



**CERTIFICATION**



**Approved. Sealed. Code Compliant.**

**Technical Evaluation Report**

**TER 1907-01**

**Big Timber® CTX Construction Lag  
Screw Properties**

**Western Builders Supply  
DBA Big Timber®**

**Product:**

**CTX Construction Lag Screws**

**Issue Date:**

**September 3, 2019**

**Revision Date:**

**August 26, 2021**

**Subject to Renewal:**

**October 1, 2022**



COMPANY  
INFORMATION:

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DIVISION: 06 00 00 - WOOD, PLASTICS AND COMPOSITES

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

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## 1 PRODUCTS EVALUATED<sup>1</sup>

- 1.1 CTX Construction Lag Screws

## 2 APPLICABLE CODES AND STANDARDS<sup>2,3</sup>

### 2.1 Codes

- 2.1.1 *IBC—15, 18, 21: International Building Code®*
- 2.1.2 *IRC—15, 18, 21: International Residential Code®*
- 2.1.3 *FBC-B—17, 20: Florida Building Code – Building<sup>4</sup> (FL 35204)*
- 2.1.4 *FBC-R—17, 20: Florida Building Code – Residential<sup>5</sup> (FL 35204)*

### 2.2 Standards and Referenced Documents

- 2.2.1 *AISI S904: Standard Test Methods for Determining the Tensile and Shear Strength of Screws*
- 2.2.2 *ANSI / AWC NDS: National Design Specification (NDS) for Wood Construction*
- 2.2.3 *ASTM A153: Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware*
- 2.2.4 *ASTM A510: Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel, and Alloy Steel*
- 2.2.5 *ASTM B117: Standard Practice for Operating Salt Spray (Fog) Apparatus*
- 2.2.6 *ASTM D1761: Standard Test Methods for Mechanical Fasteners in Wood*
- 2.2.7 *ASTM D2395: Standard Test Methods for Density and Specific Gravity (Relative Density) of Wood and Wood-Based Materials*

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<sup>1</sup> For more information, visit [drjcertification.org](http://drjcertification.org) or call us at 608-310-6748.

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

<sup>3</sup> All terms defined in the applicable building codes are italicized.

<sup>4</sup> All references to *FBC-B* are the same as 2018 *IBC* unless otherwise noted in the Supplement at the end of this TER.

<sup>5</sup> All references to *FBC-R* are the same as 2018 *IRC* unless otherwise noted in the Supplement at the end of this TER.

- 2.2.8 *ASTM D2915: Standard Practice for Sampling and Data-Analysis for Structural Wood and Wood-Based Products*
- 2.2.9 *ASTM D4442: Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials*
- 2.2.10 *ASTM F1575: Standard Test Method for Determining Bending Yield Moment of Nails*
- 2.2.11 *ASTM G85: Standard Practice for Modified Salt Spray (Fog) Testing*

### 3 PERFORMANCE EVALUATION

- 3.1 Big Timber® CTX Construction Lag (CTX) Screws were tested and evaluated to determine their structural resistance properties, which are used to develop reference design values for allowable stress design (ASD). The following properties were evaluated:
  - 3.1.1 Withdrawal strength in accordance with *ASTM D1761*
  - 3.1.2 Lateral shear strength in accordance with *ASTM D1761*
  - 3.1.3 Bending yield strength in accordance with *ASTM F1575*
  - 3.1.4 Tensile strength in accordance with *AISI S904*
  - 3.1.5 Shear strength in accordance with *AISI S904*
  - 3.1.6 Head pull-through strength in accordance with *ASTM D1037*
  - 3.1.7 Corrosion resistance of fasteners meeting or exceeding the protection afforded hot dipped galvanized fasteners in accordance with *ASTM A153, Class D*
- 3.2 Use of fasteners in locations exposed to saltwater or saltwater spray is outside the scope of this evaluation report.
- 3.3 Any code compliance issues not specifically addressed in this section are outside the scope of this TER.
- 3.4 Any engineering evaluation conducted for this TER was performed within DrJ’s ANAB “accredited ICS code scope” and/or the defined professional engineering scope of work on the dates provided herein.

### 4 PRODUCT DESCRIPTION AND MATERIALS

- 4.1 CTX screws have a round washer head with a star drive and are partially threaded. The product evaluated in this TER is shown in Figure 1.



FIGURE 1. BIG TIMBER® CTX CONSTRUCTION LAG SCREW

- 4.2 CTX screws are manufactured using a standard cold-formed process followed by a heat-treating process.
- 4.3 CTX screws are coated with a proprietary coating, designated as Bronze Star, which exceeds the protections provided by hot-dipped galvanized coatings conforming to *ASTM A153*.
- 4.4 Fasteners 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*.
- 4.4.1 The proprietary coating has 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*<sup>6</sup> and *IRC Section R317.3*), allowing for its use in pressure treated wood.

<sup>6</sup> 2018 *IBC Section 2304.10.5*



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

TABLE 1. FASTENER SPECIFICATIONS

Fastener Name	Designation	Head (in)		Nominal Length <sup>1</sup> (in)	Thread Length <sup>1</sup> (in)	Shank Diameter <sup>2</sup> (in)	Thread Diameter (in)		Specified Minimum Core Hardness <sup>4</sup> (HV 0.3)	Nominal Bending Yield, $f_{yb}$ (psi)	Allowable Fastener Strength (lbf)	
		Diameter	Drive Type				Minor	Major			Tensile	Shear <sup>3</sup>
CTX	14 x 1"	0.531	Torx 25	1	1	0.168	0.146	0.242	355	141,300	930	725
	14 x 1½"			1½	1½							
	14 x 2"			2	2							
	14 x 2½"			2½	2¼							
	14 x 3"			3	2							
	14 x 4"			4	2							
	14 x 5"			5	3							
	14 x 6"			6	3							
	15 x 2"	0.620	Torx 30	2	1½	0.202	0.179	0.275	355	151,600	1,475	1,020
	15 x 2½"			2½	1½							
	15 x 3"			3	2							
	15 x 3½"			3½	2½							
	15 x 4"			4	2½							
	15 x 5"			5	3							
	15 x 6"	6	3									
	17 x 4"	0.675	Torx 40	4	2½	0.226	0.210	0.295	355	170,500	1,850	1,240
	17 x 5"			5	3							
	17 x 6"			6	3							
	17 x 7"			7	3½							
	17 x 8"			8	4							
	17 x 10"			10	4							
	17 x 12"			12	4							
	17 x 14"			14	5							
	17 x 16"	16	5									

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

1. Fastener length is measured from the underside of the head to the tip. Thread length includes tapered tip.
2. Shank diameter based on manufactured thickness. Finished dimensions are larger, due to the proprietary coatings added.
3. Shear determined at smooth shank diameter.
4. Based on a 300 gram load using the Vickers indenter.



## 5 APPLICATIONS

### 5.1 *General*

- 5.1.1 CTX 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 CTX 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 *Design*

- 5.2.1 Design of CTX 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.

### 5.3 *CTX Reference Lateral Design Values (Z)*

- 5.3.1 Reference lateral design values (lbf) for shear load parallel and perpendicular to grain for CTX screws are specified in Table 2.



TABLE 2. CTX SCREW REFERENCE LATERAL DESIGN VALUES (Z), LBF

Fastener Name	Designation	Nominal Length (in)	Thread Length (in)	Minimum Side Member Thickness (in)	Minimum Main Member Penetration (in)	Wood Species (Specific Gravity)			
						HF/SPF (0.42)		SP (0.55)	
						Z <sub>⊥</sub>	Z <sub>∥</sub>	Z <sub>⊥</sub>	Z <sub>∥</sub>
CTX	14 x 2"	2	2	3/4	1 1/4	85	85	130	130
	14 x 2 1/2"	2 1/2	2 1/4	3/4	1 3/4	155	155	170	215
	14 x 3"	3	2			225	220	240	245
	14 x 4"	4	2	1 3/4	2 1/4	255	300	255	415
	14 x 5"	5	3			75	95	125	155
	14 x 6"	6	3	3	3	105	130	145	180
	15 x 2"	2	1 1/2	3/4	1 1/4	160	185	225	285
	15 x 2 1/2"	2 1/2	1 1/2			365	375	365	375
	15 x 3"	3	2		265	310	265	340	
	15 x 3 1/2"	3 1/2	2 1/2	1 1/2	2 1/2	460	335	460	335
	15 x 4"	4	2 1/2			180	230	240	300
	15 x 5"	5	3	2	4	280	420	300	485
	15 x 6"	6	3	1 1/2	2 1/2	310	475	315	630
	17 x 4"	4	2 1/2			310	475	315	630
	17 x 5"	5	3	2 3/4	4 1/4	310	475	315	630
	17 x 6"	6	3			310	475	315	630
	17 x 7"	7	3 1/2	3 1/2	6 1/2	310	475	315	630
	17 x 8"	8	4			310	475	315	630
	17 x 10"	10	4	3 1/2	6 1/2	310	475	315	630
	17 x 12"	12	4			310	475	315	630
17 x 14"	14	5	3 1/2	6 1/2	310	475	315	630	
17 x 16"	16	5			310	475	315	630	

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

- Reference lateral design values apply to two-member single shear connections where both members are of the same specific gravity, and the fastener is oriented perpendicular to grain. Where the members are of different specific gravities, use the lower of the two.
- For wood species with a specific gravity between 0.42 and 0.55, use the tabulated values for specific gravity of 0.42.
- Tabulated lateral design values (Z) shall be adjusted by all applicable adjustment factors per *NDS*.
- Z<sub>⊥</sub> = Lateral Design Values Perpendicular to Grain, Z<sub>∥</sub> = Lateral Design Values Parallel to Grain.
- Fastener main member penetration is the length embedded in the main member, including the tip.

5.4 CTX Reference Withdrawal Design Values (W) in Side Grain Applications

5.4.1 Reference withdrawal design values (lbf/in) for CTX screws are specified in Table 3.

TABLE 3. CTX SCREW REFERENCE WITHDRAWAL DESIGN VALUES (W) – SIDE GRAIN APPLICATIONS, LBF/IN

Fastener Name	Designation	Nominal Length (in)	Thread Length (in)	Wood Species (Specific Gravity)	
				HF/SPF (0.42)	SP (0.55)
CTX	14 x 1"	1	1	120	210
	14 x 1½"	1½	1½		
	14 x 2"	2	2		
	14 x 2½"	2½	2¼	195	215
	14 x 3"	3	2		
	14 x 4"	4	2		
	14 x 5"	5	3		
	14 x 6"	6	3		
	15 x 2"	2	1½	140	215
	15 x 2½"	2½	1½		
	15 x 3"	3	2	165	215
	15 x 3½"	3½	2½	175	230
	15 x 4"	4	2½		
	15 x 5"	5	3		
	15 x 6"	6	3		
	17 x 4"	4	2½	150	235
	17 x 5"	5	3		
	17 x 6"	6	3		
	17 x 7"	7	3½	180	235
	17 x 8"	8	4		
17 x 10"	10	4			
17 x 12"	12	4			
17 x 14"	14	5			
17 x 16"	16	5			

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

1. Tabulated withdrawal values (W) shall be adjusted by all applicable adjustment factors per NDS, Table 11.3.1.
2. Minimum fastener penetration into main member of 1" is required. Fastener penetration is the threaded length embedded in the main member, excluding the tip.
3. For wood species with a specific gravity between 0.42 and 0.55, use the tabulated values for specific gravity of 0.42.
4. 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.



5.5 CTX Reference Head Pull-Through Design Values (P)

5.5.1 Reference design values for head pull-through (lbf) for CTX screws are specified in Table 4.

TABLE 4. CTX SCREW REFERENCE HEAD PULL-THROUGH DESIGN VALUES (P), LBF

Fastener Name	Designation	Nominal Length (in)	Thread Length (in)	Wood Species (Specific Gravity)	
				HF/SPF (0.42)	SP (0.55)
CTX	14 x 1"	1	1	345	405
	14 x 1½"	1½	1½		
	14 x 2"	2	2		
	14 x 2½"	2½	2¼		
	14 x 3"	3	2		
	14 x 4"	4	2		
	14 x 5"	5	3		
	14 x 6"	6	3		
	15 x 2"	2	1½	340	485
	15 x 2½"	2½	1½		
	15 x 3"	3	2		
	15 x 3½"	3½	2½		
	15 x 4"	4	2½		
	15 x 5"	5	3		
	15 x 6"	6	3		
	17 x 4"	4	2½		
	17 x 5"	5	3		
	17 x 6"	6	3		
	17 x 7"	7	3½		
	17 x 8"	8	4		
	17 x 10"	10	4		
	17 x 12"	12	4		
	17 x 14"	14	5		
	17 x 16"	16	5		

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

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 ¾ inch.



## 6 INSTALLATION

- 6.1 Installation shall comply with the manufacturer’s installation instructions and this TER. In the event of a conflict between the manufacturer’s installation instructions and this TER, the more restrictive shall govern.
- 6.2 Minimum penetration is 1", unless otherwise stated in this TER. Install fasteners with head flush to the surface of the wood member.
- 6.3 Lead holes are not required.
- 6.4 Screws shall be installed with the appropriate rotating powered driver.
- 6.5 Minimum requirements for screw spacing, edge distance, and end distance shall be in accordance with Table 5.

TABLE 5. CTX SCREW SPACING, EDGE DISTANCE, AND END DISTANCE REQUIREMENTS<sup>1</sup>, INCH

Connection Geometry	CTX 14	CTX 15	CTX 17
Edge Distance – Load in any direction	½	⅝	⅝
End Distance – Load parallel to grain, towards end	2½	3	3¾
End Distance – Load parallel to grain, away from end	1⅝	2	2¼
End Distance – Load perpendicular to grain	1⅝	2	2¾
Spacing between Fasteners in a Row – Parallel to grain	2½	3	3¾
Spacing between Fasteners in a Row – Perpendicular to grain	1⅝	2	2¼
Spacing between Rows of Fasteners – In-line	⅞	1	1⅝
Spacing between Rows of Fasteners – Staggered <sup>2</sup>	½	½	⅝

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 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 Withdrawal strength testing in accordance with *ASTM D1761*
  - 7.1.2 Lateral shear strength testing in accordance with *ASTM D1761*
  - 7.1.3 Head pull-through strength testing in accordance with *ASTM D1037*
  - 7.1.4 Bending yield strength testing in accordance with *ASTM F1575*
  - 7.1.5 Tensile strength testing in accordance with *AISI S904*
  - 7.1.6 Shear strength testing in accordance with *AISI S904*
  - 7.1.7 Corrosion resistance testing in accordance with *ASTM B117* and *ASTM G85*
- 7.2 Information contained herein is the result of testing and/or data analysis by sources which conform to *IBC Section 1703* and/or *professional engineering regulations*. DrJ relies upon accurate data to perform its ISO/IEC 17065 evaluations.
- 7.3 Where appropriate, DrJ’s analysis is based on provisions that have been codified into law through state or local adoption of codes and standards. The providers of the codes and standards are legally responsible for their content. DrJ analysis may use code-adopted provisions as a control sample. A control sample versus a test sample establishes a product as *being equivalent* to that prescribed in this code in quality, *strength*, effectiveness, *fire resistance*, durability, and safety. Where the accuracy of the provisions provided herein is reliant upon the published properties of materials, DrJ relies upon the grade mark, grade stamp, mill certificate, and/or test data provided by material suppliers to be minimum properties. DrJ analysis relies upon these properties to be accurate.

## 8 FINDINGS

- 8.1 When used and installed in accordance with this TER and the manufacturer's installation instructions, the product(s) listed in Section 1.1 have the reference design value properties defined herein and are approved for use in accordance with the applicable code.
- 8.2 This product has been evaluated in the context of the codes listed in Section 2 and is compliant with all known state and local building codes. Where there are known variations in state or local codes applicable to this TER, they are listed here.
  - 8.2.1 No known variations
- 8.3 Building codes require data from valid research reports be obtained from approved sources (i.e., licensed registered design professionals [RDPs]).
  - 8.3.1 Building official approval of a licensed RDP is performed by verifying the RDP and/or their business entity is listed by the licensing board of the relevant jurisdiction.
- 8.4 Agencies who are accredited through ISO/IEC 17065 have met the code requirements for approval by the building official. DrJ is an ISO/IEC 17065 ANAB-Accredited Product Certification Body – Accreditation #1131 and employs RDPs.
- 8.5 Through ANAB accreditation and the IAF MLA, DrJ certification 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.”
- 8.6 IBC Section 104.11 (IRC Section R104.11 and IFC Section 104.10<sup>7</sup> are similar) states:

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

## 9 CONDITIONS OF USE

- 9.1 Wood main and side members must have a moisture content of less than or equal to 19 percent.
- 9.2 Use of fasteners in locations exposed to saltwater or saltwater spray is outside the scope of this evaluation report.
- 9.3 Where required by the building official, also known as the authority having jurisdiction (AHJ) in which the project is to be constructed, this TER and the installation instructions shall be submitted at the time of permit application.
- 9.4 Any generally accepted engineering calculations needed to show compliance with this TER shall be submitted to the AHJ for review and approval.
- 9.5 Design loads shall be determined in accordance with the building code adopted by the jurisdiction in which the project is to be constructed and/or by the building designer (e.g., owner or RDP).
- 9.6 At a minimum, this product shall be installed per Section 6 of this TER.
- 9.7 This product has an internal quality control program and a third-party quality assurance program in accordance with IBC Section 104.4 and Section 110.4 and IRC Section R104.4 and Section R109.2.
- 9.8 The actual design, suitability, and use of this TER, for any particular building, is the responsibility of the owner or the owner's authorized agent.
- 9.9 This TER shall be reviewed for code compliance by the AHJ in concert with IBC Section 104.
- 9.10 The implementation of this TER for this product is dependent on the design, quality control, third-party quality assurance, proper implementation of installation instructions, inspections required by IBC Section 110.3, and any other code or regulatory requirements that may apply.

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<sup>7</sup> 2018 IFC Section 104.9



## 10 IDENTIFICATION

- 10.1 The product(s) listed in Section 1.1 are identified by a label on the board or packaging material bearing the manufacturer's name, product name, TER number, and other information to confirm code compliance.
- 10.2 Additional technical information can be found at [bigtimberfasteners.com](http://bigtimberfasteners.com).

## 11 REVIEW SCHEDULE

- 11.1 This TER is subject to periodic review and revision. For the most recent version, visit [drjcertification.org](http://drjcertification.org).
- 11.2 For information on the current status of this TER, contact [DrJ Certification](#).

Issue Date: December 22, 2020  
Subject to Renewal: October 1, 2022

## FBC Supplement to TER 1907-01

REPORT HOLDER: Western Builders Supply  
DBA Big Timber®

### 1 EVALUATION SUBJECT

1.1 CTX Construction Lag Screws

### 2 PURPOSE AND SCOPE

#### 2.1 Purpose

2.1.1 The purpose of this Technical Evaluation Report (TER) supplement is to show CTX Construction Lag Screws, recognized in TER 1907-01, has also been evaluated for compliance with the codes listed below as adopted by the Florida Building Commission.

#### 2.2 Applicable Code Editions

2.2.1 *FBC-B—17, 20: Florida Building Code – Building (FL 35204)*

2.2.2 *FBC-R—17, 20: Florida Building Code – Residential (FL 35204)*

### 3 CONCLUSIONS

3.1 CTX Construction Lag Screws, described in TER 1907-01, complies with the *FBC-B* and *FBC-R* and is subject to the conditions of use described in this supplement.

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

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

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

### 4 CONDITIONS OF USE

4.1 CTX Construction Lag Screws, described in TER 1907-01, must comply with all of the following conditions:

4.1.1 All applicable sections in TER 1907-01

4.1.2 The design, installation, conditions of use, and identification of CTX Construction Lag Screws are in accordance with the 2018 *IBC* provisions noted in TER 1907-01.

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