



SGS U.S. Testing Company Inc.

**TABLE I – DIMENSION STONE SPECIFICATIONS**

Type of Stone	Flexural Strength C 880 (psi)	Modulus of Rupture C 99 (psi)	Compressive Strength C 170 (psi)	Absorption C 97 (%, max.)	Density C 97 (lb/ft <sup>3</sup> , min.)	Abrasion Resistance <sup>1</sup> C 241 (H <sup>100</sup> )	Acid Resistance C 217 (in., max.)
<b>Marble C 503-97</b> Calcite Dolomite Serpentine Travertine	1,000	1,000	7,500	0.20	162 175 168 144	10	Not Specified
<b>Limestone C 568-96</b> Low Density Medium Density High Density	Not Specified	400 500 1,000	1,800 4,000 8,000	12.0 7.5 3.0	110 135 160	10	Not Specified
<b>Granite C 615-96</b>	1,200	1,500	19,000	0.40	160	25	Not Specified
<b>Quartz Based C 616-97</b> Sandstone Quartzitic Sandstone Quartzite	Not Specified	350 1,000 2,000	4,000 10,000 20,000	8.0 3.0 1.0	125 150 160	2 8 8	Not Specified
<b>Slate C 629-97</b> * Across Grain (ext.) ** Along Grain (ext.) ** Across Grain (int.) *** Across Grain (int.)	Not Specified	Modulus of Rupture C 120 (psi, min.) 9,000* 7,200** 5,500***	Not Specified	Absorption C 121 (%, max.) 0.25 (ext.) 0.45 (int.)	Not Specified	8	0.015 (ext.) 0.025 (int.)
<b>Roofing Slate C 406-89</b> (Exterior) Class S1 Class S2 Class S3	Not Specified	9,000* 9,000* 9,000*	Not Specified	0.25 0.36 0.45	Not Specified	Not Specified	0.002 0.008 0.014

\* In slate testing, grain direction, of samples, plays a key part during testing. ASTM specifies (\*Across Grain) and (\*\*Along Grain).

<sup>1</sup> ASTM C 241 is under evaluation by ASTM. Recommendations suggest a H<sup>100</sup> abrasion value of 12, minimum for high traffic areas.

1341 North 108th East Avenue  
Tulsa, OK 74116  
Tel: 918-437-8333  
Fax: 918-437-8487

Report No.: 145514  
Date: 9/21/00  
Page 1 of 3

**REPORT OF TEST**

**CLIENT:** World Wide Stone Corporation  
5236 South 40<sup>th</sup> Street  
Phoenix, AZ 85040  
  
Attn: Evan Van Koeck

**SUBJECT:** ASTM C1028 - Coefficient of Friction Test.

**REFERENCE:** Letter.

**SAMPLE ID:** Samples identified as "Durango Ancient" were received from the client on 8/23/00 in good condition. These samples were treated and will be designated through out this report as "Durango Ancient with 511 Porous Plus" samples.

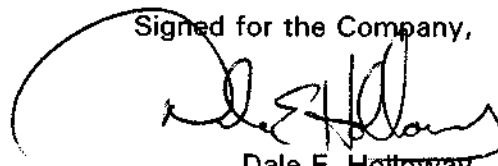
**PROCEDURE:** Material was tested for coefficient of static friction in accordance with ASTM Method C 1028, Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method. Prior to testing, the samples were treated with Miracle Sealants & Abrasives Company's 511 Porous Plus. Application was performed per manufacturers directions listed on the product. The sealant was allowed to dry for 3 hours before testing to ASTM C 1028. No revisions to this report will be allowed after 90 days of the report date.

**TEST DATE:** 9/20/00.

**RESULTS:** Results can be found on the following pages.

**REMARKS:** Although there is no requirement for static coefficient of friction given by ASTM, 0.50 is generally accepted for a slip resistant walking surface. Additionally, it is generally recognized that wet surfaces have a lower coefficient of friction than the same surface dry.

  
Eric Hundley, Engineer  
Engineering & Fire Technology Dept.  
bk

Signed for the Company,  
  
Dale E. Holloway  
Tulsa Branch Director

Member of the SGS Group

Client: World Wide Stone Corp., AZ

**TEST RESULTS:**

Durango Ancient w/511 Porous Plus

Dry, As Received:

	<u>Cal.</u>	<u>Neolite</u>		
Sensor Wgt.,g	1119.02	1119.02		
Normal Load	52.45	52.45		
Max. Force,lbs.	<u>Spec:</u>	<u>1</u>	<u>2</u>	<u>3</u>
Direction 1	42	44	42	44
Direction 2	42	46	42	46
Direction 3	42	44	44	46
Direction 4	42	44	44	44
Average Force	42.00	44.17		
Coeff/Friction	0.80	0.84		
Correction	-0.09	-0.09		
Corrected C/F	0.71	<b>0.75</b>		

Wet, As Received:

	<u>Cal.</u>	<u>Neolite</u>		
Sensor Wgt.,g	1120.17	1120.17		
Normal Load	52.47	52.47		
Max. Force,lbs.	<u>Spec:</u>	<u>1</u>	<u>2</u>	<u>3</u>
Direction 1	32	40	40	40
Direction 2	32	42	40	40
Direction 3	30	42	42	40
Direction 4	32	40	40	40
Average Force	31.50	40.50		
Coeff/Friction	0.60	0.77		
Correction	-0.13	-0.13		
Corrected C/F	0.47	<b>0.64</b>		

REPORT OF TEST

Client: World Wide Stone Corp., AZ

**TEST RESULTS:**

**Dry, Renovated:**

	<u>Cal.</u>	<u>Neolite</u>		
Sensor Wgt.,g	1119.02	1119.02		
Normal Load	52.47	52.47		
Max. Force, lbs.	<u>Spec:</u>	<u>1</u>	<u>2</u>	<u>3</u>
Direction 1	42	46	46	46
Direction 2	42	46	44	46
Direction 3	42	48	46	44
Direction 4	42	46	46	44
Average Force	42.00	45.67		
Coeff/Friction	0.80	0.87		
Correction	-0.09	-0.09		
Corrected C/F	0.71	<b>0.78</b>		

**Wet, Renovated:**

	<u>Cal.</u>	<u>Neolite</u>		
Sensor Wgt.,g	1120.48	1120.48		
Normal Load	52.47	52.47		
Max. Force, lbs.	<u>Spec:</u>	<u>1</u>	<u>2</u>	<u>3</u>
Direction 1	32	40	40	40
Direction 2	32	40	40	38
Direction 3	30	39	38	38
Direction 4	32	40	38	38
Average Force	31.50	39.08		
Coeff/Friction	0.60	0.74		
Correction	-0.13	-0.13		
Corrected C/F	0.47	<b>0.61</b>		

\*\*\*\*\*  
 End of Report

REPORT OF TEST



**SMITH-EMERY LABORATORIES**  
An Independent Commercial Testing Laboratory, Established 1904

781 E. Washington Boulevard Los Angeles, California 90021 ♦ (213) 749-3411 ♦ Fax (213) 741-8626

Proj. No.: 31668-1  
Lab No.: T-01-225 A

December 14, 2001

Client : **WORLD WIDE STONE CORP.**  
5236 South 40th Street,  
Phoenix, Arizona 85040  
Attn.: Michael Nafziger

Subject: **Skid Test on Grouted & Sealed - Flour Polymer Sealer, 8"x16"x1.2cm. "Durango Ancient Viejo"**  
Specification: ASTM C 1028 - 96  
Source: Submitted to Laboratory by Client.

**STATIC COEFFICIENT OF FRICTION (ASTM C 1028-96)**

A block of wood with a 3" x 3" x 1/8" section of standard neolite sole liner attached, was placed on the surface to be tested; then a 50 pound (22kg) weight was placed on top of this assembly. Using dynamometer, the force in pounds required to cause the test assembly to slip parallel to the test surface was measured. Four measurements were taken on each of three test surfaces, each measurement perpendicular to the previous one. The twelve measurements were averaged to obtain the coefficient of friction for each test condition.

**A. As Received:**

Test Condition	Tile No.	N	E	S	W	Average	Individual Static Coefficient of Friction (fc)	S.C.O.F After Neolite Correction Factor
Dry Neolite	1	37	37	36	37	36.75	0.72	(0.68)
	2	37	37	37	36			
	3	36	37	37	37			
Wet Neolite	1	34	34	33	34	34.17	0.67	(0.61)
	2	35	34	35	34			
	3	34	35	34	34			

**B. After Cleaning with "Hillyard's Renovator" (ASTM C 1028 Standard Cleaner)**

Dry Neolite	1	37	38	38	37	37.58	0.73	(0.69)
	2	37	38	38	37			
	3	38	37	38	38			
Wet Neolite	1	35	34	34	36	34.83	0.68	(0.62)
	2	35	36	35	35			
	3	34	35	34	35			

Respectfully Submitted,  
**SMITH - EMERY LABORATORIES**  
  
P. John Latiolait  
Registered Civil Engineer No.: C60312  
Registration Expires: 6-30-04



rc



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December 14, 2001

Client : **WORLD WIDE STONE CORP.**  
5236 South 40th Street,  
Phoenix, Arizona 85040  
Attn.: Michael Nafziger

Subject: **Skid Test on Grouted - Unsealed, 12"x12"x1.2cm. Beige Limestone "Durango Ancient Vlejo"**  
Specification: ASTM C 1028 - 96  
Source: Submitted to Laboratory by Client.

### STATIC COEFFICIENT OF FRICTION (ASTM C 1028-96)

A block of wood with a 3" x 3" x 1/8" section of standard neolite sole liner attached, was placed on the surface to be tested; then a 50 pound (22kg) weight was placed on top of this assembly. Using dynamometer, the force in pounds required to cause the test assembly to slip parallel to the test surface was measured. Four measurements were taken on each of three test surfaces, each measurement perpendicular to the previous one. The twelve measurements were averaged to obtain the coefficient of friction for each test condition.

#### A. As Received:

Test Condition	Tile No.	N	E	S	W	Average	Individual Static Coefficient of Friction (fc)	S.C.O.F
								After Neolite Correction Factor
Dry Neolite	1	37	39	40	39	38.83	0.76	(0.72)
	2	39	40	39	38			
	3	39	38	38	40			
Wet Neolite	1	37	37	36	37	37.08	0.72	(0.66)
	2	37	38	37	36			
	3	38	37	38	37			

#### B. After Cleaning with "Hillyard's Renovator" (ASTM C 1028 Standard Cleaner)

Dry Neolite	1	39	40	42	41	40.58	0.79	(0.75)
	2	41	40	41	40			
	3	40	40	42	41			
Wet Neolite	1	37	39	38	37	37.83	0.74	(0.68)
	2	37	38	39	37			
	3	38	39	37	38			

Respectfully Submitted,

**SMITH-EMERY LABORATORIES**

  
Dr. John Latiolait

Registered Civil Engineer No.: C60312

Registration Expires: 6-30-04

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Proj. No.: 31668-1  
Lab No.: T-01-225 C

December 14, 2001

Client : **WORLD WIDE STONE CORP.**  
5236 South 40th Street,  
Phoenix, Arizona 85040  
Attn.: Michael Nafziger

Subject: **Skid Test on Raw - No Sealer, No Grout, 12"x12"x1.2cm. Beige Limestone "Durango Ancient Viejo"**  
Specification: ASTM C 1028 - 96  
Source: Submitted to Laboratory by Client.

### STATIC COEFFICIENT OF FRICTION (ASTM C 1028-96)

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								After Neolite Correction Factor
Dry Neolite	1	36	36	37	37	36.83	0.72	(0.68)
	2	36	37	38	38			
	3	38	36	37	36			
Wet Neolite	1	34	35	35	35	35.08	0.68	(0.62)
	2	35	35	36	36			
	3	34	35	35	36			

#### B. After Cleaning with "Hillyard's Renovator" (ASTM C 1028 Standard Cleaner)

Dry Neolite	1	39	38	38	39	39.08	0.76	(0.72)
	2	39	40	40	40			
	3	40	38	39	39			
Wet Neolite	1	35	37	36	37	36.08	0.70	(0.64)
	2	36	37	36	35			
	3	36	37	35	36			

Respectfully Submitted,

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P. John Lafolait

Registered Civil Engineer No.: C60312

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