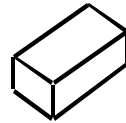




PALLET TAG PROGRAM LABORATORY REPORT



PROSOCO, Inc.

Page 1

TABLE OF CONTENTS

SAMPLES SUBMITTED	2
PURPOSE OF TEST	3
PRODUCTS EVALUATED.....	4

SECTION A – NEW CONSTRUCTION CLEANING

DESCRIPTION OF PRODUCTS EVALUATED.....	5
TEST METHOD	5
TEST RESULTS	6
CONCLUSIONS.....	7
RECOMMENDATIONS.....	7
PHOTOGRAPHS.....	8-9

SECTION B – LIMITING SURFACE ALTERATIONS

DESCRIPTION OF PRODUCTS EVALUATED.....	10
TEST METHOD	10
TEST RESULTS	11
CONCLUSIONS.....	12
RECOMMENDATIONS.....	12

SECTION C - PROTECTIVE WATER REPELLENTS

DESCRIPTION OF PRODUCTS EVALUATED.....	13
TEST METHODS	14
TEST RESULTS	15
CONCLUSIONS.....	15
RECOMMENDATIONS.....	16

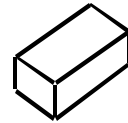
ATTACHMENTS

Technical Services TECH Note RILEM Test Method No. II.4

Product Data literature for all products evaluated



PALLET TAG PROGRAM LABORATORY REPORT



PROSOCO, Inc.

Page 2

FOR: Wayne Kirby

cc: Rob Poitevent
Mike Burdette
Paul Tessier
Steve Dean

SUBJECT: Boral Brick - Eisenhower Plant
Salisbury, NC

DATE: September 19, 2002

PROJECT: 0207-13 PTP

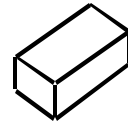
SAMPLES SUBMITTED: (5) types of clay brick

Sample/Color	Color of Finish/Type of Finish	Size
(6) "Cordoba"/Brown-Red	White/"sand slurry"	7½" x 3½" x 2½"
(6) "Berkshire"/Maroon	Maroon/"sand slurry"	
(6) "Red Range Semi-Smooth"/Red	Red/"velour"	
(6) "Windermere"/Light Red	Pink/ "sand coated"	
(6)"Ocean Isle"/Light Red	Tan/"sand slurry"	

Submitted by: Wayne Kirby
Boral Brick



PALLET TAG PROGRAM LABORATORY REPORT



PROSOCO, Inc.

Page 3

PURPOSE OF TESTING:

Five different types of clay brick were submitted to PROSOCO, Inc.'s Testing Laboratory with a request to determine if application of the products evaluated will produce any surface alteration during new construction cleaning operations. Additionally, the effectiveness of water repellents suitable for clay brick masonry will be evaluated.

A. New Construction Cleaning – Sure Klean[®] Vana Trol[®], Sure Klean[®] 600 Detergent, and Sure Klean[®] 101 Lime Solvent were evaluated for removal of laboratory applied mortar.

To simulate new construction soiling, all bricks 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 each brick and filled with a wet mixture of Ash Grove[®] Type N cementitious mortar. The wet mortar-filled cylinder was allowed to remain in contact with the brick for 10 minutes before removal.

Soiled bricks were allowed to dry before test cleaning.

Heavy deposits of mortar were removed with dry scraping after 24 hours. Prepared cleaning solutions were then evaluated for their effectiveness in removing residual Ash Grove[®] Type N mortar after 7, 14 and 21 days of curing.

B. Limiting Surface Alterations – Sure Klean[®] Vana Trol[®], Sure Klean[®] 600 Detergent, and Sure Klean[®] 101 Lime Solvent 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 Alteration was evaluated visually based upon perceived discoloration or erosion/etching of the masonry unit.

Surface Finish Removal is the visual examination of the brick 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 brick 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 brick.

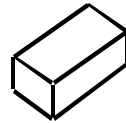
Color Change is the visual examination comparing the color of the untreated control surface to color of surfaces cleaned with selected products at given dilutions.

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

C. Water Repellent Evaluation - Sure Klean[®] Weather Seal Siloxane WB Concentrate, Sure Klean[®] Weather Seal Siloxane PD, and Sure Klean[®] Weather Seal Blok-Guard[®] & Graffiti Control were evaluated on the submitted samples for their ability to provide water repellency.



PALLET TAG PROGRAM LABORATORY REPORT



PROSOCO, Inc.

Page 4

PRODUCTS EVALUATED FOR CLEANING AND LIMITING SURFACE ALTERATIONS

SAMPLE	TREATMENT	DILUTION
"Berkshire" and "Red Range Semi-Smooth" samples	Sure Klean® Vana Trol®	1:6, 1:8
	Sure Klean® 600 Detergent	1:6, 1:8
	Sure Klean® 101 Lime Solvent	1:8
"Cordoba", "Windermere", and "Ocean Isle"	Sure Klean® Vana Trol®	1:6, 1:8

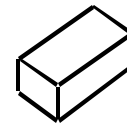
WATER REPELLENT PRODUCTS EVALUATED

SAMPLE	TREATMENT	DILUTION
All submitted clay brick	Sure Klean® Weather Seal Siloxane WB Concentrate	1:9, 1:14
	Sure Klean® Weather Seal Blok-Guard & Graffiti Control	Concentrate
	Sure Klean® Weather Seal Siloxane PD	Concentrate

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



PALLET TAG PROGRAM LABORATORY REPORT



PROSOCO, Inc.

Page 5

SECTION A – NEW CONSTRUCTION CLEANING

DESCRIPTION OF PRODUCTS EVALUATED – New Construction Cleaning

These cleaning trials were conducted to determine the optimal cleaning/cure time combination to most efficiently remove Ash Grove® Type N mortar from the submitted fired clay bricks.

Ash Grove® Type N cementitious mortar was prepared in compliance with the manufacturers instructions, applied to the brick surface and allowed to cure for 7, 14 and 21 days. Mortar removal was accomplished using chemical assistance and a high-pressure water rinse with pressure rinsing equipment. The removal of Ash Grove® Type N cementitious masonry cement mortar was visually evaluated after 7, 14 and 21 days of curing.

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. Quickly dissolves mortar smears and construction dirt, leaving the masonry clean and uniform with no acid burning or streaking. Liquid concentrate for dilution with 4-12 parts water. Apply by brush or low-pressure spray.

Sure Klean® 101 Lime Solvent – A concentrated acidic cleaner for dark-colored brick and tile surfaces which are not subject to metallic oxidation. Removes excess mortar and construction dirt. Liquid concentrate for dilution with 4-8 parts water. Apply by brush or low-pressure spray.

TEST METHOD – New Construction Cleaning

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

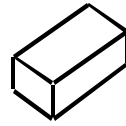
1. Prewet the surface with water.
2. Apply the cleaner.
3. Allow the appropriate dwell time, as specified.

Vana Trol®	5 minutes
600 Detergent.....	3 minutes
101 Lime Solvent	3 minutes
4. Pressure rinse thoroughly. *

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



PALLET TAG PROGRAM LABORATORY REPORT



PROSOCO, Inc.

Page 6

Test Results - New Construction Cleaning

% Removal

“Cordoba”

Product	Dilution	7 day	14 day	21 day
Sure Klean® Vana Trol®	1:6	100%	100%	100%
	1:8	100%	100%	100%

“Berkshire”

Product	Dilution	7 day	14 day	21 day
Sure Klean® Vana Trol®	1:6	100%	100%	100%
	1:8	100%	100%	100%
Sure Klean® 600 Detergent	1:6	100%	100%	100%
	1:8	100%	100%	100%
Sure Klean® 101 Lime Solvent	1:8	100%	100%	100%

“Red Range Semi-Smooth”

Product	Dilution	7 day	14 day	21 day
Sure Klean® Vana Trol®	1:6	100%	100%	100%
	1:8	100%	100%	100%
Sure Klean® 600 Detergent	1:6	100%	100%	100%
	1:8	100%	100%	100%
Sure Klean® 101 Lime Solvent	1:8	100%	100%	100%

“Windermere”

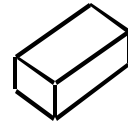
Product	Dilution	7 day	14 day	21 day
Sure Klean® Vana Trol®	1:6	100%	100%	100%
	1:8	100%	100%	100%

“Ocean Isle”

Product	Dilution	7 day	14 day	21 day
Sure Klean® Vana Trol®	1:6	100%	100%	100%
	1:8	100%	100%	100%



PALLET TAG PROGRAM LABORATORY REPORT



PROSOCO, Inc.

Page 7

CONCLUSIONS – New Construction Cleaning

Based on the test results, Sure Klean[®] Vana Trol, Sure Klean[®] 600 Detergent, and Sure Klean[®] 101 Lime Solvent in all dilutions tested performed extremely well in removing excess mortar smears on “Berkshire” and Red Range Semi-Smooth” submitted clay bricks. All three Sure Klean[®] products performed well in removing the mortar soils even after allowing the mortar to remain on the surface of the brick for 21 days under ideal curing conditions.

Based on the test results, Sure Klean[®] Vana Trol in all dilutions tested performed extremely well in removing excess mortar smears on “Cordoba”, Windermere”, and “Ocean Isle” 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 brick for 21 days under ideal curing conditions.

It is also recommended that the selected cleaners always be used in the lowest possible concentration, typically a 1:8 dilution of cleaner to fresh water. They should be rinsed with the lowest pressure of water as practical, at least 400 psi, to minimize removal of the decorative finish. Excessive pressure and water volume may combine to damage or remove decorative finishes. To facilitate easier removal of excess mortar and construction dirt while minimizing any potential surface alterations to the decorative finish, clean within 7 days of construction.

RECOMMENDED PRODUCTS AND DILUTIONS – NEW CONSTRUCTION CLEANING

Recommendations for cleaning for each type of clay bricks submitted by Boral Brick - Eisenhower Plant, Salisbury, NC are provided in the chart below. Recommendations are based on the optimum dilution for complete removal of mortar while limiting surface alterations.

Brick Type	Color of Finish/Type of Finish	New Construction Cleaning (Type N, 21 Days)
“Cordoba”	White/”sand slurry”	Sure Klean [®] Vana Trol [®] (1:8)
“Berkshire”	Maroon/”sand slurry”	Sure Klean [®] Vana Trol [®] (1:8), Sure Klean [®] 600 Detergent (1:8), or Sure Klean [®] 101 Lime Solvent 1:8
“Red Range Semi-Smooth”	Red/”velour”	Sure Klean [®] Vana Trol [®] (1:8), Sure Klean [®] 600 Detergent (1:8), or Sure Klean [®] 101 Lime Solvent (1:8)
“Windermere”	Pink/ ”sand coated”	Sure Klean [®] Vana Trol [®] (1:8)
“Ocean Isle”	Tan/”sand slurry”	Sure Klean [®] Vana Trol [®] (1:8)

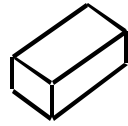
Excessive pressure and water volume may combine to damage or remove decorative finishes. To facilitate easier removal of excess mortar and construction dirt while minimizing any potential surface alterations to the decorative finish, clean within 7 days of construction.

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.



PALLET TAG PROGRAM LABORATORY REPORT

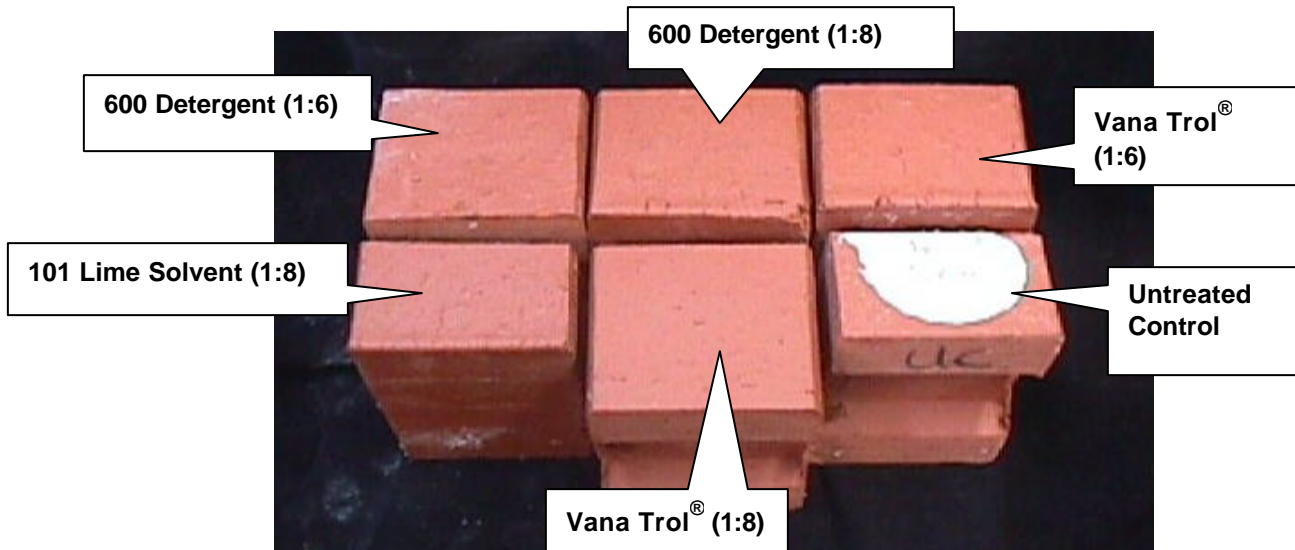


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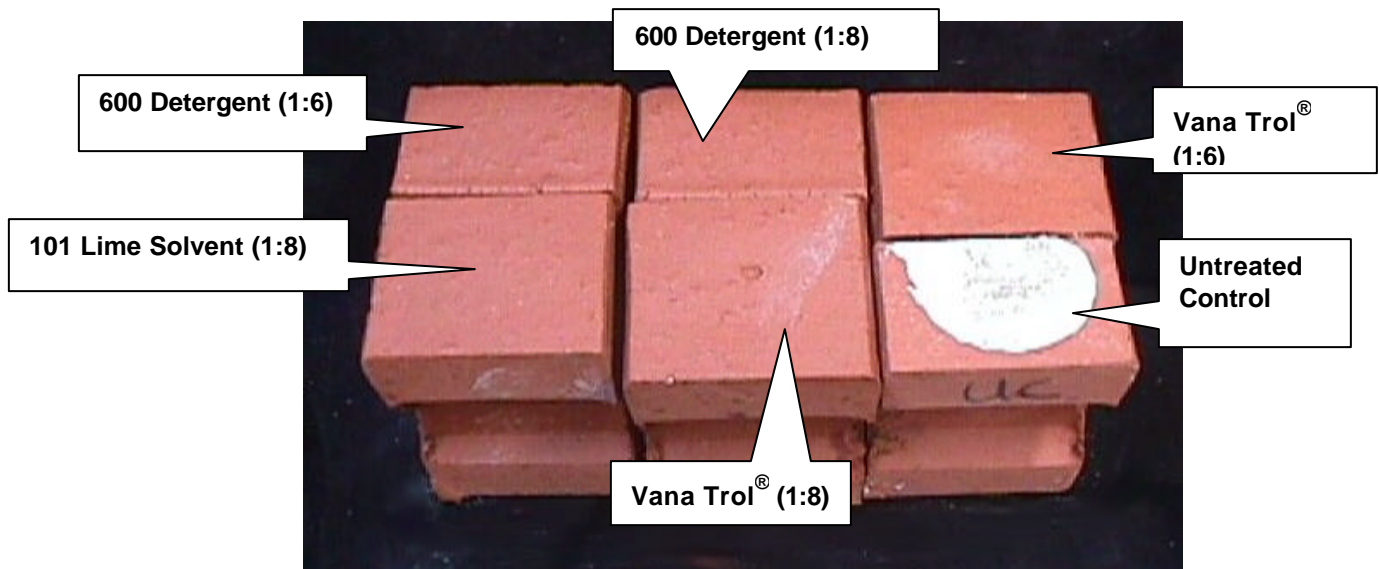
Page 8

PHOTOGRAPHS - Cleaning

“Red Range Semi-Smooth” after 7 day cleaning

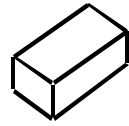


“Red Range Semi-Smooth” after 14 day cleaning





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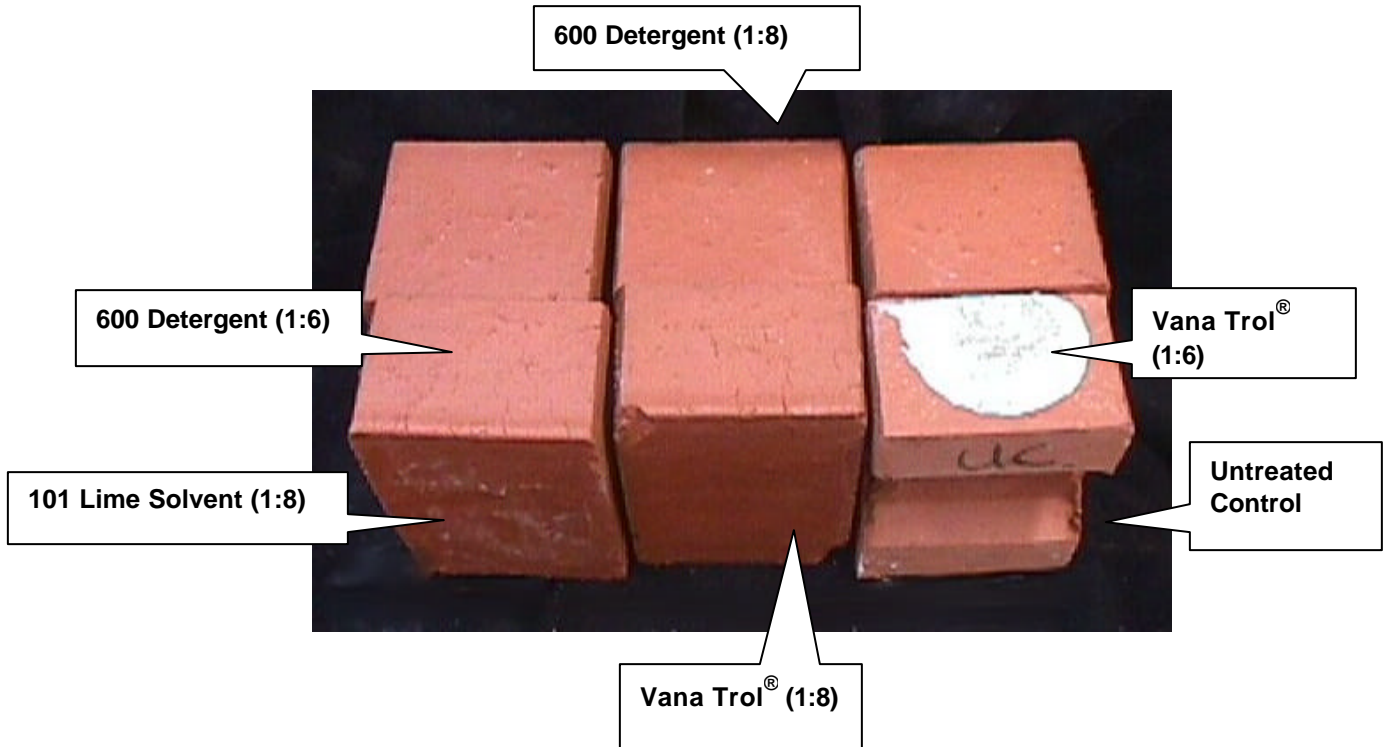


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Page 9

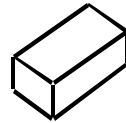
PHOTOGRAPHS – Cleaning (cont.)

“Red Range Semi-Smooth” after 21 day cleaning





PALLET TAG PROGRAM LABORATORY REPORT



PROSOCO, Inc.

Page 10

SECTION B – LIMITING SURFACE ALTERATIONS

DESCRIPTION OF PRODUCTS EVALUATED – Limiting Surface Alterations

Sure Klean® Vana Trol® - A concentrated acidic cleaner for new masonry surfaces that are subject to vanadium, manganese and other metallic stains. Designed for use on gray, brown, white and most light-colored brick, natural stone and 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.

Sure Klean® 600 Detergent – A general purpose, concentrated acidic cleaner for brick, tile, and concrete surfaces. Quickly dissolves mortar smears and construction dirt, leaving the masonry clean and uniform with no acid burning or streaking. Liquid concentrate for dilution with 4-12 parts water. Apply by brush or low-pressure spray.

Sure Klean® 101 Lime Solvent – A concentrated acidic cleaner for dark-colored brick and tile surfaces which are not subject to metallic oxidation. Removes excess mortar and construction dirt. Liquid concentrate for dilution with 4-8 parts water. Apply by brush or low-pressure spray.

TEST METHOD – Limiting Surface Alterations:

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

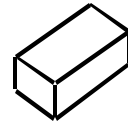
1. Prewet the surface with water.
2. Apply the cleaner.
3. Allow the appropriate dwell time, as specified.

Vana Trol®	5 minutes
600 Detergent.....	3 minutes
101 Lime Solvent	3 minutes
4. Pressure rinse thoroughly. *

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



PALLET TAG PROGRAM LABORATORY REPORT



PROSOCO, Inc.

Page 11

TEST RESULTS – Limiting Surface Alterations

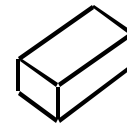
Substrate: Clay brick		Pigment Color: “Cordoba”			
Product	Dilution	Surface Finish Removal	Substrate Deterioration	Color Change	Staining
Sure Klean® Vana Trol®	1:6	0	0	0	0
Sure Klean® Vana Trol®	1:8	0	0	0	0
Substrate: Clay brick		Pigment Color: “Berkshire”			
Product	Dilution	Surface Finish Removal	Substrate Deterioration	Color Change	Staining
Sure Klean® Vana Trol®	1:6	0	0	0	0
Sure Klean® Vana Trol®	1:8	0	0	0	0
Sure Klean® 600 Detergent	1:6	0	0	0	0
Sure Klean® 600 Detergent	1:8	0	0	0	0
Sure Klean® 101 Lime Solvent	1:8	0	0	0	0
Substrate: Clay brick		Pigment Color: “Red Range Semi-Smooth”			
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
Sure Klean® 600 Detergent	1:6	0	0	0	0
Sure Klean® 600 Detergent	1:8	0	0	0	0
Sure Klean® 101 Lime Solvent	1:8	0	0	0	0
Substrate: Clay brick		Pigment Color: “Windermere”			
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: Clay brick		Pigment Color: “Ocean Isle”			
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

Scale used for reporting results of all categories

- | | |
|-----------------------|------------------------|
| 0 – No change | 3 – change – heavy |
| 1 – change – slight | 4 – change - excessive |
| 2 – change – moderate | |



PALLET TAG PROGRAM LABORATORY REPORT



PROSOCO, Inc.

Page 12

CONCLUSIONS – Limiting Surface Alterations

Test results show that none of the products tested caused any surface alterations on all types of the submitted clay bricks. It is recommended that the selected cleaners always be used in the lowest possible concentration, typically a (1:8) dilution of cleaner to fresh water. They should be rinsed with the lowest pressure of water as practical, at least 400 psi, to minimize removal of the decorative finish. Excessive pressure and water volume may combine to damage or remove decorative finishes. To facilitate easier removal of excess mortar and construction dirt while minimizing any potential surface alterations to the decorative finish, clean within 7 days of construction.

RECOMMENDED PRODUCTS AND DILUTIONS – Limiting Surface Alterations

Product recommendations for limiting surface alterations for each type of clay brick submitted by Boral Brick – Eisenhower Plant, Salisbury, NC are provided in the chart below. Recommendations are based on the optimum dilution for complete removal of mortar while limiting surface alterations.

Brick Type	Color/Finish	Limiting Surface Alterations
“Cordoba”	White/“sand slurry”	Sure Klean [®] Vana Trol [®] (1:8)
“Berkshire”	Maroon/“sand slurry”	Sure Klean [®] Vana Trol [®] (1:8), Sure Klean [®] 600 Detergent (1:8), or Sure Klean [®] 101 Lime Solvent (1:8)
“Red Range Semi-Smooth”	Red/“velour”	Sure Klean [®] Vana Trol [®] (1:8), Sure Klean [®] 600 Detergent (1:8), or Sure Klean [®] 101 Lime Solvent (1:8)
“Windermere”	Pink/“sand coated”	Sure Klean [®] Vana Trol [®] (1:8)
“Ocean Isle”	Tan/“sand slurry”	Sure Klean [®] Vana Trol [®] (1:8)

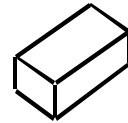
Excessive pressure and water volume may combine to damage or remove decorative finishes. To facilitate easier removal of excess mortar and construction dirt while minimizing any potential surface alterations to the decorative finish, clean within 7 days of construction.

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.



PALLET TAG PROGRAM LABORATORY REPORT



PROSOCO, Inc.

Page 13

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 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 alkoxy siloxanes mixes easily with water to produce a penetrating water repellent which is ideal for application to either dense or porous masonry surfaces.

Sure Klean® Weather Seal Siloxane PD – A ready-to-use, water-based silane/siloxane water repellent for concrete, GFRC, and most masonry and stucco surfaces. Siloxane PD penetrates more deeply than conventional water repellents. It helps masonry resist cracking, spalling, staining, and other damage related to water intrusion. Low odor and alkaline stable, Siloxane PD is ideal for field and in-plant application.

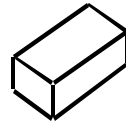
Sure Klean® Blok-Guard® & Graffiti Control – A clear, solvent-based silicone elastomer formulated to weatherproof custom masonry units, cast stone, and concrete block without altering the natural appearance. Blok-Guard® & Graffiti Control penetrates and fills pores to prevent water penetration through exterior walls exposed to normal weathering as well as long-lasting protection against many types of graffiti.

SAMPLE PREPARATION - Protective Water Repellents:

The submitted brick were cut, oven dried and allowed to reabsorb atmospheric humidity for 24 hours prior to treatment. The treatment method consisted of two 10-second immersions with a 20-second absorption period between immersions to simulate a wet-on-wet application. All treatments were allowed to cure for at least 14 days prior to testing.



PALLET TAG PROGRAM LABORATORY REPORT



PROSOCO, Inc.

Page 14

TEST METHODS - Protective Water Repellents:

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:

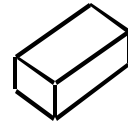
A rating of **AA** *Above Average* water repellent performance would require loss of no more than $5 \text{ ml} \times 20\% = 1 \text{ ml}$.

A rating of **A** *Average* water repellent performance would require loss of no more than $5 \text{ ml} \times 50\% = 2.5 \text{ ml}$.

A rating of **BA** *Below Average* water repellent performance would be reported for treatments which result in a loss of more than $50\% \times 5 \text{ ml} = 2.5 \text{ ml}+$.



PALLET TAG PROGRAM LABORATORY REPORT



PROSOCO, Inc.

Page 15

TEST RESULTS – Protective Water Repellents

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

AA = Above Average

A = Average

BA = Below Average

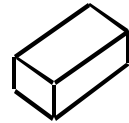
“Cordoba”	Results	Ranking
Untreated Control	5.0	--
Blok-Guard®	0.1	<u>AA</u>
Siloxane PD	0.1	<u>AA</u>
Siloxane WB (1:9)	0.0	<u>AA</u>
Siloxane WB (1:14)	0.0	<u>AA</u>
“Berkshire”	Results	Ranking
Untreated Control	4.0	--
Blok-Guard®	0.0	<u>AA</u>
Siloxane PD	0.1	<u>AA</u>
Siloxane WB (1:9)	0.0	<u>AA</u>
Siloxane WB (1:14)	0.0	<u>AA</u>
“Red Range Semi-Smooth”	Results	Ranking
Untreated Control	3.0	--
Blok-Guard®	0.0	<u>AA</u>
Siloxane PD	0.0	<u>AA</u>
Siloxane WB (1:9)	0.0	<u>AA</u>
Siloxane WB (1:14)	0.0	<u>AA</u>
“Windermere”	Results	Ranking
Untreated Control	3.5	--
Blok-Guard®	0.1	<u>AA</u>
Siloxane PD	0.2	<u>AA</u>
Siloxane WB (1:9)	0.0	<u>AA</u>
Siloxane WB (1:14)	0.0	<u>AA</u>
“Ocean Isle”	Results	Ranking
Untreated Control	3.5	--
Blok-Guard®	0.5	<u>AA</u>
Siloxane PD	0.3	<u>AA</u>
Siloxane WB (1:9)	0.1	<u>AA</u>
Siloxane WB (1:14)	0.0	<u>AA</u>

CONCLUSIONS - Protective Water Repellents:

Test results indicate that Sure Klean® Blok-Guard® & Graffiti Control, Sure Klean® Weather Seal Siloxane PD, and Sure Klean® Weather Seal Siloxane WB Concentrate diluted with nine or fourteen parts fresh water exhibited above average water repellency on all submitted clay bricks.



PALLET TAG PROGRAM LABORATORY REPORT



RECOMMENDATIONS - Protective Water Repellents:

Recommendations for water repellent treatments for each type of clay brick submitted by Boral Brick - Eisenhower Plant, Salisbury, NC are provided in the chart below. Recommendations are based on the treatments that proved most effective by results and can provide water repellency on all types submitted if possible.

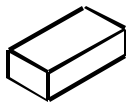
Brick Type	Water Repellent
"Cordoba"	Sure Klean® Weather Seal Siloxane WB Concentrate (1:9) or (1:14) Sure Klean® Weather Seal Blok-Guard® & Graffiti Control Sure Klean® Weather Seal Siloxane PD
"Berkshire"	Sure Klean® Weather Seal Siloxane WB Concentrate (1:9) or (1:14) Sure Klean® Weather Seal Blok-Guard® & Graffiti Control Sure Klean® Weather Seal Siloxane PD
"Red Range Semi-Smooth"	Sure Klean® Weather Seal Siloxane WB Concentrate (1:9) or (1:14) Sure Klean® Weather Seal Blok-Guard® & Graffiti Control Sure Klean® Weather Seal Siloxane PD
"Windermere"	Sure Klean® Weather Seal Siloxane WB Concentrate (1:9) or (1:14) Sure Klean® Weather Seal Blok-Guard® & Graffiti Control Sure Klean® Weather Seal Siloxane PD
"Ocean Isle"	Sure Klean® Weather Seal Siloxane WB Concentrate (1:9) or (1:14) Sure Klean® Weather Seal Blok-Guard® & Graffiti Control Sure Klean® Weather Seal Siloxane PD

It must be pointed out that in any installation, the brick are a single component of the masonry facade. 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.

Courtney A. Williams
Technical Analyst

CAW/



Laboratory Report

Pallet Tag Program Evaluation

**Boral Brick
Eisenhower Plant
Salisbury, NC**

Project No. 0207-13 PTP

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***PROSOCO, Inc.
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