HELLENIC SURVEY OF GEOLOGY AND MINERAL EXPLORATION
(H.S.G.M.E.)
MINISTRY OF ENVIRONMENT AND ENERGY

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ΕΡΓΑΣΤΗΡΙΟ ΠΟΙΟΤΗΤΑΣ ΔΙΑΚΟΣΜΗΤΙΚΩΝ ΠΕΤΡΩΜΑΤΩΝ ΛΙΘΟΣ

TO:
JOHN PAPAGIANNOULIS BROS S.A.
83, Irinis Avenue
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Tavros - Athens
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Our Ref.: 471 A/ 27.10.2020

LABORATORY TESTS RESULTS FOR THE DOLOMITIC MARBLE UNDER THE COMMERCIAL NAME "THASSOS MARBLE" *, IN COMPLIANCE WITH EN 1469 (Quarry: Thassos island, Kavala Prefecture, Greece)*

**Stone denomination and quarry location, as quoted by the client*

Apparent density (EN 1936)	**2830 kg/m^3**
Open porosity (EN 1936)	**0,6 % vol.**
Water absorption at atmospheric pressure (EN 13755)	**0,2 % wt.**
Water absorption due to capillarity (EN 1925)	**Not performed (Open porosity < 1 % vol.)**
Flexural strength under concentrated load (EN 12372)	**12,9 MPa** **Minimum value expected: 11,1 MPa**
Freeze-thaw resistance, 12 cycles: **- Flexural strength after 12 freeze-thaw cycles (EN 12371 & EN 12372)**	**11,8 MPa**
Resistance to ageing by thermal shock (EN 14066)	**Δρ (%): 0,0(change in open porosity)**
	ΔF (%):- 4,7 (change in flexural strength)
Breaking load at dowel hole (EN 13364)	**2100 N** **- Standard deviation: 150 N** **- Minimum value expected: 1753 N**

ΕΛΟΤ EN 1469: Natural stone products – Slabs for cladding - Requirements

PERSONS RESPONSIBLE FOR THE LABORATORY TESTS

Dr. K. Laskaridis
Geologist

Dr. M. Patronis
Mining Eng.

Laboratory tests were carried out by: I. Kouseris (Technician)

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LABORATORY TESTS RESULTS FOR THE DOLOMITIC MARBLE UNDER THE COMMERCIAL NAME "THASSOS MARBLE" *, IN COMPLIANCE WITH EN 12057

(Quarry: Thassos island, Kavala Prefecture, Greece)*

**Stone denomination and quarry location, as quoted by the client*

Apparent density (EN 1936)	**2830 kg/m^3**	
Open porosity (EN 1936)	**0,6 % vol.**	
Water absorption at atmospheric pressure (EN 13755)	**0,2 % wt.**	
Water absorption due to capillarity (EN 1925)	**Not performed (Open porosity < 1 % vol.)**	
Flexural strength under concentrated load (EN 12372)	**12,9 MPa** **Minimum value expected: 11,1 MPa**	
Freeze-thaw resistance, 48 cycles: **- Flexural strength after 48 freeze-thaw cycles (EN 12371 & EN 12372)**	**11,9 MPa**	
Resistance to ageing by thermal shock (EN 14066)	**Δρ (%): 0,0 (change in open porosity)**	
	ΔF (%): - 4,7 (change in flexural strength)	
Abrasion resistance (EN 14157 – Method B)	**15 cm^3 / 50 cm^2** (volume loss)	
Slip resistance (EN 14231)	**Mat surface**	**SRV_{DRY} = 59** **SRV_{WET} = 31**
Slip resistance (EN 14231)	**Unpolished surface**	**SRV_{DRY} = 68** **SRV_{WET} = 59**
Slip resistance (EN 14231)	**Polished surface**	**SRV_{DRY} = 51** **SRV_{WET} = 10**

ΕΛΟΤ EN 12057: Natural stone products – Modular tiles - Requirements

PERSONS RESPONSIBLE FOR THE LABORATORY TESTS

Dr. K. Laskaridis
Geologist

Dr. M. Patronis
Mining Eng.

Laboratory tests were carried out by: I. Kouseris (Technician)

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LABORATORY TESTS RESULTS FOR THE DOLOMITIC MARBLE UNDER THE COMMERCIAL NAME "THASSOS MARBLE" *, IN COMPLIANCE WITH EN 12058

(Quarry: Thassos island, Kavala Prefecture, Greece)*

**Stone denomination and quarry location, as quoted by the client*

Apparent density (EN 1936)	**2830 kg/m^3**	
Open porosity (EN 1936)	**0,6 % vol.**	
Water absorption at atmospheric pressure (EN 13755)	**0,2 % wt.**	
Water absorption due to capillarity (EN 1925)	**Not performed (Open porosity < 1 % vol.)**	
Flexural strength under concentrated load (EN 12372)	**12,9 MPa** **Minimum value expected: 11,1 MPa**	
Freeze-thaw resistance, 48 cycles: **- Flexural strength after 48 freeze-thaw cycles (EN 12371 & EN 12372)**	**11,9 MPa**	
Resistance to ageing by thermal shock (EN 14066)	**Δρ (%): 0,0 (change in open porosity)**	
	ΔF (%):- 4,7 (change in flexural strength)	
Abrasion resistance (EN 14157 – Method B)	**15 cm^3 / 50 cm^2** (volume loss)	
Slip resistance (EN 14231)	**Mat surface**	**SRV_{DRY} = 59** **SRV_{WET} = 31**
Slip resistance (EN 14231)	**Polished surface**	**SRV_{DRY} = 51** **SRV_{WET} = 10**
Slip resistance (EN 14231)	**Unpolished surface**	**SRV_{DRY} = 68** **SRV_{WET} = 59**

ΕΛΟΤ EN 12058: Natural stone products – Slabs for floors and stairs - Requirements

PERSONS RESPONSIBLE FOR THE LABORATORY TESTS

Dr. K. Laskaridis
Geologist

Dr. M. Patronis
Mining Eng.

Laboratory tests were carried out by: I. Kouseris (Technician)

NATURAL STONE INSTITUTE

STONE LABORATORY TEST REPORT

Report No.: 24-0070.01-R0
Test Date(s): 06/11/24 – 06/19/24
Initial Report Date: 07/08/24
Revision Date: 07/10/24
Retention Date: 06/19/27

Prepared for: Irini Papagiannouli
John Papagiannouli Bros. S.A.
83 Irinis Ave.
Tavros-Athens, GREECE 17778

Product: Natural Stone Product (Thassos Marble)

Scope: The Natural Institute (NSI) was contracted by John Papagiannouli Bros. S.A. to perform a physical properties evaluation for one natural stone product (Trade Name: Thassos Marble). The scope of testing included Absorption, Density, Compressive Strength, Flexural Strength, Abrasion Resistance, and Dynamic Coefficient of Friction. All testing was performed at the NSI laboratory located in Oberlin, Ohio.

Methods: The products were evaluated in accordance with the following test method(s):

ASTM C97/C97M-18, *Standard Test Method for Absorption and Bulk Specific Gravity of Dimension Stone*

ASTM C170/C170M-24, *Standard Test Method for Compressive Strength of Dimension Stone*

ASTM C880/C880M-24*, Standard Test Method for Flexural Strength of Dimension Stone*

ASTM C1353/C1353M-20, *Standard Test Method for Abrasion Resistance of Dimension Stone Subjected to Foot Traffic Using a Rotary Platform Abraser*

ASTM C503/C503M-23, *Standard Specification for Marble Dimension Stone*

ANSI A326.3-2021 – *American National Standard Test Method for Measuring Dynamic Coefficient of Friction of Hard Surface Flooring Materials*

Test Materials: Test materials were provided by John Papagiannouli Bros. S.A. on 06/06/24 and were received in good condition for testing. The natural stone provided for testing was designated as Trade Name: Thassos Marble. The specimens were tested as received other than preconditioning as required by the applicable test method(s) prior to testing. Representative test materials shall be retained by the NSI for a period of four years.

Test Witness Record

Name	Company
Roger Lawson	NSI
Jack Freas	NSI
Clint Eads	NSI
Scott D. Scallorn	NSI

Test Procedure(s): Unless otherwise stated, all specimen conditioning and testing was conducted in standard laboratory conditions. Test photos are located on pages 12-15 of this report. Equipment calibration certificates are available upon request.

ASTM C97 – Absorption and Density Evaluation

The absorption and density evaluations were conducted in accordance with the procedures detailed in ASTM C97. The specimens were dried in a ventilated oven maintained at 60°C (ICN: NSI00012) to a stable mass condition (minimum 48 hours), reacclimated to ambient lab temperature and weighed on an Ohaus digital balance (ICN: NSI00022) for determination of dry condition mass. They were then immersed in filtered water bath maintained at 22°C temperature (verified by an Omega HH509R Thermometer (ICN: NSI00010) for 48 hours prior to individual specimen removal, surface drying and determination of wet condition mass. The specimens were then suspended in the water within a wire cage and weighed for determination of immersed condition mass. Absorption (%) and bulk specific gravity were calculated for each specimen as per the equations in ASTM C97, Section 9. Test results were averaged for the test series and evaluated against the performance criteria presented in ASTM C503, Table 1.

ASTM C170 – Compressive Strength Evaluation

The compressive strength evaluation was conducted on a Test Mark compression tester (ICN: NSI00001) in accordance with the procedures detailed in ASTM C170. Pretest specimen dimensions were measured with a 6" x 0.0005" Digital Caliper (ICN: NSI00008). Specimens were tested in both oven-dry and wet conditions. Dry condition specimens were oven-dried at 60°C for a minimum of 48 hours and cooled to ambient prior to testing. Wet condition specimens were immersed in water for 48 hours prior to individual removal and testing. Compressive strength was calculated for each specimen as per the equation in ASTM C170, Section 10.1. Test results were averaged for each test series and evaluated against the performance criteria presented in ASTM C503, Table 1.

ASTM C880 – Flexural Strength Evaluation

The Flexural strength evaluation was conducted on an ATS Universal Test Machine (ICN: NSI00003) employing a 12.5-kip load cell (ICN: NSI00004) in accordance with the procedures detailed in ASTM C880. Specimens were tested in both oven-dry and wet conditions. Dry condition specimens were oven-dried at 60°C for a minimum of 48 hours and cooled to ambient prior to testing. Wet condition specimens were immersed in water for 48 hours prior to individual removal and testing. Specimens were supported at a test span of 12.5 in. and loaded at quarter point (6.25 in. loading span) until failure. Flexural strength was calculated for each specimen as per the equation in ASTM C880, Section 10.1. Test results were averaged for each test series and evaluated against the performance criteria presented in ASTM C503, Table 1.

ASTM C1353 – Abrasion Resistance Evaluation

The abrasion resistance evaluation was conducted in accordance with the procedures detailed in ASTM C1353. The specimens were oven-dried at 60°C for a minimum of 48 hours and cooled prior to determination of pre-abrasion mass on an Ohaus digital balance (ICN: NSI00022) The specimens were then evaluated on a Taber Industries rotary platform abraser (ICN: NSI00024) employing H-22 Calibrade abrasive wheels with 1,000 grams of downward force applied to each for a total of 1000 wear cycles. Upon completion of cycling, post-exposure mass was determined for each specimen. Employing the bulk specific gravity results obtained from ASTM C97 evaluation, Index of Abrasion was calculated for each specimen as per the equation in ASTM C1353, Section 9.1. Test results were averaged for the series and evaluated against the performance criteria presented in ASTM C503, Table 1.

ANSI A326.3 Dynamic Coefficient of Friction (DCOF) Evaluation

The DCOF evaluation was conducted in accordance with the procedures detailed in ANSI A326.3, sections 8, and 9. Specimens were evaluated with a BOT 3000E tribometer (ICN: NSI00002) in wet condition (employing a 0.05% SLS solution for wet condition). Four travel passes were taken at a 90° offset to one another and the resultant DCOF measurements averaged for each specimen. Mean individual specimen results were averaged for each test series and evaluated against the ANSI A326.3, Section 3.1 recommended slip resistance performance criteria of 0.42.

Specimen Details

Test Method	Quantity	Nominal Dimensions	Description
ASTM C97	5	2.4 in. cubes	White natural marble product
ASTM C170	20 Total Perpendicular, Wet: 5 Perpendicular, Dry: 5 Parallel, Wet: 5 Parallel, Dry: 5	2.4 in. cubes	
ASTM C880	20 Total Perpendicular, Wet: 5 Perpendicular, Dry: 5 Parallel, Wet: 5 Parallel, Dry: 5	4 in. x 15 in. x 1.25 in. thickness	
ASTM C1353	3	4 in. square x 0.5 in. thickness	
ANSI A326.3	6 Total Honed: 3 Polished: 3	12 in. square x 0.75 in. thickness	

Test Results

ASTM C97 – Absorption & Density Evaluation

Specimen No.	Measured Mass (g)			Absorption (%)	Bulk Specific Gravity	Density (lbs/ft³)	
	Oven-Dry	48-Hour Wetted	Immersed Suspended			lbs/ft³	kg/m³
1	632.15	632.94	410.46	0.12	2.841	177.4	2,841
2	629.32	630.09	408.66	0.12	2.842	177.4	2,842
3	622.80	623.55	403.95	0.12	2.836	177.0	2,836
4	631.04	631.79	409.56	0.12	2.840	177.3	2,840
5	631.68	632.47	410.25	0.13	2.843	177.5	2,843
Series Average				**0.12**	**2.840**	**177.0**	**2,840**
Standard Deviation				0.00	0.003	0.19	2.70
Coefficient of Variation (%)				2.25	0.095	0.11	0.10

ASTM C1353 – Abrasion Resistance
Thassos Marble , Honed Finish

Specimen No.	Bulk Specific Gravity	Mass (g)			Wear Cycles Completed	Index of Abrasion
		Initial	End	Loss		
Honed - 1	2.84	234.76	229.67	5.09	1,000	20.5
Honed - 2		248.96	245.05	3.91		26.7
Honed - 3		227.12	222.01	5.11		20.4
Series Average						**22.5**
Standard Deviation						3.6
Coefficient of Variation (%)						16.0

ASTM C1353 – Abrasion Resistance
Thassos Marble , Polished Finish

Specimen No.	Bulk Specific Gravity	Mass (g)			Wear Cycles Completed	Index of Abrasion
		Initial	End	Loss		
Polished - 1	2.84	250.32	247.35	2.97	1,000	35.1
Polished - 2		235.54	231.98	3.56		29.3
Polished - 3		238.39	234.62	3.77		27.7
Series Average						**30.7**
Standard Deviation						3.9
Coefficient of Variation (%)						12.8

ASTM C170 – Compressive Strength
Test Condition: Perpendicular Loading, Wet

Specimen No.	Test Condition	Specimen Dimensions (in)		Loading Area (in^2)	Failure Load (lb_f)	Compressive Strength	
		Length	Width			psi	MPa
PP-W-1	Loaded perpendicular to the stone rift plane Wet Condition	2.39	2.38	5.69	123,650	21,730	149.8
PP-W-2		2.39	2.37	5.66	102,630	18,130	125.0
PP-W-3		2.39	2.40	5.71	130,200	22,800	157.2
PP-W-4		2.39	2.39	5.71	157,850	27,640	190.6
PP-W-5		2.39	2.39	5.70	139,070	24,400	168.2
Series Average						**22,940**	**158.2**
Standard Deviation						3,494	24.1
Coefficient of Variation (%)						15.2	15.2

ASTM C170 – Compressive Strength
Test Condition: Perpendicular Loading, Dry

Specimen No.	Test Condition	Specimen Dimensions (in)		Loading Area (in^2)	Failure Load (lb_f)	Compressive Strength	
		Length	Width			psi	MPa
PP-D-1	Loaded perpendicular to the stone rift plane Dry Condition	2.37	2.38	5.66	140,260	24,780	170.9
PP-D-2		2.40	2.38	5.71	96,070	16,820	116.0
PP-D-3		2.39	2.38	5.69	119,810	21,060	145.2
PP-D-4		2.38	2.39	5.68	129,500	22,800	157.2
PP-D-5		2.40	2.39	5.74	126,500	22,040	151.9
Series Average						**21,500**	**148.2**
Standard Deviation						2,951	20.4
Coefficient of Variation (%)						13.7	13.7

ASTM C170 – Compressive Strength
Test Condition: Parallel Loading, Wet

Specimen No.	Test Condition	Specimen Dimensions (in)		Loading Area (in^2)	Failure Load (lb_f)	Compressive Strength (psi)	
		Length	Width			psi	MPa
LL-W-1	Loaded parallel to the stone rift plane Wet Condition	2.38	2.38	5.66	133,360	23,560	162.5
LL-W-2		2.38	2.39	5.68	80,210	14,120	97.4
LL-W-3		2.38	2.39	5.68	144,490	25,440	175.4
LL-W-4		2.39	2.39	5.71	135,710	23,770	163.9
LL-W-5		2.40	2.40	5.74	132,630	23,110	159.3
Series Average						**22,340**	**154.1**
Standard Deviation						4,104	28.3
Coefficient of Variation (%)						18.4	18.4

ASTM C170 – Compressive Strength
Test Condition: Parallel Loading, Dry

Specimen No.	Test Condition	Specimen Dimensions (in)		Loading Area (in^2)	Failure Load (lb_f)	Compressive Strength	
		Length	Width			psi	MPa
LL-D-1	Loaded parallel to the stone rift plane Dry Condition	2.39	2.38	5.70	127,470	22,360	154.2
LL-D-2		2.38	2.37	5.66	125,530	22,180	152.9
LL-D-3		2.39	2.37	5.66	130,880	23,120	159.4
LL-D-4		2.40	2.38	5.73	125,690	21,940	151.2
LL-D-5		2.38	2.37	5.66	77,450	13,680	94.3
Series Average						**20,660**	**142.4**
Standard Deviation						3,925	27.1
Coefficient of Variation (%)						19.0	19.0

ASTM C880 – Flexural Strength
Test Condition: Perpendicular Loading, Wet

Specimen Details		Support Span (in)	Specimen Dimensions (in)		Failure Load (lb_f)	Flexural Strength	
No.	**Test Condition**		**Width**	**Depth**		**psi**	**MPa**
PP-W-1	Loaded perpendicular to the stone rift plane Wet Condition	12.5	3.96	1.19	1,123	1,880	13.0
PP-W-2			3.95	1.20	1,317	2,160	14.9
PP-W-3			3.93	1.21	1,146	1,860	12.8
PP-W-4			3.94	1.21	1,077	1,750	12.1
PP-W-5			3.93	1.21	1,250	2,030	14.0
Series Average						**1,940**	**13.3**
Standard Deviation						160	1.1
Coefficient of Variation (%)						8.2	8.2

ASTM C880 – Flexural Strength
Test Condition: Perpendicular Loading, Dry

Specimen Details		Support Span (in)	Specimen Dimensions (in)		Failure Load (lb_f)	Flexural Strength (psi)	
No.	**Test Condition**		**Width**	**Depth**		**psi**	**MPa**
PP-D-1	Loaded perpendicular to the stone rift plane Dry Condition	12.5	3.95	1.20	1,363	2,240	15.5
PP-D-2			3.95	1.17	1,173	2,030	14.0
PP-D-3			3.95	1.20	1,204	1,990	13.7
PP-D-4			3.95	1.21	870	1,420	9.8
PP-D-5			3.96	1.18	1,240	2,110	14.5
Series Average						**1,960**	**13.5**
Standard Deviation						316	2.2
Coefficient of Variation (%)						16.1	16.1

ASTM C880 – Flexural Strength
Test Condition: Parallel Loading, Wet

Specimen Details		Support Span (in)	Specimen Dimensions (in)		Failure Load (lb_f)	Flexural Strength (psi)	
No.	**Test Condition**		**Width**	**Depth**		**psi**	**MPa**
LL-W-1	Loaded parallel to the stone rift plane Wet Condition	12.5	3.95	1.20	722	1,200	8.2
LL-W-2			3.96	1.20	945	1,540	10.6
LL-W-3			3.95	1.20	660	1,090	7.5
LL-W-4			3.95	1.21	732	1,190	8.2
LL-W-5			3.95	1.19	640	1,060	7.3
Series Average						**1,220**	**8.4**
Standard Deviation						191	1.3
Coefficient of Variation (%)						15.7	15.7

ASTM C880 – Flexural Strength
Test Condition: Parallel Loading, Dry

Specimen Details		Support Span (in)	Specimen Dimensions (in)		Failure Load (lb_f)	Flexural Strength (psi)	
No.	**Test Condition**		**Width**	**Depth**		**psi**	**MPa**
LL-D-1	Loaded parallel to the stone rift plane Dry Condition	12.5	3.96	1.20	611	1,010	7.0
LL-D-2			3.96	1.23	876	1,370	9.4
LL-D-3			3.95	1.18	777	1,330	9.2
LL-D-4			3.95	1.19	752	1,260	8.7
LL-D-5			3.95	1.19	624	1,040	7.2
Series Average						**1,200**	**8.3**
Standard Deviation						167	1.1
Coefficient of Variation (%)						13.9	13.8

ANSI A326.3 - Dynamic Coefficient of Friction
Thassos Marble – Honed Finish, Wet Condition

Specimen No.	Test Orientation				Wet Condition DCOF
	0°	90°	180°	270°	
Honed - 1	0.69	0.69	0.70	0.66	0.69
Honed - 2	0.54	0.54	0.55	0.59	0.56
Honed - 3	0.51	0.54	0.53	0.53	0.53
Series Average					**0.59**
Standard Deviation					0.07
Coefficient of Variation (%)					12.5

ANSI A326.3 - Dynamic Coefficient of Friction
Thassos Marble – Polished Finish, Wet Condition

Specimen No.	Test Orientation				Wet Condition DCOF
	0°	90°	180°	270°	
Polished - 1	0.28	0.24	0.28	0.22	0.26
Polished - 2	0.34	0.29	0.30	0.28	0.30
Polished - 3	0.24	0.18	0.21	0.14	0.19
Series Average					**0.25**
Standard Deviation					0.06
Coefficient of Variation (%)					22.4

Conclusion: The average test results for the Thassos Marble product were evaluated against the performance criteria presented in ASTM C503, Table 1 and ANSI A326.3. The results of these evaluations are presented in the table(s) below:

ASTM C503 Marble Performance Evaluation Summary				
Physical Requirement	**Test Series Detail**		**Result**	
			Mean Test Value	**Performance Evaluation**
C97 Absorption (%): Class I, Class II: ≤0.20			0.12	Meets as Stated
C97 Density (lbs/ft³): Class I (Calcite): ≥162 lbs/ft³ (2,600 kg/m³) Class II (Dolomite): ≥175 lbs/ft³ (2,800 kg/m³)			177.0 (2,840)	Meets as Stated
C170 Compressive Strength (psi): Class I, Class II: ≥7,500 psi (52 MPa)	Perpendicular	Wet	22,940 (158.2)	Meets as Stated
		Dry	21,500 (148.2)	
	Parallel	Wet	22,340 (154.1)	Meets as Stated
		Dry	20,660 (142.4)	
C880 Flexural Strength (psi): Class I, Class II: ≥1,000 (6.9 MPa)	Perpendicular	Wet	1,940 (13.3)	Meets as Stated
		Dry	1,960 (13.5)	
	Parallel	Wet	1,220 (8.4)	Meets as Stated
		Dry	1,200 (8.3)	
C1353 Abrasion Resistance: Class I, Class II: ≥10	Honed Finish		22.5	Meets as Stated
	Polished Finish		30.7	

ASTM C503 Marble Performance Evaluation

The Thassos Marble product satisfied the ASTM C503 performance requirements for all properties evaluated.

ANSI A326.3 Performance Evaluation Summary			
Physical Requirement	**Test Series Detail**	**Result**	
		Mean Test Value	**Performance Evaluation**
ANSI A326.3 - Dynamic Coefficient of Friction (Wet): DCOF ≥0.42	Honed Finish	0.59	Meets as Stated
	Polished Finish	0.25	Fails to Meet as Stated

ANSI A326.3 Evaluation

The Thassos Marble product (Honed Finish) satisfied the ANSI A326.3 recommended minimum performance criteria of 0.42 DCOF for wet condition (Mean Wet Condition DCOF: 0.59).

The Thassos Marble product (Polished Finish) failed to satisfy the ANSI A326.3 recommended minimum performance criteria of 0.42 DCOF for wet condition (Mean Wet Condition DCOF: 0.25).

It has been our pleasure to provide this product testing service for your project. Please do not hesitate to contact us if you have any questions or require additional information. Contact information is listed below.

Respectfully submitted,

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Revision Log

No.	Date	Page(s)	Description
0	07/08/24	N/A	Initial report release.
1	07/10/24	4, 5-8, 10	Inclusion of SI units for all test results

Document Control Number : *NSICD 00001-R0*

Photographs

Photo No. 1
ASTM C97 – Test Apparatus (Dry Mass Determination Stage Depicted)

Photo No. 2
ASTM C170 – Representative Pretest Condition Specimen

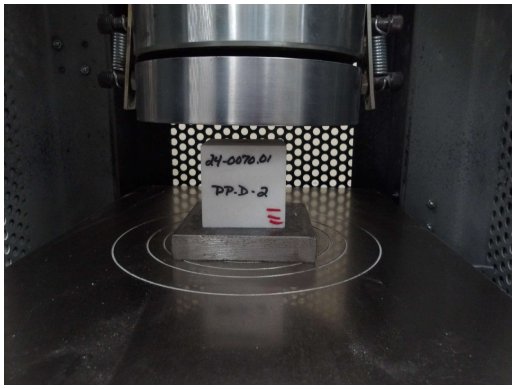

Photo No. 3
ASTM C170 – Test Setup

Photo No. 4
ASTM C170 – Representative Specimen Failure Mode (Perpendicular Loading)

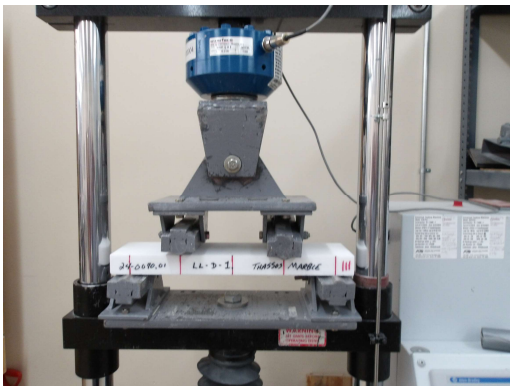

Photo No. 5
ASTM C880 – Test Setup

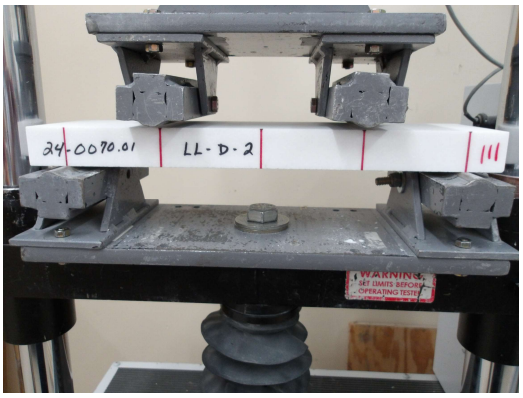

Photo No. 6
ASTM C880 – Load Application Fixture Detail

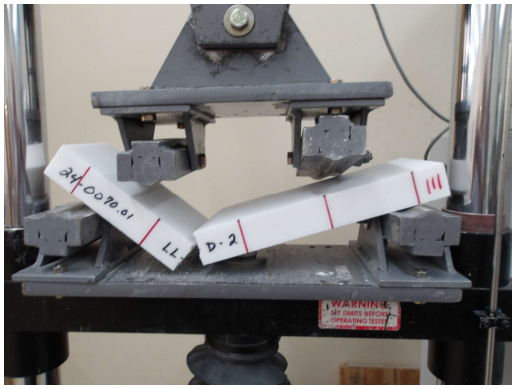

Photo No. 7
ASTM C880 – Representative Specimen Failure Mode (Parallel Loading)

Photo No. 8
ASTM C880 – Representative Specimen Failure Mode (Perpendicular Loading)

Photo No. 9
ASTM C1353 – Mass Determination Test Apparatus

Photo No. 10
ASTM C1353 – Abrasion Apparatus

Photo No. 11
ASTM C1353 – Representative Post-Abrasion Specimen (Honed Finish)

Photo No. 12
ASTM C1353 – Representative Post-Abrasion Specimen (Polished Finish)

Photo No. 13
BOT 3000E Test Apparatus

Photo No. 14
ANSI A326.3 – Dynamic Coefficient of Friction Test Set Up

Photo No. 15
ANSI A326.3 – Specimen Detail
(Honed Finish Depicted)

Photo No. 16
ANSI A326.3 – Specimen Detail
(Polished Finish Depicted)