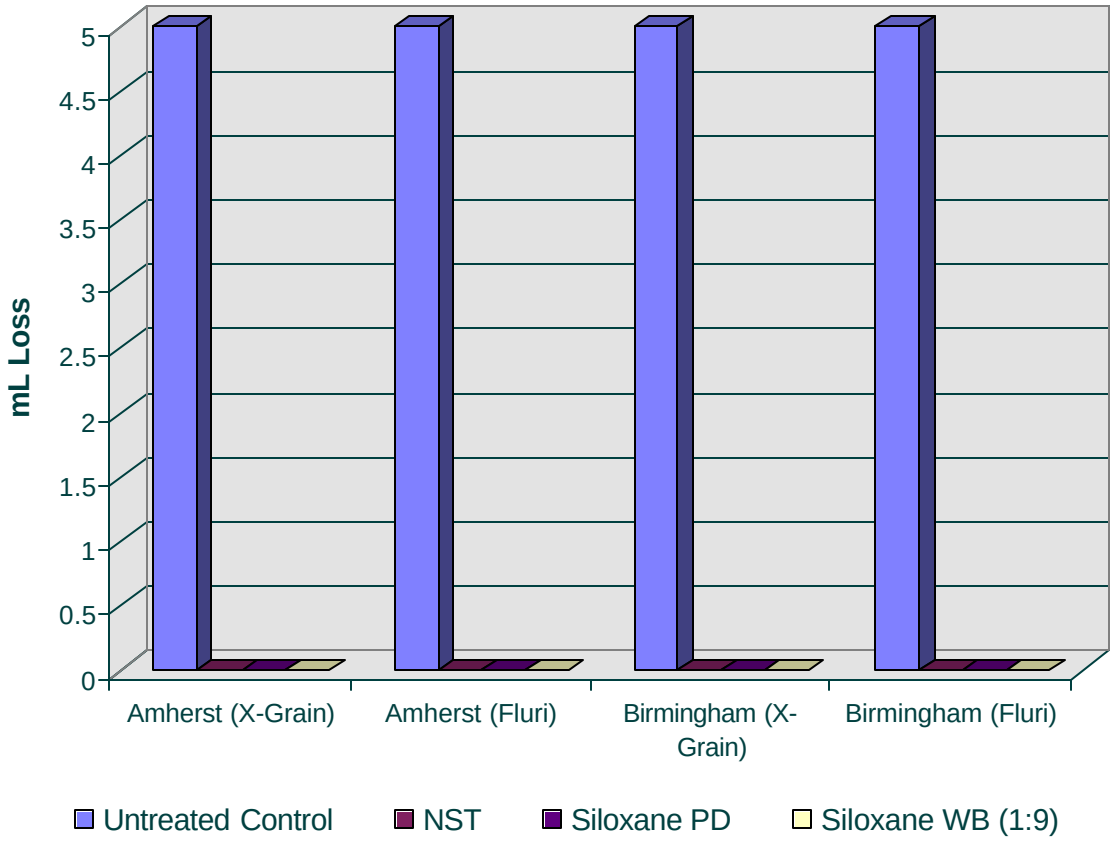
Water Absorption Tube Test: RILEM II.4, 5.0 milliliters, 20 Minutes

AA = Above Average **AA = Average** BA = Below Average

"Amherst Gray" (X-Grain)	Results	Ranking
Untreated Control	>5.0 mL loss	---
NST	0.0 mL loss	**AA**
Siloxane PD	0.0 mL loss	**AA**
Siloxane WB (1:9)	0.0 mL loss	**AA**
"Amherst Gray" (Fluri)	**Results**	**Ranking**
Untreated Control	>5.0 mL loss	---
NST	0.0 mL loss	**AA**
Siloxane PD	0.0 mL loss	**AA**
Siloxane WB (1:9)	0.0 mL loss	**AA**
"Birmingham Buff" (X-Grain)	**Results**	**Ranking**
Untreated Control	>5.0 mL loss	---
NST	0.0 mL loss	**AA**
Siloxane PD	0.0 mL loss	**AA**
Siloxane WB (1:9)	0.0 mL loss	**AA**
"Birmingham Buff" (Fluri)	**Results**	**Ranking**
Untreated Control	>5.0 mL loss	---
NST	0.0 mL loss	**AA**
Siloxane PD	0.0 mL loss	**AA**
Siloxane WB (1:9)	0.0 mL loss	**AA**

Water Absorption Tube Test:

RILEM II.4, 5.0 milliliters, 20 minutes



Graph 2

CONCLUSIONS - Protective Water Repellents:

Based upon laboratory evaluations, Sure Klean® Weather Seal Natural Stone Treatment and Sure Klean® Weather Seal Siloxane PD exhibited above average water repellency on all types and grains of the submitted sandstone. Generally, a reduction of approximately 80% is required to provide resistance to water intrusion under normal exposure conditions. Sure Klean® Weather Seal Siloxane WB Concentrate diluted with nine parts water was unable to achieve this percentage with the Fluri grain sandstone in either color.

RECOMMENDATIONS - Protective Water Repellents:

Based on test results, Sure Klean® Weather Seal Siloxane Natural Stone Treatment and Sure Klean® Weather Seal Siloxane PD provided excellent water-repellent protection on all of the types of sandstone tile submitted by Cleveland Quarries, Amherst, OH, and is recommended for job-site evaluation.

The ability of a water repellent treatment to prevent the ingress of water is affected by a variety of other 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.

Jason L. Anderson
Materials Testing Technician

JLA/csm

Laboratory Report

Pallet Card Evaluation

Cleveland Quarries
Amherst, OH

Project No. **0104-17 PC**

Prepared For:

Chris Foisy
Cleveland Quarries
St. Rt. 113
P.O. Box 261
Amherst, OH 44001

Prepared By:

PROSOCO, Inc.
June 2001