Architectural Testing

PERFORMANCE TEST REPORT

Rendered to:

NATIONAL NAIL CORP.

PRODUCTS: CAMO Exterior Screws
TYPES: Structural Screws (2.5", 3", 3.5", 4", 5", 6", 8", 10")
Ledger Screws (3.625", 5")

Report No: C0940.01-106-31
Report Date: 10/17/12
Test Record Retention Period: 10/17/16

130 Derry Court
York, PA 17406-8405
phone: 717-764-7700
fax: 717-764-4129
www.archtest.com

Architectural Testing

PERFORMANCE TEST REPORT

Rendered to:

NATIONAL NAIL CORP.
2964 Clydon SW
Grand Rapids, Michigan 49509

Report No:	C0940.01-106-31
Test Dates:	08/13/12
Through:	09/21/12
Report Date:	10/17/12
Test Record Retention Period:	10/17/16

Products: CAMO Exterior Screws

Types: Multi-Purpose Structural Screws (2.5", 3", 3.5", 4", 5", 6", 8", 10")
Ledger Screws (3.625", 5")

Project Summary: Architectural Testing, Inc. was contracted by National Nail Corp. to evaluate the properties of the products listed above, inclusive of withdrawal, shear, lateral strength and bending strength when utilized in the connection of Southern Yellow Pine truss lumber. The following report depicts the range of values for each product.

Test Methods: The test specimens were evaluated in accordance with the following methods.

ASTM D 1037-06a, *Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials* (Pull-Through)

ASTM D 1761-06, *Standard Test Methods for Mechanical Fasteners in Wood* (Lateral Shear)

ASTM E 8/E8M-11, *Standard Test Methods for Tension Testing of Metallic Materials* (Tensile Strength)

ASTM F 606-11a, *Standard Test Methods for Determining the Mechanical Properties of Externally and Internally Threaded Fasteners, Washers, Direct Tension Indicators, and Rivets* (Single Shear)

ASTM F 1575-03(2008), *Standard Test Method for Determining Bending Yield Moment of Nails* (Bending Strength)

Product Descriptions: The fasteners were provided to Architectural Testing, Inc. by National Nail Corp. in sealed consumer-ready packages. Each fastener incorporated a flared head and required a 6 point star driver to engage the fastener. All fasteners were protected with a green proprietary coating.

130 Derry Court
York, PA 17406-8405
phone: 717-764-7700
fax: 717-764-4129
www.archtest.com

Test Procedures: All tests were conducted utilizing southern yellow pine on an INSTRON Model 3369 universal test machine (ICN 005740). Wood moisture content was measured using a Delmhorst Model BD-2100 electronic meter (ICN Y003141). All testing was performed at standard laboratory conditions of 70ºF and 50% Relative Humidity.

For the withdrawal and lateral shear tests, a fastener was inserted into a sample of wood and tested at a rate of 0.10 inches per minute. For the pull-through tests, a fastener was embedded into/through the main face of a 2x4 and loaded at a rate of 0.06 inches per minute until a maximum load was attained. Fastener bending and single shear tests were conducted at 0.25 inches per minute. Tensile tests of the fasteners were conducted at a rate of 0.2 inches per minute.

Test Results: The results are reported in the following tables. Each reported result for a fastener designation represents the average of ten individual tests for that fastener designation and test configuration.

Table 1A - CAMO Multi-Purpose Screws (Fastener Properties)

Fastener Designation	Head Marking	Overall Length (in)	Length of Thread (in)	Unthreaded Shank Diameter (in)	Minor Thread Root Diameter (in)	Bending Yield Strength (psi) [lb]	Tensile Strength (psi) [lb]	Single Shear Strength (psi) [lb]
2.5"	CAMO 2.5	2.5	2	3/16	5/32	153,600 [418]	152,900 [4565]	141,600 [2715]
3"	CAMO 3	3	2	3/16	5/32			
3.5"	CAMO 3.5	3.5	2	3/16	5/32			
4"	CAMO 4	4	2	3/16	5/32			
5"	CAMO 5	5	2	3/16	5/32			
6"	CAMO 6	6	2	3/16	5/32			
8"	CAMO 8	8	2	3/16	5/32			
10"	CAMO 10	10	2	3/16	5/32			

Table 1B - CAMO Ledger Screws (Fastener Properties)

Fastener Designation	Head Marking	Overall Length (in)	Length of Thread (in)	Unthreaded Shank Diameter (in)	Minor Thread Root Diameter (in)	Bending Yield Strength (psi) [lb]	Tensile Strength (psi) [lb]	Single Shear Strength (psi) [lb]
3.625"	CAMO 3.625	3.625	2	7/32	3/16	134,600 [485]	152,340 [5438]	117,100 [3233]
5"	CAMO 5	5	3	7/32	3/16			

Test Results: (Continued)

Table 2 - CAMO Structural Screws (Direct Withdrawal Values)

Fastener Designation	Fastener Type	Length of Thread (in)	Withdrawal Strength (lbs/in)	
			Dry	Wet
2.5"	Multi-Purpose Structural	2	1003	700
3"		2	1058	725
3.5"		2	994	809
4"		2	986	918
5"		2	1299	945
6"		2	1279	1218
8"		2	1389	1389
10"		2	1195	999
3.625"	Ledger	2	1232	940
5"		3	1886	1448

Table 3 - CAMO Structural Screws (Pull-Through Values)

Fastener Designation	Fastener Type	Length of Thread (in)	Pull-Through (lbs/in)
2.5"	Multi-Purpose Structural	2	1185
3"		2	1245
3.5"		2	1201
4"		2	1219
5"		2	1511
6"		2	1316
8"		2	1286
10"		2	1331
3.625"	Ledger	2	1322
5"		3	1176

All pull-through samples exhibited a failure mode of pulling the head through the wood specimen. No fastener failure occurred.

Test Results: (Continued)

Table 4A - CAMO Structural Screws (Lateral Shear Values - Parallel to Grain)

Fastener Designation	Fastener Type	Side Member Thickness (in)	Fastener Penetration (in)	Single Shear (Two-Member) Connection Parallel to Grain (lbs)
2.5"	Multi-Purpose Structural	1.5	1	866
3"		1.5	1.5	1157
3.5"		1.5	2	1304
4"		1.5	2.5	1368
5"		1.5	3.5	2289
6"		1.5	4.5	2460
8"		1.5	6.5	2477
10"		1.5	8.5	1803
3.625"	Ledger	1.5	2.125	1814
5"		1.5	3.5	2048

Table 4B - CAMO Structural Screws (Lateral Shear Values - Perpendicular to Grain)

Fastener Designation	Fastener Type	Side Member Thickness (in)	Fastener Penetration (in)	Single Shear (Two-Member) Connection Perpendicular to Grain (lbs)
2.5"	Multi-Purpose Structural	1.5	1	1105
3"		1.5	1.5	1765
3.5"		1.5	2	1724
4"		1.5	2.5	2002
5"		1.5	3.5	2449
6"		1.5	4.5	2335
8"		1.5	6.5	2792
10"		1.5	8.5	2233
3.625"	Ledger	1.5	2.125	2068
5"		1.5	3.5	2250

Test Results: (Continued)

Table 4C - CAMO Structural Screws (Rafter/Truss to Top Plate Uplift)

Fastener Designation	Fastener Type	Side Member Thickness (in)	Fastener Penetration (in)	Single Shear (Two-Member) Connection Perpendicular to Grain (lbs)
2.5"	Multi-Purpose Structural	1.5	1	841
3"		1.5	1.5	1406
3.5"		1.5	2	1986
4"		1.5	2.5	2129
5"		1.5	3.5	2518
6"		1.5	4.5	2137
8"		1.5	6.5	2002
10"		1.5	8.5	2278

The side member thickness is the actual thickness of the lumber utilized.

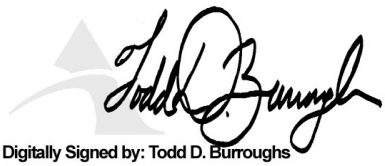
The specific gravity of the wood was determined by dry-basis weight to be an average of 0.60 for the 2x4 lumber, 0.52 for the 2x6 lumber, 0.59 for the 2x8 lumber and 0.49 for the 2x10 lumber. The overall average moisture content for all lumber was 11.1%.

Architectural Testing will service this report for the entire test record retention period. Test records that are retained such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation will be retained by Architectural Testing, Inc. for the entire test record retention period.

Architectural Testing will service this report for the entire test record retention period. Test records that are retained such as detailed drawings, datasheets, representative samples of test specimens, or other pertinent project documentation will be retained by Architectural Testing, Inc. for the entire test record retention period.

Results obtained are tested values and were secured using the designated test methods. This report does not constitute certification of this product nor an opinion or endorsement by this laboratory. It is the exclusive property of the client so named herein and relates only to the specimens tested. This report may not be reproduced, except in full, without the written approval of Architectural Testing, Inc.

For ARCHITECTURAL TESTING, INC.:



Todd D. Burroughs - Senior Project Engineer
Components / Materials Testing

Gary Hartman, P.E. - Director
Components / Materials Testing

TDB:tdb/nlh

Attachments (pages) This report is complete only when all attachments listed are included.
Appendix A - Photographs (2)

Revision Log

Rev. #	Date	Page(s)	Revision(s)
0	10/17/12	N/A	Original report issue.

APPENDIX A

Photographs

Photo No. 1
Multi-Purpose Structural Screw Head Markings

Photo No. 2
Multi-Purpose Structural Screws

Photo No. 3
Ledger Screw Head Markings

Photo No. 4
Ledger Screws