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ESR-3534

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DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES
SECTION: 06 05 23—WOOD, PLASTIC AND COMPOSITE FASTENINGS

REPORT HOLDER:

WESTERN BUILDERS SUPPLY

**POST OFFICE BOX 1243
BILLINGS, MONTANA 59103**

EVALUATION SUBJECT:

BIG TIMBER™ SCREWS



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

REPORT HOLDER:

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EVALUATION SUBJECT:**BIG TIMBER™ SCREWS****1.0 EVALUATION SCOPE****Compliance with the following codes:**

- 2015, 2012 and 2009 *International Building Code*® (IBC)
- 2015, 2012 and 2009 *International Residential Code*® (IRC)

Properties evaluated:

- Structural
- Corrosion resistance

2.0 USES

The Big Timber™ screws are used in wood-to-wood connections. The screws may be used where fasteners are required to exhibit corrosion resistance when exposed to adverse environmental conditions and/or preservative-treated wood, and are alternates to hot-dip-zinc galvanized fasteners with a coating weight in compliance with ASTM A153, Class D. The screws have been evaluated for use with wood chemically treated with waterborne alkaline copper quaternary (ACQ-D) preservative.

3.0 DESCRIPTION**3.1 Fasteners:**

3.1.1 General: The Big Timber fasteners are made from carbon steel wire, hardened after forming and then coated. The fasteners are self-drilling, self-tapping screws with various head styles. See Table 1 for all fastener dimensions and Figure 1 for fastener details.

The coatings on the fasteners are comprised of a layer of zinc and an outer layer of a proprietary coating, which is named in the manufacturer's quality documentation. The

coatings for the different types of screws differ in pigmentation only.

3.1.2 Construction Lag Screws: Construction Lag Screws, designated 'CTX', are partially threaded, with a round washer head with a star drive recess. The coating for these screws is designated as Bronze Star.

3.1.3 Log, Timber & Landscape Screws: Log, Timber & Landscape Screws, designated 'BL', are partially threaded, with a hex washer head. The coating for these screws is designated as Black Log.

3.1.4 Gray Structural Screws: Gray Structural Screws, designated 'GL', are partially threaded, with a hex washer head. The coating for these screws is designated as Gray Log.

3.2 Wood Members:

Wood side and main members must have a moisture content of less than 19 percent both at the time of screw installation and in service. Wood members must be solid-sawn lumber having a minimum assigned specific gravity as shown in the tables in this report. Assigned specific gravity must be determined in accordance with Table 12.3.3A of the 2015 ANSI/AWC National Design Specification (NDS) for Wood Construction (Table 11.3.3A of NDS-12 for the 2012 IBC, Table 11.3.2A of NDS-05 for the 2009 IBC). The thickness of the main member, t_m , must be equal to or greater than the screw length less the thickness of the side member.

4.0 DESIGN AND INSTALLATION**4.1 Design:**

Allowable fastener tension and shear strengths are given in Table 1. Reference withdrawal and pull-through design values are given in Table 2. Reference lateral design values for wood-to-wood connections loaded parallel or perpendicular to the grain are given in Table 3. Reference design values are for allowable stress design and must be multiplied by all applicable adjustment factors, as applicable to wood screws, in accordance with the NDS to determine adjusted design values.

The allowable load for a single-screw connection in which the screw is subject to tension is the least of: (a) the reference withdrawal design value given in Table 2, multiplied by the thread length in the main member, and adjusted by all applicable adjustment factors; (b) the reference head pull-through design value given in Table 2, adjusted by all applicable adjustment factors; and (c) the allowable screw tension strength given in Table 1.

The allowable lateral load for a single-screw connection is the lesser of: (a) the reference lateral design value given in Table 3, adjusted by all applicable adjustment factors; and (b) the allowable screw shear strength given in Table 1. The tabulated allowable screw shear strength is applicable to connections where the shear plane passes through the smooth shank portion of the screw.

Connections containing multiple screws must be designed in accordance with Sections 11.2.2 and 12.6 of NDS-15 (Sections 10.2.2 and 11.6 of NDS-12 and NDS-05 for the 2012 and 2009 IBC).

Where the screws are subjected to combined lateral and withdrawal loads, connections shall be designed in accordance with Section 12.4.1 of NDS-15 (Section 11.4.1 of NDS-12 and NDS-05 for the 2012 and 2009 IBC).

When designing a connection, the structural members must be checked for load-carrying capacity in accordance with Section 11.1.2 of NDS-15 (Section 10.1.2 of NDS-12 and NDS-05 for the 2012 and 2009 IBC), and local stresses within the connection must be checked against Appendix E of the NDS to ensure the capacity of the connection and fastener group.

Use of the Big Timber™ coated screws must be in accordance with the typical applications and limitations defined in Table 5. The screws are recognized for use in wood treated with waterborne alkaline copper quaternary (ACQ-D) preservatives with a maximum retention of 0.40 pcf (6.4kg/m³).

4.2 Installation:

Screws must be installed in accordance with the report holder's published installation instructions and this report. Pilot holes are not required. Screws must be installed with the minimum spacing, end distances, and edge distances needed to prevent splitting of the wood or as noted in Table 4, whichever is more restrictive. The screws must be installed by turning with the appropriate powered driver, not by driving with a hammer.

5.0 CONDITIONS OF USE

The fasteners described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 Installation must comply with this report, the report holder's published instructions and the applicable code. A copy of the report holder's published installation instructions must be available at the jobsite at all times during installation. In the event of a conflict between the published installation instructions and this report, the more restrictive requirements govern.

5.2 When the capacity of the connection is controlled by the fastener metal strength, rather than wood strength, the metal strength must not be multiplied by the adjustment factors specified in the NDS.

5.3 Installation must be limited to connections between wood members used in dry service conditions where the wood moisture content does not exceed 19 percent.

5.4 The Big Timber™ screws are manufactured under a quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

6.1 Data in accordance with the ICC-ES Acceptance Criteria for Alternate Dowel-type Threaded Fasteners (AC233), dated April 2015 (editorially revised August 2015).

6.2 Data in accordance with the ICC-ES Acceptance Criteria for Corrosion-resistant Fasteners and Evaluation of Corrosion Effects of Wood Treatment Chemicals (AC257), dated October 2009 (editorially revised May 2015).

7.0 IDENTIFICATION

The CTX screw heads are marked with "W B S" as shown in Figure 1. Packages of screws are identified with the report holder name (Western Builders Supply), the brand name (Big Timber™), the fastener type (Construction Lag Screws; Log, Timber & Landscape Screws; or Gray Structural Screws), the nominal fastener size and length, the purchase order number, the lot number and the evaluation report number (ESR-3534).

TABLE 1—FASTENER SPECIFICATIONS

FASTENER DESIGNATION	NOMINAL LENGTH (inch)	THREAD LENGTH (inch)	HEAD DIAMETER (inch)	DRIVE TYPE AND SIZE	MINOR (ROOT) DIAMETER (inch)	SHANK DIAMETER (inch)	OUTSIDE THREAD DIAMETER (inch)	SPECIFIED MINIMUM CORE HARDNESS (HV 0.3) ²	ALLOWABLE STEEL STRENGTH	
									Tensile (lbf)	Shear ³ (lbf)
CTX	14 x 2 1/2	2 1/2	0.531	Torx 25	0.142	0.168	0.242	355	931	724
	14 x 3	3								
	14 x 4	4								
	14 x 5	5								
	14 x 6	6								
	15 x 3	3	0.620	Torx 30	0.181	0.202	0.275	355	1,477	1,019
	15 x 3 1/2	3 1/2								
	15 x 4	4								
	15 x 5	5								
	15 x 6	6	0.675	Torx 40	0.213	0.226	0.295	355	1,851	1,238
17 x 7	7									
17 x 8	8									
17 x 10	10									
17 x 12	12									
BL	14 x 4	4	0.487	Hex 5/16	0.171	0.189	0.258	300	1,086	724
	14 x 6	6								
	14 x 8	8								
	14 x 10	10								
	14 x 12	12								
	14 x 14	14								
GL	17 x 5	5	0.571	Hex 5/16	0.207	0.224	0.293	355	1,991	1,238
	17 x 7	7								
	17 x 9	9								
	17 x 11	11								

For SI: 1 inch = 25.4 mm, 1 lbf = 4.45N

¹Length of thread includes tip.

²Based on a 300 gram load using the Vickers scale.

³Applies to installation with the shear plane through the smooth shank portion of the fastener.

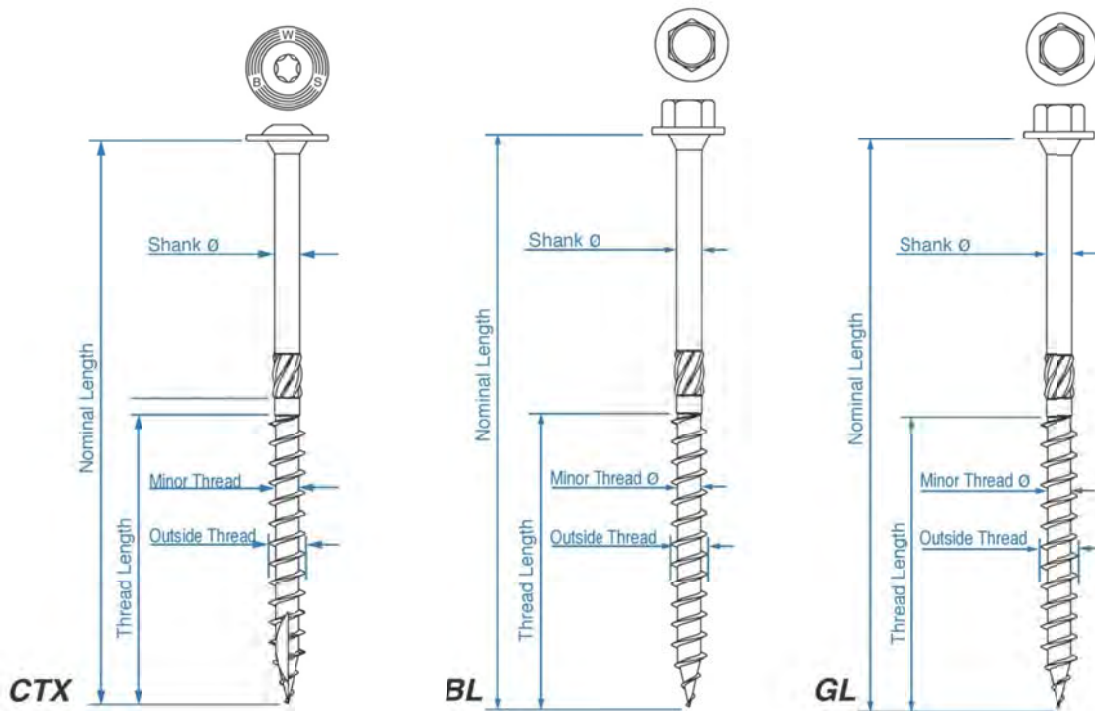


FIGURE 1—BIG TIMBER™ SCREWS

TABLE 2—REFERENCE WITHDRAWAL (W) AND PULL-THROUGH (P) DESIGN VALUES^{2,5}

FASTENER DESIGNATION	THREAD ¹ LENGTH (inch)	W (lbf/in) ³		P (lbf) ⁴	
		For Specific Gravities of:			
		0.42	0.55	0.42	0.55
CTX	14 x 2 ¹ / ₂	156	170	294	358
	14 x 3				
	14 x 4				
	14 x 5				
	14 x 6				
	15 x 3	134	174	298	403
	15 x 3 ¹ / ₂				
	15 x 4	141	183	298	403
	15 x 5				
	15 x 6				
	17 x 7				
	17 x 8	170	198	364	481
17 x 10					
17 x 12					
14 x 4	156				
14 x 6					
14 x 8					
14 x 10					
14 x 12					
14 x 14					
GL	17 x 5	170	198	272	323
	17 x 7				
	17 x 9				
	17 x 11				

For SI: 1 inch = 25.4 mm; 1 lbf/in = 175 N/m, 1 lbf = 4.4N

¹ Tabulated thread length includes tip.

² Values must be multiplied by all applicable adjustment factors.

³ Reference withdrawal values must be multiplied by the length of the threaded portion of the fastener embedded in the side grain of the main member to obtain the full design withdrawal value.

⁴ Tabulated pull-through design values apply to connections having a minimum wood side member thickness of not less than ³/₄ inch.

⁵ For wood specific gravities between 0.42 and 0.55, use the tabulated values for specific gravity of 0.42.

TABLE 3—REFERENCE LATERAL DESIGN VALUES (Z) FOR SINGLE SHEAR (TWO-MEMBER) CONNECTIONS^{1,2}

FASTENER DESIGNATION	WOOD SIDE MEMBER THICKNESS (inch)	FASTENER PENETRATION INTO MAIN MEMBER, p (inch)	REFERENCE LATERAL DESIGN VALUE, Z (lbf) FOR SPECIFIC GRAVITIES OF:				
			0.42		0.55		
			Parallel to Grain, Z	Perpendicular to Grain, Z _⊥	Parallel to Grain, Z	Perpendicular to Grain, Z _⊥	
CTX	14 x 2 ¹ / ₂	3 ³ / ₄	1 ³ / ₄	150	125	180	154
	14 x 3	2 ¹ / ₄					
	14 x 4	1 ³ / ₄	2 ¹ / ₄	182	187	215	209
	14 x 6	3	3	240	222	335	240
	15 x 3	3 ³ / ₄	2 ¹ / ₄	151	132	226	180
	15 x 3 ¹ / ₂		2 ³ / ₄				
	15 x 4	1 ¹ / ₂	2 ¹ / ₂	240	243	280	259
	15 x 5		3 ¹ / ₂				
	15 x 6	2	4	258	258	296	261
	17 x 7	2 ³ / ₄	4 ¹ / ₄	384	265	439	286
	17 x 8		5 ¹ / ₄				
	17 x 10	3 ¹ / ₂	6 ¹ / ₂	470	273	561	302
17 x 12	8 ¹ / ₂						
BL	14 x 4	3 ³ / ₄	3 ³ / ₄	150	125	180	154
	14 x 6	3	3	240	222	335	240
	14 x 8		5				
	14 x 10		7				
	14 x 12		9				
14 x 14	11						
GL	17 x 5	1 ¹ / ₂	3 ¹ / ₂	240	243	280	259
	17 x 7	2 ³ / ₄	4 ¹ / ₄	384	265	439	286
	17 x 9		6 ¹ / ₄				
	17 x 11	3 ¹ / ₂	7 ¹ / ₂	470	273	561	302

For SI: 1 inch = 25.4 mm; 1 lbf = 4.4N

¹ Values must be multiplied by all applicable adjustment factors.

² For wood specific gravities between 0.42 and 0.55, use the tabulated values for specific gravity of 0.42.

TABLE 4—CONNECTION GEOMETRY^{1,2}

CONNECTION GEOMETRY/ CRITERIA	DIAMETERS	DISTANCE BASED ON FASTENER TYPE AND SIZE (inch)				
		CTX14	CTX15	CTX17	BL14	GL17
Minimum Edge Distance						
Load in any direction	8	1 ³ / ₈	1 ⁵ / ₈	1 ⁷ / ₈	1 ¹ / ₂	1 ⁷ / ₈
Minimum End Distance						
Load toward end and parallel to grain	15	2 ¹ / ₂	3	3 ³ / ₈	2 ⁷ / ₈	3 ³ / ₈
Load away from end and parallel to grain	10	1 ³ / ₄	2	2 ¹ / ₄	1 ⁷ / ₈	2 ¹ / ₄
Load perpendicular to grain	10	1 ³ / ₄	2	2 ¹ / ₄	1 ⁷ / ₈	2 ¹ / ₄
Spacing Between Fasteners in a Row						
Load parallel to grain	15	2 ¹ / ₂	3	3 ³ / ₈	2 ⁷ / ₈	3 ³ / ₈
Load perpendicular to grain	10	1 ³ / ₄	2	2 ¹ / ₄	1 ⁷ / ₈	2 ¹ / ₄
Spacing Between Rows of Fasteners						
In-Line rows	5	⁷ / ₈	1	1 ¹ / ₈	1	1 ¹ / ₈
Staggered rows	2.5	¹ / ₂	¹ / ₂	⁵ / ₈	¹ / ₂	⁵ / ₈

For SI: 1 inch = 25.4 mm

¹ End, edge and spacing distances shall be sufficient to preclude splitting of the wood member, but not less than the tabulated value.

² Values for spacing between staggered rows apply where screws in adjacent rows are offset by half of the spacing between screws in a row.

TABLE 5—EXPOSURE CONDITIONS FOR CTX, GL AND BL SCREWS

EXPOSURE CONDITION	TYPICAL APPLICATIONS	RECOGNITION LIMITATIONS
Corrosion Resistance of Fasteners		
1	Treated wood in dry use applications	Limited to use where equilibrium moisture content of the chemically treated wood meets the dry service conditions as described in the NDS.
3	General construction	Limited to freshwater and chemically treated wood exposure, e.g., no saltwater exposure.