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Technical Evaluation Report™

TER 1911-02

Big Timber® STX and SCTX Stainless Screw Properties

Western Builders Supply DBA Big Timber®

Products:

STX and SCTX Stainless Screws

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KIRK H. GRUNDAHL LICENSE No. 73618 STATE OF FLORIDA PROFESSIONAL ENGINEER

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Kirk Grundahl

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DIVISION: 06 00 00 - WOOD, PLASTICS AND COMPOSITES SECTION: 06 05 23 - Wood, Plastic, and Composite Fastenings

1 Innovative Products Evaluated[1,2]

1.1 STX and SCTX Stainless Screws

2 Applicable Codes and Standards[3,4]

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—20, 23: Florida Building Code – Building (FL 41094)*[5]

2.1.4 *FBC-R—20, 23: Florida Building Code – Residential (FL 41094)*[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 A493: Standard Specification for Stainless Steel Wire and Wire Rods for Cold Heading and Cold Forging*

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

2.2.5 *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 **Federal Regulation Definition.** 24 CFR 3280.2 "Listed or certified" means included in a list published by a nationally recognized testing laboratory, inspection agency, or other organization concerned with product evaluation that maintains periodic inspection 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. **International Building Code (IBC) Definition of Listed.** Equipment, materials, products or services included in a list published by an organization acceptable to the building official and concerned with evaluation of products or services that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services and whose Listing states either that the equipment, material, product or service meets identified standards or has been tested and found suitable for a specified purpose. **IBC Definition of Labeled**. Equipment, materials or products to which has been affixed a label, seal, symbol or other identifying mark of a nationally recognized testing laboratory, approved agency or other organization concerned with product evaluation that maintains periodic inspection of the production of the above-labeled items and whose labeling indicates either that the equipment, material or product meets identified standards or has been tested and found suitable for a specified purpose.

3 This Listing is a code defined research report, which is also known as a duly authenticated report, provided by an approved agency (see IBC Section 1703.1) and/or an approved source (see IBC Section 1703.4.2). An approved agency is "approved" when it is ANAB accredited. DrJ Engineering, LLC (DrJ) is listed in the ANAB directory). A professional engineer is "approved" as an approved source when that professional engineer is properly licensed to transact engineering commerce. Where sealed by a professional engineer, it is also a duly authenticated report certified by an approved source. (i.e., Registered Design Professional). DrJ is an ANAB accredited product certification body.

4 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.

5 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 TER.

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2.2.6 *ASTM D2395: Standard Test Methods for Density and Specific Gravity (Relative Density) of Wood and Wood-Based Materials*

2.2.7 *ASTM D2915: Standard Practice for Sampling and Data-Analysis for Structural Wood and Wood-Based Products*

2.2.8 *ASTM D4442: Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials*

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

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

2.2.11 *DOC PS 2: Performance Standard for Wood-based Structural-use Panels*

3 Performance Evaluation

3.1 Tests, test reports, research reports, duly authenticated reports and related engineering evaluations are defined as intellectual property and/or trade secrets and protected by Defend Trade Secrets Act 2016 (DTSA).[6]

3.2 Testing and/or inspections conducted for this TER were performed an ISO/IEC 17025 accredited testing laboratory,[7] an ISO/IEC 17020 accredited inspection body,[8] which are internationally recognized accreditations through International Accreditation Forum (IAF), and/or a licensed Registered Design Professional (RDP).

3.3 Big Timber® STX and SCTX Stainless 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:

3.3.1 Withdrawal strength in accordance with ASTM D1761

3.3.2 Lateral shear in accordance with NDS

3.3.3 Bending yield in accordance with ASTM F1575

3.3.4 Tensile strength in accordance with AISI S904

3.3.5 Shear strength in accordance with AISI S904

3.3.6 Head pull-through in accordance with ASTM D1761

3.3.7 Corrosion resistance in accordance with ASTM B117 and ASTM G85

3.4 Any building code 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 RDPs/approved sources. DrJ is qualified[9] to practice product and code compliance services within its scope of accreditation and engineering expertise, respectively.

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[6] https://www.law.cornell.edu/uscode/text/18/part-I/chapter-90. Given our professional duty to inform, please be aware that whoever, with intent to convert a trade secret (TS), that is related to a product or service used in or intended for use in interstate or foreign commerce, to the economic benefit of anyone other than the owner thereof, and intending or knowing that the offense will, injure any owner of that trade secret, knowingly without authorization copies, duplicates, sketches, draws, photographs, downloads, uploads, alters, destroys, photocopies, replicates, transmits, delivers, sends, mails, communicates, or conveys such information; shall be fined under this title or imprisoned not more than 10 years, or both. 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. As the National Society of Professional Engineers states, "Engineers shall not disclose, without consent, confidential information concerning the business affairs or technical processes of any present or former client or employer, or public body on which they serve." Therefore, to protect intellectual property (IP) and TS, and to achieve 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. For more information, please review this website: Intellectual Property and Trade Secrets.

[7] Internationally recognized accreditations are performed by members of the International Accreditation Forum (IAF). Accreditation Body and Regional Accreditation Group Members of IAF are admitted to the IAF MLA only after a stringent evaluation of their operations by a peer evaluation team, which is charged to ensure that the applicant complies fully with both international standards and IAF requirements. Once an accreditation body is a signatory of the IAF MLA, it is required to recognise certificates and validation and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA, with the appropriate scope.

[8] Ibid.

[9] 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.

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

3.6 Any regulation specific issues not addressed in this section are outside the scope of this TER.

4 Product Description and Materials

4.1 STX and SCTX Stainless screws are made from Grade 316 stainless steel. The STX screw has a round flat head with ribs and a star drive (Torx screw) and is partially threaded (Figure 1). The SCTX screw has a round washer head and a star drive (Torx screw) and is partially threaded (Figure 2).

Figure 1. STX General Purpose Stainless Steel Screw

Figure 2. SCTX Construction Lag Stainless Steel Screw

4.2 STX and SCTX Stainless Screws are manufactured using a standard cold-formed process.

4.3 STX and SCTX Stainless Screws are approved for use in chemically treated or untreated lumber where ASTM A153, Class D coatings are approved for use in accordance with IBC Section 2304.10 and IRC Section R317.3.

4.3.1 The stainless fasteners have been tested and found to exceed the protection provided by code-approved hot-dipped galvanized coatings meeting ASTM A153, Class D (IBC Section 2304.10.6[10] and IRC Section R317.3), allowing for its use in pressure-treated wood.

4.4 STX and SCTX Stainless Screws are approved for use in fire-retardant treated lumber, provided the conditions set forth by the fire-retardant treated lumber manufacturer are met, including appropriate strength reductions.

4.5 STX and SCTX Stainless Screws are approved for use in chemically treated wood with exposure to saltwater, including coastal construction applications.

[10] 2018 IBC Section 2304.10.5

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4.6 The fasteners evaluated in this TER are set forth in Table 1.

Table 1. Fastener Specifications

Fastener Name(s)	Designation	Head		Nominal Length[1] (in)	Thread Length[1] (in)	Shank Diameter[2] (in)	Thread Diameter (in)		Nominal Bending Yield, f_{yb} (psi)	Allowable Fastener Strength (lbf)	
		Diameter (in)	Drive Type				Minor	Major		Tensile	Shear[3]
STX	8 x 1 1/4"	0.329	Torx 20	1 1/4	3/4	0.116	0.100	0.163	122,000	360	355
	8 x 1 1/2"			1 1/2	1						
	8 x 2"			2	1 1/4						
	9 x 1 5/8"	0.350	Torx 25	1 5/8	1	0.130	0.110	0.181	122,000	375	340
	9 x 2"			2	1 1/4						
	9 x 2 1/2"			2 1/2	1 1/2						
	9 x 3"			3	1 1/2						
	10 x 2 1/2"	0.376	Torx 25	2 1/2	1 1/2	0.145	0.126	0.193	124,000	440	420
	10 x 3"			3	1 1/2						
	10 x 3 1/2"			3 1/2	2						
	10 x 4"			4	2						
SCTX	15 x 2"	0.620	Torx 30	2	1 1/2	0.202	0.179	0.275	111,000	855	725
	15 x 2 1/2"			2 1/2	1 1/2						
	15 x 3"			3	2						
	15 x 3 1/2"			3 1/2	2 1/2						
	15 x 4"			4	2 1/2						
	15 x 5"			5	3						
	15 x 6"			6	3						
	15 x 7"			7	3 1/2						
	15 x 8"			8	4						

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

1. STX fastener length is measured from the top of the head to the tip. SCTX fastener length is measured from the underside of the head to the tip. Thread length includes the tapered tip.
2. Shank diameter based on manufactured thickness.
3. Shear strength applicable at both the smooth shank and thread diameter.

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5 Applications

5.1 *General*

5.1.1 STX and SCTX Stainless Screws are used to attach wood framing members in conventional light-frame construction and provide resistance against withdrawal, head pull-through, axial, and shear loads. See Section 6 for installation requirements.

5.1.2 STX and SCTX Stainless Screws are installed without lead holes, as prescribed in NDS.

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

5.2 *Structural Applications*

5.2.1 Design of STX and SCTX Stainless Screws is governed by the applicable code and the provisions for dowel-type fasteners in NDS.

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

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5.3 *STX and SCTX Reference Lateral Design Values (Z)*

5.3.1 Reference lateral design values (lb) for shear load parallel and perpendicular to grain for STX and SCTX Stainless Screws are specified in Table 2 for Oriented Strand Board (OSB) and Table 3 for sawn lumber.

Table 2. Reference Lateral Design Values for SPF Main Member and OSB Side Member Connections[1]

Fastener Name	Designation	Nominal Length (in)	Thread Length (in)	Minimum Side Member Thickness (in)	Minimum Main Member Penetration[4] (in)	Lateral Design Value,[2,3] Z (lbf)	
						OSB[5] (SG = 0.50)	
						$Z_{\perp}$	$Z_{\parallel}$
STX	8 x 1 1/2"	1 1/2	1	23/32	3/4	50	50
	8 x 2"	2	1 1/4		1 1/4	60	60
	9 x 1 5/8"	1 5/8	1		7/8		
	9 x 2"	2	1 1/4		1 1/4	65	65
	9 x 2 1/2"	2 1/2	1 1/2		1 1/2		
	9 x 3"	3	1 1/2				
	10 x 2 1/2"	2 1/2	1 1/2		1 1/2	80	80
	10 x 3"	3	1 1/2				
	10 x 3 1/2"	3 1/2	2				
	10 x 4"	4	2				
	8 x 1 1/4"	1 1/4	3/4	7/16	3/4	40	40
	8 x 1 1/2"	1 1/2	1		1	45	45
	8 x 2"	2	1 1/4		1 1/2		
	9 x 1 5/8"	1 5/8	1		1 1/8	55	55
	9 x 2"	2	1 1/4		1 1/2		
	9 x 2 1/2"	2 1/2	1 1/2				
	9 x 3"	3	1 1/2				
	10 x 2 1/2"	2 1/2	1 1/2		1 1/2	70	70
	10 x 3"	3	1 1/2				
	10 x 3 1/2"	3 1/2	2				
	10 x 4"	4	2				

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

1. Reference lateral design values apply to two-member single shear connections where the side member is OSB, the main member is SPF (SG = 0.42), and the fastener is installed in the face of the member and oriented perpendicular to grain. The main member shall have a minimum thickness of 1.5".
2. Tabulated lateral design values (Z) shall be adjusted by all applicable adjustment factors per NDS Table 11.3.1.
3. $Z_{\perp}$ = Lateral Design Values Perpendicular to Main Member Grain, $Z_{\parallel}$ = Lateral Design Values Parallel to Main Member Grain.
4. Fastener main member penetration is the length embedded in the main member, including the tip.
5. OSB shall comply with DOC PS 2. OSB shall have a specific gravity of at least 0.50.

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Table 3. Reference Lateral Design Values for Connections in Sawn Lumber[1]

Fastener Name	Designation	Nominal Length (in)	Thread Length (in)	Minimum Side Member Thickness (in)	Minimum Main Member Penetration[5] (in)	Lateral Design Value,[2,3,4] Z (lbf)					
						HF/SPF (SG = 0.42)		DF-L (SG = 0.50)		SP (SG = 0.55)	
						$Z_{\perp}$	$Z_{\parallel}$	$Z_{\perp}$	$Z_{\parallel}$	$Z_{\perp}$	$Z_{\parallel}$
STX	8 x 1 1/2"	1 1/2	1	3/4	3/4	40	40	55	55	65	65
	8 x 2"	2	1 1/4		1 1/4	50	50	60	60	70	70
	9 x 1 5/8"	1 5/8	1	3/4	7/8	50	50	70	70	80	80
	9 x 2"	2	1 1/4		1 1/4	60	60	75	75		
	9 x 2 1/2"	2 1/2	1 1/2	1 1/2	1	60	60	75	75	80	80
	9 x 3"	3	1 1/2		1 1/2	65	65				
	10 x 2 1/2"	2 1/2	1 1/2	1 1/2	1	75	75	95	95	110	110
	10 x 3"	3	1 1/2		1 1/2	85	85	100	100	110	110
	10 x 3 1/2"	3 1/2	2								
	10 x 4"	4	2								
SCTX	15 x 2"	2	1 1/2	3/4	1 1/4	75	95	105	130	125	155
	15 x 2 1/2"	2 1/2	1 1/2		1 1/2	95	115	115	145	130	160
	15 x 3"	3	2	1 1/2	1 1/2	115	140	145	185	160	200
	15 x 3 1/2"	3 1/2	2 1/2			125	155				
	15 x 4"	4	2 1/2	1 1/2	2 1/2	125	155	145	185	160	200
	15 x 5"	5	3								
	15 x 6"	6	3								
	15 x 7"	7	3 1/2	3 1/2	3 1/2						
	15 x 8"	8	4								

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

1. Reference lateral design values apply to two-member single shear connections where both members are of the same specific gravity, and the fastener is installed in the face of the member and oriented perpendicular to grain. Where the members are of different specific gravities, use the lower of the two.
2. For wood species with a specific gravity between 0.42 and 0.50, use the tabulated values for specific gravity of 0.42.
3. Tabulated lateral design values (Z) shall be adjusted by all applicable adjustment factors per NDS Table 11.3.1.
4. $Z_{\perp}$ = Lateral Design Values Perpendicular to Grain, $Z_{\parallel}$ = Lateral Design Values Parallel to Grain.
5. Fastener main member penetration is the length embedded in the main member, including the tip.

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5.4 *STX and SCTX Reference Withdrawal Design Values (W) in Side Grain Applications*

5.4.1 Reference withdrawal design values (lb/in) for STX and SCTX screws in sawn lumber are specified in Table 4 and Table 5, respectively.

Table 4. STX Reference Withdrawal Design Values[1]

Fastener Name	Designation	Nominal Length (in)	Thread Length (in)	Withdrawal Design Value,[3] W (lbf/in)		
				Wood Species[2] (Specific Gravity)		
				HF/SPF (0.42)	DF-L (0.50)	SP (0.55)
STX	8 x 1 1/4"	1 1/4	3/4	195	295	295
	8 x 1 1/2"	1 1/2	1			
	8 x 2"	2	1 1/4			
	9 x 1 5/8"	1 5/8	1	210	315	315
	9 x 2"	2	1 1/4			
	9 x 2 1/2"	2 1/2	1 1/2			
	9 x 3"	3	1 1/2			
	10 x 2 1/2"	2 1/2	1 1/2	235	315	315
	10 x 3"	3	1 1/2			
	10 x 3 1/2"	3 1/2	2			
	10 x 4"	4	2			

SI: 1 in = 25.4 mm, 1 lb/ft = 0.0146 kN/m

1. Tabulated withdrawal values (W) shall be adjusted by all applicable adjustment factors per NDS Table 11.3.1.
2. For wood species with a specific gravity between 0.42 and 0.50, use the tabulated values for specific gravity of 0.42.
3. The full design withdrawal value is equal to the reference withdrawal value multiplied by the length of the threaded portion of the fastener embedded in the main member. Fastener penetration is the threaded length embedded in the main member, including the tip.

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Table 5. SCTX Reference Withdrawal Design Values[1]

Fastener Name	Designation	Nominal Length (in)	Thread Length (in)	Withdrawal Design Value,[3] W (lbf/in)		
				Wood Species[2] (Specific Gravity)		
				HF/SPF (0.42)	DF-L (0.50)	SP (0.55)
SCTX	15 x 2"	2	1 1/2	140	345	215
	15 x 2 1/2"	2 1/2	1 1/2			
	15 x 3"	3	2	165		215
	15 x 3 1/2"	3 1/2	2 1/2	285		365
	15 x 4"	4	2 1/2			
	15 x 5"	5	3			
	15 x 6"	6	3			
	15 x 7"	7	3 1/2			
	15 x 8"	8	4			

SI: 1 in = 25.4 mm, 1 lb/ft = 0.0146 kN/m

1. Tabulated withdrawal values (W) shall be adjusted by all applicable adjustment factors per NDS Table 11.3.1.
2. For wood species with a specific gravity between 0.42 and 0.55, use the tabulated values for specific gravity of 0.42.
3. The full design withdrawal value is equal to the reference withdrawal value multiplied by the length of the threaded portion of the fastener embedded in the main member. Fastener penetration is the threaded length embedded in the main member, excluding the tip.

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5.5 *STX and SCTX Reference Head Pull-Through Design Values (P)*

5.5.1 Reference design values for head pull-through (lb) for STX screws are specified in Table 6 for OSB and Table 7 for sawn lumber.

5.5.2 Reference design values for head pull-through (lb) for SCTX screws are specified in Table 8.

Table 6. STX Reference Head Pull-Through Design Values in OSB

Fastener Name	Designation	Nominal Length (in)	Thread Length (in)	Head Pull-Through Design Value,[1] P (lbf)	
				OSB[2] Thickness (SG = 0.50)	
				23/32"	7/16"
STX	8 x 1 1/4"	1 1/4	3/4	275	115
	8 x 1 1/2"	1 1/2	1		
	8 x 2"	2	1 1/4		
	9 x 1 5/8"	1 5/8	1	275	115
	9 x 2"	2	1 1/4		
	9 x 2 1/2"	2 1/2	1 1/2		
	9 x 3"	3	1 1/2		
	10 x 2 1/2"	2 1/2	1 1/2	275	115
	10 x 3"	3	1 1/2		
	10 x 3 1/2"	3 1/2	2		
	10 x 4"	4	2		

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

1. Tabulated pull-through values (P) shall be adjusted by all applicable adjustment factors per NDS Table 11.3.1.
2. OSB shall comply with DOC PS 2. OSB and have a specific gravity of at least 0.50. Listed thicknesses are minimums.

Table 7. STX Reference Head Pull-Through Design Values in Sawn Lumber

Fastener Name	Designation	Nominal Length (in)	Thread Length (in)	Head Pull-Through Design Value,[1,3] P (lbf)		
				Wood Species[2] (Specific Gravity)		
				HF/SPF (0.42)	DF-L (0.50)	SP (0.55)
STX	9 x 1 5/8"	1 5/8	1	215	335	335
	9 x 2"	2	1 1/4			
	9 x 2 1/2"	2 1/2	1 1/2			
	9 x 3"	3	1 1/2			
	10 x 2 1/2"	2 1/2	1 1/2	280	380	380
	10 x 3"	3	1 1/2			
	10 x 3 1/2"	3 1/2	2			
	10 x 4"	4	2			

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

1. Tabulated pull-through values (P) shall be adjusted by all applicable adjustment factors per NDS Table 11.3.1.
2. For wood species with a specific gravity between 0.42 and 0.50, use the tabulated values for specific gravity of 0.42.
3. Pull-through design values apply to connections having a minimum wood side member thickness of at least 1.5".

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Table 8. SCTX Reference Head Pull-Through Design Values in Sawn Lumber

Fastener Name	Designation	Nominal Length (in)	Thread Length (in)	Head Pull-Through Design Value,[1,3] P (lbf)		
				Wood Species[2] (Specific Gravity)		
				HF/SPF (0.42)	DF-L (0.50)	SP (0.55)
SCTX	15 x 2"	2	1 1/2	570	745	815
	15 x 2 1/2"	2 1/2	1 1/2			
	15 x 3"	3	2			
	15 x 3 1/2"	3 1/2	2 1/2			
	15 x 4"	4	2 1/2			
	15 x 5"	5	3			
	15 x 6"	6	3			
	15 x 7"	7	3 1/2			
	15 x 8"	8	4			

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

1. Tabulated pull-through values (P) shall be adjusted by all applicable adjustment factors per NDS Table 11.3.1.
2. For wood species with a specific gravity between 0.42 and 0.55, use the tabulated values for specific gravity of 0.42.
3. Pull-through design values apply to connections having a minimum wood side member thickness of at least 1.5".

5.6 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.

6 Installation

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

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

6.3 Minimum penetration is 1", unless otherwise stated in this TER. Install fasteners with head flush to the surface of the wood member.

6.4 Lead holes are not required.

6.5 Screws shall be installed with the appropriate rotating powered driver and never driven with a hammer.

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6.6 Minimum requirements for screw spacing, edge distance and end distance shall be in accordance with Table 9.

Table 9. STX and SCTX Screw Spacing, Edge Distance, and End Distance Requirements[1,2]

Connection Geometry	Minimum Spacing/Distance (in)			
	STX8	STX9	STX10	SCTX15
Edge Distance – Load in any direction	3/8	3/8	3/8	5/8
End Distance – Load parallel to grain, towards end	1 3/4	2	2 1/4	3 1/8
End Distance – Load parallel to grain, away from end	1 1/4	1 3/8	1 1/2	2 1/8
End Distance – Load perpendicular to grain	1 1/4	1 3/8	1 1/2	2 1/8
Spacing between Fasteners in a Row – Parallel to grain	1 3/4	2	2 1/4	3 1/8
Spacing between Fasteners in a Row – Perpendicular to grain	1 1/4	1 3/8	1 1/2	2 1/8
Spacing between Rows of Fasteners – In-line	5/8	3/4	3/4	1 1/8
Spacing between Rows of Fasteners – Staggered	3/8	3/8	3/8	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 more restrictive.
2. Values for "Spacing between Rows of 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 and tensile testing in accordance with AISI S904

7.1.3 Lateral strength testing in accordance with ASTM D1761

7.1.4 Withdrawal strength testing in accordance with ASTM D1761

7.1.5 Head pull-through testing in accordance with ASTM D1037 and ASTM D1761

7.1.6 Corrosion resistance testing in accordance with ASTM B117 and ASTM G85

7.2 Calculations for reference lateral design values in accordance with NDS and accepted engineering practice.

7.3 Information contained herein may include the result of testing and/or data analysis by sources that are approved agencies (i.e., ANAB accredited agencies), approved sources (i.e., RDPs), and/or professional engineering regulations. Accuracy of external test data and resulting analysis is relied upon.

7.4 Where pertinent, testing and/or engineering analysis is based upon provisions that have been codified into law through state or local adoption of codes and standards. The developers of these codes and standards are responsible for the reliability of published content. DrJ's engineering practice may use a code-adopted provision as the control sample. A control sample versus a test sample establishes a product as being equivalent to the code-adopted provision in terms of quality, strength, effectiveness, fire resistance, durability, and safety.

7.5 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, Listings, certified reports, duly authenticated reports from approved agencies, and research reports prepared by approved agencies and/or approved sources provided by the suppliers of products, materials, designs, assemblies and/or methods of construction. These are presumed to be minimum properties and relied upon to be accurate. The reliability of DrJ's engineering practice, as contained in this TER, may be dependent upon published design properties by others.

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7.6 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.[11]

7.7 Where additional condition of use and/or code compliance information is required, please search for STX and SCTX Stainless Screws on the DrJ Certification website.

8 Findings

8.1 As delineated in Section 3, STX and SCTX Stainless Screws have performance characteristics that were tested and/or meet pertinent standards and are suitable for use pursuant to its specified purpose.

8.2 When used and installed in accordance with this TER and the manufacturer installation instructions, STX and SCTX Stainless Screws shall be approved for the following applications:

8.2.1 Use as fasteners in accordance with the listed design values and any required codes.

8.3 Unless exempt by state statute, when STX and SCTX Stainless 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.

8.4 Any application specific issues not addressed herein can be engineered by an RDP. Assistance with engineering is available from Western Builders Supply DBA Big Timber®.

8.5 IBC Section 104.11 (IRC Section R104.11 and IFC Section 104.10[12] 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.

8.6 **Approved**:[13] Building codes require that the building official shall accept duly authenticated reports[14] or research reports[15] from approved agencies and/or approved sources (i.e., licensed RDP) with respect to the quality and manner of use of new products, materials, designs, services, assemblies, or methods of construction.

8.6.1 Acceptance of an approved agency, by a building official, is performed by verifying that the agency is accredited by a recognized accreditation body of the International Accreditation Forum (IAF).

8.6.2 Acceptance of a licensed RDP, by a building official, is performed by verifying that the RDP and/or their business entity is listed by the licensing board of the relevant jurisdiction.

8.6.3 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, as denial without written reason deprives a protected right to free and fair competition in the marketplace.

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

[12] 2018 IFC Section 104.9

[13] 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.

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

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

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8.7 DrJ is an engineering company, employs RDPs and is an ISO/IEC 17065 ANAB-Accredited Product Certification Body – Accreditation #1131.

8.8 Through ANAB accreditation and the IAF Multilateral Agreements, this TER can be used to obtain product approval in any jurisdiction or country that has IAF MLA Members & Signatories to meet the Purpose of the MLA – "*certified once, accepted everywhere*." IAF specifically says, "*Once an accreditation body is a signatory of the IAF MLA, it is required to recognise certificates and validation and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA, with the appropriate scope*."[16]

9 Conditions of Use

9.1 Material properties shall not fall outside the boundaries defined in Section 3.

9.2 As defined in Section 3, 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.

9.3 Wood member moisture content shall be less than or equal to 19% for sawn lumber and less than 16% for OSB.

9.4 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:

9.4.1 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.

9.4.2 This TER and the installation instructions shall be submitted at the time of permit application.

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

9.4.4 At a minimum, these innovative products shall be installed per Section 6 of this TER.

9.4.5 The review of this TER, by the AHJ, shall be in compliance with IBC Section 104 and IBC Section 105.4.

9.4.6 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.

9.4.7 The application of these innovative products in the context of this TER are 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.

9.5 The approval of this TER by the AHJ shall comply with IBC Section 1707.1, where legislation states in pertinent part, "*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 Section 104.11*," all of IBC Section 104, and IBC Section 105.4.

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 (i.e., owner or RDP).

9.7 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.

[16] https://iaf.nu/en/about-iaf-mla/#:~:text=required%20to%20recognise

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10 Identification

10.1 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, TER number, and other information to confirm code compliance.

10.2 Additional technical information can be found at bigtimberfasteners.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 status of this TER, contact DrJ Certification.

12 Approved for Use Pursuant to US and International Legislation Defined in Appendix A

12.1 STX and SCTX Stainless Screws are included in this TER 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, and whose TER Listing states either that the material, product, or service meets identified standards or has been tested and found suitable for a specified purpose. This TER meets the legislative intent and definition of being acceptable to the AHJ.

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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, and

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 STX and SCTX Stainless Screws 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),[17] where providing test reports, engineering analysis and/or other related IP/TS is subject to prison of not more than 10 years[18] and/or a $5,000,000 fine or 3 times the value of[19] 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[20] that are not specifically provided for in any building code, 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.[21]

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 has 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.[22]

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[17] http://www.drjengineering.org/AppendixC and https://www.drjcertification.org/cornell-2016-protection-trade-secrets

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

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

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

[21] IBC 2021, Section 1706.1 Conformance to Standards

[22] IBC 2021, Section 1707 Alternative Test Procedure, 1707.1 General

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1.3 **Approved**[23] **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, which 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.[24] The Superintendent of Building roster of approved testing agencies 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 CBI 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.[25]

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 NYC Building Code 2022 (NYCBC) states in pertinent part that an approved agency shall be deemed[26] 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[27] (i.e., ANAB, International Accreditation Forum (IAF), etc.).

1.6 **Approved by Florida**: Statewide approval of products, methods, or systems of construction shall be approved, without further evaluation, by 1) A certification mark or listing of an approved certification agency, 2) A test report from an approved testing laboratory, 3) A product evaluation report based upon testing or comparative or rational analysis, or a combination thereof, from an approved product evaluation entity; 4) A product evaluation report based upon testing or comparative or rational analysis, or a combination thereof, developed and signed and sealed by a professional engineer or architect, licensed in Florida. 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) A certification mark, listing, or label from a commission-approved certification agency indicating that the product complies with the code; 2) A test report from a commission-approved testing laboratory indicating that the product tested complies with the code; 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; 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; 5) A statewide product approval issued by the Florida Building Commission. 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).

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[23] See Section 8 for the distilled building code definition of **Approved**

[24] Los Angeles Municipal Code, SEC. 98.0503. TESTING AGENCIES

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

[26] New York City, The Rules of the City of New York, § 101-07 Approved Agencies

[27] New York City, The Rules of the City of New York, § 101-07 Approved Agencies

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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 Building Code 2018 of New Jersey in IBC Section 1707.1 General,[28] 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)".[29] Furthermore N.J.A.C 5:23-3.7 states: Municipal approvals of alternative materials, equipment, or methods of construction. **(a) 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. 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 (a) above. 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 (a) above. 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 2 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[30] and Part 3280,[31] the Department encourages innovation and the use of new technology in manufactured homes. The design and construction of a manufactured home shall conform with the provisions of Part 3282 and Part 3280 where key approval provisions in mandatory language follow: 1) "All construction methods shall be in conformance with accepted engineering practices"; 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."; and 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.[32]

1.10.2 For innovative alternative products, materials, designs, services and/or methods of construction, in the absence of approved rules or other approved standards…the building official shall accept duly authenticated reports (i.e., listing and/or research report) from approved agencies with respect to the quality and manner of use of new materials or assemblies.[33] A building official approved agency is deemed to be approved via certification from an accreditation body that is listed by the International Accreditation Forum[34] or equivalent.

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

[29] https://www.nj.gov/dca/divisions/codes/codreg/ucc.html

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

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

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

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

[34] Please see the ANAB directory for building official approved agencies.

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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.[35] An approved source is defined as a PE subject to professional engineering laws, where a research and/or a technical evaluation report certified by a PE, shall be approved.

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

1.11.1 Permit participation of conformity assessment bodies located in the territories of other Members (defined as GATT Countries) under conditions no less favourable than those accorded to bodies located within their territory or the territory of any other country,

1.11.2 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.

1.11.3 State that conformity assessment procedures are not prepared, adopted, or applied with a view to or with the effect of creating unnecessary obstacles to international trade. This means that conformity assessment procedures shall not be more strict or be applied more strictly than is necessary to give the importing Member adequate confidence that products conform to the applicable technical regulations or standards.

1.11.4 **Approved**: The purpose of the IAF 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, products, designs, services, assemblies and/or methods of construction. Accreditations granted by IAF MLA signatories are recognised worldwide based on their equivalent accreditation programs, therefore reducing costs and adding value to businesses and consumers.

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

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Issue Date: March 9, 2022

Subject to Renewal: October 1, 2026

FBC Supplement to TER 1911-02

REPORT HOLDER: Western Builders Supply DBA Big Timber®

1 Evaluation Subject

1.1 STX and SCTX Stainless Screws

2 Purpose and Scope

2.1 Purpose

2.1.1 The purpose of this Technical Evaluation Report (TER) supplement is to show STX and SCTX Stainless Screws, recognized in TER 1911-02, 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 41094)*

2.2.2 *FBC-R—20, 23: Florida Building Code – Residential (FL 41094)*

3 Conclusions

3.1 STX and SCTX Stainless Screws, described in TER 1911-02, 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.

3.2.3 FBC-B Section 2304.10 replaces IBC Section 2304.10.

3.2.4 FBC-B Section 2304.10.5 replaces IBC Section 2304.10.6.

4 Conditions of Use

4.1 STX and SCTX Stainless Screws, described in TER 1911-02, must comply with all of the following conditions:

4.1.1 All applicable sections in TER 1911-02.

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

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