Listing and Technical Evaluation Report™

A Duly Authenticated Report from an Approved Agency

Report No: 2404-04

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CAMO® Structural Fasteners Used in Beam and Wall Connections

Trade Secret Report Holder:

National Nail® Corporation dba CAMO®

Phone: 616-638-8000 Fax: 616-531-5970 Website: www.nationalnail.com or www.camofasteners.com

CSI Designations:

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 Innovative Products Evaluated[1]

1.1 CAMO Series Structural Wood Screws:

1.1.1 $^{5}/_{16}$" CAMO® Series Hot-Dip Galvanized Hex Head Screws

1.1.2 $^{5}/_{16}$" CAMO® Series PROTECH™ Ultra 4 Coated Hex Head Screws

1.1.3 $^{5}/_{16}$" CAMO® Series PROTECH™ Ultra 4 Coated Flat Head Screws

2 Product Description and Materials

2.1 The innovative products evaluated in this report are shown in **Figure 1**, **Figure 2** and **Figure 3**.

Figure 1. $^{5}/_{16}$" CAMO Series Hex Head Screw - Hot-Dip Galvanized

Figure 2. $^{5}/_{16}$" CAMO Series Hex Head Screw – PROTECH Ultra 4

Figure 3. $^{5}/_{16}$" CAMO Series Flat Head Screw - PROTECH Ultra 4

2.2 *Product Description*

2.2.1 CAMO Series Structural Wood Screws are partially threaded fasteners manufactured using standard cold-forming processes and are subsequently heat-treated and coated.

2.2.2 CAMO Series Structural Wood Screws are available with a variety of coatings including a proprietary coating system designated as PROTECH Ultra 4, meeting the requirements of ASTM G198 or Hot-Dip Galvanized with a coating weight in compliance with ASTM A153, Class D.

2.3 *Fastener Material*

2.3.1 CAMO Series Structural Wood Screws are made of hardened carbon steel grade 10B18, 1022 or 10B21 wire conforming to ASTM A510, or Grade 17MnB3 or 19MnB4 wire conforming to DIN 1654 using standard cold-forming processes.

2.4 *Corrosion Resistance*

2.4.1 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 (HDG) screws with a coating weight in compliance with ASTM A153, Class D.

2.4.1.1 CAMO Series Structural Wood Screws with the proprietary PROTECH Ultra 4 coating 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 (i.e., Ground Contact – General Use AWPA UC1 through UC4A).

2.5 *Pressure-Preservative Treated (PPT) Wood Applications*

2.5.1 CAMO Series Structural Wood Screws with the proprietary PROTECH Ultra 4 and HDG coatings are recognized for use in PPT lumber provided the conditions set forth by the PPT lumber manufacturer be met, including appropriate strength reductions.

2.6 *Fire-Retardant Treated (FRT) Wood Applications*

2.6.1 CAMO Series Structural Wood Screws with the proprietary PROTECH Ultra 4 and HDG coatings are recognized for use in FRT lumber provided the conditions set forth by the FRT lumber manufacturer be met, including appropriate strength reductions.

2.7 *Wood Material*

2.7.1 Solid sawn wood main and side members connected using CAMO Series Structural Wood Screws shall consist of lumber species or species combinations having an assigned specific gravity as given in the respective tables of this report.

2.7.2 Structural Composite Lumber (SCL) (i.e., LVL, LSL, PSL, etc.) connected using CAMO Series Structural Wood Screws shall be recognized in evaluation reports having published equivalent specific gravities for dowel-bearing strength and withdrawal resistance.

2.8 *Fastener Specifications*

2.8.1 The fasteners evaluated in this report are set forth in **Table 1** for CAMO Series Structural Wood Screws with the PROTECH Ultra 4 coating, and **Table 2** for CAMO Series Structural Wood Screws with the HDG coating.

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

Fastener Designation	Head				Length (in)		Diameter (in)			Bending Yield Strength, $^4F_{yb}$ (psi)	Allowable Steel Strength (lbf)	
	Style	Drive System	Diameter (in)	Height (in)	Fastener[2]	Thread[3]	Shank	Minor	Major		Tensile	Shear[5]
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						
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 3 1/2"					3.500	2.000						
5/16" x 4"					4.000	2.370						
5/16" x 4 1/2"					4.500	2.370						
5/16" x 5"					5.000	2.752						
5/16" x 6"					6.000	2.752						
5/16" x 6 3/4"					6.750	2.752						
5/16" x 8"					8.000	2.752						
5/16" x 10"					10.000	2.752						

SI: 1 in = 25.4 mm, 1 lbf. = 4.448 N, 1 psi = 0.00689 MPa

1. Tabulated fastener dimensions are measured on uncoated fasteners. Finished dimensions are larger due to the proprietary coatings added.
2. Length of the hex head screws are measured from the underside of the head to the tip. Length of the flat head screws are measured from the topside 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.

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

Fastener Designation	Head				Length (in)		Diameter (in)			Bending Yield Strength, $^4F_{yb}$ (psi)	Allowable Steel Strength (lbf)	
	Style	Drive System	Diameter (in)	Height (in)	Fastener[2]	Thread[3]	Shank	Minor	Major		Tensile	Shear[5]
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 lbf. = 4.448 N, 1 psi = 0.00689 MPa

1. Tabulated fastener dimensions are measured on uncoated fasteners. Finished dimensions are larger due to the proprietary coatings added.
2. Length of the hex 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.

2.9 As needed, review material properties for design in **Section 6** and to regulatory evaluation in **Section 8**.

3 Definitions

3.1 New Materials[2] are defined as building materials, equipment, appliances, systems or methods of construction not provided for by prescriptive and/or legislatively adopted regulations, known as alternative materials.[3] The design strengths and permissible stresses shall be established by tests[4] and/or engineering analysis.[5]

3.2 Duly authenticated reports[6] and research reports[7] are test reports and related engineering evaluations, which are written by an approved agency[8] and/or an approved source.[9]

3.2.1 These reports contain intellectual property and/or trade secrets, which are protected by the Defend Trade Secrets Act (DTSA).[10]

3.3 An approved agency is *"approved"* when it is ANAB ISO/IEC 17065 accredited. DrJ Engineering, LLC (DrJ) is listed in the ANAB directory.

3.4 An approved source is *"approved"* when a professional engineer (i.e., Registered Design Professional) is properly licensed to transact engineering commerce. The regulatory authority governing approved sources is the state legislature via its professional engineering regulations.[11]

3.5 Testing and/or inspections conducted for this duly authenticated report were performed by an ISO/IEC 17025 accredited testing laboratory, an ISO/IEC 17020 accredited inspection body and/or a licensed Registered Design Professional (RDP).

3.5.1 The Center for Building Innovation (CBI) is ANAB[12] ISO/IEC 17025 and ISO/IEC 17020 accredited.

3.6 The regulatory authority shall enforce[13] the specific provisions of each legislatively adopted regulation. If there is a non-conformance, the specific regulatory section and language of the non-conformance shall be provided in writing[14] stating the nonconformance and the path to its cure.

3.7 The regulatory authority shall accept duly authenticated reports from an approved agency and/or an approved source with respect to the quality and manner of use of new materials or assemblies as provided for in regulations regarding the use of alternative materials, designs, or methods of construction.[15]

3.8 ANAB is an International Accreditation Forum (IAF) Multilateral Recognition Arrangement (MLA) signatory where recognition of certificates, validation and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA with the appropriate scope, shall be approved.[16] Therefore, all ANAB ISO/IEC 17065 duly authenticated reports are approval equivalent.[17]

3.9 Approval equity is a fundamental commercial and legal principle.[18]

4 Applicable Standards for the Listing; Regulations for the Regulatory Evaluation[19]

4.1 *Standards*

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

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

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

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

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

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

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

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

4.2 *Regulations*

4.2.1 *IBC – 15, 18, 21: International Building Code®*

4.2.2 *IRC – 15, 18, 21: International Residential Code®*

4.2.3 *FBC-B—20, 23: Florida Building Code – Building (FL 41741)*[20]

4.2.4 *FBC-R—20, 23: Florida Building Code – Residential (FL 41741)*[20]

5 Listed[21]

5.1 Equipment, materials, products or services included in a List published by a nationally recognized testing laboratory (i.e., CBI), approved agency (i.e., CBI and DrJ), and/or approved source (i.e., DrJ) or other organization concerned with product evaluation (i.e., DrJ) that maintains periodic inspection (i.e., CBI) of production of listed equipment or materials, and whose listing states either that the equipment or material meets nationally recognized standards or has been tested and found suitable for use in a specified manner.

6 Tabulated Properties Generated from Nationally Recognized Standards

6.1 CAMO Series Structural Wood Screws are used in the construction of decks that meet the requirements of IBC Section 2308 or IRC Section R507 for the following applications:

6.1.1 CAMO Series Structural Wood Screws are used to attach deck beams over notched posts. See **Section 6.6** for allowable design loads.

6.1.2 CAMO Series Structural Wood Screws are used to attach deck beams on top of posts (installation into end grain of posts). See **Section 6.7** for allowable design loads.

6.1.3 CAMO Series Structural Wood Screws are used to attach knee braces to posts. See **Section 6.8** for allowable design loads.

6.2 CAMO Series Structural Wood Screws are alternatives to the fasteners specified in IRC Section R507.2.3, IRC Table R507.2.3 and IRC Section R507.5.1.

6.3 Allowable design loads are applicable to fasteners installed in accordance with **Section 6** and **Section 9**.

6.4 CAMO Series Structural Wood Screws are used in buildings or structures requiring structural design for wind loads in accordance with IBC Section 1609, or wind design in accordance with IRC Section R301.2.1.

6.5 CAMO Series Structural Wood Screws are used in buildings or structures requiring structural design for earthquake loads in accordance with IBC Section 1613, or seismic design in accordance with IRC Section R301.2.2.

6.6 *Allowable Design Loads – Beam to Notched Post Connection*

6.6.1 Allowable uplift design loads for a deck beam to notched post connection using CAMO Series $^{5}/_{16}$" PROTECH Ultra 4 coated Flat Head Screws are shown in **Table 3**.

6.6.2 Fastener schedule for the values in **Table 3** are provided in **Table 4**.

6.6.3 See **Figure 4** through **Figure 7** for example details regarding deck beam to notched post connections using CAMO Series $^{5}/_{16}$" PROTECH Ultra 4 coated Flat Head Screws.

Table 3. Allowable Uplift Loads for Notched Post to Beam Connections using $^{5}/_{16}$" PROTECH Ultra 4 Coated Flat Head Screws[1,2,3,4,5,6,7]

Nominal Post Size (in)	Beam Size (in)	Allowable Loads (lbf) – Uplift and Lateral Screws											
		Post/Beam Configuration											
		SPF (0.42)			DF (0.50)			SP (0.55)			SCL (0.50)		
		Continuous	Spliced	End	Continuous	Spliced	End	Continuous	Spliced	End	Continuous	Spliced	End
Single Ply Beam													
4x4	2x6	215	N/A	110	255	N/A	130	285	N/A	140	255	N/A	130
	2x8	430	N/A	215	515	N/A	255	565	N/A	285	515	N/A	255
	2x10	645	N/A	325	770	N/A	385	850	N/A	425	770	N/A	385
	2x12	860	N/A	430	1,025	N/A	515	1,130	N/A	565	1,025	N/A	515
6x6	2x6	215	215	215	255	255	255	285	285	285	255	255	255
	2x8	430	430	430	515	515	515	565	565	565	515	515	515
	2x10	645	645	645	770	770	770	850	850	850	770	770	770
	2x12	860	860	860	1,025	1,025	1,025	1,130	1,130	1,130	1,025	1,025	1,025
Two-Ply Beam													
6x6	2x6	260	260	260	290	290	290	310	310	310	235	235	235
	2x8	520	520	520	580	580	580	620	620	620	470	470	470
	2x10	780	780	780	875	875	875	925	925	925	705	705	705
	2x12	1,040	1,040	1,040	1,165	1,165	1,165	1,235	1,235	1,235	940	940	940
8x8	2x6	260	260	260	290	290	290	310	310	310	235	235	235
	2x8	520	520	520	580	580	580	620	620	620	470	470	470
	2x10	780	780	780	875	875	875	925	925	925	705	705	705
	2x12	1,040	1,040	1,040	1,165	1,165	1,165	1,235	1,235	1,235	940	940	940
Three-Ply Beam													
8x8	2x6	205	205	205	240	240	240	255	255	255	235	235	235
	2x8	415	415	415	475	475	475	515	515	515	470	470	470
	2x10	620	620	620	715	715	715	770	770	770	705	705	705
	2x12	830	830	830	955	955	955	1,030	1,030	1,030	940	940	940

SI: 1 in = 25.4 mm, 1 lbf = 4.448 N

1. For dimensional lumber beams, beam and post were assumed to be of the same species.
2. For SCL beams, SCL shall have a minimum equivalent specific gravity of 0.50 (see SCL manufacturer's evaluation report for listed value), and the notched post shall have a minimum published specific gravity of 0.42. Values are applicable to posts with specific gravity greater than 0.42.
3. Minimum fastener length used in single-ply beam on notched 4x4 and 6x6 posts is 3.5". Minimum fastener length used in two-ply beam on 6x6 posts is 5.0". Values are applicable to fasteners of longer lengths. Fasteners shall not protrude from the other side of the post.
4. For wood species with an assigned specific gravity between 0.42 and 0.50, use the tabulated values for a specific gravity of 0.42. For wood species with an assigned specific gravity between 0.50 and 0.55, use the tabulated values for a specific gravity of 0.50. For wood species with an assigned specific gravity greater than 0.55, use the tabulated values for a specific gravity of 0.55.
5. For applications involving members with different specific gravities, use the allowable load corresponding to the lowest specific gravity.
6. Tabulated loads are based on a Load Duration factor of C_D = 1.00 and a Wet Service factor of C_M = 0.70. Loads may be adjusted for Load Duration per NDS.
7. Connections shall comply with **Table 9** for spacing and end/edge distance requirements.

Table 4. Fastener Schedule for Beam to Notched Post Connection[1,2]

Fastener	Nominal Beam Size	Minimum Fastener Length (in.)	4x4 Post			6x6 Post			8x8 Post		
			Continuous	Splice	End	Continuous	Splice	End	Continuous	Splice	End
$^{5}/_{16}$" Flat Head Screw with PROTECH Ultra 4 Coating	**Single Ply Beam**										
	2x6	3.50	2	N/A	1	2	2	2	2	2	2
	2x8		4	N/A	2	4	4	4	4	4	4
	2x10		6	N/A	3	6	6	6	6	6	6
	2x12		8	N/A	4	8	8	8	8	8	8
	2-ply Beam										
	2x6	5.00	N/A	N/A	N/A	2	2	2	2	2	2
	2x8		N/A	N/A	N/A	4	4	4	4	4	4
	2x10		N/A	N/A	N/A	6	6	6	6	6	6
	2x12		N/A	N/A	N/A	8	8	8	8	8	8
	3-ply Beam										
	2x6	6.75	N/A	N/A	N/A	N/A	N/A	N/A	2	2	2
	2x8		N/A	N/A	N/A	N/A	N/A	N/A	4	4	4
	2x10		N/A	N/A	N/A	N/A	N/A	N/A	6	6	6
	2x12		N/A	N/A	N/A	N/A	N/A	N/A	8	8	8

1. N/A indicates that the beam-post connection is not recommended.
2. Installation shown **Figure 4** through **Figure 7** are examples. Connections shall comply with **Table 9** for spacing and end/edge distance requirements.

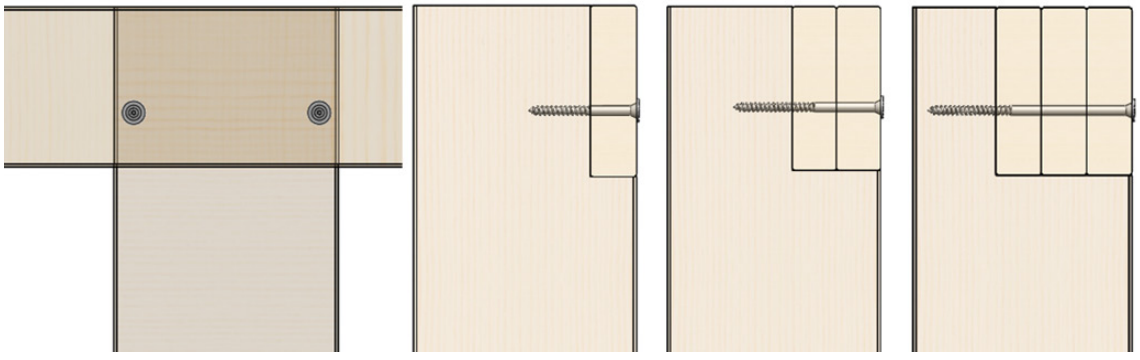

Figure 4. Continuous Beam over Notched Post using CAMO Series $^{5}/_{16}$" PROTECH Ultra 4 Coated Flat Head Screws

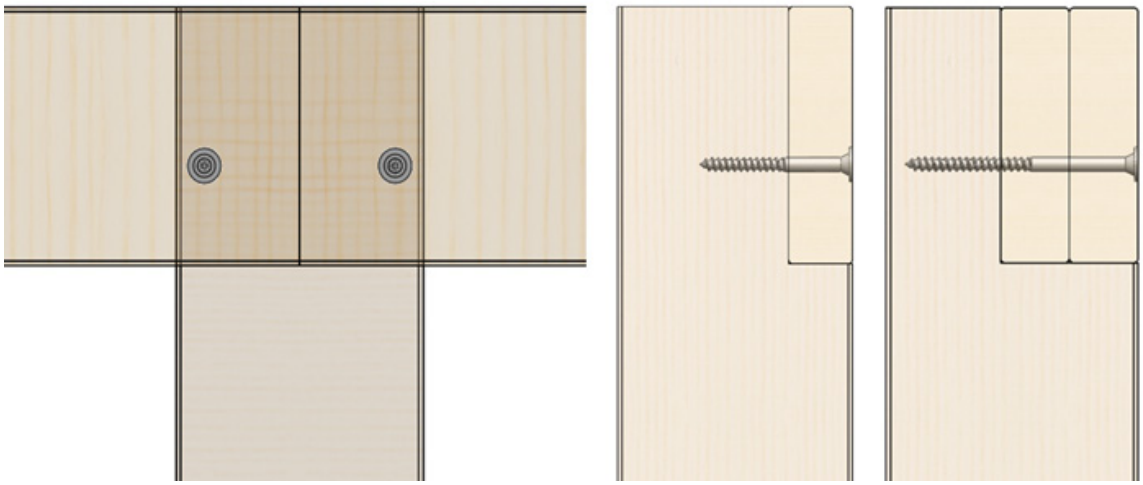

Figure 5. Spliced Beam over Notched Post using CAMO Series $^{5}/_{16}$" PROTECH Ultra 4 Coated Flat Head Screws

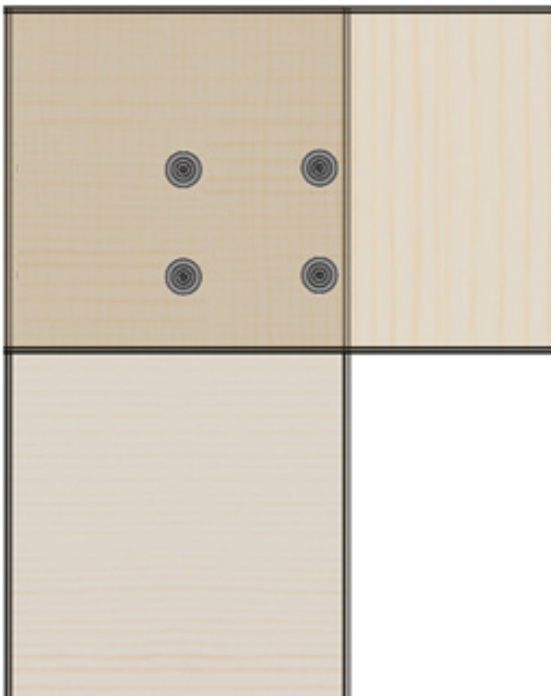

Figure 6. Beam over Notched End Post using CAMO Series $^{5}/_{16}$" PROTECH Ultra 4 Coated Flat Head Screws

6.7 *Allowable Design Loads – Top Beam to Post End Grain Connection*

6.7.1 Allowable uplift design loads for a deck beam to post connection using CAMO Series $^{5}/_{16}$" PROTECH Ultra 4 coated screws installed from the top of the beam to the end grain of the posts are shown in **Table 5**.

6.7.2 Allowable uplift design loads for a deck beam to post connection using CAMO Series $^{5}/_{16}$" HDG coated screws installed from the top of the beam to the end grain of the posts are shown in **Table 6**.

6.7.2.1 Minimum penetration into post shall be the specified thread length of the fastener.

6.7.2.2 Select an appropriate length of fastener to satisfy **Section 6.7.2.1**, above.

6.7.3 See **Figure 7** through **Figure 9** for example details regarding deck beam to post connections using CAMO Series Structural Wood Screws.

Table 5. Allowable Loads for Installation of CAMO $^{5}/_{16}$" PROTECH Ultra 4 Coated Fasteners from Top of Beam to End Grain of Post[1,2,3,4,5,6,7]

Fastener	Nominal Post Size	Nominal Beam Size	Installation Angle	Number of Fasteners	Allowable Design Loads (lbf)					
					Condition					
					SPF (0.42)		DF (0.50)		SP (0.55)	
					Uplift	Lateral	Uplift	Lateral	Uplift	Lateral
$^{5}/_{16}$" Flat Head Screw PROTECH Ultra 4	6x6	6x6	90°	2	1,255	250	1,825	280	1,825	295
	8x8	8x8								
$^{5}/_{16}$" Hex Head Screw PROTECH Ultra 4	6x6	6x6		2	1,255	240	1,740	280	1,740	295
	8x8	8x8								

SI: 1 in = 25.4 mm, 1 lbf = 4.448 N

1. For dimensional lumber beams, beam and post were assumed to be of the same species.
2. For SCL beams, SCL shall have a minimum equivalent specific gravity of 0.50 (see SCL manufacturer's evaluation report for listed value), and the notched post shall have a minimum over-dry specific gravity of 0.42. Values are applicable to posts with specific gravity greater than 0.42.
3. For wood species with an assigned specific gravity between 0.42 and 0.50, use the tabulated values for a specific gravity of 0.42. For wood species with an assigned specific gravity between 0.50 and 0.55, use the tabulated values for a specific gravity of 0.50. For wood species with an assigned specific gravity greater than 0.55, use the tabulated values for a specific gravity of 0.55.
4. For applications involving members with different specific gravities, use the allowable load corresponding to the lowest specific gravity.
5. Tabulated loads are based on a Load Duration factor of C_D = 1.00, and an End Grain Service Factor of C_{eg} = 0.75 for withdrawal and 0.67 for lateral per Section 12.5.2 of NDS. Loads may be adjusted for Load Duration per NDS.
6. For in-service moisture content greater than dry-service conditions as defined in NDS, the appropriate adjustment factor from Tale 11.3.3 of NDS shall be applied.
7. Connections shall comply with **Table 9** for spacing and end/edge distance requirements.

Table 6. Allowable Loads for Installation of CAMO $^{5}/_{16}$" HDG Coated Fasteners from Top of Beam to End Grain of Post[1,2,3,4,5,6,7]

Fastener	Nominal Post Size	Nominal Beam Size	Installation Angle	Number of Fasteners	Allowable Design Loads (lbf)					
					Condition					
					SPF (0.42)		DF (0.50)		SP (0.55)	
					Uplift	Lateral	Uplift	Lateral	Uplift	Lateral
$^{5}/_{16}$" Hex Head Screw HDG	6x6	6x6	90°	2	1,255	210	1,740	235	1,740	250
	8x8	8x8								

SI: 1 in = 25.4 mm, 1 lbf = 4.448 N

1. For dimensional lumber beams, beam and post were assumed to be of the same species.
2. For SCL beams, SCL shall have a minimum equivalent specific gravity of 0.50 (see SCL manufacturer's evaluation report for listed value), and the notched post shall have a minimum over-dry specific gravity of 0.42. Values are applicable to posts with specific gravity greater than 0.42.
3. For wood species with an assigned specific gravity between 0.42 and 0.50, use the tabulated values for a specific gravity of 0.42. For wood species with an assigned specific gravity between 0.50 and 0.55, use the tabulated values for a specific gravity of 0.50. For wood species with an assigned specific gravity greater than 0.55, use the tabulated values for a specific gravity of 0.55.
4. For applications involving members with different specific gravities, use the allowable load corresponding to the lowest specific gravity.
5. Tabulated loads are based on a Load Duration factor of C_D = 1.00, and an End Grain Service Factor of C_{eg} = 0.75 for withdrawal and 0.67 for lateral per Section 12.5.2 of NDS. Loads may be adjusted for Load Duration per NDS.
6. For in-service moisture content greater than dry-service conditions as defined in NDS, the appropriate adjustment factor from Tale 11.3.3 of NDS shall be applied.
7. Connections shall comply with **Table 9** for spacing and end/edge distance requirements.

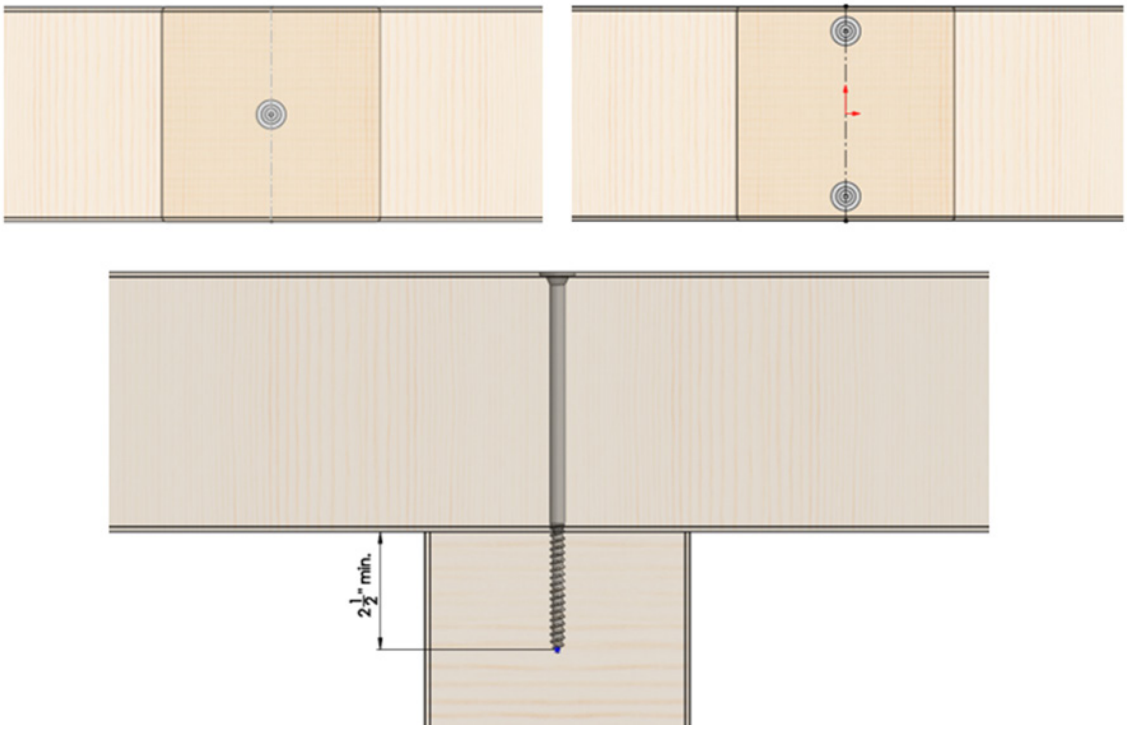

Figure 7. Continuous Sawn Lumber Beam to Post End-Grain using CAMO Series $^{5}/_{16}$" Structural Screws (PROTECH Ultra 4 Coated Flat Head Screw Shown)

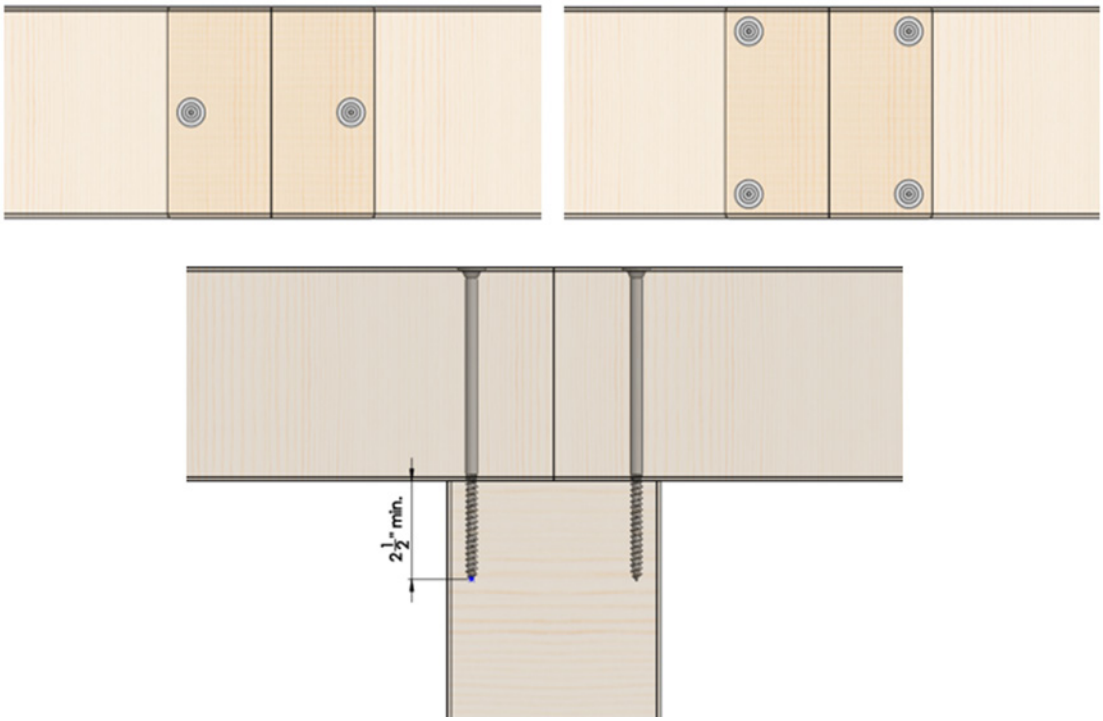

Figure 8. Spliced Sawn Lumber Beam to Post End-Grain using CAMO Series $^{5}/_{16}$" Structural Screws (PROTECH Ultra 4 Coated Flat Head Screw Shown)

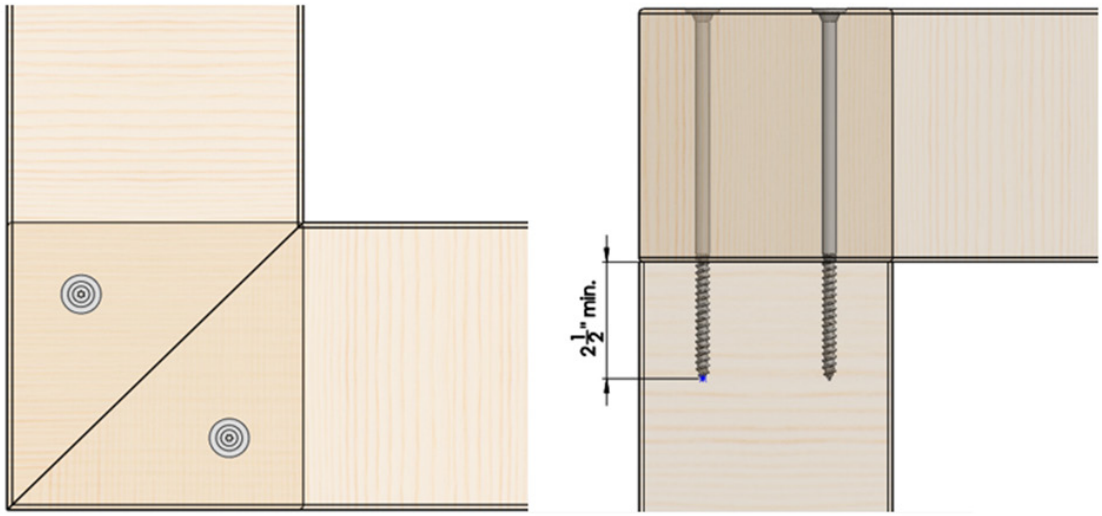

Figure 9. Mitered Corner Post Connection using CAMO Series $^{5}/_{16}$" Structural Screws (PROTECH Ultra 4 Coated Flat Head Screw Shown)

6.8 *Allowable Design Loads – Knee Brace to Post Connection*

6.8.1 Allowable lateral design loads for a knee brace to post connection using CAMO Series $^{5}/_{16}$" PROTECH Ultra 4 coated screws are shown in **Table 7**.

6.8.2 Allowable lateral design loads for a knee brace to post connection using CAMO Series $^{5}/_{16}$" HDG coated screws are shown in **Table 8**.

6.8.3 See **Figure 10** through **Figure 12** for example details regarding knee brace to post connections using CAMO Series Structural Wood Screws.

Table 7. Allowable Lateral Loads for CAMO $^{5}/_{16}$" PROTECH Ultra 4 Coated Fasteners in Knee Brace to Post Connections[1,2,3,4,5,6,7]

Fastener	Nominal Post Size	Nominal Brace Size	Installation Angle (to Post/Beam)	Number of Rows of Fasteners	Allowable Design Loads (lbf)					
					Condition					
					SPF (0.42)		DF (0.50)		SP (0.55)	
					Uplift	Lateral, F1	Uplift	Lateral, F1	Uplift	Lateral, F1
$^{5}/_{16}$" Flat Head Screw PROTECH Ultra 4	4x4	4x4	90°[8]	2	2,110	435	2,430	480	2,430	510
	6x6	6x6								
	8x8	8x8								
	4x4	4x4	45°[9]	2	1,435	355	2,085	400	2,085	425
	6x6	6x6								
	8x8	8x8								
	4x4	4x4	90°[10]	2	310	310	365	365	405	405
	6x6	6x6								
	8x8	8x8								
$^{5}/_{16}$" Hex Head Screw PROTECH Ultra 4	4x4	4x4	90°[8]	2	1,775	435	2,220	480	1,740	510
	6x6	6x6								
	8x8	8x8								
	4x4	4x4	45°[9]	2	1,435	355	2,085	400	2,085	425
	6x6	6x6								
	8x8	8x8								
	8x8	2x4	90°[10]	2	310	310	365	365	405	405

SI: 1 in = 25.4 mm, 1 lbf = 4.448 N

1. For dimensional lumber beams, beam and post were assumed to be of the same species.
2. For SCL beams, SCL shall have a minimum equivalent specific gravity of 0.50 (see SCL manufacturer's evaluation report for listed value), and the notched post shall have a minimum over-dry specific gravity of 0.42. Values are applicable to posts with specific gravity greater than 0.42.
3. For wood species with an assigned specific gravity between 0.42 and 0.50, use the tabulated values for a specific gravity of 0.42. For wood species with an assigned specific gravity between 0.50 and 0.55, use the tabulated values for a specific gravity of 0.50. For wood species with an assigned specific gravity greater than 0.55, use the tabulated values for a specific gravity of 0.55.
4. For applications involving members with different specific gravities, use the allowable load corresponding to the lowest specific gravity.
5. Tabulated loads are based on a Load Duration factor of C_D = 1.00. Loads may be adjusted for Load Duration per NDS.
6. For in-service moisture content greater than dry-service conditions as defined in NDS, the appropriate adjustment factor from Tale 11.3.3 of NDS shall be applied.
7. Connections shall comply with **Table 9** for spacing and end/edge distance requirements.
8. Tabulated loads are subjected to the following:
   4x4 post/brace: Minimum fastener length shall be 5". A borehole perpendicular to the post shall be drilled to achieve a flat surface that runs parallel to the post. The diameter of this borehole shall be sufficient to allow the head of the fastener to fit inside. The depth of the borehole shall be sufficient to allow the entire thread length of the selected fastener to fully penetrate into the post.
   6x6 post/brace: Minimum fastener length shall be 6". A borehole perpendicular to the post shall be drilled to achieve a flat surface that runs parallel to the post. The diameter of this borehole shall be sufficient to allow the head of the fastener to fit inside. The depth of the borehole shall be sufficient to allow the entire thread length of the selected fastener to fully penetrate into the post.
   8x8 post/brace: Minimum fastener length shall be 6". A borehole perpendicular to the post shall be drilled to achieve a flat surface that runs parallel to the post. The diameter of this borehole shall be sufficient to allow the head of the fastener to fit inside. The depth of the borehole shall be sufficient to allow the entire thread length of the selected fastener to fully penetrate into the post.
   See **Figure 10**.
9. Tabulated loads are applicable to all post sizes provided that the minimum fastener length of 6" is used. Distance of the starting point of the selected fastener shall be 3±$^{1}/_{4}$". See **Figure 11**.
10. Fastener shall be installed along the centerline of the 2x4 lumber brace. See **Figure 12**.

Table 8. Allowable Lateral Loads for CAMO $^{5}/_{16}$" HDG Coated Fasteners in Knee Brace to Post Connections[1,2,3,4,5,6,7]

Fastener	Nominal Post Size	Nominal Brace Size	Installation Angle (to Post/Beam)	Number of Rows of Fasteners	Allowable Design Loads (lbf)					
					Condition					
					SPF (0.42)		DF (0.50)		SP (0.55)	
					Uplift	Lateral, F1	Uplift	Lateral, F1	Uplift	Lateral, F1
$^{5}/_{16}$" Hex Head Screw HDG	4x4	4x4	90°[8]	2	1,705	365	2,145	405	2,170	430
	6x6	6x6								
	8x8	8x8								
	4x4	4x4	45°[9]	2	1,150	300	1,490	335	1,490	360
	6x6	6x6								
	8x8	8x8								
	8x8	2x4	90°[10]	2	280	280	340	340	370	370

SI: 1 in = 25.4 mm, 1 lbf = 4.448 N

1. For dimensional lumber beams, beam and post were assumed to be of the same species.
2. For SCL beams, SCL shall have a minimum equivalent specific gravity of 0.50 (see SCL manufacturer's evaluation report for listed value), and the notched post shall have a minimum over-dry specific gravity of 0.42. Values are applicable to posts with specific gravity greater than 0.42.
3. For wood species with an assigned specific gravity between 0.42 and 0.50, use the tabulated values for a specific gravity of 0.42. For wood species with an assigned specific gravity between 0.50 and 0.55, use the tabulated values for a specific gravity of 0.50. For wood species with an assigned specific gravity greater than 0.55, use the tabulated values for a specific gravity of 0.55.
4. For applications involving members with different specific gravities, use the allowable load corresponding to the lowest specific gravity.
5. Tabulated loads are based on a Load Duration factor of C_D = 1.00. Loads may be adjusted for Load Duration per NDS.
6. For in-service moisture content greater than dry-service conditions as defined in NDS, the appropriate adjustment factor from Tale 11.3.3 of NDS shall be applied.
7. Connections shall comply with **Table 9** for spacing and end/edge distance requirements.
8. Tabulated loads are subjected to the following:
   4x4 post/brace: Minimum fastener length shall be 5". A borehole perpendicular to the post shall be drilled to achieve a flat surface that runs parallel to the post. The diameter of this borehole shall be sufficient to allow the head of the fastener to fit inside. The depth of the borehole shall be sufficient to allow the entire thread length of the selected fastener to fully penetrate into the post.
   6x6 post/brace: Minimum fastener length shall be 6". A borehole perpendicular to the post shall be drilled to achieve a flat surface that runs parallel to the post. The diameter of this borehole shall be sufficient to allow the head of the fastener to fit inside. The depth of the borehole shall be sufficient to allow the entire thread length of the selected fastener to fully penetrate into the post.
   8x8 post/brace: Minimum fastener length shall be 6". A borehole perpendicular to the post shall be drilled to achieve a flat surface that runs parallel to the post. The diameter of this borehole shall be sufficient to allow the head of the fastener to fit inside. The depth of the bor hole shall be sufficient to allow the entire thread length of the selected fastener to fully penetrate into the post.
   See **Figure 10**.
9. Tabulated loads are applicable to all post sizes provided that the minimum fastener length of 6" is used. Distance of the starting point of the selected fastener shall be 3±$^{1}/_{4}$". See **Figure 11**.
10. Fastener shall be installed along the centerline of the 2x4 lumber brace. See **Figure 12**.

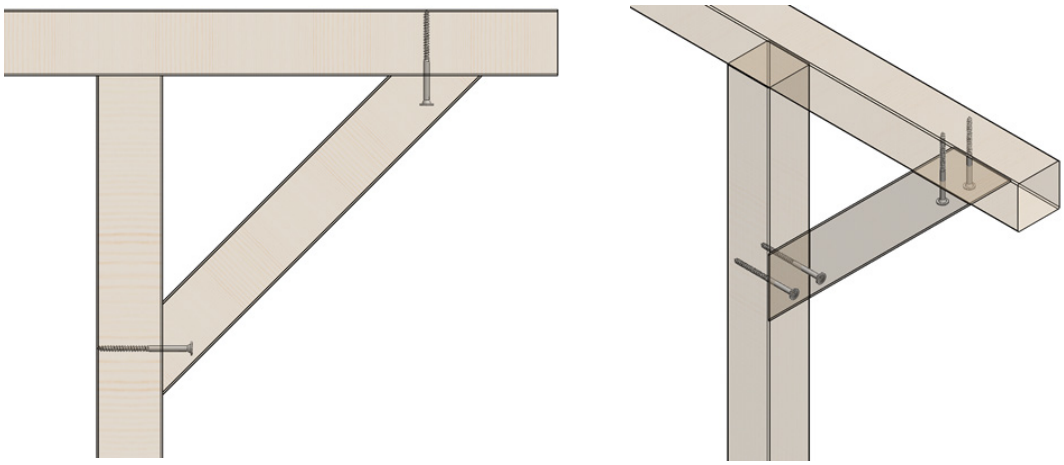

Figure 10. Knee Brace to Post Connection (Perpendicular to Post/Beam) using CAMO Series $^{5}/_{16}$" Structural Screws (PROTECH Ultra 4 Coated Flat Head Screw Shown)

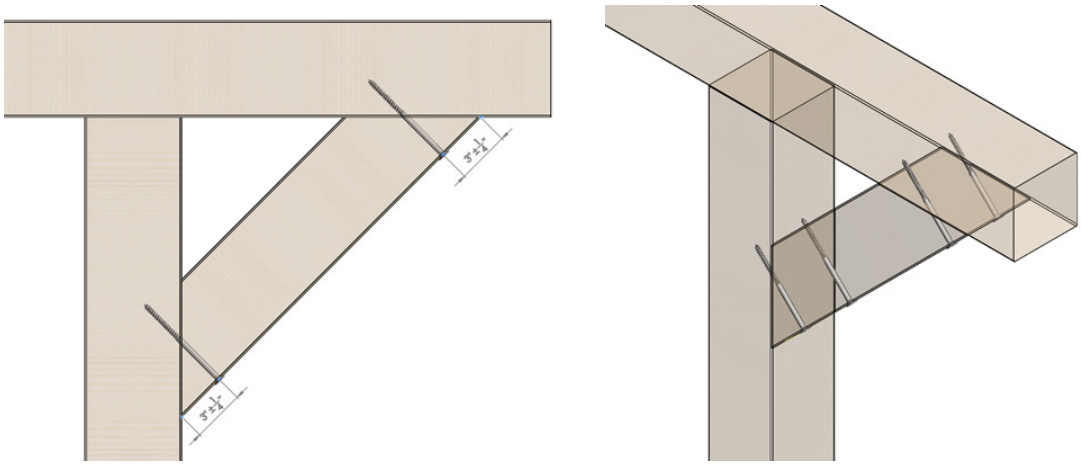

Figure 11. Knee Brace to Post Connection (Perpendicular to Brace) using CAMO Series $^{5}/_{16}$" Structural Screws (PROTECH Ultra 4 Coated Flat Head Screw Shown)

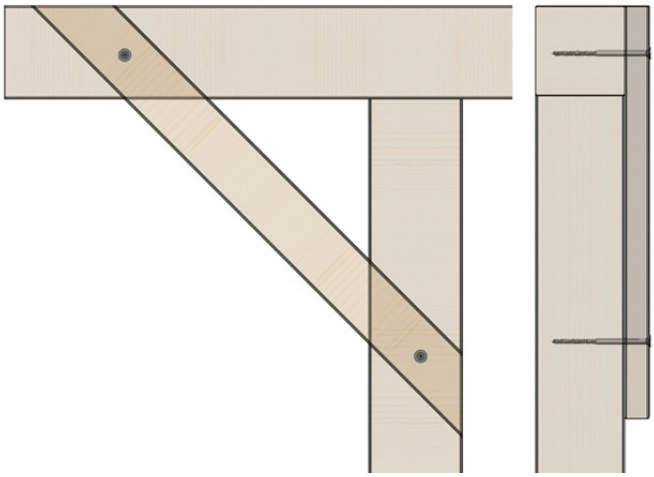

Figure 12. 2x4 Knee Brace to Post Connection using CAMO Series $^{5}/_{16}$" Structural Screws (PROTECH Ultra 4 Coated Flat Head Screw Shown)

6.9 Where it is anticipated that loads will be applied to a single fastener simultaneously in more than one direction, additional evaluation is required to account for the combined effect of these loads using accepted engineering practice.

6.10 Where the application falls outside of the performance evaluation, conditions of use and/or installation requirements set forth herein, alternative techniques shall be permitted in accordance with accepted engineering practice and experience. This includes but is not limited to the following areas of engineering: mechanics or materials, structural, building science and fire science.

7 Certified Performance[22]

7.1 All construction methods shall conform to accepted engineering practices to ensure durable, livable, and safe construction and shall demonstrate acceptable workmanship reflecting journeyman quality of work of the various trades.[23]

7.2 The strength and rigidity of the component parts and/or the integrated structure shall be determined by engineering analysis or by suitable load tests to simulate the actual loads and conditions of application that occur.[24]

8 Regulatory Evaluation and Accepted Engineering Practice

8.1 CAMO Series Structural Wood Screws comply with the following legislatively adopted regulations and/or accepted engineering practice for the following reasons:

8.1.1 CAMO Series Structural Wood Screws were evaluated as an alternative means of attaching:

8.1.1.1 Deck beam to post providing uplift and lateral load resistance as specified in IBC Section 2304.10.8.

8.1.1.2 Knee brace to post/beam to provide (additional) uplift and lateral load resistance.

8.1.2 Evaluation consisted of the following (where applicable):

8.1.2.1 Withdrawal and head pull-through strength for use as an alternative to toenail connections, metal hurricane and seismic clip/straps, or nails in tension (uplift) load applications.

8.1.2.2 Shear strength for use as an alternative to toenail connections, hurricane and seismic clip/straps, or nails in shear (lateral) load applications either parallel or perpendicular to wood grain.

8.1.2.3 Shear strength to resist shear (lateral and uplift) loads applied parallel or perpendicular to the wood grain.

8.1.3 Corrosion resistance was evaluated in accordance with ASTM B117, ASTM G85 and ASTM G198.

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

8.3 Any building code, regulation and/or accepted engineering evaluations (i.e., research reports, duly authenticated reports, etc.) that are conducted for this Listing were performed by DrJ Engineering, LLC (DrJ), an ISO/IEC 17065 accredited certification body and a professional engineering company operated by RDP/approved sources. DrJ is qualified[25] to practice product and regulatory compliance services within its scope of accreditation and engineering expertise, respectively.

8.4 Engineering evaluations are conducted with DrJ's ANAB accredited ICS code scope of expertise, which are also its areas of professional engineering competence.

8.5 Any regulation specific issues not addressed in this section are outside the scope of this report.

9 Installation

9.1 Installation shall comply with the approved construction documents, the manufacturer installation instructions, this report and the applicable building code.

9.2 In the event of a conflict between the manufacturer installation instructions and this report, the more restrictive shall govern.

9.3 Fasteners shall be installed in accordance with the appropriate subsection of **Section 6**.

9.4 *General Guidelines*

9.4.1 Fasteners shall be installed with a $^{1}/_{2}$" (12.7 mm), low rpm/high torque electric drill (450 rpm).

9.4.2 Fasteners shall be installed with manufacturer-supplied bits.

9.4.3 Fasteners shall be installed with the topside of the head flush to the surface of the wood member.

9.4.4 Fasteners shall not be overdriven.

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

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

9.4.6.1 Provisions for lead holes for lag screws in Section 12.1.4 of the NDS shall be followed.

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

9.4.8 Minimum requirements for fastener spacing, edge distance and end distance shall be in accordance with **Table 9**.

Table 9. Minimum Spacing, Edge Distance and End Distance Requirements

Connection Geometry	Minimum Spacing/Distance (in)
	$^{5}/_{16}$" Flat Head or Hex Head Screw
Edge Distance – Load in any direction	$^{5}/_{8}$
End Distance – Load parallel to grain, towards end	$3^{3}/_{8}$
End Distance – Load parallel to grain, away from end	$2^{1}/_{4}$
End Distance – Load perpendicular to grain	$2^{1}/_{4}$
Spacing between Fasteners in a Row – Parallel to grain	$3^{3}/_{8}$
Spacing between Fasteners in a Row – Perpendicular to grain	$2^{1}/_{4}$
Spacing between Rows of Fasteners – In-line	$1^{1}/_{8}$
Spacing between Rows of Fasteners – Staggered	$^{5}/_{8}$

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 of Fasteners – Staggered"* apply where the fasteners in adjacent rows are offset by one half of the *"Spacing between Fasteners in a Row"*.

10 Substantiating Data

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

10.1.1 Connection design value calculations by DrJ Engineering, LLC in accordance with NDS and accepted engineering practices.

10.1.2 Mechanical properties for CAMO Series Structural Wood Screws from Report Number 2102-01.

10.2 Information contained herein may include the result of testing and/or data analysis by sources that are approved agencies, approved sources and/or RDPs. Accuracy of external test data and resulting analysis is relied upon.

10.3 Where applicable, testing and/or engineering analysis are based upon provisions that have been codified into law through state or local adoption of regulations and standards. The developers of these regulations and standards are responsible for the reliability of published content. DrJ's engineering practice may use a regulation-adopted provision as the control. A regulation-endorsed control versus a simulation of the conditions of application to occur establishes a new material as being equivalent to the regulatory provision in terms of quality, strength, effectiveness, fire resistance, durability and safety.

10.4 The accuracy of the provisions provided herein may be reliant upon the published properties of raw materials, which are defined by the grade mark, grade stamp, mill certificate or duly authenticated reports from approved agencies and/or approved sources provided by the supplier. These are presumed to be minimum properties and relied upon to be accurate. The reliability of DrJ's engineering practice, as contained in this duly authenticated report, may be dependent upon published design properties by others.

10.5 Testing and engineering analysis: The strength, rigidity, and/or general performance of component parts and/or the integrated structure are determined by suitable tests that simulate the actual conditions of application that occur and/or by accepted engineering practice and experience.[26]

10.6 Where additional condition of use and/or regulatory compliance information is required, please search for CAMO Series Structural Wood Screws on the DrJ Certification website.

11 Findings

11.1 As outlined in **Section 6**, CAMO Series Structural Wood Screws have performance characteristics that were tested and/or meet applicable regulations and are suitable for use pursuant to its specified purpose.

11.2 When used and installed in accordance with this duly authenticated report and the manufacturer installation instructions, CAMO Series Structural Wood Screws shall be approved for the following applications:

11.2.1 An acceptable means of attaching posts to beams in accordance with **Table 3** and **Table 5**.

11.2.2 An acceptable means of attaching knee braces to posts/beams in accordance with **Table 6**.

11.3 Unless exempt by state statute, when CAMO Series Structural Wood Screws are to be used as a structural and/or building envelope component in the design of a specific building, the design shall be performed by an RDP.

11.4 Any application specific issues not addressed herein can be engineered by an RDP. Assistance with engineering is available from National Nail Corporation or CAMO.

11.5 IBC Section 104.11 (IRC Section R104.11 and IFC Section 104.10[27] are similar) in pertinent part 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.

11.6 **Approved**:[28] Building regulations require that the building official shall accept duly authenticated reports.[29]

11.6.1 An approved agency is *"approved"* when it is ANAB ISO/IEC 17065 accredited.

11.6.2 An approved source is *"approved"* when an RDP is properly licensed to transact engineering commerce.

11.6.3 Federal law, Title 18 US Code Section 242, requires that where the alternative product, material, service, design, assembly and/or method of construction is not approved, the building official shall respond in writing, stating the reasons why the alternative was not approved. Denial without written reason deprives a protected right to free and fair competition in the marketplace.

11.7 DrJ is a licensed engineering company, employs licensed RDPs and is an ANAB-Accredited Product Certification Body – Accreditation #1131.

11.8 Through the IAF Multilateral Agreements (MLA), this duly authenticated report can be used to obtain product approval in any jurisdiction or country because all ANAB ISO/IEC 17065 duly authenticated reports are equivalent.[30]

12 Conditions of Use

12.1 Material properties shall not fall outside the boundaries defined in **Section 6**.

12.2 As defined in **Section 6**, where material and/or engineering mechanics properties are created for load resisting design purposes, the resistance to the applied load shall not exceed the ability of the defined properties to resist those loads using the principles of accepted engineering practice.

12.3 Where applicable, the tabulated loads in **Table 3**, **Table 5** and **Table 6** shall be multiplied by all applicable adjustment factors specified in Table 11.3.1 of NDS.

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

12.5 When required by adopted legislation and enforced by the building official, also known as the authority having jurisdiction (AHJ) in which the project is to be constructed:

12.5.1 Any calculations incorporated into the construction documents shall conform to accepted engineering practice and, when prepared by an approved source, shall be approved when signed and sealed.

12.5.2 This report and the installation instructions shall be submitted at the time of permit application.

12.5.3 These innovative products have an internal quality control program and a third-party quality assurance program.

12.5.4 At a minimum, these innovative products shall be installed per **Section 9** of this report.

12.5.5 The review of this report by the AHJ shall comply with IBC Section 104 and IBC Section 105.4.

12.5.6 These innovative products have an internal quality control program and a third party quality assurance program in accordance with IBC Section 104.4, IBC Section 110.4, IBC Section 1703, IRC Section R104.4 and IRC Section R109.2.

12.5.7 The application of these innovative products in the context of this report is dependent upon the accuracy of the construction documents, implementation of installation instructions, inspection as required by IBC Section 110.3, IRC Section R109.2 and any other regulatory requirements that may apply.

12.6 The approval of this report by the AHJ shall comply with IBC Section 1707.1, where legislation states in part, "*the building official shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new material or assemblies as provided for in Section 104.11*," all of IBC Section 104, and IBC Section 105.4.

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

12.8 The actual design, suitability, and use of this report for any particular building, is the responsibility of the owner or the authorized agent of the owner.

13 Identification

13.1 The innovative products listed in **Section 1.1** are identified by a label on the board or packaging material bearing the manufacturer name, product name, this report number and other information to confirm code compliance.

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

14 Review Schedule

14.1 This report is subject to periodic review and revision. For the latest version, visit drjcertification.org.

14.2 For information on the status of this report, please contact DrJ Certification.

15 Approved for Use Pursuant to U.S. and International Legislation Defined in Appendix A

15.1 CAMO Series Structural Wood Screws are included in this report published by an approved agency that is concerned with evaluation of products or services, maintains periodic inspection of the production of listed materials or periodic evaluation of services. This report states either that the material, product or service meets recognized standards or has been tested and found suitable for a specified purpose. This report meets the legislative intent and definition of being acceptable to the AHJ.

Appendix A

1 Legislation that Authorizes AHJ Approval

1.1 **Fair Competition**: State legislatures have adopted Federal regulations for the examination and approval of building code referenced and alternative products, materials, designs, services, assemblies and/or methods of construction that:

1.1.1 Advance innovation

1.1.2 Promote competition so all businesses have the opportunity to compete on price and quality in an open market on a level playing field unhampered by anticompetitive constraints

1.1.3 Benefit consumers through lower prices, better quality, and greater choice

1.2 **Adopted Legislation**: The following local, state and federal regulations affirmatively authorize these innovative products to be approved by AHJs, delegates of building departments and/or delegates of an agency of the federal government:

1.2.1 Interstate commerce is governed by the Federal Department of Justice to encourage the use of innovative products, materials, designs, services, assemblies, and/or methods of construction. The goal is to "*protect economic freedom and opportunity by promoting free and fair competition in the marketplace*."

1.2.2 Title 18 US Code Section 242 affirms and regulates the right of individuals and businesses to freely and fairly have new products, materials, designs, services, assemblies and/or methods of construction approved for use in commerce. Disapproval of alternatives shall be based upon non-conformance with respect to specific provisions of adopted legislation and shall be provided in writing stating the reasons why the alternative was not approved, with reference to the specific legislation violated.

1.2.3 The federal government and each state have a public records act. In addition, each state also has legislation that mimics the federal Defend Trade Secrets Act 2016 (DTSA),[31] where providing test reports, engineering analysis and/or other related IP/TS is subject to prison of not more than ten years[32] and/or a $5,000,000 fine or 3 times the value of[33] the Intellectual Property (IP) and Trade Secrets (TS).

1.2.3.1 Compliance with public records and trade secret legislation requires approval through the use of Listings, certified reports, Technical Evaluation Reports, duly authenticated reports and/or research reports prepared by approved agencies and/or approved sources.

1.2.4 For new materials[34] that are not specifically provided for in any regulation, the design strengths and permissible stresses shall be established by tests, where suitable load tests simulate the actual loads and conditions of application that occur.

1.2.5 The design strengths and permissible stresses of any structural material shall conform to the specifications and methods of design using accepted engineering practice.[35]

1.2.6 The commerce of approved sources (i.e., registered PEs) is regulated by professional engineering legislation. Professional engineering commerce shall always be approved by AHJs, except where there is evidence provided in writing, that specific legislation have been violated by an individual registered PE.

1.2.7 The AHJ shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in IBC Section 104.11.[36]

1.3 **Approved**[37] **by Los Angeles**: The Los Angeles Municipal Code (LAMC) states in pertinent part that the provisions of LAMC are not intended to prevent the use of any material, device or method of construction not specifically prescribed by LAMC. The Department shall use Part III, Recognized Standards in addition to Part II, Uniform Building Code Standards of Division 35, Article 1, Chapter IX of the LAMC in evaluation of products for approval where such standard exists for the product or the material and may use other approved standards that apply. Whenever tests or certificates of any material or fabricated assembly are required by Chapter IX of the LAMC, such tests or certification shall be made by a testing agency approved by the Superintendent of Building to conduct such tests or provide such certifications. The testing agency shall publish the scope and limitation(s) of the listed material or fabricated assembly.[38] The Superintendent of Building Approved Testing Agency Roster is provided by the Los Angeles Department of Building and Safety (LADBS). The Center for Building Innovation (CBI) Certificate of Approval License is TA24945. Tests and certifications found in a DrJ Listing are LAMC approved. In addition, the Superintendent of Building shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in the California Building Code (CBC) Section 1707.1.[39]

1.4 **Approved by Chicago**: The Municipal Code of Chicago (MCC) states in pertinent part that an Approved Agency is a Nationally Recognized Testing Laboratory (NRTL) acting within its recognized scope and/or a certification body accredited by the American National Standards Institute (ANSI) acting within its accredited scope. Construction materials and test procedures shall conform to the applicable standards listed in the MCC. Sufficient technical data shall be submitted to the building official to substantiate the proposed use of any product, material, service, design, assembly and/or method of construction not specifically provided for in the MCC. This technical data shall consist of research reports from approved sources (i.e., MCC defined Approved Agencies).

1.5 **Approved by New York City**: The 2022 NYC Building Code (NYCBC) states in part that an approved agency shall be deemed[40] an approved testing agency via ISO/IEC 17025 accreditation, an approved inspection agency via ISO/IEC 17020 accreditation, and an approved product evaluation agency via ISO/IEC 17065 accreditation. Accrediting agencies, other than federal agencies, must be members of an internationally recognized cooperation of laboratory and inspection accreditation bodies subject to a mutual recognition agreement[41] (i.e., ANAB, International Accreditation Forum also known as IAF, etc.).

1.6 **Approved by Florida**: Statewide approval of products, methods or systems of construction shall be approved, without further evaluation by:

1.6.1 A certification mark or listing of an approved certification agency,

1.6.2 A test report from an approved testing laboratory,

1.6.3 A product evaluation report based upon testing or comparative or rational analysis, or a combination thereof, from an approved product evaluation entity, or

1.6.4 A product evaluation report based upon testing, comparative or rational analysis, or a combination thereof, developed, signed and sealed by a professional engineer or architect, licensed in Florida.

1.6.5 For local product approval, products or systems of construction shall demonstrate compliance with the structural wind load requirements of the Florida Building Code (FBC) through one of the following methods:

1.6.5.1 A certification mark, listing or label from a commission-approved certification agency indicating that the product complies with the code,

1.6.5.2 A test report from a commission-approved testing laboratory indicating that the product tested complies with the code,

1.6.5.3 A product-evaluation report based upon testing, comparative or rational analysis, or a combination thereof, from a commission-approved product evaluation entity which indicates that the product evaluated complies with the code,

1.6.5.4 A product-evaluation report or certification based upon testing or comparative or rational analysis, or a combination thereof, developed and signed and sealed by a Florida professional engineer or Florida registered architect, which indicates that the product complies with the code, or

1.6.5.5 A statewide product approval issued by the Florida Building Commission.

1.6.6 The Florida Department of Business and Professional Regulation (DBPR) website provides a listing of companies certified as a Product Evaluation Agency (i.e., EVLMiami 13692), a Product Certification Agency (i.e., CER10642), and as a Florida Registered Engineer (i.e., ANE13741).

1.7 **Approved by Miami-Dade County (i.e., Notice of Acceptance [NOA])**: A Florida statewide approval is an NOA. An NOA is a Florida local product approval. By Florida law, Miami-Dade County shall accept the statewide and local Florida Product Approval as provided for in Florida legislation 553.842 and 553.8425.

1.8 **Approved by New Jersey**: Pursuant to the 2018 Building Code of New Jersey in IBC Section 1707.1 General,[42] it states: "*In the absence of approved rules or other approved standards, the building official shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in the administrative provisions of the Uniform Construction Code (N.J.A.C. 5:23)*".[43] Furthermore N.J.A.C 5:23-3.7 states: "*Municipal approvals of alternative materials, equipment, or methods of construction*."

1.8.1 **Approvals**: Alternative materials, equipment or methods of construction shall be approved by the appropriate subcode official provided the proposed design is satisfactory and that the materials, equipment or methods of construction are suitable for the intended use and are at least the equivalent in quality, strength, effectiveness, fire resistance, durability and safety of those conforming with the requirements of the regulations.

1.8.1.1 A field evaluation label and report or letter issued by a nationally recognized testing laboratory verifying that the specific material, equipment or method of construction meets the identified standards or has been tested and found to be suitable for the intended use, shall be accepted by the appropriate subcode official as meeting the requirements of the above.

1.8.1.2 Reports of engineering findings issued by nationally recognized evaluation service programs such as but not limited to, the Building Officials and Code Administrators (BOCA), the International Conference of Building Officials (ICBO), the Southern Building Code Congress International (SBCCI), the International Code Council (ICC), and the National Evaluation Service, Inc., shall be accepted by the appropriate subcode official as meeting the requirements of the above.

1.8.2 The New Jersey Department of Community Affairs has confirmed that technical evaluation reports, from any accredited entity listed by ANAB, meets the requirements of item the previous paragraph, given that the listed entities are no longer in existence and/or do not provide "*reports of engineering findings*."

1.9 **Approved by the Code of Federal Regulations Manufactured Home Construction and Safety Standards**: Pursuant to Title 24, Subtitle B, Chapter XX, Part 3282.14[44] and Part 3280,[45] the Department encourages innovation and the use of new technology in manufactured homes. The design and construction of a manufactured home shall conform to the provisions of Part 3282 and Part 3280 where key approval provisions in mandatory language follow:

1.9.1 "*All construction methods shall be in conformance with accepted engineering practices*."

1.9.2 "*The strength and rigidity of the component parts and/or the integrated structure shall be determined by engineering analysis or by suitable load tests to simulate the actual loads and conditions of application that occur*."

1.9.3 "*The design stresses of all materials shall conform to accepted engineering practice*."

1.10 **Approval by US, Local and State Jurisdictions in General**: In all other local and state jurisdictions, the adopted building code legislation states in pertinent part that:

1.10.1 For new materials that are not specifically provided for in this code, the design strengths and permissible stresses shall be established by tests.[46]

1.10.2 For innovative alternatives and/or methods of construction, the building official shall accept duly authenticated reports from approved agencies with respect to the quality and manner of use of new materials or assemblies.[47]

1.10.2.1 An approved agency is *"approved"* when it is ANAB ISO/IEC 17065 accredited. DrJ Engineering, LLC (DrJ) is in the ANAB directory.

1.10.2.2 An approved source is *"approved"* when an RDP is properly licensed to transact engineering commerce. The regulatory authority governing approved sources is the state legislature via its professional engineering regulations.[48]

1.10.3 The design strengths and permissible stresses of any structural material…shall conform to the specifications and methods of design of accepted engineering practice performed by an approved source.[49]

1.11 **Approval by International Jurisdictions**: The USMCA and GATT agreements provide for approval of innovative materials, designs, services, and/or methods of construction through the Agreement on Technical Barriers to Trade and the IAF Multilateral Recognition Arrangement (MLA), where these agreements:

1.11.1 State that conformity assessment procedures (i.e., ISO/IEC 17020, 17025, 17065, etc.) are prepared, adopted, and applied so as to grant access for suppliers of like products originating in the territories of other Members under conditions no less favourable than those accorded to suppliers of like products of national origin or originating in any other country, in a comparable situation.

1.11.2 **Approved**: The purpose of the MLA is to ensure mutual recognition of accredited certification and validation/verification statements between signatories to the MLA and subsequently, acceptance of accredited certification and validation/verification statements in many markets based on one accreditation for the timely approval of innovative materials, designs, services, and/or methods of construction.

1.11.3 ANAB is an IAF-MLA signatory where recognition of certificates, validation, and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA, with the appropriate scope, shall be approved.[50]

1.11.4 Therefore, all ANAB ISO/IEC 17065 duly authenticated reports are approval equivalent.[51]

1.12 Approval equity is a fundamental commercial and legal principle.[52]

Issue Date: November 20, 2024
Subject to Renewal: January 1, 2026

FBC Supplement to Report Number 2404-04

REPORT HOLDER: National Nail® Corporation

1 Evaluation Subject

1.1 CAMO Series Structural Wood Screws

2 Purpose and Scope

2.1 Purpose

2.1.1 The purpose of this Report Supplement is to show CAMO Series Structural Wood Screws, recognized in Report Number 2404-04, 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—20, 23: Florida Building Code – Building (FL 41741)*

2.2.2 *FBC-R—20, 23: Florida Building Code – Residential (FL 41741)*

3 Conclusions

3.1 CAMO Series Structural Wood Screws, described in Report Number 2404-04, 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 report, they are listed here:

3.2.1 FBC-B Section 104.4, Section 110.4, Section 1613 and Section 2308 are reserved.

3.2.2 FBC-R Section R104, Section R109 and Section R301.2.2 are reserved.

3.2.3 FBC-B Section 2304.10.5 replaces IBC Section 2304.10.6.

3.2.4 FBC-B Section 2304.10.7 replaces IBC Section 2304.10.8.

3.2.5 FBC-R Section R301.2.1 replaces IRC Section R301.2.1.

3.2.6 FBC-R Section R507 replaces IRC Section R507.

3.2.7 FBC-R Section R507.2 replaces IRC Section R507.2.3.

3.2.8 FBC-R Section R507.6.2 replaces IRC Section R507.5.1.

4 Conditions of Use

4.1 CAMO Series Structural Wood Screws, described in Report Number 2404-04, must comply with all of the following conditions:

4.1.1 All applicable sections in Report Number 2404-04.

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

Notes

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

[2] https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1702

[3] Alternative Materials, Design and Methods of Construction and Equipment: The provisions of any regulation code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by a regulation. Please review https://www.justice.gov/atr/mission and https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104.11

[4] https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706:~:text=the%20design%20strengths%20and%20permissible%20stresses%20shall%20be%20established%20by%20tests%20as

[5] The design strengths and permissible stresses of any structural material shall conform to the specifications and methods of design of accepted engineering practice. https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706:~:text=shall%20conform%20to%20the%20specifications%20and%20methods%20of%20design%20of%20accepted%20engineering%20practice

[6] https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1707.1:~:text=the%20building%20official%20shall%20accept%20duly%20authenticated%20reports%20from%20approved%20agencies

[7] https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1703.4.2

[8] https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#approved_agency

[9] https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#approved_source

[10] https://www.law.cornell.edu/uscode/text/18/1832 (b) Any organization that commits any offense described in subsection (a) shall be fined not more than the greater of $5,000,000 or 3 times the value of the stolen trade secret to the organization, including expenses for research and design and other costs of reproducing the trade secret that the organization has thereby avoided. The federal government and each state have a public records act. To follow DTSA and comply state public records and trade secret legislation requires approval through ANAB ISO/IEC 17065 accredited certification bodies or approved sources. For more information, please review this website: Intellectual Property and Trade Secrets.

[11] https://www.nspe.org/resources/issues-and-advocacy/professional-policies-and-position-statements/regulation-professional AND https://apassociation.org/list-of-engineering-boards-in-each-state-archive/

[12] https://www.cbitest.com/accreditation/

[13] https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104:~:text=to%20enforce%20the%20provisions%20of%20this%20code

[14] https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104.11:~:text=Where%20the%20alternative%20material%2C%20design%20or%20method%20of%20construction%20is%20not%20approved%2C%20the%20building%20official%20shall%20respond%20in%20writing%2C%20stating%20the%20reasons%20why%20the%20alternative%20was%20not%20approved AND https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#105.3.1:~:text=If%20the%20application%20or%20the%20construction%20documents%20do%20not%20conform%20to%20the%20requirements%20of%20pertinent%20laws%2C%20the%20building%20official%20shall%20reject%20such%20application%20in%20writing%2C%20stating%20the%20reasons%20therefore

[15] https://up.codes/viewer/colorado/ibc-2021/chapter/17/special-inspections-and-tests#1707.1:~:text=the%20building%20official%20shall%20accept%20duly%20authenticated%20reports%20from%20approved%20agencies%20in%20respect%20to%20the%20quality%20and%20manner%20of%20use%20of%20new%20materials%20or%20assemblies%20as%20provided%20for%20in%20Section%20104.11

[16] https://iaf.nu/en/about-iaf-mla/#:~:text=it%20is%20required%20to%20recognise%20certificates%20and%20validation%20and%20verification%20statements%20issued%20by%20conformity%20assessment%20bodies%20accredited%20by%20all%20other%20signatories%20of%20the%20IAF%20MLA%2C%20with%20the%20appropriate%20scope

[17] True for all ANAB accredited product evaluation agencies and all International Trade Agreements.

[18] https://www.justice.gov/crt/deprivation-rights-under-color-law AND https://www.justice.gov/atr/mission

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

[20] All references to the FBC-B and FBC-R are the same as the 2021 IBC and 2021 IRC unless otherwise noted in the Florida Supplement at the end of this report.

[21] https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#p-3280.2(Listed%20or%20certified); https://up.codes/viewer/colorado/ibc-2021/chapter/2/definitions#listed AND https://up.codes/viewer/colorado/ibc-2021/chapter/2/definitions#labeled

[22] https://up.codes/viewer/colorado/ibc-2021/chapter/17/special-inspections-and-tests#1703.4

[23] https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#:~:text=All%20construction%20methods%20shall%20be%20in%20conformance%20with%20accepted%20engineering%20practices%20to%20insure%20durable%2C%20livable%2C%20and%20safe%20housing%20and%20shall%20demonstrate%20acceptable%20workmanship%20reflecting%20journeyman%20quality%20of%20work%20of%20the%20various%20trades

[24] https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#:~:text=The%20strength%20and%20rigidity%20of%20the%20component%20parts%20and/or%20the%20integrated%20structure%20shall%20be%20determined%20by%20engineering%20analysis%20or%20by%20suitable%20load%20tests%20to%20simulate%20the%20actual%20loads%20and%20conditions%20of%20application%20that%20occur

[25] Qualification is performed by a legislatively defined Accreditation Body. ANSI National Accreditation Board (ANAB) is the largest independent accreditation body in North America and provides services in more than 75 countries. DrJ is an ANAB accredited product certification body.

[26] See Code of Federal Regulations (CFR) Title 24 Subtitle B Chapter XX Part 3280 for definition.

[27] 2018 IFC Section 104.9

[28] Approved is an adjective that modifies the noun after it. For example, Approved Agency means that the Agency is accepted officially as being suitable in a particular situation. This example conforms to IBC/IRC/IFC Section 201.4 where the building code authorizes sentences to have an ordinarily accepted meaning such as the context implies.

[29] https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1707.1

[30] Multilateral approval is true for all ANAB accredited product evaluation agencies and all International Trade Agreements.

31 http://www.drjengineering.org/AppendixC AND https://www.drjcertification.org/cornell-2016-protection-trade-secrets

32 https://www.law.cornell.edu/uscode/text/18/1832#:~:text=imprisoned%20not%20more%20than%2010%20years

33 https://www.law.cornell.edu/uscode/text/18/1832#:~:text=Any%20organization%20that,has%20thereby%20avoided

34 https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706.2

35 IBC 2021, Section 1706.1 Conformance to Standards

36 IBC 2021, Section 1707 Alternative Test Procedure, 1707.1 General

37 See **Section 11** for the distilled building code definition of **Approved**

38 Los Angeles Municipal Code, SEC. 98.0503. TESTING AGENCIES

39 https://up.codes/viewer/california/ca-building-code-2022/chapter/17/special-inspections-and-tests#1707.1

40 New York City, The Rules of the City of New York, § 101-07 Approved Agencies

41 New York City, The Rules of the City of New York, § 101-07 Approved Agencies

42 https://up.codes/viewer/new_jersey/ibc-2018/chapter/17/special-inspections-and-tests#1707.1

43 https://www.nj.gov/dca/divisions/codes/codreg/ucc.html

44 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3282/subpart-A/section-3282.14

45 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280

46 IBC 2021, Section 1706 Design Strengths of Materials, 1706.2 New Materials. Adopted law pursuant to IBC model code language 1706.2.

47 IBC 2021, Section 1707 Alternative Test Procedure, 1707.1 General. Adopted law pursuant to IBC model code language 1707.1.

48 https://www.nspe.org/resources/issues-and-advocacy/professional-policies-and-position-statements/regulation-professional AND https://apassociation.org/list-of-engineering-boards-in-each-state-archive/

49 IBC 2021, Section 1706 Design Strengths of Materials, Section 1706.1 Conformance to Standards Adopted law pursuant to IBC model code language 1706.1.

50 https://iaf.nu/en/about-iaf-mla/#:~:text=it%20is%20required%20to%20recognise%20certificates%20and%20validation%20and%20verification%20statements%20issued%20by%20conformity%20assessment%20bodies%20accredited%20by%20all%20other%20signatories%20of%20the%20IAF%20MLA%2C%20with%20the%20appropriate%20scope

51 True for all ANAB accredited product evaluation agencies and all International Trade Agreements.

52 https://www.justice.gov/crt/deprivation-rights-under-color-law AND https://www.justice.gov/atr/mission