DrJ™ CERTIFICATION

ANAB ANSI National Accreditation Board ACCREDITED ISO/IEC 17065 PRODUCT CERTIFICATION BODY

IAF MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT

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Technical Evaluation Report

TER 2102-01

CAMO® Series Structural Wood Screw Properties

National Nail Corporation DBA CAMO®

Products:

Framing Screws, Truss Screws, 1/4″ Structural Flat and Hex Head Screws, and 5/16″ Structural Flat and Hex Head Screws

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COMPANY
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DIVISION: 06 00 00 - WOOD, PLASTICS AND COMPOSITES

SECTION: 06 00 90 - Wood and Plastic Fastenings

SECTION: 06 05 23 - Wood, Plastic, and Composite Fastenings

1 Products Evaluated[1]

1.1 Framing Screws, Truss Screws, 1/4″ Structural Flat and Hex Head Screws, and 5/16″ Structural Flat and Hex Head Screws

2 Applicable Codes and Standards[2,3]

2.1 *Codes*

2.1.1 *IBC—15, 18, 21: International Building Code®*

2.1.2 *IRC—15, 18, 21: International Residential Code®*

2.1.3 *FBC-B—17, 20: Florida Building Code – Building*[4]

2.1.4 *FBC-R—17, 20: Florida Building Code – Residential*[4]

2.1.5 *LABC—17, 20: Los Angeles Building Code*[5]

2.1.6 *LARC—17, 20: Los Angeles Residential Code*[5]

2.2 *Standards and Referenced Documents*

2.2.1 *AISI S904: Standard Test Methods for Determining the Tensile and Shear Strength of Screws*

2.2.2 *ANSI/AWC NDS: National Design Specification (NDS) for Wood Construction*

2.2.3 *ASTM A153: Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware*

2.2.4 *ASTM A510: Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel, and Alloy Steel*

2.2.5 *ASTM B117: Standard Practice for Operating Salt Spray (Fog) Apparatus*

2.2.6 *ASTM D1761: Standard Test Methods for Mechanical Fasteners in Wood*

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[1] For more information, visit drjcertification.org or call us at 608-310-6748.

[2] Unless otherwise noted, all references in this TER are from the 2021 version of the codes and the standards referenced therein. This material, design, or method of construction also complies with the 2000-2018 versions of the referenced codes and the standards referenced therein.

[3] All terms defined in the applicable building codes are italicized.

[4] All references to the *FBC-B* and *FBC-R* are the same as the 2018 *IBC* and 2018 *IRC*, respectively, unless otherwise noted in the supplement at the end of this TER.

[5] All references to the *LABC* and *LARC* are the same as the 2018 *IBC* and 2018 *IRC*, respectively, unless otherwise noted in the supplement at the end of this TER.

2.2.7 *ASTM F1575: Standard Test Method for Determining Bending Yield Moment of Nails*

2.2.8 *ASTM G85: Standard Practice for Modified Salt Spray (Fog) Testing*

2.2.9 *ASTM G198: Standard Test Method for Determining the Relative Corrosion Performance of Driven Fasteners in Contact with Treated Wood*

3 Performance Evaluation

3.1 CAMO® series structural wood screws were tested and evaluated to determine their structural resistance properties, which were used to develop reference design values for allowable stress design (ASD). The following properties were evaluated:

3.1.1 Bending yield in accordance with *ASTM F1575*

3.1.2 Shear strength in accordance with *AISI S904*

3.1.3 Tensile strength in accordance with *AISI S904*

3.1.4 Lateral resistance in accordance with *ASTM D1761* and *NDS*

3.1.5 Withdrawal resistance in accordance with *ASTM D1761*

3.1.6 Head pull-through in accordance with *ASTM D1761*

3.1.7 Corrosion resistance in accordance with *ASTM B117*, *ASTM G85*, and *ASTM G198*

3.2 Use of fasteners in locations exposed to saltwater or saltwater spray is outside the scope of this TER.

3.3 Any code compliance issues not specifically addressed in this section are outside the scope of this TER.

3.4 For design values for CAMO® series structural wood screws in ledger connection applications, see TER 2102-02.

3.5 For design values for CAMO® series structural wood screws in truss to top plate and bottom plate to rim board connection applications, see TER 2102-03.

3.6 For design values for CAMO® series structural wood screws in multi-ply beam connection applications, see TER 2102-04.

3.7 Any engineering evaluation conducted for this TER was performed within DrJ's ANAB accredited ICS code scope and/or the defined professional engineering scope of work on the dates provided herein.

4 Product Description and Materials

4.1 CAMO® series structural wood screws are threaded fasteners manufactured using standard cold-forming processes and are subsequently heat-treated and coated.

4.2 CAMO® series structural wood screws are available with a variety of coatings, including a proprietary coating system designated at PROTECH™ Ultra 4 and Hot-Dip Galvanized with a coating weight in compliance with *ASTM A153*, Class D.

4.3 The CAMO® series structural wood screws evaluated in this TER is shown in Figure 1, Figure 2, Figure 3, Figure 4, Figure 5, Figure 6, Figure 7, and Figure 8.

Figure 1. #12 Framing Screw - PROTECH™ Ultra 4

Figure 2. #14 Truss Screw - PROTECH™ Ultra 4

Figure 3. ¼″ Flat Head Screw - PROTECH™ Ultra 4

Figure 4. ¼″ Hex Head Screw - PROTECH™ Ultra 4

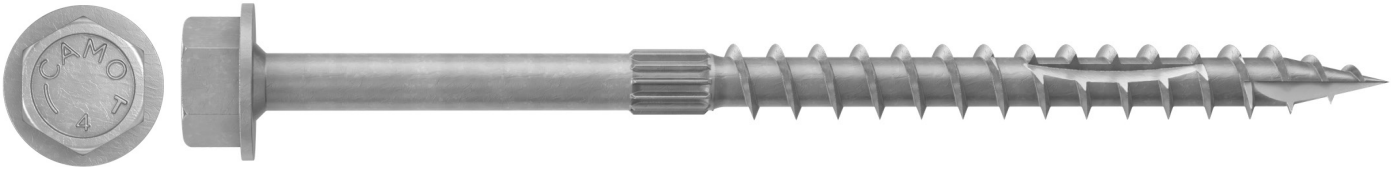

Figure 5. ¼″ Hex Head Screw - Hot-Dip Galvanized

Figure 6. $^{5}/_{16}$″ Flat Head Screw - PROTECH™ Ultra 4

Figure 7. $^{5}/_{16}$″ Hex Head Screw - PROTECH™ Ultra 4

Figure 8. $^{5}/_{16}$″ Hex Head Screw - Hot-Dip Galvanized

4.4 *Fastener Material*

4.4.1 CAMO® series structural wood screws are made of hardened carbon steel grade 10B18, 1022, or 10B21 wire conforming to *ASTM A510* and/or Grade 17MnB3 or 19MnB4 wire conforming to *DIN 1654*.

4.4.2 The fasteners evaluated in this TER are set forth in Table 1 and Table 2.

Table 1. Fastener Specifications - PROTECH™ Ultra 4 Coated[1]

Fastener Designation	Head				Length (in)		Diameter (in)			Bending Yield[4], f_{yb} (psi)	Allowable Steel Strength (lb)	
	Style	Drive System	Diameter (in)	Height (in)	Fastener[2]	Thread[3]	Shank	Minor	Major		Tensile	Shear[5]
#12 x 2½″	Flat Head	T25 Star Drive	0.472	0.079	2.500	1.398	0.159	0.144	0.215	172,000	865	655
#12 x 3″					3.000	1.516						
#14 x 6″	Cylinder Head	T30 Star Drive	0.335	0.163	6.000	Full	0.156	0.156	0.241	189,000	1,175	820
¼″ x 3″	Flat Head	T30 Star Drive	0.622	0.079	3.000	1.500	0.191	0.177	0.254	172,000	1,355	965
¼″ x 4″					4.000	2.370						
¼″ x 6″					6.000	2.752						
¼″ x 8″					8.000	2.752						
¼″ x 10″					10.000	2.752						
¼″ x 1½″	Hex Head	3/8″ Hex Head	0.335	0.103	1.441	1.250	0.191	0.177	0.254	172,000	1,310	1,005
¼″ x 3″					2.941	1.500						
¼″ x 4″					3.941	2.370						
¼″ x 6″					5.941	2.752						
5/16″ x 2 7/8″	Flat Head	T40 Star Drive	0.738	0.079	2.875	1.437	0.220	0.197	0.307	175,000	1,580	1,150
5/16″ x 3½″					3.500	2.000						
5/16″ x 4″					4.000	2.370						
5/16″ x 4½″					4.500	2.370						
5/16″ x 5″					5.000	2.752						
5/16″ x 6″					6.000	2.752						
5/16″ x 6¾″					6.750	2.752						
5/16″ x 8″					8.000	2.752						
5/16″ x 10″					10.000	2.752						
5/16″ x 8″	Hex Head	7/16″ Hex Head	0.415	0.147	7.941	2.752	0.220	0.197	0.307	175,000	1,510	1,245
5/16″ x 10″					9.941	2.752						
5/16″ x 12″					11.921	2.752						

SI: 1 in = 25.4 mm, 1 lb = 4.45 N, 1 psi = 0.00689 MPa

1. Tabulated nominal fastener dimensions are measured on uncoated fasteners. Finished dimensions are different due to proprietary coatings applied.
2. Lengths of the cylinder head screws are measured from the topside of the head to the tip. Length of the hex head and flat head screws are measured from the underside of the head to the tip.
3. Thread length includes tapered tip.
4. Bending yield strength, F_{yb}, is determined in accordance with *ASTM F1575* using minor thread diameter when fastener is tested in threaded section.
5. Shear strength is determined in accordance with *AISI S904* using minor thread diameter when fastener is tested in threaded section.
6. The ¼" Flat Head and Hex Head screw outer diameter is equivalent to a #15 screw. The 5/16" Flat Head and Hex Head screw outer diameter is equivalent to a #19 screw.

Table 2. Fastener Specifications - Hot-Dip Galvanized[1]

Fastener Designation	Head				Length (in)		Diameter (in)			Bending Yield[4], f_{yb} (psi)	Allowable Steel Strength (lb)	
	Style	Drive System	Diameter (in)	Height (in)	Fastener[2]	Thread[3]	Shank	Minor	Major		Tensile	Shear[5]
¼″ x 1½″	Hex Head	3/8″ Hex Head	0.335	0.103	1.441	1.250	0.191	0.169	0.254	124,000	900	755
¼″ x 3″					2.941	1.500						
¼″ x 4″					3.941	2.370						
¼″ x 6″					5.941	2.752						
5/16″ x 8″	Hex Head	7/16″ Hex Head	0.415	0.147	7.941	2.752	0.220	0.197	0.307	124,000	995	855
5/16″ x 10″					9.941	2.752						
5/16″ x 12″					11.921	2.752						

SI: 1 in = 25.4 mm, 1 lb = 4.45 N, 1 psi = 0.00689 MPa

1. Tabulated nominal fastener dimensions are measured on uncoated fasteners. Finished dimensions are different due to the coatings applied.
2. Length of the Hex Head Screws is measured from the underside of the head to the tip.
3. Thread length includes tapered tip.
4. Bending yield strength, F_{yb}, is determined in accordance with *ASTM F1575* using minor thread diameter when fastener is tested in threaded section.
5. Shear strength is determined in accordance with *AISI S904* using minor thread diameter when fastener is tested in threaded section.

4.5 *Corrosion Resistance*

4.5.1 CAMO® series structural wood screws may be used where screws are required to exhibit corrosion resistance when exposed to adverse environmental conditions and/or in chemically treated wood, which are subject to the limitations of this report, and are alternatives to hot-dipped galvanized screws with a coating weight in compliance with *ASTM A153*, Class D.

4.5.2 The CAMO® series structural wood screws having the proprietary PROTECH™ Ultra 4 coatings are equivalent to the protection provided by code-approved hot-dipped galvanized coatings meeting *ASTM A153*, Class D (*IBC* Section 2304.10.6 and *IRC* Section R317.3) when recognized for use by the American Wood Protection Association (AWPA) in untreated wood and Ground Contact – General Use pressure treated wood for exterior, freshwater, general construction applications (e.g., Ground Contact – General Use AWPA UC1-UC4A).

4.5.3 *Fire Retardant Treated (FRT) Wood Applications:*

4.5.3.1 CAMO® structural series wood screws having the proprietary PROTECH™ Ultra 4 coatings and hot-dipped galvanized CAMO® structural series wood screws are recognized for use in FRT lumber, provided the conditions set forth by the FRT lumber manufacturer are met, including appropriate strength reductions.

4.6 *Wood Material*

4.6.1 Wood main and side members must be solid-sawn lumber or boards having an assigned specific gravity as given in the respective tables of this TER.

5 Applications

5.1 CAMO® structural series wood screws are dowel-type threaded and self-drilling screws used for wood-to-wood connections.

5.2 Where the application exceeds the limitations set forth herein, design shall be permitted in accordance with accepted engineering procedures, experience, and technical judgment.

5.3 *Design*

5.3.1 Design of CAMO® structural series wood screws is governed by the applicable code and the provisions for dowel-type fasteners in *NDS*.

5.3.2 Unless otherwise noted, adjustment of the design stresses for duration of load shall be in accordance with the applicable code.

5.4 *Reference Lateral Design Values (Z)*

5.4.1 Reference lateral design values (lbf) for shear load perpendicular to grain and parallel to grain for CAMO® structural series wood screws are specified in Table 3 for PROTECH™ Ultra 4 screws, and Table 4 for Hot-Dip Galvanized screws *ASTM A153*, Class D.

Table 3. Reference Lateral Design Values (Z) for Connections in Lumber - PROTECH™ Ultra 4, lbf[1,3,4]

Fastener Designation	Minimum Side Member Thickness (in)	Minimum Main Member Penetration[5] (in)	Wood Species[2] (Specific Gravity)			
			HF/SPF (0.42)		DF-L (0.50)	
			$Z_\perp$	$Z_\parallel$	$Z_\perp$	$Z_\parallel$
#12 x 2.5″	1.5	1.0	230	225	320	315
#12 x 3″	1.5	1.5				
#14 x 6″	3	3.0	335	270	475	420
¼″ x 3″ Flat	1.5	1.5	120	150	160	200
¼″ x 4″ Flat	1.5	2.5	455	410	640	510
¼″ x 6″ Flat	1.5	2.5				
¼″ x 8″ Flat	1.5	2.5				
¼″ x 10″ Flat	1.5	2.5				
¼″ x 3″ Hex	1.5	1.5	120	150	155	195
¼″ x 4″ Hex	1.5	2.5	435	410	620	560
¼″ x 6″ Hex	1.5	2.5				
5/16″ x 2 7/8″ Flat	1.5	1.4	330	380	420	435
5/16″ x 3½″ Flat	1.5	1.5				
5/16″ x 4″ Flat	1.5	1.5				
5/16″ x 4½″ Flat	1.5	1.5				
5/16″ x 5″ Flat	1.5	3.0	590	550	765	660
5/16″ x 6″ Flat	1.5	3.0				
5/16″ x 6¾″ Flat	1.5	3.0				
5/16″ x 8″ Flat	1.5	3.0				
5/16″ x 10″ Flat	1.5	3.0				
5/16″ x 8″ Hex	1.5	3.0	455	460	750	600
5/16″ x 10″ Hex	1.5	3.0				
5/16″ x 12″ Hex	1.5	3.0				

SI: 1 in = 25.4 mm, 1 lb = 4.45 N

1. Reference lateral values apply to two-member single shear connection where both members are of the same specific gravity, and the fastener is oriented perpendicular to grain.
2. For wood species with an assigned specific gravity between 0.42 and 0.50, use the tabulated values for specific gravity of 0.42. For wood species with an assigned specific gravity greater than or equal to 0.50, use the tabulated values for specific gravity of 0.50. Tabulated values may also be used for engineered wood products with a corresponding assigned specific gravity.
3. Tabulated lateral design values (Z) shall be adjusted by all applicable adjustment factors per *NDS* Table 11.3.1 for ASD only.
4. $Z_\perp$ = Lateral Design Values Perpendicular to Grain (lb), $Z_\parallel$ = Lateral Design Values Parallel to Grain (lb)
5. Fastener main member penetration is the length embedded in the main member, including the tip.

Table 4. Reference Lateral Design Values (Z) for Connections in Lumber – Hot-Dip Galvanized *ASTM A153* Class D, lbf[1,3,4]

Fastener Designation	Minimum Side Member Thickness (in)	Minimum Main Member Penetration[5] (in)	Wood Species[2] (Specific Gravity)			
			HF/SPF (0.42)		DF-L (0.50)	
			$Z_\perp$	$Z_\parallel$	$Z_\perp$	$Z_\parallel$
¼″ x 3″ Hex	1.5	1.5	125	140	145	180
¼″ x 4″ Hex	1.5	2.5	125	155	145	180
¼″ x 6″ Hex	1.5	2.5				
5/16″ x 8″ Hex	1.5	3.0	135	165	175	220
5/16″ x 10″ Hex	1.5	3.0				
5/16″ x 12″ Hex	1.5	3.0				

SI: 1 in = 25.4 mm, 1 lb = 4.45 N

1. Reference lateral values apply to two-member single shear connection where both members are of the same specific gravity, and the fastener is oriented perpendicular to grain.
2. For wood species with an assigned specific gravity between 0.42 and 0.50, use the tabulated values for specific gravity of 0.42. For wood species with an assigned specific gravity greater than or equal to 0.50, use the tabulated values for specific gravity of 0.50. Tabulated values may also be used for engineered wood products with a corresponding assigned specific gravity.
3. Tabulated lateral design values (Z) shall be adjusted by all applicable adjustment factors per *NDS* Table 11.3.1 for ASD only.
4. $Z_\perp$ = Lateral Design Values Perpendicular to Grain (lb), $Z_\parallel$ = Lateral Design Values Parallel to Grain (lb)
5. Fastener main member penetration is the length embedded in the main member, including the tip.

5.5 *Reference Withdrawal Design Values (W) and Head Pull-Through Design Values (P)*

5.5.1 Reference withdrawal design values (lbf/in) for CAMO® structural series wood screws are specified in Table 5.

Table 5. Reference Withdrawal Values (W) – Side Grain Applications, lbf/in

Fastener Designation	Penetration[2] (in)	Withdrawal Design Value[1,3], W (lbf/in)	
		Wood Species[4] (Specific Gravity)	
		HF/SPF (0.42)	DF-L (0.50)
#12 Framing	1	240	355
	> 1	275	400
#14 Truss	1	240	325
	> 1	265	510
¼" Structural Flat and Hex Head	1	220	310
	> 1	325	495
5/16" Structural Flat and Hex Head	1	215	270
	> 1	355	540

SI: 1 in = 25.4 mm, 1 lb = 4.45 N, 1 lb/in = 0.175 kN/m

1. Tabulated withdrawal values (W) shall be adjusted by all applicable adjustment factors per *NDS* Table 11.3.1 for ASD only.
2. Minimum fastener penetration into main member of 1" is required. Fastener penetration is the threaded length embedded in the main member, including the tip.
3. The design withdrawal value in pounds is equal to $w_1 + (L_T - 1)*w_2$; where w_1 = the reference withdrawal value corresponding to 1″ penetration, L_T = embedded thread length (minimum of 1″ and maximum of thread length corresponding selected screw's thread length, as listed in Table 1), and w_2 = reference withdrawal value corresponding to > 1″ penetration.
4. For wood species with an assigned specific gravity between 0.42 and 0.50, use the tabulated values for specific gravity of 0.42. For wood species with an assigned specific gravity greater than or equal to 0.50, use the tabulated values for specific gravity of 0.50. Tabulated values may also be used for engineered wood products with a corresponding assigned specific gravity.

5.5.2 Reference head pull-through design values (lbf) for CAMO® structural series wood screws are specified in Table 6.

Table 6. Reference Pull-Through Design Values (P), lbf

Fastener Designation	Wood Side Member Thickness (in)	Pull-Through Design Value [1], P (lbf)	
		Wood Species[2] (Specific Gravity)	
		HF/SPF (0.42)	DF-L (0.50)
#12 Framing	1.5	510	620
#14 Truss		470	710
¼" Structural Flat Head		810	1,085
¼" Structural Hex Head		545	720
5/16" Structural Flat Head		1,075	1,220
5/16" Structural Hex Head		670	870

SI: 1 in = 25.4 mm, 1 lb = 4.45 N, 1 lb/in = 0.175 kN/m

1. Tabulated head pull-through values (P) shall be adjusted by all applicable adjustment factors per *NDS* Table 11.3.1 for ASD only.
2. For wood species with an assigned specific gravity between 0.42 and 0.50, use the tabulated values for specific gravity of 0.42. For wood species with an assigned specific gravity greater than or equal to 0.50, use the tabulated values for specific gravity of 0.50. Tabulated values may also be used for engineered wood products with a corresponding assigned specific gravity.

5.5.3 Table 7 is a design tool to show where withdrawal or head pull-through will control the connection design, for connections where a nominal 2x side member is attached to the side grain of a main member.

5.5.3.1 Table 8 provides the required fastener thread length embedment in the main where head pull-through begins to control (i.e. where the main member embedment is greater than or equal to the tabulated value, head pull-through controls the design).

Table 7. Main Member Embedment Where Head-Pull Through Controls

Fastener Designation	Wood Side Member Thickness (in)	Thread Length Embedded in Main Member[1] (in)	
		Wood Species[2] (Specific Gravity)	
		HF/SPF (0.42)	DF-L (0.50)
#12 Framing	1.5	2.0	1.7
#14 Truss		1.9	1.8
¼" Structural Flat Head		2.0	1.8
¼" Structural Hex Head		2.8	2.6
5/16" Structural Flat Head		2.3	2.1
5/16" Structural Hex Head		3.4	2.8

SI: 1 in = 25.4 mm

1. Thread length embedded in main member includes the fastener tip.
2. For wood species with an assigned specific gravity between 0.42 and 0.50, use the tabulated values for specific gravity of 0.42. For wood species with an assigned specific gravity greater than or equal to 0.50, use the tabulated values for specific gravity of 0.50. Tabulated values may also be used for engineered wood products with a corresponding assigned specific gravity.

6 Installation

6.1 Installation shall comply with the manufacturer's installation instructions and this TER. In the event of a conflict between the manufacturer's installation instructions and this TER, the more restrictive shall govern.

6.2 Fasteners shall be installed with a ½" (12.7mm), low rpm/high torque electric drill (450 rpm).

6.3 Fasteners shall be installed with manufacturer's supplied bits.

6.4 Fasteners shall be installed with the underside of the head flush to the surface of the wood member. Fasteners shall not be overdriven.

6.5 Fasteners shall not be struck with a hammer during installation.

6.6 Lead holes are not required but may be used where lumber is prone to splitting.

6.7 Installer shall use appropriate/required personal protection equipment during installation and must not place fastener in mouth.

6.8 Minimum requirements for screw spacing edge distance, and end distance shall be in accordance with Table 8.

Table 8. Screw Spacing, Edge Distance, and End Distance Requirements[1]

Connection Geometry	Minimum Spacing/Distance (in)			
	#12 Framing Screw	#14 Truss Screw	¼" Flat or Hex	5/16" Flat or Hex
Edge Distance –Load in any direction	½			5/8
End Distance – Load parallel to grain, towards end	2½	2 3/8	2 7/8	3 3/8
End Distance – Load perpendicular to grain, away from end	1 5/8		2	2¼
End Distance – Load perpendicular to grain	1 5/8		2	2¼
Spacing between Fasteners in a Row – Parallel to grain	2½	2 3/8	2 7/8	3 3/8
Spacing between Fasteners in a Row – Perpendicular to grain	1 5/8		2	2¼
Spacing between Rows of Fasteners – In-line	7/8		1	1 1/8
Spacing between Rows of Fasteners – Staggered[2]	½			5/8

SI: 1 in = 25.4 mm

1. Edge distances, end distances, and spacing of fasteners shall be sufficient to prevent splitting of the wood or as shown in this table, whichever is the more restrictive.
2. Values for "Spacing between Rows or Fasteners-Staggered" apply where the screws in adjacent rows are offset by one-half of the "Spacing between Fasteners in a Row".

7 Substantiating Data

7.1 Testing has been performed under the supervision of a professional engineer and/or under the requirements of ISO/IEC 17025 as follows:

7.1.1 Bending yield testing in accordance with *ASTM F1575*

7.1.2 Shear strength testing in accordance with *AISI S904*

7.1.3 Tensile strength testing in accordance with *AISI S904*

7.1.4 Lateral connection testing in accordance with *ASTM D1761*

7.1.5 Withdrawal testing in accordance with *ASTM D1761*

7.1.6 Head pull-through testing in accordance with *ASTM D1761*

7.1.7 Corrosion resistance testing in accordance with *ASTM B117*, *ASTM G85*, and *ASTM G198*

7.2 Information contained herein is the result of testing and/or data analysis by sources which conform to *IBC* Section 1703 and/or professional engineering regulations. DrJ relies upon accurate data to perform its ISO/IEC 17065 evaluations.

7.3 Where appropriate, DrJ's analysis is based on provisions that have been codified into law through state or local adoption of codes and standards. The providers of the codes and standards are legally responsible for their content. DrJ analysis may use code-adopted provisions as a control sample. A control sample versus a test sample establishes a products as being equivalent to that prescribed in this code in quality, *strength*, effectiveness, *fire resistance*, durability, and safety. Where the accuracy of the provisions provided herein is reliant upon the published properties of materials, DrJ relies upon the grade mark, grade stamp, mill certificate, and/or test data provided by material suppliers to be minimum properties. DrJ analysis relies upon these properties to be accurate.

8 Findings

8.1 When used and installed in accordance with this TER and the manufacturer's installation instructions, the products listed in Section 1.1 is approved for the following:

8.1.1 Provide resistance to lateral loads applied to the fastener in a wood to wood connection as shown in Table 3 and Table 4.

8.1.2 Provide resistance to reference withdrawal loads as shown in Table 5.

8.1.3 Provide resistance to head pull-through loads as shown in Table 6.

8.2 Building codes require data from valid *research reports* be obtained from *approved sources* (i.e., licensed *registered design professionals* [RDPs]).

8.2.1 Building official approval of a licensed RDP is performed by verifying the RDP and/or their business entity is listed by the licensing board of the relevant *jurisdiction*.

8.3 Agencies who are accredited through ISO/IEC 17065 have met the code requirements for approval by the *building official*. DrJ is an ISO/IEC 17065 ANAB-Accredited Product Certification Body – Accreditation #1131 and employs RDPs.

8.4 Through ANAB accreditation and the IAF MLA, DrJ certification can be used to obtain products approval in any *jurisdiction* or country that has IAF MLA Members & Signatories to meet the Purpose of the MLA – "certified once, accepted everywhere."

8.5 *IBC* Section 104.11 (*IRC* Section R104.11 and *IFC* Section 104.10[6] are similar) states:

> **104.11 Alternative materials, design and methods of construction and equipment.** The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code…Where the alternative material, design or method of construction is not *approved*, the *building official* shall respond in writing, stating the reasons the alternative was not *approved*.

9 Conditions of Use

9.1 Wood main and side members must have a moisture content of less than or equal to 19%. Where fasteners are installed in a wet service condition, the appropriate reduction factors shall be applied per *NDS* Table 11.3.1.

9.2 Use of fasteners in locations exposed to saltwater or saltwater spray is outside the scope of this TER.

9.3 In cases where fastener metal capacity (instead of the wood member) controls the connection design, the allowable connection strength shall not be multiplied by the adjustment factors specified in the *NDS*.

9.4 Where required by the *building official*, also known as the authority having jurisdiction (AHJ) in which the project is to be constructed, this TER and the installation instructions shall be submitted at the time of *permit* application.

[6] 2018 *IFC* Section 104.9

9.5 Any generally accepted engineering calculations needed to show compliance with this TER shall be submitted to the AHJ for review and approval.

9.6 Design loads shall be determined in accordance with the building code adopted by the *jurisdiction* in which the project is to be constructed and/or by the building designer (e.g., *owner* or RDP).

9.7 At a minimum, this products shall be installed per Section 6 of this TER.

9.8 This products has an internal quality control program and a third-party quality assurance program in accordance with *IBC* Section 104.4 and Section 110.4 and *IRC* Section R104.4 and Section R109.2.

9.9 The actual design, suitability, and use of this TER, for any particular building, is the responsibility of the *owner* or the owner's authorized agent.

9.10 This TER shall be reviewed for code compliance by the AHJ in concert with *IBC* Section 104.

9.11 The implementation of this TER for this products is dependent on the design, quality control, third-party quality assurance, proper implementation of installation instructions, inspections required by *IBC* Section 110.3, and any other code or regulatory requirements that may apply.

10 Identification

10.1 The products listed in Section 1.1 is identified by a label on the board or packaging material bearing the manufacturer’s name, product name, TER number, and other information to confirm code compliance.

10.2 Additional technical information can be found at camofasteners.com or nationalnail.com.

11 Review Schedule

11.1 This TER is subject to periodic review and revision. For the most recent version, visit drjcertification.org.

11.2 For information on the current status of this TER, contact DrJ Certification.

Issue Date: July 15, 2022
Subject to Renewal: October 1, 2023

FBC Supplement to TER 2102-01

REPORT HOLDER: National Nail Corporation DBA CAMO®

1 Evaluation Subject

1.1 Framing Screws, Truss Screws, 1/4″ Structural Flat and Hex Head Screws, and 5/16″ Structural Flat and Hex Head Screws

2 Purpose and Scope

2.1 *Purpose*

2.1.1 The purpose of this Technical Evaluation Report (TER) supplement is to show Framing Screws, Truss Screws, 1/4″ Structural Flat and Hex Head Screws, and 5/16″ Structural Flat and Hex Head Screws, recognized in TER 2102-01, have also been evaluated for compliance with the codes listed below as adopted by the Florida Building Commission.

2.2 *Applicable Code Editions*

2.2.1 *FBC-B—17, 20: Florida Building Code – Building*

2.2.2 *FBC-R—17, 20: Florida Building Code – Residential*

3 Conclusions

3.1 Framing Screws, Truss Screws, 1/4″ Structural Flat and Hex Head Screws, and 5/16″ Structural Flat and Hex Head Screws, described in TER 2102-01, comply with the *FBC-B* and *FBC-R* and are subject to the conditions of use described in this supplement.

3.2 Where there are variations between the *IBC* and *IRC* and the *FBC-B* and *FBC-R* applicable to this TER, they are listed here.

3.2.1 *FBC-B* Section 104.4 and Section 110.4 are reserved.

3.2.2 *FBC-R* Section R104 and Section R109 are reserved.

4 Conditions of Use

4.1 Framing Screws, Truss Screws, 1/4″ Structural Flat and Hex Head Screws, and 5/16″ Structural Flat and Hex Head Screws, described in TER 2102-01, must comply with all of the following conditions:

4.1.1 All applicable sections in TER 2102-01

4.1.2 The design, installation, and inspections are in accordance with additional requirements of *FBC-B* Chapter 16 and Chapter 17, as applicable.

Issue Date: July 15, 2022
Subject to Renewal: October 1, 2023

LABC and LARC Supplement to TER 2102-01

REPORT HOLDER: National Nail Corporation DBA CAMO®

1 Evaluation Subject

1.1 Framing Screws, Truss Screws, 1/4″ Structural Flat and Hex Head Screws, and 5/16″ Structural Flat and Hex Head Screws

2 Purpose and Scope

2.1 *Purpose*

2.1.1 The purpose of this Technical Evaluation Report (TER) supplement is to show Framing Screws, Truss Screws, 1/4″ Structural Flat and Hex Head Screws, and 5/16″ Structural Flat and Hex Head Screws, recognized in TER 2102-01, have also been evaluated for compliance with the codes listed below as adopted by the Los Angeles Department of Building and Safety (LADBS).

2.2 *Applicable Code Editions*

2.2.1 *LABC—17, 20: Los Angeles Building Code*

2.2.2 *LARC—17, 20: Los Angeles Residential Code*

3 Conclusions

3.1 Framing Screws, Truss Screws, 1/4″ Structural Flat and Hex Head Screws, and 5/16″ Structural Flat and Hex Head Screws, described in TER 2102-01, comply with the *LABC* and *LARC* and are subject to the conditions of use described in this supplement.

3.2 Where there are variations between the *IBC* and *IRC* and the *LABC* and *LARC* applicable to this TER, they are listed here.

3.2.1 *LABC* Section 91.104.2.6 and *LARC* Section 91.104.2.6 replace *IBC* Section 104.11 and *IRC* Section R104.11, respectively.

3.2.2 *LABC* Section 91.104.2.2 and *LARC* Section 91.104.2.2 replace *IBC* Section 104.4 and *IRC* Section R104.4, respectively.

3.2.3 *LABC* Section 91.108 and *LARC* Section 91.108 replace *IBC* Section 110.4 and *IRC* Section R109.2, respectively.

3.2.4 *LABC* Section 91.104 replaces *IBC* Section 104

3.2.5 *LABC* Section 91.108.5 replaces *IBC* Section 110.3.

4 Conditions of Use

4.1 Framing Screws, Truss Screws, 1/4″ Structural Flat and Hex Head Screws, and 5/16″ Structural Flat and Hex Head Screws, described in TER 2102-01, must comply with all of the following conditions:

4.1.1 All applicable sections in TER 2102-01

4.1.2 The design, installation, conditions of use, and identification of Framing Screws, Truss Screws, 1/4″ Structural Flat and Hex Head Screws, and 5/16″ Structural Flat and Hex Head Screws are in accordance with the 2015 *International Building Code* (*IBC*) provisions noted in TER 2102-01.

4.1.3 The design, installation, and inspections are in accordance with additional requirements of *LABC* Chapter 16 and 17, as applicable.