NATIONAL CONCRETE MASONRY ASSOCIATION
RESEARCH & DEVELOPMENT LABORATORY

13750 Sunrise Valley Drive
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July 11, 2017

Fred Dunand
Saturn Materials
350 Yorkville Park Square
Columbus, MS 39702

Please find enclosed a copy of a test report that we performed at your request on the following product that you supplied to the NCMA Research and Development Laboratory:

4 x 8 x 24 inch Concrete Masonry Unit
Mark: 'Cored Facing Unit'

NCMA Job Number: 17-362-2A

We are pleased to report that the tested properties from this report comply with the applicable requirements of ASTM C90 -16a, Standard Specification for Loadbearing Concrete Masonry Units.

The attached report includes the tested compressive strength of the concrete masonry unit. The compressive strength of mason ry constructed using these units can be calculated using the Unit Strength Method as outlined in Section 1.4.B.2.b of Specification for Masonry Structures (TMS 602 -13 / ACI 530.1-13 / ASCE 6-13). It should be noted that as a result of industry research, the Unit Strength Method was recalibratied in the 2013 edition of the Specifi cation for Masonry Structures, reducing the conservatism in the calculated compressive strength of masonry that was present in previous editions. Because jurisdictions adopt model codes at different times, the calculated values using both the 2011 and the 2013 Specification for masonry structures is provided below.

In accordance with the Unit Strength Method, the compressive strength of masonry is a function of unit strength and mortar ty pe. As shown in the attached test report...

Net Area Compressive Strength of 4 x 8 x 24 inch Concrete Masonry Unit Mark: 'Cored Facing Unit'	3710 psi

Therefore, the net area compressive strength of masonry when these units are used, can be considered to be the following:

	TMS 602-13/ ACI 530.1-13/ ASCE 6-13	*TMS 602-11/ ACI 530.1-11/ ASCE 6-11*
	Net Area Compressive Strength of Masonry	Net Area Compressive Strength of Masonry
When used with:		
Type M or S mortar	2680 psi	2480 psi
Type N mortar	2330 psi	2330 psi

The values provided above can be compared directly to the specified compressive strength of masonry, $f'_{m.}$ If these values exceed f'_{m}, compliance has been documented.

As mentioned before, the Unit Strength Method is a conservative method for determining compliance with the specified compress ive strength of masonry when compared against the alternative Prism Test Method that may also be used. The results from the Prism Test Method will likely exceed the values calculated values of the Unit Strength Method.

Sincerely,

Nicholas R. Lang
Director of Business Development

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ASTM C140/C140M-17 Test Report
Sampling and Testing Concrete Masonry Units and Related Units

Job Number: 17-362-2A
Report Date: 7/11/2017

Client: Saturn Materials
Address: 350 Yorkville Park Square
Columbus, MS 39702

Testing Agency: National Concrete Masonry Association
Research and Development Laboratory
Address: 13750 Sunrise Valley Drive
Herndon, VA 20171-4662

Standard Specification: ASTM C90-16a

Sampling Party: Saturn Materials

Unit Description:
4 x 8 x 24 inch Concrete Masonry Unit
Mark: 'Cored Facing Unit'

Date Samples Received: 6/8/2017

NOTE: Specimens have been reduced in size from full-size units in order to comply with compression machine capacity requirements in accordance with ASTM C140/C140M-17.

Summary of Test Results

Physical Property	ASTM C90-16a Required Values	Tested Values	
Net Compressive Strength[1]	2,000 min	3710	psi
Gross Compressive Strength[1]	****	2840	psi
Density[2]	****	125.9	pcf
Absorption[2]	13 max	4.7	pcf

Physical Property	ASTM C90-16a Required Values	Tested Values[2]	
Min. Faceshell Thickness (t_{fs})	0.75 min	1.14	in.
Min. Web Thickness (t_w)	0.75 min	1.25	in.
Normalized Web Area (A_{wn})	6.5 min	26.88	$in.^2/ft^2$
Equivalent Web Thickness	****	2.49	in.
Equivalent Thickness	****	2.72	in.
Max. Var. from Spec. Dimensions	.125 max	0.030	in.
Percent Solid	****	74.9	%

[1] Reported values are based on the properties of reduced-size compression specimens.

[2] Reported values are based on the properties of full sized units.

Individual Unit Test Results

Properties of Reduced-Size Compression Specimens

		Received Wt, W_R	Cross-Sectional Area[3] Gross	Cross-Sectional Area[3] Net	Max. Load	Compressive Strength Gross	Compressive Strength Net
		lb	in^2	in^2	lb	psi	psi
Date Tested	Unit #1a	12.98	30.56	23.74	84460	2760	3560
6/28/2017	Unit #2a	12.82	30.84	23.74	71260	2310	3000
	Unit #3a	13.50	30.88	23.74	89510	2900	3770
	Unit #4a	13.04	31.43	23.74	100540	3200	4240
	Unit #5a	13.40	31.24	23.74	94620	3030	3990
	Average	13.15	30.99	23.74	88080	2840	3710

[3] Cross-sectional area determined from three absorption specimens saw-cut to the same configuration as compression specimens.

Properties of Full-Size Absorption Specimens

Date Tested: 6/21/2017 to 6/26/2017

	Average Width	Average Height	Average Length	Avg./Min. t_{fs}[4]	Min. t_w	Normalized Web Area	Immersed Weight	Saturated Weight	Oven Dry Weight	Absorption	Density	Net Volume	Percent Solid
	in.	in.	in.	in.	in.	$in.^2/ft^2$	lb	lb	lb	pcf	pcf	ft^3	%
Unit #6	3.63	7.66	23.61	1.14	1.26	28.20	19.66	37.36	36.12	4.4	127.3	0.2837	74.8
Unit #7	3.62	7.64	23.61	1.13	1.26	28.15	19.21	36.84	35.54	4.6	125.8	0.2825	74.8
Unit #8	3.62	7.64	23.61	1.13	1.25	28.00	19.23	36.88	35.58	4.6	125.8	0.2829	74.9
Unit #9	3.66	7.66	23.61	1.15	1.23	22.16	19.09	36.92	35.42	5.2	124.0	0.2857	74.8
Unit #10	3.65	7.65	23.61	1.14	1.25	27.87	19.65	37.48	36.16	4.6	126.5	0.2857	75.0
Average	3.63	7.65	23.61	1.14	1.25	26.88	19.37	37.10	35.76	4.7	125.9	0.2841	74.9

[4] Where the thinnest point of opposite face shells differ in thickness by less than 0.125 inches, their measurements are averaged.

Properties of Reduced Size Absoprtion Specimens for Net Area

Date Tested: 6/19/2017 to 6/21/2017

	Average Width	Average Height	Average Length	Received Weight	Immersed Weight	Saturated Weight	Net Volume
	in.	in.	in.	lb	lb	lb	ft^3
Unit #1b	3.63	7.66	8.43	13.28	7.13	13.59	0.1036
Unit #2b	3.62	7.64	8.52	12.52	6.46	12.94	0.1040
Unit #3b	3.62	7.64	8.53	12.94	6.77	13.33	0.1051
Unit #4b	3.66	7.66	8.60	13.72	7.35	13.99	0.1065
Unit #5b	3.65	7.65	8.57	13.36	7.07	13.69	0.1061
Average	3.63	7.65	8.53	13.16	6.95	13.51	0.1050

Comments: 1) These units meet or exceed the compression strength, absorption and dimensional requirements of ASTM C90-16a.

Nicholas R. Lang
Director of Business Development

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ASTM C140/C140M-17 Test Report
Sampling and Testing Concrete Masonry Units and Related Units

NCMA Job No: 17-362-2B
Report Date: 8/21/2017

Client: Saturn Materials
Address: 350 Yorkville Park Square
Columbus, MS 39702

Testing Agency: National Concrete Masonry Association
Research and Development Laboratory
Address: 13750 Sunrise Valley Drive
Herndon, VA 20171

Unit Specification: ASTM C1634-16

Unit Description/Designation: 4 x 8 x 24 inch Concrete Masonry Unit

Sampling Party: Saturn Materials

Date Samples Received: 6/8/2017

Summary of Test Results

Physical Property	ASTM C1634-16 Required Value		Tested Value	
Net Compressive Strength	2500	psi minimum	4750	psi
Gross Compressive Strength	***		3630	psi
Density	****		121.0	pcf
Absorption	15	pcf maximum	6.9	pcf
Net Cross-Sectional Area	****	in^2	30.8	in^2
Minimum Edge Distance	0.75	in. minimum		in.
Maximum Variation from Specified Dimensions	0.125	in. maximum	0.105	in.

Individual Unit Results

Compression		Received	Cross-Sectional Area *		Max.	Compressive Strength	
	Specimen	Wt, W_r	Gross	Net	Load	Gross	Net
Units	No.	lb	in^2	in^2	lb	psi	psi
	#1	3.92	30.77	23.54	132160	4290	5610
	#2	3.71	30.77	23.54	98530	3200	4190
Date Tested:	#3	3.81	30.77	23.54	104730	3400	4450
8/16/2017	Average	3.81	30.77	23.54	111807	3630	4750

* Unit areas determined as the average of the three absorption units and are assumed to be the same as those units tested in compression. Net cross-sectional area calculated as the product of the length and the width of the units since units are solid.

Absorption	Specimen	Avg Width	Avg Height	Avg Length	Edge Distance
Units	No.	in.	in.	in.	in.
	#4	3.63	2.23	8.43	1.12
	#5	3.62	2.18	8.52	1.13
Date Tested:	#6	3.63	2.26	8.53	1.15
8/7/2017	Average	3.62	2.22	8.49	1.14

	Specimen	Received Wt, WR	Immersed Wt, WI	Saturated Wt, WS	Oven-Dry Wt, WD	Absorp	Density	Net Volume	Percent Solid
	No.	lb	lb	lb	lb	pcf	pcf	ft^3	%
Date Tested:	#4	3.81	2.05	3.92	3.78	4.9	125.6	0.0301	76.1
8/9/2017	#5	3.54	1.89	3.75	3.51	8.2	117.8	0.0298	76.6
to	#6	3.75	2.01	3.95	3.71	7.5	119.6	0.0310	76.8
8/21/2017	Average	3.70	2.05	3.87	3.66	6.9	121.0	0.0303	76.5

Note: 1) These units meet or exceed the compressive strength, absorption and dimensional requirements of ASTM C1634-16.

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ASTM C1262-16 Test Report
Freeze-Thaw Durability

Job No.: 17-362-2C
Report Date: 11/30/2017

Client: Saturn Materials
Address: 350 Yorkville Park Square
Columbus, MS 39702

Testing Agency: National Concrete Masonry Association
Research and Development Laboratory
Address: 13750 Sunrise Valley Drive
Herndon, VA 20171-4662

Unit Designation/Description:
4 x 8 x 24 inch Concrete Masonry Unit
Mark: 'Cored Facing Unit'

Sampling Party: Saturn Materials

Date Samples Received: 6/8/2017
Date Testing Began: 10/2/2017

Test Specimen Dimensions: 1.25 x 4 x 8 in.
Specimen Sample Location: Back molded vertical surface of the unit

Test Media: WATER

Unit No.	Received Weight, (g)	Calculated Oven-Dry Initial Wt. (g)
1	1182.9	1211.9
2	1179.3	1254.4
3	1224.9	1244.4
4	1223.1	1273.7
5	1224.0	1273.3

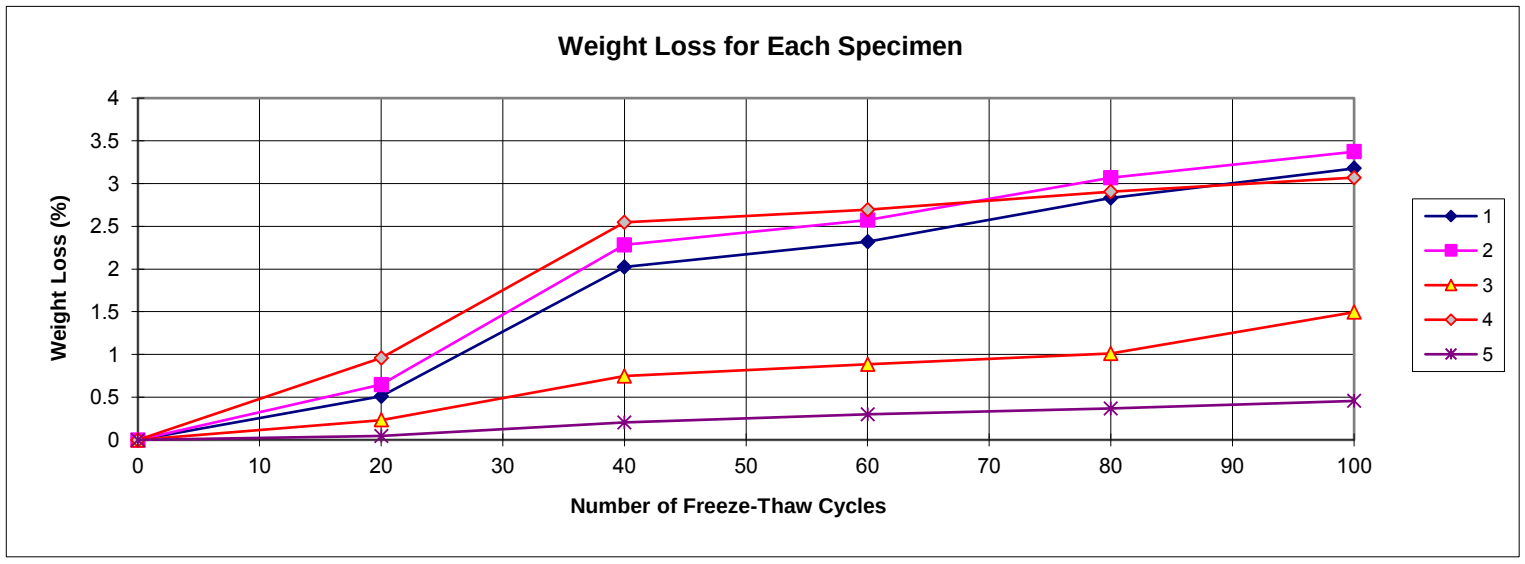
Note: Initial weight calculated as sum of final oven-dry weight of specimen plus oven-dry weight of all collected residue.

Accumulative Residue Weight (g)

Unit No.	Cycle No.: 0	20	40	60	80	100
1	0.0	6.2	24.5	28.1	34.3	38.5
2	0.0	8.1	28.6	32.3	38.5	42.3
3	0.0	2.9	9.3	11.0	12.6	18.6
4	0.0	12.2	32.4	34.3	37.0	39.1
5	0.0	0.6	2.6	3.8	4.7	5.8

Specimen Weight Loss (%)

Unit No.	Cycle No.: 0	20	40	60	80	100
1	0	0.5	2.0	2.3	2.8	3.2
2	0	0.6	2.3	2.6	3.1	3.4
3	0	0.2	0.7	0.9	1.0	1.5
4	0	1.0	2.5	2.7	2.9	3.1
5	0	0.0	0.2	0.3	0.4	0.5



Comment: ASTM C90-16a and ASTM C1634-16 do not contain performance requirements for freeze-thaw durability.

Nicholas R. Lang
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ASTM C1262-16 Test Report
Freeze-Thaw Durability

Job No.: 17-362-2D
Report Date: 11/30/2017

Client: Saturn Materials
Address: 350 Yorkville Park Square
Columbus, MS 39702

Testing Agency: National Concrete Masonry Association
Research and Development Laboratory
Address: 13750 Sunrise Valley Drive
Herndon, VA 20171-4662

Unit Designation/Description:
4 x 8 x 24 inch Concrete Masonry Unit
Mark: 'Cored Facing Unit'

Sampling Party: Saturn Materials

Date Samples Received: 6/8/2017
Date Testing Began: 9/2/2017

Test Specimen Dimensions: 1.25 x 4 x 8 in.
Specimen Sample Location: Back molded vertical surface of the unit

Test Media: 3% SALINE

Unit No.	Received Weight, (g)	Calculated Oven-Dry Initial Wt. (g)
1	1193.0	1195.4
2	1224.9	1079.4
3	1220.9	1109.1
4	1218.1	1233.7
5	1189.1	1180.1

Note: Initial weight calculated as sum of final oven-dry weight of specimen plus oven-dry weight of all collected residue.

Accumulative Residue Weight (g)

Unit No.	Cycle No.: 0	10	20	30	40	50	60
1	0.0	0.0	2.1	7.3	9.8	26.2	42.6
2	0.0	0.0	2.6	7.8	10.1	39.8	83.8
3	0.0	0.0	2.9	8.1	11.0	31.1	31.1
4	0.0	0.0	2.5	9.0	11.2	20.9	69.3
5	0.0	0.0	2.9	9.3	12.1	38.2	64.1

Specimen Weight Loss (%)

Unit No.	Cycle No.: 0	10	20	30	40	50	60
1	0.0	0.0	0.2	0.6	0.8	2.2	3.6
2	0.0	0.0	0.2	0.7	0.9	3.7	7.8
3	0.0	0.0	0.3	0.7	1.0	2.8	2.8
4	0.0	0.0	0.2	0.7	0.9	1.7	5.6
5	0.0	0.0	0.2	0.8	1.0	3.2	5.4

Comment: ASTM C90-16a and ASTM C1634-16 do not contain performance requirements for freeze-thaw durability.

Nicholas R. Lang
Director of Business Development