Architectural Testing

PERFORMANCE TEST REPORT

Rendered to:

ECO-BLOCK®, LLC

PRODUCT: Eco-Block®
Insulating Concrete Forms

Report No: 01-44994.01
Report Date: 08/08/03
Expiration Date: 07/10/07

130 Derry Court
York, PA 17402-9405
phone: 717.764.7700
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www.archtest.com

Architectural Testing

PERFORMANCE TEST REPORT

Rendered to:

ECO-Block®, LLC
11112 Grader Street
Dallas, Texas 75238

Report No: 01-44994.01
Test Dates: 07/08/03
Through: 07/10/03
Report Date: 08/08/03
Expiration Date: 07/10/07

Product: Eco-Block® Insulating Concrete Forms **Bead Type**: Nova 35 MB

Project Summary: Architectural Testing, Inc. (ATI) was contracted by Eco-Block®, LLC, to conduct performance tests on Eco-Block® Insulating Concrete Forms in accordance with ASTM D 1761-88 (Reapproved 2000), *Standard Test Methods for Mechanical Fasteners in Wood.* Samples of the product were selected by Jaques St. Denis of Intertek Testing Services at the Polymos facility in Terrasse Vaudreuil, Quebec on May 28, 2003. The samples were received at ATI's York, Pennsylvania facility on June 4, 2003. Four fasteners were tested with the Eco-Block® product. The withdrawal and lateral resistance load results for each of these fasteners are summarized in the charts below.

ASTM D 1761-88 (Reapproved 2000) Summary of Results
Standard Test Methods for Mechanical Fasteners in Wood

Staple and Screw Withdrawal and Lateral Resistance Tests (Loading Rate = 0.10 in/min)

Fasteners	Avg. Max. Withdrawal Load	Avg. Lat. Load at 0.125" Deflection	Avg. Peak Lateral Loads	Avg. Deflection at Peak Lateral Loads
Dura-Grip #6 x 1-5/8" Course Thread Drywall Screws	156 lbs	95 lbs	191 lbs	0.408"
Dura-Grip #8 x 3" Fine Thread Drywall Screws	171 lbs	154 lbs	309 lbs	0.623"
Bostich BCS1109 1/2" x 1-1/2" 16 ga. Staples	35 lbs	42 lbs	76 lbs	0.487"
#10 x 1-1/2" Wood Screws (Withdrawal Tests Only)	199 lbs	N/A	N/A	N/A
#10 x 2-1/2" Wood Screws (Lateral Tests Only)	N/A	154 lbs	359 lbs	1.260"

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Test Methods: The following test method was used.

ASTM D 1761-88 (Reapproved 2000), *Standard Test Methods for Mechanical Fasteners in Wood.*

Test Specimen Descriptions: All withdrawal tests were performed on visually identical molded plastic nailing webs measuring 15-5/16" long x 2-3/4" high x 1" wide. They are typically embedded into each Eco-Block® foam panel at 8" intervals. Each web had two large center openings and four smaller outer end openings. The ribbed nailing face had thicknesses ranging from 0.17" to 0.27". The walls perpendicularly oriented across the face had 0.17" x 1" cross-sections and were connected by a 0.20" deep member that varied in thickness from 0.26" just below the center large openings to 0.33" just below the smaller openings. The client identified the plastic web material as a "homopolymer polypropylene". One fastener was driven through the nailing face of each web sample, centered over one of the large openings. The end of each fastener extended at least 1/4" below the nailing face wall. The staples were installed perpendicular to the length of the webs. A sufficient portion of each fastener was allowed to remain above the surface to be secured in the gripping device of the test apparatus.

Twenty lateral resistance test samples were cut from whole Eco-Block® Insulating Concrete Forms having nominal dimensions of 16" x 48" x 2.5". Samples 7-7/8" wide x 16" long were cut from the forms in a widthwise direction such that a polypropylene web was centrally embedded in each foam panel. Plywood panels 6" wide by 15" long x 1/2" thick were centered over the embedded webs and attached with two fasteners. The 15" length of the plywood extended 4" beyond the end of the foam panel. Fasteners were driven through the plywood, the foam and into each web at locations 6-1/2" and 9-1/2"from the top of the foam panels. These locations caused the fasteners to be centrally located in the two large openings of the webs. The heads of each screw fastener were driven as close to flush with the plywood surface as possible without the use of any pre-drilled pilot holes. The staples were installed perpendicular to the length of the webs. Approximately 1/4" of the end foam was sawn off the bottom of each lateral resistance sample making the foam end face flush with the bottom of each embedded web.

Test Procedure: All testing was performed in general accordance with the referenced ASTM test method. The specimen materials described above and the fasteners supplied by the client were substituted for the fasteners and wood prisms described in ASTM D 1761. Lateral resistance tests were performed using compressive shear forces instead of tension shear forces. The withdrawal and lateral resistance testing was conducted on a Satec Mats II 50UD Universal Testing Machine (ATI Equipment #Y002011) using a crosshead speed of 0.100" per minute. The Satec machine recorded all loads and deflections. Fixtures for all tests were provided by ATI (see the attached photos). A roller was positioned 1/16" from the face of the plywood before starting each lateral shear test in order to prevent side motion of the plywood away from the foam/web sample.

Test Results: The individual test results are reported in the following tables. The attached printouts from the Satec machine provide additional data.

ASTM D 1761-88 (Reapproved 2000)

Standard Test Methods for Mechanical Fasteners in Wood

Nail, Staple, or Screw Withdrawal Test (Loading Rate = 0.10 in/min)
Maximum Withdrawal Loads (lbs)

Fastener	Dura-Grip #6 x 1-5/8" Course Thread Drywall Screws	Dura-Grip #8 x 3" Fine Thread Drywall Screws	Bostich BCS1109 1/2" x 1-1/2" 16 ga. Staples	#10 x 1-1/2" Wood Screws
1	148	181	34	204
2	164	174	31	166
3	165	171	37	215
4	146	184	34	185
5	161	175	38	213
6	148	179	37	201
7	157	151	33	205
8	154	164	37	203
9	156	172	32	202
10	159	158	39	195
Average:	**156**	**171**	**35**	**199**
Std. Dev.:	**7**	**10**	**3**	**14**

Test Results: (Continued)

ASTM D 1761-88 (Reapproved 2000)
Standard Test Methods for Mechanical Fasteners in Wood

Lateral Nail, Staple, or Screw Resistance Test (Loading Rate = 0.10 in/min)

Fastener	Combined Load (lbs) at 0.125" Deflection for Two Fasteners	Average Load (lbs) at 0.125" Deflection for Each Fastener	Combined Peak Load (lbs) for Two Fasteners	Average Peak Load (lbs) for Each Fastener	Deflection (in) at Peak Load
Dura-Grip #6 x 1-5/8" Course Thread Drywall Screws					
1 & 2	193	97	330	165	0.407
3 & 4	192	96	542	271	0.577
5 & 6	195	97	343	172	0.404
7 & 8	190	95	415	208	0.382
9 & 10	179	89	283	142	0.271
Average:	**190**	**95**	**383**	**191**	**0.408**
Std. Dev.:	**6**	**3**	**101**	**50**	**0.110**
Dura-Grip #8 x 3" Fine Thread Drywall Screws					
1 & 2	314	157	617	308	0.558
3 & 4	274	137	611	305	0.667
5 & 6	364	182	675	338	0.660
7 & 8	288	144	523	262	0.532
9 & 10	300	150	663	331	0.698
Average:	**308**	**154**	**618**	**309**	**0.623**
Std. Dev.:	**35**	**17**	**60**	**30**	**0.073**
Bostich BCS1109 1/2" x 1-1/2" 16 ga. Staples					
1 & 2	72	36	147	74	0.698
3 & 4	83	42	154	77	0.406
5 & 6	82	41	160	80	0.621
7 & 8	94	47	150	75	0.352
9 & 10	91	45	151	76	0.359
Average:	**84**	**42**	**153**	**76**	**0.487**
Std. Dev.:	**9**	**4**	**5**	**2**	**0.161**
#10x2-1/2" Wood Screws					
1 & 2	232	116	597	298	0.596
3 & 4	327	163	728	364	0.705
5 & 6	270	135	729	364	0.768
7 & 8	302	151	789	394	2.288
9 & 10	407	204	753	376	1.941
Average:	**308**	**154**	**719**	**359**	**1.260**
Std. Dev.:	**66**	**33**	**73**	**36**	**0.792**

Architectural Testing

A copy of this report and representative test samples will be retained by ATI for a period of four years. This report is the exclusive property of the client so named herein and is applicable only to the samples tested. Results obtained are tested values and do not constitute an opinion or endorsement by this laboratory. This report may not be reproduced, except in full, without the approval of Architectural Testing.

For ARCHITECTURAL TESTING, INC.:

Stephen L. Mott

Digitally Signed by: Stephen L. Mott

Stephen L. Mott
Senior Technician - Component/Materials Testing

Digitally Signed by: Todd D. Burroughs

Todd D. Burroughs
Director - Component/Materials Testing

SLM:slm/nlb
01-44994.01

Attachments
Test Photographs
Satec Printouts/Graphs

DOCUMENT CONTROL ADDENDUM #01-44994.00

Current Issue Date: 08/08/03

Report No.: 01-44994.01

Requested by: Sheldon Warman, P.E., Eco-Block® LLC
Purpose: ASTM D 1761-88 (00) testing of Eco-Block® Insulating Concrete Forms.
Issued Date: 08/08/03
Comments:

Fastener Design Loads

Effective April 26, 2005

	Lateral Shear (lbs) Tested in accordance with ASTM D1761	**Withdrawal (lbs)** Tested in accordance with ASTM D1761
Dura- Grip # 6 x 1 ⅝" Course Thread Drywall Screw	**49.8**	**31.2**
Dura- Grip # 8 x 3" Fine Thread Drywall Screws	**96.5**	**34.2**
#10 x 1½" Wood Screws	**112.3**	**39.8**
Bostich BCS1109 ½" x 1½" 16 gauge Staples	**23.8**	**7.1**

Analyzed in accordance with ICCES AC116

Architectural Testing Inc Test Report # 01-44994.01

Fastener Ultimate Loads

	Average Ultimate Lateral Shear (lbs) Tested in accordance with ASTM D1761	**Average Ultimate Withdrawal (lbs)** Tested in accordance with ASTM D1761
Dura- Grip # 6 x 1 ⅝" Course Thread Drywall Screw	**159.3**	**155.8**
Dura- Grip # 8 x 3" Fine Thread Drywall Screws	**308.8**	**171.0**
#10 x 1½" Wood Screws	**359.5**	**199.0**
Bostich BCS1109 ½" x 1½" 16 gauge Staples	**76.3**	**35.3**

Architectural Testing Inc Test Report # 01-44994.01

Data Analysis By;

Sheldon Warman, P.Eng.
Technical Director, ECO-Block®, LLC

Architectural Testing Report No. 01-44994.01
ECO-Block, LLC
ASTM D 1761 Withdrawal Results (Four Fastener Types)
Test Dates: 07/08/03 thru 07/10/03
Tech: Steve Mott (Assisted by Tim Donnan)
Material: Polypropylene Web (only)

ASTM D 1761 Maximum Withdrawal Loads (lbs

Fastener #	**Dura- Grip #6x1-5/8" Course Thread Drywall Screws**	**Dura- Grip #8x3" Fine Thread Drywall Screws**	**Bostich BCS1109 1/2"x1-1/2" 16 ga. Staples**	**#10x1-1/2" Wood Screws**
1	148	181	34	204
2	164	174	31	166
3	165	171	37	215
4	146	184	34	185
5	161	175	38	213
6	148	179	37	201
7	157	151	33	205
8	154	164	37	203
9	156	172	32	202
10	159	158	39	195
Average:	155.8	171.0	35.3	199.0
Std. Dev.:	7	10	3	15
Coefficient of Variation:	4.6%	5.8%	7.4%	7.6%
Design Load per AC116	**31.2**	**34.2**	**7.1**	**39.8**

Data Analysis By;

Sheldon Warman, P.Eng.
Technical Director, ECO-Block®, LLC

01-44994.01
ECO-Block, LLC
ASTM D 1761 Lateral Results (Four Fastener Types)
Test Dates: 07/11/03 thru 07/14/03
Tech: Steve Mott
Material: Polypropylene Webs Molded in Foam Panels/Plywood Cleats Secured with Two Fasteners per Assembly

ASTM D 1761 Lateral Loads

Fastener: Dura- Grip #6x1-5/8" Course Thread Drywall Screws

Fastener #s	Combined Load (lbs) at 0.125" Deflection for Two Fasteners	Average Load (lbs) at 0.125" Deflection for Each Fastener	Combined Peak Load (lbs) for Two Fasteners	Average Peak Load (lbs) for Each Fastener	Deflection (in) at Peak Load
1 & 2	193	97	330	165	0.407
3 & 4	192	96	542	**na**	0.577
5 & 6	195	97	343	172	0.404
7 & 8	190	95	415	**na**	0.382
9 & 10	179	89	283	142	0.271
Average:	190	95	383	159.3	0.408
Std. Dev.:	6	3	101	16	0.110
Coefficient of Variation:				9.8%	
Design Load per AC116		71.2		57.1	@ COV 9.8%
		@ 75% Proportional Limit		**49.8**	**Avg Peak @ SF 3.2**

ASTM D 1761 Lateral Loads

Fastener: Dura-Grip #8x3" Fine Thread Drywall Screws

Fastener #s	Combined Load (lbs) at 0.125" Deflection for Two Fasteners	Average Load (lbs) at 0.125" Deflection for Each Fastener	Combined Peak Load (lbs) for Two Fasteners	Average Peak Load (lbs) for Each Fastener	Deflection (in) at Peak Load
1 & 2	314	157	617	308	0.558
3 & 4	274	137	611	305	0.667
5 & 6	364	182	675	338	0.660
7 & 8	288	144	523	262	0.532
9 & 10	300	150	663	331	0.698
Average:	308	154	618	308.8	0.623
Std. Dev.:	35	17	60	30	0.073
Coefficient of Variation:				9.7%	
Design Load per AC116		115.6		164.6	@ COV 9.7%
		@ 75% Proportional Limit		**96.5**	**Avg Peak @ SF 3.2**

ASTM D 1761 Lateral Loads

Fastener: Bostich BCS1109 1/2"x1-1/2" 16 ga. Staples

Fastener #s	Combined Load (lbs) at 0.125" Deflection for Two Fasteners	Average Load (lbs) at 0.125" Deflection for Each Fastener	Combined Peak Load (lbs) for Two Fasteners	Average Peak Load (lbs) for Each Fastener	Deflection (in) at Peak Load
1 & 2	72	36	147	74	0.698
3 & 4	83	42	154	77	0.406
5 & 6	82	41	160	80	0.621
7 & 8	94	47	150	75	0.352
9 & 10	91	45	151	76	0.359
Average:	84	42	153	76.3	0.487
Std. Dev.:	9	4	5	2	0.161
Coefficient of Variation:				3.1%	
Design Load per AC116		31.6		31.9	@ COV 3.1%
		@ 75% Proportional Limit		**23.8**	**Avg Peak @ SF 3.2**

ASTM D 1761 Lateral Loads

Fastener: #10x2-1/2" Wood Screws

Fastener #s	Combined Load (lbs) at 0.125" Deflection for Two Fasteners	Average Load (lbs) at 0.125" Deflection for Each Fastener	Combined Peak Load (lbs) for Two Fasteners	Average Peak Load (lbs) for Each Fastener	Deflection (in) at Peak Load
1 & 2	232	116	597	298	0.596
3 & 4	327	163	728	364	0.705
5 & 6	270	135	729	364	0.768
7 & 8	302	151	789	394	2.288
9 & 10	407	204	753	376	1.941
Average:	308	154	719	359.5	1.260
Std. Dev.:	66	33	73	36	0.792
Coefficient of Variation:				10.1%	
Design Load per AC116		115.4		128.0	@ COV 10.1%
		@ 75% Proportional Limit		**112.3**	**Avg Peak @ SF 3.2**