TEST REPORT

REPORT NUMBER: 3193927TOR-003
ORIGINAL ISSUE DATE: December 18, 2009

EVALUATION CENTER

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RENDERED TO

NUDURA CORPORATION
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PRODUCT EVALUATED: Nudura Insulating Concrete Forms High Performance Wall Systems

EVALUATION PROPERTY: Testing of Webs for Fastener Strength (Lateral Shear and Withdrawal Resistance)

Report of Testing Nudura Insulating Concrete Forms for compliance with the applicable requirements of the following criteria: ICC Evaluation Services' AC 353 *Acceptance Criteria for Stay-in-Place, Foam Plastic Insulating Concrete Form (ICF) System for Solid Concrete Walls* dated October 2007.

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2 Introduction

Intertek has conducted a testing program for Nudura Corporation on Nudura Insulating Concrete Forms High Performance to evaluate fastener strength. Samples were tested for fastener withdrawal and lateral shear resistance from the Insulating Concrete Form web flanges. Testing was conducted in accordance with ICC Evaluation Services' AC 353 *Acceptance Criteria for Stay-in-Place, Foam Plastic Insulating Concrete Form (ICF) System for Solid Concrete Walls* dated October 2007. This evaluation began November 17, 2009 and was completed December 16, 2009.

3 Test Samples

3.1. SAMPLE SELECTION

The subject test specimens are traceable samples and verified to be on normal manfufacturing procedures from two of Nudura's manufacturing facilities. Details of the sample selection are outlined in Table 1 below.

Table 1. Nudura Insulating Concrete Forms Sample Selection Details

MANUFACTURER	MANUFACTURING ADDRESS	INTERTEK REPRESENTATIVE	DATE SAMPLED
Polyform Incorporated	Granby, Quebec Canada	Jean-Philippe Plourde	October 13, 2009
ICForm	Columbus, Georgia	Ron Hensley	November 10, 2009

The samples selection was conducted in compliance with Section 3.1 of ICC-ES AC 85.

3.2. SAMPLE AND ASSEMBLY DESCRIPTION

Material: Nudura Insulating Concrete Forms

Panel Material: Type II expanded polystyrene foam.

Foam Panel Dimensions: 458 mm (18 in) high by 2438 mm (96 in) wide by 67 mm thick each side

Color: Blue / Green

Web Material: Injection Molded Polypropylene

Web Spacing: Every 8" horizontally

Web Color: Black

Table 2 outlines the fasteners used for both fastener withdrawal resistance and lateral shear testing.

Table 1. Fastener Description

Paulin Dura-Grip 6 x 2 Coarse Drywall Screws
8 x 2 Metal Screws Number 608-648
8 x 2 Construction Screws Number 214-633
Compass Marker Darts 8 x 1-3/4 Cement Board Screws
10 x 2 Metal Screws Number 208-700
10 X 2 Wood Screws Number 197-700
Trillium Screw 10 x 2 Hex Head with Washer Coarse Thread Self Tapping
12 x 2 Metal Screws Number 846-256
Fastenel HWSL SMS 14 X 2 ZA Screws Number 1131155
1/4 - 14 X 1-3/4 AB Screws
Tree Island 1-1/2” Ring Nails
6” Brick Ledge Screws[1]

Note 1: This fastener was tested by client request for fastener withdrawal only

The fastener withdrawal and lateral shear tests were both performed on Nudura Insulated Concrete Form specimens filled with concrete. The fasteners were inserted into the webs of the insulated concrete forms, with the fastener head exposed. Concrete was 3/8" pea gravel 2900 psi (20 MPa) strength.

4 Testing and Evaluation Methods

Testing was conducted in accordance with ICC-ES AC 353 *Acceptance Criteria for Stay-in-Place, Foam Plastic Insulating Concrete Form (ICF) System for Solid Concrete Walls* dated October 2007, referencing ASTM D 1761-06.

4.1. FASTENER WITHDRAWAL STRENGTH

Fastener withdrawal testing was conducted on ten (10) of each type of fastener submitted per Table 1 of this report. Each fastener was driven into the centre of the width of the web specimens without pre-drilling pilot holes. This left a 1/2" length of each fastener head exposed. Fasteners were inserted a minimum of 4” apart and from any end of a web specimen. Concrete filled ICF test specimen panels cut to 16” wide and containing two webs in the specimen blocks were prepared for the testing. The ICF test block specimens were restrained from movement, and the exposed fastener head connected to a universal test machine. Each fastener test specimen was loaded using a cross head speed of 0.1 in / min movement until ultimate load (deemed the test specimen failure) was reached. Further details of the test setup can be found in Appendix A.

Allowable fastener withdrawal loads were determined by dividing the average ultimate load for all fastener withdrawal tests for the fastener type in question, by a safety factor of 5. The Allowable Loads are outlined in Table 2 of this report.

4.2. LATERAL SHEAR STRENGTH

Lateral load resistance testing was conducted on ten (10) of each type of fastener submitted per Table 1 of this report. Each test fastener was driven into the centre of the width of the web specimens without pre-drilling pilot holes. The lateral resistance test samples used a 150 mm (6”) long by 150 mm (6”) by 1/2" plywood with one (1) fastener. Fasteners were inserted a minimum of 4” apart and from any end of a web specimen. Concrete filled Insulated concrete form test specimen panels 16” wide with two webs in the specimen panels were used for the test. The fasteners went through the 1/2" plywood, and penetrated through the web. Concrete filled ICF test specimen panels cut to 16” wide and containing two webs in the specimen blocks were prepared for the testing. The ICF test block specimens were restrained from movement, and the exposed fastener head connected to a universal test machine with the plywood panel aligned with the compression direction for the cross head. A load was applied to the top edge of the plywood at a cross head speed of 2.5 mm/min (0.10 in/min), causing shear in the fastener specimen. The downward movement of the plywood panel was measured with a linear transducer to determine the load strain relationship. Further details of the test setup can be found in Appendix A.

The conservative value between 75% of the average Proportional Limit Load or the average Ultimate Load divided by a safety factor was selected as the allowable shear resistance.

Where the coefficient of variation (COV) for the ultimate shear load for all test samples of a given fastener type was less than 15%, a safety factor of 3.2 was applied.

Where the COV for the ultimate shear load for all test samples of a given fastener type was greater than 15%, the allowable shear load was calculated using the following equation:

$\mathbf{F_{all} = F(1 - 2 * COV / 2.24)}$ Where

$\mathbf{F_{all}}$ = Allowable Load, pounds (N).
COV = Coefficient of variation in a test series.
F = Average Ultimate Load in test series, pounds (N)

4.3. DEVIATION FROM STANDARD

ASTM D 1761–06 is for testing mechanical fasteners in wood and specifies the dimensions and pre-conditioning of the wood materials to be used. This test method was modified to be used for testing of plastic ICF webs cast into EPS foam insulation. The method specifies that pilot holes be drilled prior to inserting the fasteners. Since this not normally part of the installation procedure we did not pre-drill pilot holes prior to installing the fasteners.

5 Testing and Evaluation Results

5.1. RESULTS AND OBSERVATIONS

Table 2. Fastener Withdrawal Test Results

Test Result		
Fastener Type	**Ultimate Load, lbs (N)**	**Allowable Load (Ultimate Load / 5) lbs (N)**
Paulin Dura-Grip 6 x 2 Coarse Drywall Screws	201 (895)	**40 (179)**
8 x 2 Metal Screws Number 608-64	219 (975)	**44 (195)**
Compass Marker Darts 8 x 1-3/4 Cement Board Screws	233 (1035)	**47 (207)**
#8 x 2 Construction Screws Number 214-633	235 (1044)	**47 (209)**
10 X 2 Metal Screws Number 208-700	234 (1042)	**47 (208)**
10 X 2 Wood Screws Number 197-700	254 (1130)	**51 (226)**
Trillium Screw 10 x 2 Hex Head with Washer Coarse Thread Self Tapping	255 (1136)	**51 (227)**
12 x 2 Metal Screws Number 846-256	247 (1100)	**49 (220)**
Fastenel HWSL SMS 14 X 2 ZA Screws Number 1131155	242 (1231)	**55 (246)**
1/4 - 14 X 1-3/4 AB Screws	248 (1101)	**50 (220)**
Tree Island 1-1/2” Ring Nails	90 (402)	**18 (80)**
6” Brick Ledge Screws	271 (1203)	**54 (241)**

Note: The allowable withdrawal load is determined as the ultimate load divided by a safety factor of 5.

Table 3. Fastener Lateral Shear Resistance

Test Result					
Fastener Type	**Ultimate Load, lbs (N)**	**Ultimate Load / 3.2, lbs (N)**	**Proportional Limit lbs (N)**	**Proportional Limit x 75%, lbs (N)**	**Allowable Load, lbs (N)**
Paulin Dura-Grip 6 x 2 Coarse Drywall Screws	257 (1145)	80 (356)	86 (383)	65 (289)	**65 (289)**
8 x 2 Metal Screws Number 608-64	284 (1263)	89 (396)	74 (327)	55 (245)	**55 (245)**
Compass Marker Darts 8 x 1-3/4 Cement Board Screws	316 (1406)	99 (440)	110 (491)	83 (369)	**83 (369)**
#8 x 2 Construction Screws Number 214-633	290 (1291)	91 (405)	107 (475)	80 (356)	**80 (356)**
10 X 2 Metal Screws Number 208-700	322 (1430)	100 (445)	102 (452)	76 (338)	**76 (338)**
10 X 2 Wood Screws Number 197-700	396 (1318)	93 (414)	124 (553)	93 (414)	**89 (396)**[2]
Trillium Screw 10 x 2 Hex Head with Washer Coarse Thread Self Tapping	348 (1549)	109 (485)	157 (697)	117 (520)	**109 (485)**
12 x 2 Metal Screws Number 846-256	363 (1616)	114 (507)	119 (529)	89 (396)	**89 (396)**
Fastenel HWSL SMS 14 X 2 ZA Screws Number 1131155	465 (2068)	145 (645)	97 (431)	73 (325)	**73 (325)**[2]
1/4 - 14 X 1-3/4 AB Screws	404 (1797)	126 (560)	137 (611)	103 (458)	**103 (458)**
Tree Island 1-1/2" Ring Nails	54 (238)	17 (76)	36 (160)	27 (120)	**11 (49)**[2]

Note 2: The Test Ultimate Load Achieved Coefficient of Variation for the sample population was determined to be greater than 15%. As such, a new factor of safety was determined in accordance with Section 4.2 of this report. The lower value between the ultimate load divided by the new factor of safety, and 75% of the proportional limit was determined as the allowable load. See the data sheets for further information.

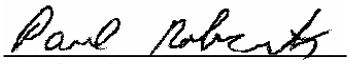
7 Conclusion

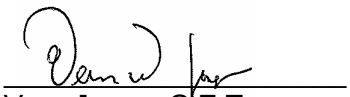
Intertek has conducted a testing program for Nudura Corporation on Nudura Insulating Concrete Forms High Performance to evaluate fastener strength. Samples were tested for fastener withdrawal and lateral shear resistance from the Insulating Concrete Form web flanges. Testing was conducted in accordance with ICC Evaluation Services' AC 353 *Acceptance Criteria for Stay-in-Place, Foam Plastic Insulating Concrete Form (ICF) System for Solid Concrete Walls* dated October 2007. This evaluation began November 17, 2009 and was completed December 16, 2009.

The fasteners listed in Table 1 of this report have achieved the allowable loads outlined in Section 6 when tested in accordance with ICC-ES AC353 for fastener withdrawal and lateral shear resistance.

Tested by: Paul Roberts

INTERTEK

Reported by: 
Paul Roberts
Physical Testing Services

Reviewed by: 
Vern Jones, C.E.T.
Manager
Physical Testing Services

APPENDIX A

Photographs (15 Pages)

Photograph No. 1: Showing a typical insulated concrete form specimen as received.

Photograph No. 2: Showing Paulin Fasteners 6 x 2 Coarse Drywall Screw

Photograph No. 3: Showing Fasteners 8 x 2 Metal Screws Number 608-648

Photograph No. 4: Showing Fasteners Compass Marker Darts 8 x 1-3/4 Cement Board Screws

Photograph No. 5: Showing Fasteners #8 x 2 Construction Screws Number 214-633

Photograph No. 6: Showing Fasteners 10 x 2 Metal Screws Number 208-700

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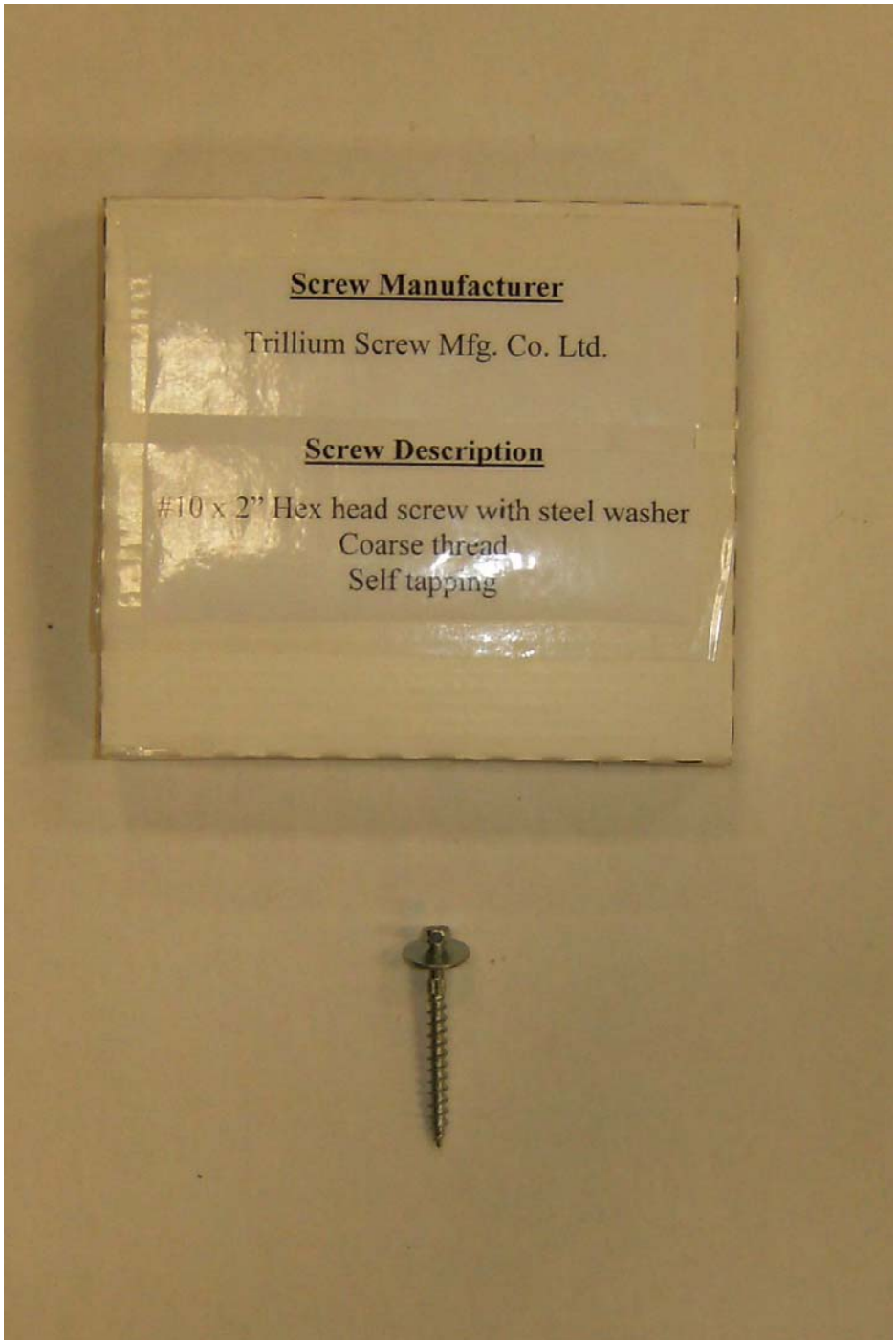
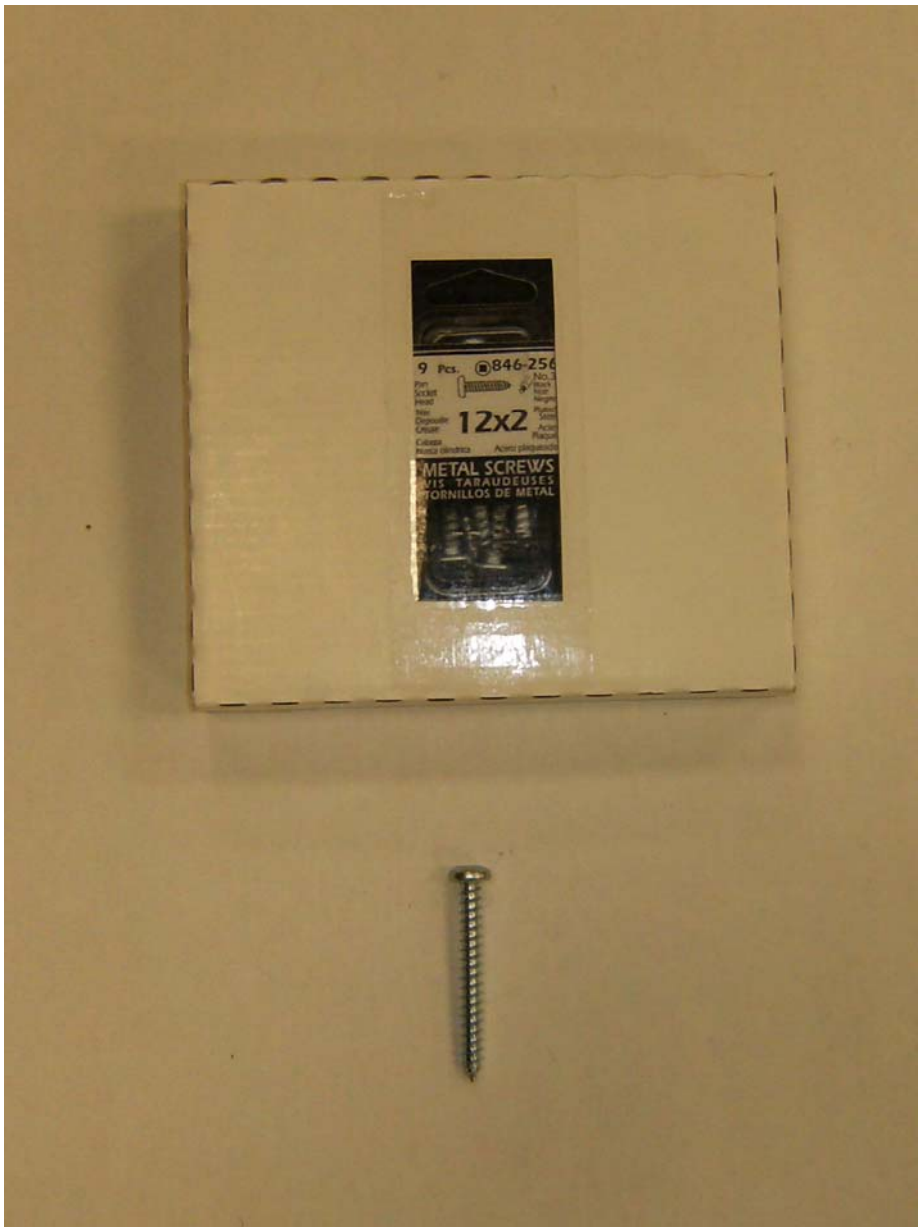
Photograph No. 7: Showing Fasteners 10 X 2 Wood Screws Number 197-700

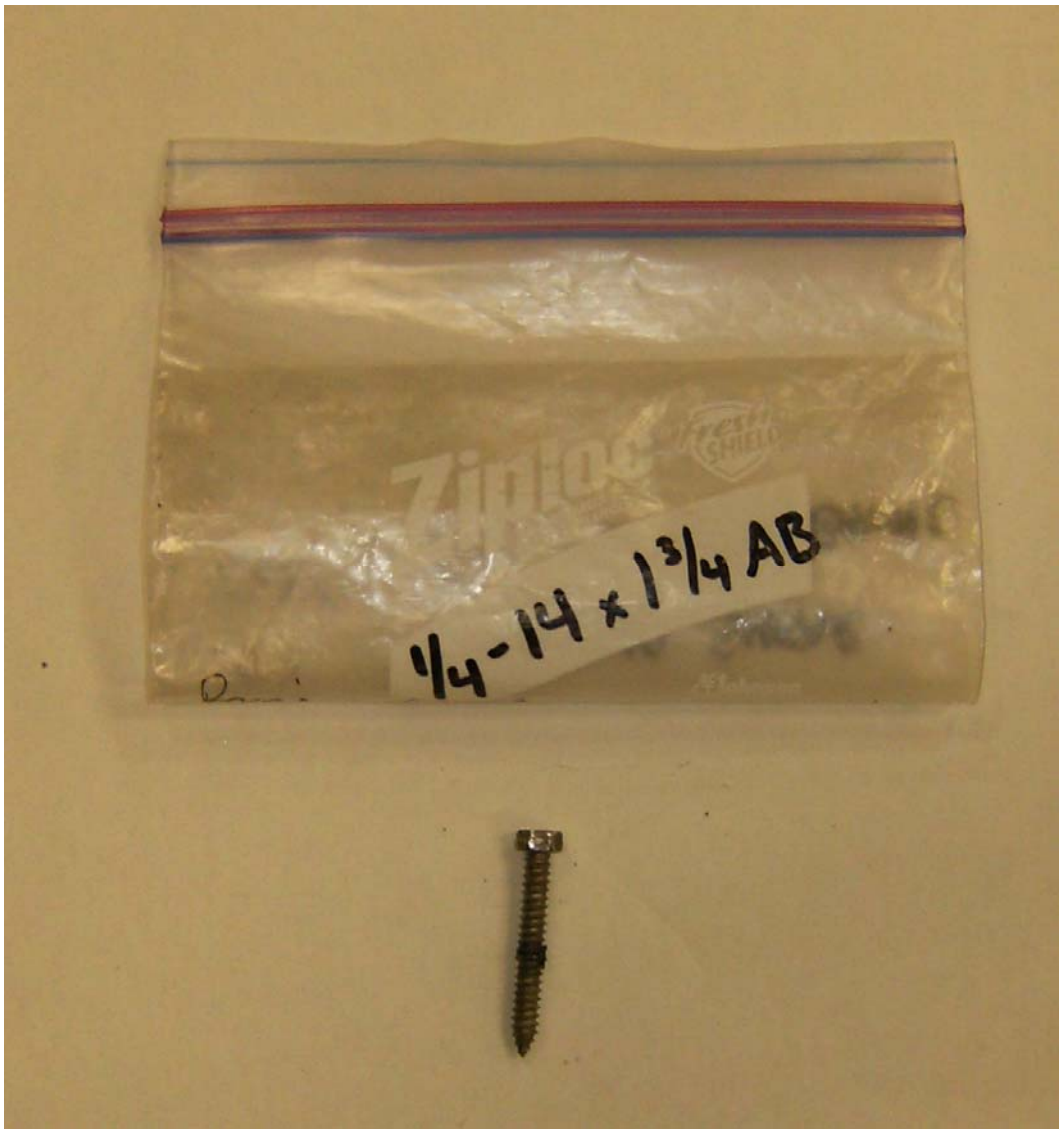


Photograph No. 8: Showing Fasteners Trillium Screw 10 x 2 Hex Head with Washer Coarse Thread Self Tapping



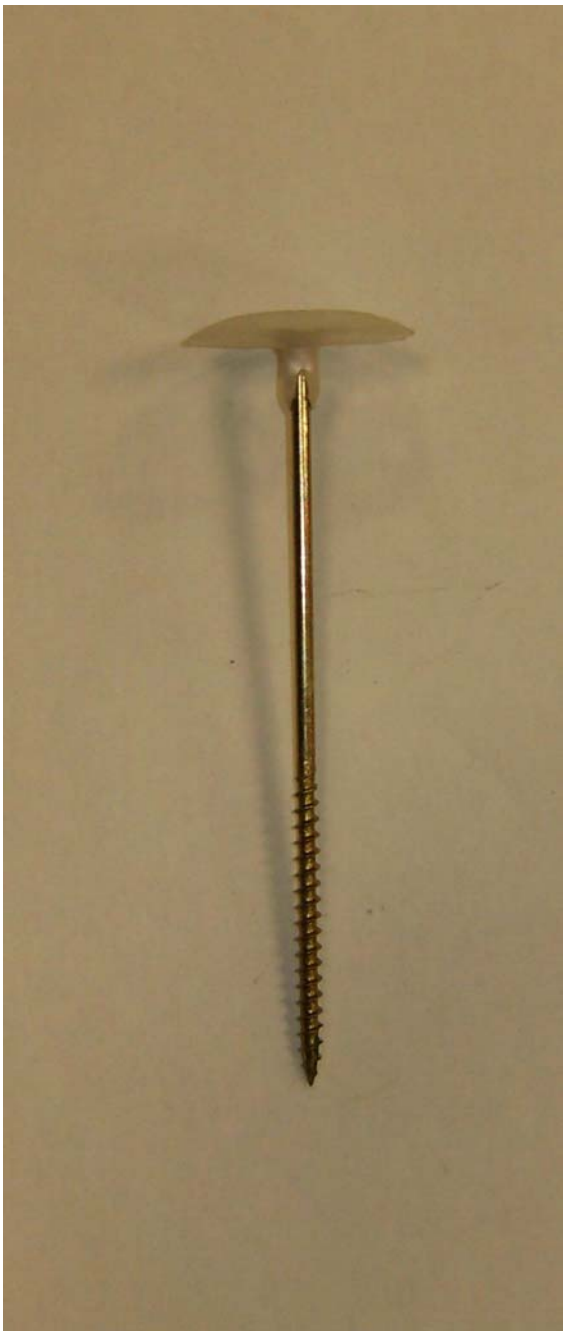
Photograph No. 9: Showing Fasteners 12 X 2 Metal Screws Number 846-256

Photograph No. 10: Showing Fasteners Fastenel HWSL SMS 14 X 2 ZA Screws Number 1131155



Photograph No. 11: Showing Fasteners 1/4 - 14 X 1-3/4 AB Screws

Photograph No. 12: Showing Tree Island Fasteners 1-1/2" Ring Nails



Photograph No. 13: Showing Fastener 6” Brick Ledge Screws

Photograph No. 14: Showing test set-up for screw and nail withdrawal test using Satec Unidrive Testing Machine.

Photograph No. 15: Showing set-up for lateral fastener resistance tests.

APPENDIX B

Fastener Withdrawal Test Results (12 Pages)

Test:	**Fastener Withdrawel Testing**	**Project:**	3193927
Date:	December 8, 2009	**Eng/Tech:**	Benson P.
Client:	Nudura Incorporated		
Product:	Nudura Insulated Concrete Forms		
Fastener:	Paulin Fasteners Dura-Grip 6 x 2 Coarse Drywall Screws		
Method:	ICC-ES AC353 *Acceptance Criteria for Stay in Place, Foam Plastic Insulating Concrete Form (ICF) Systems for Solid Concrete Walls* approved October 2007		
	ASTM D1761-06, *Standard Test Methods for Mechanical Fasteners in Wood*		
Conditioning:	48 hours at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%		
Crosshead Speed:	0.1 in/min		
Equipment:	Baldwin Universal Tester		
	s/n: 280-01-0015		
	Calibration Date: September 16, 2010		
	Uncertainty: 0.25%		

Specimen	Maximum Load		Allowable Load	
	(lbf)	(N)	(lbf)	(N)
1	196	872	39	174
2	209	930	42	186
3	195	867	39	173
4	184	818	37	164
5	194	863	39	173
6	175	778	35	156
7	215	956	43	191
8	212	943	42	189
9	241	1072	48	214
10	190	845	38	169
Mean:	**201**	**895**	**40**	**179**
StdDev:	**19**	**84**	**4**	**17**
COV:	**9%**	**9%**	**9%**	**9%**

Note: Allowable Load Based on a Safety Factor of 5 Applied

Test:	**Fastener Withdrawel Testing**	**Project:**	3193927
Date:	December 8, 2009	**Eng/Tech:**	Benson P.
Client:	Nudura Incorporated		
Product:	Nudura Insulated Concrete Forms		
Fastener:	8 x 2 Metal Screws Number 608-64		
Method:	ICC-ES AC353 *Acceptance Criteria for Stay in Place, Foam Plastic Insulating Concrete Form (ICF) Systems for Solid Concrete Walls* approved October 2007 ASTM D1761-06, *Standard Test Methods for Mechanical Fasteners in Wood*		
Conditioning:	48 hours at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%		
Crosshead Speed:	0.1 in/min		
Equipment:	Baldwin Universal Tester s/n: 280-01-0015 Calibration Date: September 16, 2010 Uncertainty: 0.25%		

Specimen	Maximum Load		Allowable Load	
	(lbf)	(N)	(lbf)	(N)
1	194	863	39	173
2	263	1170	53	234
3	219	974	44	195
4	279	1241	56	248
5	216	961	43	192
6	203	903	41	181
7	223	992	45	198
8	186	827	37	165
9	205	912	41	182
10	205	912	41	182
Mean:	**219**	**975**	**44**	**195**
StdDev:	**30**	**132**	**6**	**26**
COV:	**14%**	**14%**	**14%**	**14%**

Note: Allowable Load Based on a Safety Factor of 5 Applied

Test:	**Fastener Withdrawel Testing**	**Project:**	3193927
Date:	December 8, 2009	**Eng/Tech:**	Benson P.
Client:	Nudura Incorporated		
Product:	Nudura Insulated Concrete Forms		
Fastener:	Compass Marker Darts 8 x 1-3/4 Cement Board Screws		
Method:	ICC-ES AC353 *Acceptance Criteria for Stay in Place, Foam Plastic Insulating Concrete Form (ICF) Systems for Solid Concrete Walls* approved October 2007		
	ASTM D1761-06, *Standard Test Methods for Mechanical Fasteners in Wood*		
Conditioning:	48 hours at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%		
Crosshead Speed:	0.1 in/min		
Equipment:	Baldwin Universal Tester		
	s/n: 280-01-0015		
	Calibration Date: September 16, 2010		
	Uncertainty: 0.25%		

Specimen	Maximum Load		Allowable Load	
	(lbf)	(N)	(lbf)	(N)
1	243	1081	49	216
2	269	1197	54	239
3	223	992	45	198
4	253	1125	51	225
5	224	996	45	199
6	203	903	41	181
7	236	1050	47	210
8	248	1103	50	221
9	221	983	44	197
10	206	916	41	183
Mean:	**233**	**1035**	**47**	**207**
StdDev:	**21**	**94**	**4**	**19**
COV:	**9%**	**9%**	**9%**	**9%**

Note: Allowable Load Based on a Safety Factor of 5 Applied

Test:	**Fastener Withdrawel Testing**	**Project:**	3193927
Date:	December 8, 2009	**Eng/Tech:**	Benson P.
Client:	Nudura Incorporated		
Product:	Nudura Insulated Concrete Forms		
Fastener:	#8 x 2 Construction Screws Number 214-633		
Method:	ICC-ES AC353 *Acceptance Criteria for Stay in Place, Foam Plastic Insulating Concrete Form (ICF) Systems for Solid Concrete Walls* approved October 2007		
	ASTM D1761-06, *Standard Test Methods for Mechanical Fasteners in Wood*		
Conditioning:	48 hours at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%		
Crosshead Speed:	0.1 in/min		
Equipment:	Baldwin Universal Tester		
	s/n: 280-01-0015		
	Calibration Date: September 16, 2010		
	Uncertainty: 0.25%		

Specimen	Maximum Load		Allowable Load	
	(lbf)	(N)	(lbf)	(N)
1	237	1054	47	211
2	228	1014	46	203
3	336	1495	67	299
4	258	1148	52	230
5	221	983	44	197
6	199	885	40	177
7	199	885	40	177
8	221	983	44	197
9	205	912	41	182
10	244	1085	49	217
Mean:	**235**	**1044**	**47**	**209**
StdDev:	**40**	**180**	**8**	**36**
COV:	**17%**	**17%**	**17%**	**17%**

Note: Allowable Load Based on a Safety Factor of 5 Applied

Test:	**Fastener Withdrawel Testing**	**Project:**	3193927
Date:	December 8, 2009	**Eng/Tech:**	Benson P.
Client:	Nudura Incorporated		
Product:	Nudura Insulated Concrete Forms		
Fastener:	10 x 2 Metal Screws Number 208-700		
Method:	ICC-ES AC353 *Acceptance Criteria for Stay in Place, Foam Plastic Insulating Concrete Form (ICF) Systems for Solid Concrete Walls* approved October 2007		
	ASTM D1761-06, *Standard Test Methods for Mechanical Fasteners in Wood*		
Conditioning:	48 hours at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%		
Crosshead Speed:	0.1 in/min		
Equipment:	Baldwin Universal Tester		
	s/n: 280-01-0015		
	Calibration Date: September 16, 2010		
	Uncertainty: 0.25%		

Specimen	Maximum Load		Allowable Load	
	(lbf)	(N)	(lbf)	(N)
1	244	1085	49	217
2	273	1214	55	243
3	233	1036	47	207
4	249	1108	50	222
5	220	979	44	196
6	212	943	42	189
7	250	1112	50	222
8	228	1014	46	203
9	234	1041	47	208
10	199	885	40	177
Mean:	**234**	**1042**	**47**	**208**
StdDev:	**21**	**94**	**4**	**19**
COV:	**9%**	**9%**	**9%**	**9%**

Note: Allowable Load Based on a Safety Factor of 5 Applied

Test:	**Fastener Withdrawel Testing**	**Project:**	3193927
Date:	December 8, 2009	**Eng/Tech:**	Benson P.
Client:	Nudura Incorporated		
Product:	Nudura Insulated Concrete Forms		
Fastener:	10 X 2 Wood Screws Number 197-700		
Method:	ICC-ES AC353 *Acceptance Criteria for Stay in Place, Foam Plastic Insulating Concrete Form (ICF) Systems for Solid Concrete Walls* approved October 2007		
	ASTM D1761-06, *Standard Test Methods for Mechanical Fasteners in Wood*		
Conditioning:	48 hours at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%		
Crosshead Speed:	0.1 in/min		
Equipment:	Baldwin Universal Tester		
	s/n: 280-01-0015		
	Calibration Date: September 16, 2010		
	Uncertainty: 0.25%		

Specimen	Maximum Load		Allowable Load	
	(lbf)	(N)	(lbf)	(N)
1	256	1139	51	228
2	257	1143	51	229
3	323	1437	65	287
4	311	1383	62	277
5	290	1290	58	258
6	173	770	35	154
7	219	974	44	195
8	240	1068	48	214
9	249	1108	50	222
10	222	988	44	198
Mean:	**254**	**1130**	**51**	**226**
StdDev:	**45**	**201**	**9**	**40**
COV:	**18%**	**18%**	**18%**	**18%**

Note: Allowable Load Based on a Safety Factor of 5 Applied

Test:	**Fastener Withdrawel Testing**	**Project:**	3193927
Date:	December 8, 2009	**Eng/Tech:**	Benson P.
Client:	Nudura Incorporated		
Product:	Nudura Insulated Concrete Forms		
Fastener:	Trillium Screw 10 x 2 Hex Head with Washer Coarse Thread Self Tapping		
Method:	ICC-ES AC353 *Acceptance Criteria for Stay in Place, Foam Plastic Insulating Concrete Form (ICF) Systems for Solid Concrete Walls* approved October 2007		
	ASTM D1761-06, *Standard Test Methods for Mechanical Fasteners in Wood*		
Conditioning:	48 hours at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%		
Crosshead Speed:	0.1 in/min		
Equipment:	Baldwin Universal Tester		
	s/n: 280-01-0015		
	Calibration Date: September 16, 2010		
	Uncertainty: 0.25%		

Specimen	Maximum Load		Allowable Load	
	(lbf)	(N)	(lbf)	(N)
1	224	996	45	199
2	327	1455	65	291
3	246	1094	49	219
4	274	1219	55	244
5	277	1232	55	246
6	212	943	42	189
7	276	1228	55	246
8	244	1085	49	217
9	263	1170	53	234
10	210	934	42	187
Mean:	**255**	**1136**	**51**	**227**
StdDev:	**36**	**159**	**7**	**32**
COV:	**14%**	**14%**	**14%**	**14%**

Note: Allowable Load Based on a Safety Factor of 5 Applied

Test:	**Fastener Withdrawel Testing**	**Project:**	3193927
Date:	December 8, 2009	**Eng/Tech:**	Benson P.
Client:	Nudura Incorporated		
Product:	Nudura Insulated Concrete Forms		
Fastener:	12 X 2 Metal Screws Number 846-256		
Method:	ICC-ES AC353 *Acceptance Criteria for Stay in Place, Foam Plastic Insulating Concrete Form (ICF) Systems for Solid Concrete Walls* approved October 2007		
	ASTM D1761-06, *Standard Test Methods for Mechanical Fasteners in Wood*		
Conditioning:	48 hours at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%		
Crosshead Speed:	0.1 in/min		
Equipment:	Baldwin Universal Tester		
	s/n: 280-01-0015		
	Calibration Date: September 16, 2010		
	Uncertainty: 0.25%		

Specimen	Maximum Load		Allowable Load	
	(lbf)	(N)	(lbf)	(N)
1	244	1085	49	217
2	246	1094	49	219
3	283	1259	57	252
4	278	1237	56	247
5	241	1072	48	214
6	213	947	43	189
7	256	1139	51	228
8	259	1152	52	230
9	254	1130	51	226
10	198	881	40	176
Mean:	**247**	**1100**	**49**	**220**
StdDev:	**26**	**116**	**5**	**23**
COV:	**11%**	**11%**	**11%**	**11%**

Note: Allowable Load Based on a Safety Factor of 5 Applied

Test:	**Fastener Withdrawel Testing**	**Project:**	3193927
Date:	December 8, 2009	**Eng/Tech:**	Benson P.
Client:	Nudura Incorporated		
Product:	Nudura Insulated Concrete Forms		
Fastener:	Fastenel HWSL SMS 14 X 2 ZA Screws Number 1131155		
Method:	ICC-ES AC353 *Acceptance Criteria for Stay in Place, Foam Plastic Insulating Concrete Form (ICF) Systems for Solid Concrete Walls* approved October 2007 ASTM D1761-06, *Standard Test Methods for Mechanical Fasteners in Wood*		
Conditioning:	48 hours at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%		
Crosshead Speed:	0.1 in/min		
Equipment:	Baldwin Universal Tester s/n: 280-01-0015 Calibration Date: September 16, 2010 Uncertainty: 0.25%		

Specimen	Maximum Load		Allowable Load	
	(lbf)	(N)	(lbf)	(N)
1	302	1343	60	269
2	245	1090	49	218
3	264	1174	53	235
4	309	1374	62	275
5	274	1219	55	244
6	281	1250	56	250
7	256	1139	51	228
8	290	1290	58	258
9	273	1214	55	243
10	274	1219	55	244
Mean:	**232**	**1231**	**55**	**246**
StdDev:	**20**	**88**	**4**	**18**
COV:	**9%**	**7%**	**7%**	**7%**

Note: Allowable Load Based on a Safety Factor of 5 Applied

Test:	**Fastener Withdrawel Testing**	**Project:**	3193927
Date:	December 8, 2009	**Eng/Tech:**	Benson P.
Client:	Nudura Incorporated		
Product:	Nudura Insulated Concrete Forms		
Fastener:	1/4 - 14 X 1-3/4 AB Screws		
Method:	ICC-ES AC353 *Acceptance Criteria for Stay in Place, Foam Plastic Insulating Concrete Form (ICF) Systems for Solid Concrete Walls* approved October 2007		
	ASTM D1761-06, *Standard Test Methods for Mechanical Fasteners in Wood*		
Conditioning:	48 hours at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%		
Crosshead Speed:	0.1 in/min		
Equipment:	Baldwin Universal Tester		
	s/n: 280-01-0015		
	Calibration Date: September 16, 2010		
	Uncertainty: 0.25%		

Specimen	Maximum Load		Allowable Load	
	(lbf)	(N)	(lbf)	(N)
1	263	1170	53	234
2	267	1188	53	238
3	217	965	43	193
4	235	1045	47	209
5	263	1170	53	234
6	240	1068	48	214
Mean:	**248**	**1101**	**50**	**220**
StdDev:	**20**	**89**	**4**	**18**
COV:	**0.081**	**0.081**	**0.081**	**0.081**

Note: Allowable Load Based on a Safety Factor of 5 Applied

Test:	**Fastener Withdrawel Testing**	**Project:**	3193927
Date:	December 8, 2009	**Eng/Tech:**	Benson P.
Client:	Nudura Incorporated		
Product:	Nudura Insulated Concrete Forms		
Fastener:	Tree Island Fasteners 1-1/2" Ring l Nails		
Method:	ICC-ES AC353 *Acceptance Criteria for Stay in Place, Foam Plastic Insulating Concrete Form (ICF) Systems for Solid Concrete Walls* approved October 2007 ASTM D1761-06, *Standard Test Methods for Mechanical Fasteners in Wood*		
Conditioning:	48 hours at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%		
Crosshead Speed:	0.1 in/min		
Equipment:	Baldwin Universal Tester s/n: 280-01-0015 Calibration Date: September 16, 2010 Uncertainty: 0.25%		

Specimen	Maximum Load		Allowable Load	
	(lbf)	(N)	(lbf)	(N)
1	114	507	23	101
2	106	472	21	94
3	79	351	16	70
4	86	383	17	77
5	108	480	22	96
6	7	31	1	6
7	94	418	19	84
8	103	458	21	92
9	111	494	22	99
10	96	427	19	85
Mean:	**90**	**402**	**18**	**80**
StdDev:	**31**	**139**	**6**	**28**
COV:	**35%**	**35%**	**35%**	**35%**

Note: Allowable Load Based on a Safety Factor of 5 Applied

Test:	**Fastener Withdrawel Testing**	**Project:**	3193927
Date:	December 8, 2009	**Eng/Tech:**	Benson P.
Client:	Nudura Incorporated		
Product:	Nudura Insulated Concrete Forms		
Fastener:	6" Brick Ledge Screws		
Method:	ICC-ES AC353 *Acceptance Criteria for Stay in Place, Foam Plastic Insulating Concrete Form (ICF) Systems for Solid Concrete Walls* approved October 2007 ASTM D1761-06, *Standard Test Methods for Mechanical Fasteners in Wood*		
Conditioning:	48 hours at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%		
Crosshead Speed:	0.1 in/min		
Equipment:	Baldwin Universal Tester s/n: 280-01-0015 Calibration Date: September 16, 2010 Uncertainty: 0.25%		

Specimen	Maximum Load		Allowable Load	
	(lbf)	(N)	(lbf)	(N)
1	288	1281	58	256
2	313	1392	63	278
3	255	1134	51	227
4	338	1503	68	301
5	241	1072	48	214
6	226	1005	45	201
7	278	1237	56	247
8	240	1068	48	214
9	291	1294	58	259
10	235	1045	47	209
Mean:	**271**	**1203**	**54**	**241**
StdDev:	**37**	**165**	**7**	**33**
COV:	**14%**	**14%**	**14%**	**14%**

Note: Allowable Load Based on a Safety Factor of 5 Applied

APPENDIX C

Fastener Lateral Shear Resistance Test Results (12 Pages)

Test:	**Fastener Lateral Shear Resistance Testing**	**Project:**	3199237
Date:	December 10, 2009	**Eng/Tech:**	Benson P.
Client:	Nudura Incorporated		
Product:	Nudura Insulated Concrete Forms		
Fastener:	Paulin Fasteners Dura-Grip 6 x 2 Coarse Drywall Screws		
Method:	ICC-ES AC353 *Acceptance Criteria for Stay in Place, Foam Plastic Insulating Concrete Form (ICF) Systems for Solid Concrete Walls* approved October 2007		
	ASTM D1761-06, *Standard Test Methods for Mechanical Fasteners in Wood*		
Conditioning:	48 hours at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%		
Crosshead Speed:	0.1 in/min		
Equipment:	Baldwin Universal Tester		
	s/n: 280-01-0015		
	Calibration Date: September 16, 2010		
	Uncertainty: 0.25%		

Specimen	Load @ 1/8 Inch		Maximum Load		Proportional Load	
	(lbf)	(N)	(lbf)	(N)	(lbf)	(N)
1	86	383	216	961	69	307
2	102	454	271	1205	75	334
3	84	374	285	1268	59	262
4	125	556	245	1090	109	485
5	98	436	249	1108	78	347
6	91	405	265	1179	80	356
7	82	365	231	1028	70	311
8	120	534	319	1419	100	445
9	129	574	228	1014	117	520
10	106	472	265	1179	105	467
Mean:	**102**	**455**	**257**	**1145**	**86**	**383**
StdDev:	**17**	**77**	**30**	**136**	**20**	**88**
COV:	**17%**	**17%**	**12%**	**12%**	**23%**	**23%**

NOTE: IF COEFFICIENT > 15%, ALLOWABLE LOAD NOTED BELOW GOVERNS

Allowable Load (Ultimate Load / 3.2) (lbs):	**80**
75% Proportional Limit (lbs):	**65**
Greater than 15% COV, Allowable Load (lbs):	**N/A**

Allowable Load (lbs): 65

Test:	**Fastener Lateral Shear Resistance Testing**	**Project:**	3199237
Date:	December 10, 2009	**Eng/Tech:**	Benson P.
Client:	Nudura Incorporated		
Product:	Nudura Insulated Concrete Forms		
Fastener:	8 x 2 Metal Screws Number 608-648		
Method:	ICC-ES AC353 *Acceptance Criteria for Stay in Place, Foam Plastic Insulating Concrete Form (ICF) Systems for Solid Concrete Walls* approved October 2007		
	ASTM D1761-06, *Standard Test Methods for Mechanical Fasteners in Wood*		
Conditioning:	48 hours at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%		
Crosshead Speed:	0.1 in/min		
Equipment:	Baldwin Universal Tester		
	s/n: 280-01-0015		
	Calibration Date: September 16, 2010		
	Uncertainty: 0.25%		

Specimen	Load @ 1/8 Inch		Maximum Load		Proportional Load	
	(lbf)	(N)	(lbf)	(N)	(lbf)	(N)
1	104	463	319	1419	94	418
2	118	525	288	1281	103	458
3	92	409	301	1339	80	356
4	110	489	370	1646	94	418
5	95	423	285	1268	9	40
6	90	400	293	1303	83	369
7	78	347	244	1085	65	289
8	68	302	210	934	60	267
9	82	365	281	1250	74	329
10	89	396	249	1108	74	329
Mean:	**93**	**412**	**284**	**1263**	**74**	**327**
StdDev:	**15**	**67**	**44**	**195**	**26**	**117**
COV:	**16%**	**16%**	**15%**	**15%**	**36%**	**36%**

NOTE: IF COEFFICIENT > 15%, ALLOWABLE LOAD NOTED BELOW GOVERNS

Allowable Load (Ultimate Load / 3.2) (lbs):	**89**
75% Proportional Limit (lbs):	**55**
Greater than 15% COV, Allowable Load (lbs):	**88**

Allowable Load (lbs): 55

Test:	**Fastener Lateral Shear Resistance Testing**	**Project:**	3199237
Date:	December 10, 2009	**Eng/Tech:**	Benson P.
Client:	Nudura Incorporated		
Product:	Nudura Insulated Concrete Forms		
Fastener:	Compass Marker Darts 8 x 1-3/4 Cement Board Screws		
Method:	ICC-ES AC353 *Acceptance Criteria for Stay in Place, Foam Plastic Insulating Concrete Form (ICF) Systems for Solid Concrete Walls* approved October 2007		
	ASTM D1761-06, *Standard Test Methods for Mechanical Fasteners in Wood*		
Conditioning:	48 hours at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%		
Crosshead Speed:	0.1 in/min		
Equipment:	Baldwin Universal Tester		
	s/n: 280-01-0015		
	Calibration Date: September 16, 2010		
	Uncertainty: 0.25%		

Specimen	Load @ 1/8 Inch		Maximum Load		Proportional Load	
	(lbf)	(N)	(lbf)	(N)	(lbf)	(N)
1	104	463	321	1428	115	512
2	110	489	305	1357	121	538
3	93	414	290	1290	83	369
4	115	512	304	1352	107	476
5	113	503	299	1330	110	489
6	90	400	278	1237	92	409
7	115	512	289	1286	101	449
8	171	761	391	1739	150	667
9	133	592	350	1557	141	627
10	124	552	333	1481	84	374
Mean:	**117**	**520**	**316**	**1406**	**110**	**491**
StdDev:	**23**	**102**	**34**	**152**	**22**	**100**
COV:	**20%**	**20%**	**11%**	**11%**	**20%**	**20%**

NOTE: IF COEFFICIENT > 15%, ALLOWABLE LOAD NOTED BELOW GOVERNS

Allowable Load (Ultimate Load / 3.2) (lbs):	**99**
75% Proportional Limit (lbs):	**83**
Greater than 15% COV, Allowable Load (lbs):	**N/A**

Allowable Load (lbs): 83

Test:	**Fastener Lateral Shear Resistance Testing**	**Project:**	3199237
Date:	December 10, 2009	**Eng/Tech:**	Benson P.
Client:	Nudura Incorporated		
Product:	Nudura Insulated Concrete Forms		
Fastener:	#8 x 2 Construction Screws Number 214-633		
Method:	ICC-ES AC353 *Acceptance Criteria for Stay in Place, Foam Plastic Insulating Concrete Form (ICF) Systems for Solid Concrete Walls* approved October 2007		
	ASTM D1761-06, *Standard Test Methods for Mechanical Fasteners in Wood*		
Conditioning:	48 hours at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%		
Crosshead Speed:	0.1 in/min		
Equipment:	Baldwin Universal Tester		
	s/n: 280-01-0015		
	Calibration Date: September 16, 2010		
	Uncertainty: 0.25%		

Specimen	Load @ 1/8 Inch		Maximum Load		Proportional Load	
	(lbf)	(N)	(lbf)	(N)	(lbf)	(N)
1	99	440	313	1392	97	431
2	90	400	288	1281	88	391
3	139	618	358	1592	131	583
4	96	427	284	1263	100	445
5	94	418	289	1286	100	445
6	112	498	298	1326	103	458
7	96	427	299	1330	95	423
8	160	712	277	1232	153	681
9	124	552	247	1099	96	427
10	119	529	249	1108	105	467
Mean:	**113**	**502**	**290**	**1291**	**107**	**475**
StdDev:	**23**	**102**	**32**	**141**	**20**	**88**
COV:	**20%**	**20%**	**11%**	**11%**	**19%**	**19%**

NOTE: IF COEFFICIENT > 15%, ALLOWABLE LOAD NOTED BELOW GOVERNS

Allowable Load (Ultimate Load / 3.2) (lbs):	**91**
75% Proportional Limit (lbs):	**80**
Greater than 15% COV, Allowable Load (lbs):	**N/A**

Allowable Load (lbs): 80

Test:	**Fastener Lateral Shear Resistance Testing**	**Project:**	3199237
Date:	December 10, 2009	**Eng/Tech:**	Benson P.
Client:	Nudura Incorporated		
Product:	Nudura Insulated Concrete Forms		
Fastener:	10 x 2 Metal Screws Number 208-700		
Method:	ICC-ES AC353 *Acceptance Criteria for Stay in Place, Foam Plastic Insulating Concrete Form (ICF) Systems for Solid Concrete Walls* approved October 2007		
	ASTM D1761-06, *Standard Test Methods for Mechanical Fasteners in Wood*		
Conditioning:	48 hours at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%		
Crosshead Speed:	0.1 in/min		
Equipment:	Baldwin Universal Tester		
	s/n: 280-01-0015		
	Calibration Date: September 16, 2010		
	Uncertainty: 0.25%		

Specimen	Load @ 1/8 Inch		Maximum Load		Proportional Load	
	(lbf)	(N)	(lbf)	(N)	(lbf)	(N)
1	108	480	316	1406	103	458
2	71	316	324	1441	71	316
3	121	538	329	1463	115	512
4	123	547	338	1503	87	387
5	125	556	317	1410	112	498
6	126	560	337	1499	121	538
7	126	560	313	1392	112	498
8	82	365	347	1544	80	356
9	130	578	311	1383	114	507
10	118	525	283	1259	101	449
Mean:	**113**	**503**	**322**	**1430**	**102**	**452**
StdDev:	**20**	**90**	**18**	**80**	**17**	**75**
COV:	**18%**	**18%**	**6%**	**6%**	**17%**	**17%**

NOTE: IF COEFFICIENT > 15%, ALLOWABLE LOAD NOTED BELOW GOVERNS

Allowable Load (Ultimate Load / 3.2) (lbs):	**100**
75% Proportional Limit (lbs):	**76**
Greater than 15% COV, Allowable Load (lbs):	**N/A**

Allowable Load (lbs): 76

Test: **Fastener Lateral Shear Resistance Testing** **Project:** 3199237
Date: December 10, 2009 **Eng/Tech:** Benson P.
Client: Nudura Incorporated
Product: Nudura Insulated Concrete Forms
Fastener: 10 X 2 Wood Screws Number 197-700
Method: ICC-ES AC353 *Acceptance Criteria for Stay in Place, Foam Plastic Insulating Concrete Form (ICF) Systems for Solid Concrete Walls* approved October 2007
ASTM D1761-06, *Standard Test Methods for Mechanical Fasteners in Wood*
Conditioning: 48 hours at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%
Crosshead Speed: 0.1 in/min
Equipment: Baldwin Universal Tester
s/n: 280-01-0015
Calibration Date: September 16, 2010
Uncertainty: 0.25%

Specimen	Load @ 1/8 Inch		Maximum Load		Proportional Load	
	(lbf)	(N)	(lbf)	(N)	(lbf)	(N)
1	119	529	336	1495	112	498
2	140	623	283	1259	144	641
3	170	756	380	1690	160	712
4	136	605	269	1197	135	601
5	131	583	250	1112	130	578
6	149	663	305	1357	139	618
7	190	845	321	1428	191	850
8	91	405	233	1036	79	351
9	77	343	340	1512	66	294
10	101	449	246	1094	88	391
Mean:	**130**	**580**	**296**	**1318**	**124**	**553**
StdDev:	**35**	**155**	**48**	**214**	**39**	**172**
COV:	**27%**	**27%**	**16%**	**16%**	**31%**	**31%**

NOTE: IF COEFFICIENT > 15%, ALLOWABLE LOAD NOTED BELOW GOVERNS

Allowable Load (Ultimate Load / 3.2) (lbs): **93**
75% Proportional Limit (lbs): **93**
Greater than 15% COV, Allowable Load (lbs): **89**

Allowable Load (lbs): 89

Test:	**Fastener Lateral Shear Resistance Testing**	**Project:**	3199237
Date:	December 10, 2009	**Eng/Tech:**	Benson P.
Client:	Nudura Incorporated		
Product:	Nudura Insulated Concrete Forms		
Fastener:	Trillium Screw 10 x 2 Hex Head with Washer Coarse Thread Self Tapping		
Method:	ICC-ES AC353 *Acceptance Criteria for Stay in Place, Foam Plastic Insulating Concrete Form (ICF) Systems for Solid Concrete Walls* approved October 2007		
	ASTM D1761-06, *Standard Test Methods for Mechanical Fasteners in Wood*		
Conditioning:	48 hours at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%		
Crosshead Speed:	0.1 in/min		
Equipment:	Baldwin Universal Tester		
	s/n: 280-01-0015		
	Calibration Date: September 16, 2010		
	Uncertainty: 0.25%		

Specimen	Load @ 1/8 Inch		Maximum Load		Proportional Load	
	(lbf)	(N)	(lbf)	(N)	(lbf)	(N)
1	151	672	319	1419	134	596
2	174	774	327	1455	159	707
3	146	649	338	1503	125	556
4	150	667	371	1650	160	712
5	157	698	372	1655	140	623
6	111	494	289	1286	114	507
7	151	672	339	1508	141	627
8	160	712	405	1802	155	689
9	222	988	351	1561	208	925
10	233	1036	371	1650	230	1023
Mean:	**166**	**736**	**348**	**1549**	**157**	**697**
StdDev:	**36**	**162**	**33**	**147**	**36**	**162**
COV:	**22%**	**22%**	**9%**	**9%**	**23%**	**23%**

NOTE: IF COEFFICIENT > 15%, ALLOWABLE LOAD NOTED BELOW GOVERNS

Allowable Load (Ultimate Load / 3.2) (lbs):	**109**
75% Proportional Limit (lbs):	**117**
Greater than 15% COV, Allowable Load (lbs):	**N/A**

Allowable Load (lbs): 109

Test:	**Fastener Lateral Shear Resistance Testing**	**Project:**	3199237
Date:	December 10, 2009	**Eng/Tech:**	Benson P.
Client:	Nudura Incorporated		
Product:	Nudura Insulated Concrete Forms		
Fastener:	12 X 2 Metal Screws Number 846-256		
Method:	ICC-ES AC353 *Acceptance Criteria for Stay in Place, Foam Plastic Insulating Concrete Form (ICF) Systems for Solid Concrete Walls* approved October 2007		
	ASTM D1761-06, *Standard Test Methods for Mechanical Fasteners in Wood*		
Conditioning:	48 hours at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%		
Crosshead Speed:	0.1 in/min		
Equipment:	Baldwin Universal Tester		
	s/n: 280-01-0015		
	Calibration Date: September 16, 2010		
	Uncertainty: 0.25%		

Specimen	Load @ 1/8 Inch		Maximum Load		Proportional Load	
	(lbf)	(N)	(lbf)	(N)	(lbf)	(N)
1	137	609	391	1739	126	560
2	127	565	384	1708	117	520
3	116	516	409	1819	160	712
4	99	440	354	1575	95	423
5	142	632	346	1539	141	627
6	98	436	309	1374	77	343
7	124	552	368	1637	117	520
8	113	503	355	1579	104	463
9	171	761	360	1601	158	703
10	104	463	356	1584	95	423
Mean:	**123**	**548**	**363**	**1616**	**119**	**529**
StdDev:	**23**	**100**	**27**	**122**	**28**	**123**
COV:	**18%**	**18%**	**8%**	**8%**	**23%**	**23%**

NOTE: IF COEFFICIENT > 15%, ALLOWABLE LOAD NOTED BELOW GOVERNS

Allowable Load (Ultimate Load / 3.2) (lbs):	**114**
75% Proportional Limit (lbs):	**89**
Greater than 15% COV, Allowable Load (lbs):	**N/A**

Allowable Load (lbs): 89

Test:	**Fastener Lateral Shear Resistance Testing**	**Project:**	3199237
Date:	December 10, 2009	**Eng/Tech:**	Benson P.
Client:	Nudura Incorporated		
Product:	Nudura Insulated Concrete Forms		
Fastener:	Fastenel HWSL SMS 14 X 2 ZA Screws Number 1131155		
Method:	ICC-ES AC353 *Acceptance Criteria for Stay in Place, Foam Plastic Insulating Concrete Form (ICF) Systems for Solid Concrete Walls* approved October 2007		
	ASTM D1761-06, *Standard Test Methods for Mechanical Fasteners in Wood*		
Conditioning:	48 hours at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%		
Crosshead Speed:	0.1 in/min		
Equipment:	Baldwin Universal Tester		
	s/n: 280-01-0015		
	Calibration Date: September 16, 2010		
	Uncertainty: 0.25%		

Specimen	Load @ 1/8 Inch		Maximum Load		Proportional Load	
	(lbf)	(N)	(lbf)	(N)	(lbf)	(N)
1	92	409	498	2215	72	320
2	83	369	478	2126	91	405
3	132	587	524	2331	122	543
4	128	569	547	2433	108	480
5	115	512	526	2340	103	458
6	83	369	504	2242	68	302
7	80	356	437	1944	77	343
8	125	556	313	1392	109	485
9	117	520	524	2331	103	458
10	145	645	298	1326	117	520
Mean:	**110**	**489**	**465**	**2068**	**97**	**431**
StdDev:	**24**	**105**	**89**	**398**	**19**	**85**
COV:	**21%**	**21%**	**19%**	**19%**	**20%**	**20%**

NOTE: IF COEFFICIENT > 15%, ALLOWABLE LOAD NOTED BELOW GOVERNS

Allowable Load (Ultimate Load / 3.2) (lbs):	**145**
75% Proportional Limit (lbs):	**73**
Greater than 15% COV, Allowable Load (lbs):	**128**

Allowable Load (lbs): 73

Test:	**Fastener Lateral Shear Resistance Testing**	**Project:**	3199237
Date:	December 10, 2009	**Eng/Tech:**	Benson P.
Client:	Nudura Incorporated		
Product:	Nudura Insulated Concrete Forms		
Fastener:	1/4 - 14 X 1-3/4 AB Screws		
Method:	ICC-ES AC353 *Acceptance Criteria for Stay in Place, Foam Plastic Insulating Concrete Form (ICF) Systems for Solid Concrete Walls* approved October 2007 ASTM D1761-06, *Standard Test Methods for Mechanical Fasteners in Wood*		
Conditioning:	48 hours at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%		
Crosshead Speed:	0.1 in/min		
Equipment:	Baldwin Universal Tester s/n: 280-01-0015 Calibration Date: September 16, 2010 Uncertainty: 0.25%		

Specimen	Load @ 1/8 Inch		Maximum Load		Proportional Load	
	(lbf)	(N)	(lbf)	(N)	(lbf)	(N)
1	123	547	425	1890	113	503
2	177	787	434	1931	167	743
3	106	472	369	1641	98	436
4	122	543	439	1953	113	503
5	192	854	455	2024	187	832
6	115	512	374	1664	106	472
7	176	783	377	1677	151	672
8	176	783	408	1815	164	730
9	119	529	409	1819	102	454
10	173	770	350	1557	172	765
Mean:	**148**	**658**	**404**	**1797**	**137**	**611**
StdDev:	**33**	**148**	**35**	**155**	**34**	**151**
COV:	**22%**	**22%**	**9%**	**9%**	**25%**	**25%**

NOTE: IF COEFFICIENT > 15%, ALLOWABLE LOAD NOTED BELOW GOVERNS

Allowable Load (Ultimate Load / 3.2) (lbs):	**126**
75% Proportional Limit (lbs):	**103**
Greater than 15% COV, Allowable Load (lbs):	**N/A**

Allowable Load (lbs): 103

Test:	**Fastener Lateral Shear Resistance Testing**	**Project:**	3199237
Date:	December 10, 2009	**Eng/Tech:**	Benson P.
Client:	Nudura Incorporated		
Product:	Nudura Insulated Concrete Forms		
Fastener:	Tree Island Fasteners 1-1/2" Ring Nails		
Method:	ICC-ES AC353 *Acceptance Criteria for Stay in Place, Foam Plastic Insulating Concrete Form (ICF) Systems for Solid Concrete Walls* approved October 2007 ASTM D1761-06, *Standard Test Methods for Mechanical Fasteners in Wood*		
Conditioning:	48 hours at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%		
Crosshead Speed:	0.1 in/min		
Equipment:	Baldwin Universal Tester s/n: 280-01-0015 Calibration Date: September 16, 2010 Uncertainty: 0.25%		

Specimen	Load @ 1/8 Inch		Maximum Load		Proportional Load	
	(lbf)	(N)	(lbf)	(N)	(lbf)	(N)
1	32	142	42	187	29	129
2	52	231	59	262	46	205
3	50	222	68	302	46	205
4	39	173	75	334	37	165
5	52	231	70	311	51	227
6	45	200	52	231	35	156
7	29	129	43	191	27	120
8	34	151	53	236	35	156
9	28	125	41	182	25	111
10	29	129	33	147	29	129
Mean:	**39**	**173**	**54**	**238**	**36**	**160**
StdDev:	**10**	**44**	**14**	**63**	**9**	**40**
COV:	**25%**	**25%**	**26%**	**26%**	**25%**	**25%**

NOTE: IF COEFFICIENT > 15%, ALLOWABLE LOAD NOTED BELOW GOVERNS

Allowable Load (Ultimate Load / 3.2) (lbs):	**17**
75% Proportional Limit (lbs):	**27**
Greater than 15% COV, Allowable Load (lbs):	**11**

Allowable Load (lbs): 11

Test:	**Fastener Lateral Shear Resistance Testing**	**Project:**	3199237
Date:	December 10, 2009	**Eng/Tech:**	Benson P.
Client:	Nudura Incorporated		
Product:	Nudura Insulated Concrete Forms		
Fastener:			
Method:	ICC-ES AC353 *Acceptance Criteria for Stay in Place, Foam Plastic Insulating Concrete Form (ICF) Systems for Solid Concrete Walls* approved October 2007 ASTM D1761-06, *Standard Test Methods for Mechanical Fasteners in Wood*		
Conditioning:	48 hours at a temperature of 23 ± 2°C and relative humidity of 50 ± 5%		
Crosshead Speed:	0.1 in/min		
Equipment:	Baldwin Universal Tester s/n: 280-01-0015 Calibration Date: September 16, 2010 Uncertainty: 0.25%		

Specimen	Load @ 1/8 Inch		Maximum Load		Proportional Load	
	(lbf)	(N)	(lbf)	(N)	(lbf)	(N)
1		0		0		0
2		0		0		0
3		0		0		0
4		0		0		0
5		0		0		0
6		0		0		0
7		0		0		0
8		0		0		0
9		0		0		0
10		0		0		0
Mean:	**#DIV/0!**	**0**	**#DIV/0!**	**0**	**#DIV/0!**	**0**
StdDev:	**#DIV/0!**	**0**	**#DIV/0!**	**0**	**#DIV/0!**	**0**
COV:	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**	**#DIV/0!**

NOTE: IF COEFFICIENT > 15%, ALLOWABLE LOAD NOTED BELOW GOVERNS

Allowable Load (Ultimate Load / 3.2) (lbs): #DIV/0!
75% Proportional Limit (lbs): #DIV/0!
Greater than 15% COV, Allowable Load (lbs): #DIV/0!

Allowable Load (lbs): #DIV/0!