Technical Evaluation Report™

TER 1907-03

Big Timber® Screws for Use in Deck Ledger Applications

Western Builders Supply dba Big Timber®

Products:

Big Timber CTX, BL, GL and WTX Screws

Issue Date:

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SECTION: 06 05 23 - Wood, Plastic, and Composite Fastenings	SECTION: 06 15 00 - Wood Decking

1 Innovative Products Evaluated[1,2]

1.1 Big Timber® BL Log, Timber & Landscape Screws

1.2 Big Timber® CTX Construction Lag Screws

1.3 Big Timber® GL Gray Structural Screws

1.4 Big Timber® WTX Wafer Head Wood 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®*

2.2 *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*

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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.

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

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

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).[5]

3.2 Testing and/or inspections conducted for this TER were performed an ISO/IEC 17025 accredited testing laboratory,[6] an ISO/IEC 17020 accredited inspection body,[7] which are internationally recognized accreditations through International Accreditation Forum (IAF), and/or a licensed Registered Design Professional (RDP).

3.3 The Big Timber® screws listed in **Section 1** were evaluated to determine:

3.3.1 Use for attachment of deck ledgers to the building structure. This application includes attachments to Spruce-Pine-Fir (SPF) band joists[8] and Oriented Strand Board (OSB) band joists.

3.3.2 Lateral strength of ledger connections to wood-framed walls. This application includes zero, one, or two layers of $^{5}/_{8}$" Gypsum Wall Board (GWB) between the ledger and the wall studs.

3.4 For conventionally framed buildings, the deck ledger is required to be attached to the band joist in accordance with IBC Section 1604.8.3 or IRC Section R507.9[9] as applicable.

3.4.1 Where a band joist is not used, as in some truss installations, an engineered design is required.[10]

3.5 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[11] to practice product and code compliance services within its scope of accreditation and engineering expertise, respectively.

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

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

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5 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.

6 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.

7 Ibid.

8 The term "band joist" is used throughout this report. Other regional terms synonymous with band joist include rim board, band board, header board, and header joist.

9 2015 IRC Section R507.2

10 For guidance on designing the connection of the deck ledger to trusses where a band joist is not used, see SBCA Research Report, *Deck Ledger Attachment to Residential Wood Truss Floor Systems*.

11 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.

4 Product Description and Materials

4.1 The innovative products evaluated in this TER are shown in **Figure 1**, **Figure 2**, **Figure 3**, and **Figure 4**.

Figure 1. CTX Construction Lag Screw

Figure 2. BL Log, Timber & Landscaping Screw

Figure 3. GL Gray Structural Screw

Figure 4. WTX Wafer Head Screw

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4.2 The Big Timber® screws evaluated in this TER are set forth in **Table 1**.

Table 1. Big Timber® Fastener Specifications

Fastener Name	Designation	Head (in)		Nominal Length[1] (in)	Thread Length[1] (in)	Shank Diameter[2] (in)	Thread Diameter (in)		Specified Minimum Core Hardness[4] (HV 0.3)	Nominal Bending Yield, f_{yb} (psi)	Allowable Fastener Strength (lb)	
		Diameter	Drive Type				Minor	Major			Tensile	Shear[3]
CTX[(1)]	15 x 3 1/2"	0.620	Torx 30	3 1/2	2 1/2	0.202	0.179	0.275	355	151,600	1,475	1,020
	15 x 4"			4	2 1/2							
	15 x 5"			5	3							
	15 x 6"			6	3							
	17 x 4"	0.675	Torx 40	4	2 1/2	0.226	0.210	0.295	355	170,500	1,850	1,240
	17 x 5"			5	3							
	17 x 6"			5	3							
BL[(1)]	17 x 4"	0.570	Hex 5/16	4	2	0.224	0.211	0.297	355	172,600	1,990	1,240
	17 x 5"			5	3							
	17 x 6"			6	3							
GL[(1)]	17 x 4"	0.570	Hex 5/16	4	2	0.224	0.211	0.297	355	172,600	1,990	1,240
	17 x 5"			5	3							
	17 x 6"			6	3							
WTX[(5)]	15 x 3 1/2"	0.659	Torx 30	3 1/2	2	0.205	0.187	0.274	286	190,000	1,545	1,165
	15 x 4"			4	2							
	15 x 4 1/2"			4 1/2	2							
	15 x 5"			5	2							
	15 x 6"			6	2 1/2							
	15 x 8"			8	2 1/2							

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. Fastener length is measured from the top of the head to the tip. Thread length includes tapered tip.

4.3 Big Timber® screws are manufactured using a standard cold-formed process followed by a heat-treating process.

4.4 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.

4.5 BL screws are coated with a proprietary coating, designated as Black Log, which exceeds the protections provided by hot-dipped galvanized coatings conforming to ASTM A153.

4.6 GL screws are coated with a proprietary coating, designated as Gray Log, which exceeds the protections provided by hot-dipped galvanized coatings conforming to ASTM A153.

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4.7 WTX screws are coated with a proprietary coating, designated as Black, which exceeds the protections provided by hot-dipped galvanized coatings conforming to ASTM A153.

4.8 Big Timber 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.

4.8.1 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[12] and IRC Section R317.3), allowing for its use in pressure-treated wood.

4.8.2 Big Timber® 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.

5 Applications

5.1 Big Timber CTX, BL, GL and WTX Screws are self-tapping fasteners used for attaching the deck ledger to the band joist of a building in accordance with IBC Section 1604.8.3 and IRC Section R507.9.[13] See **Section 6** for installation requirements.

5.2 Big Timber CTX, BL, GL and WTX Screws can be used for attaching ledger boards to wall studs with zero, one, or two layers of GWB between the ledger and the wall studs.

5.3 Big Timber CTX, BL, GL and WTX Screws are installed without lead holes, as prescribed in NDS.

5.4 Design of Big Timber CTX, BL, GL and WTX Screws are governed by the applicable code and the provisions for dowel-type fasteners in NDS.

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

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

5.7 *Reference Design Values for Deck Ledger to Band Joist Attachment*

5.7.1 Big Timber CTX, BL, GL and WTX Screws are designed for attaching the deck ledger to the band joist of a building in accordance with IBC Section 1604.8.3 and IRC Section R507.9.[13] This connection is shown in **Figure 5**.

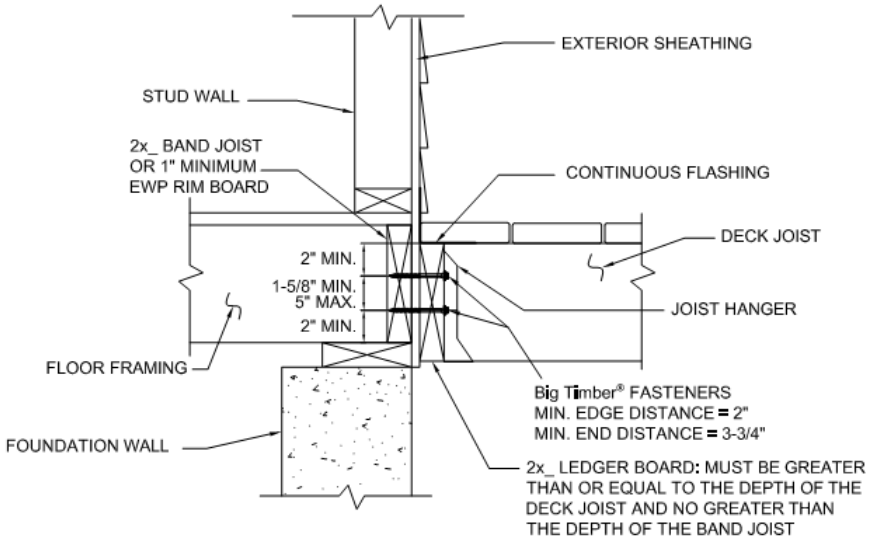

Figure 5. Big Timber Deck Ledger Connection to Band Joist

[12] 2018 IBC Section 2304.10.5

[13] 2015 IRC Section R507.2

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5.7.2 The IRC provides prescriptive fastener spacing for the attachment of a deck ledger to a rim joist with 1/2" diameter lag screws or through bolts as shown in IRC Table R507.9.1.3(1).[14]

5.7.2.1 **Table 2** provides the Big Timber CTX, BL, GL and WTX Screws spacing required to provide performance at least equivalent to the lag screws found in IRC Table R507.9.1.3(1)[14] in accordance with IBC Section 104.11 and Section 1604.8.3 and IRC Section R104.11 and Section R507.9[15] in accordance with generally accepted engineering practice.

5.7.2.1.1 **Table 2** provides screw spacing for materials found in IRC Section R507.9,[15] as well as a wider range of materials commonly used for rim joists. Screw spacing values are provided for two loading conditions.

5.7.2.2 When installed in accordance with the spacing requirements of **Table 2**, Big Timber CTX, BL, GL, and WTX screws provide equivalent performance to IRC Table R507.9.1.3(1).[14]

Table 2. Screw Spacing for Items in IRC Table R507.9.1.3(1)[16] and Other Materials and Loading Conditions[1]

Fastener Designation[2,8] (in)	Load Case[9]	2x Nominal Ledger Species[3,4,5]	Band Joist Material[6,7]	Maximum On-center Spacing of Fasteners (in)						
				Maximum Deck Joist Spans (ft)						
				Up to 6'	Up to 8'	Up to 10'	Up to 12'	Up to 14'	Up to 16'	Up to 18'
CTX 15 x 4" CTX 15 x 5" CTX 15 x 6" CTX 17 x 4" CTX 17 x 5" CTX 17 x 6"	LL + DL 40 + 10	HF	2x Sawn Lumber	18	13	10	8	7	6	5
			1 1/8" OSB	24	18	12	10	9	8	7
		SP	2x Sawn Lumber	22	16	12	10	8	7	6
			1 1/8" OSB	23	17	13	11	9	8	7
	SL + DL 50 + 10	HF	2x Sawn Lumber	14	11	8	7	6	5	4
			1 1/8" OSB	20	13	10	8	7	6	5
		SP	2x Sawn Lumber	18	12	10	8	7	6	5
			1 1/8" OSB	19	14	11	9	8	7	6
	SL + DL 60 + 10	HF	2x Sawn Lumber	12	9	7	6	5	4	4
			1 1/8" OSB	17	11	9	7	6	5	5
		SP	2x Sawn Lumber	14	11	8	7	6	5	4
			1 1/8" OSB	16	12	9	8	6	6	5
	SL + DL 70 + 10	HF	2x Sawn Lumber	11	8	6	5	4	4	3
			1 1/8" OSB	13	10	8	6	5	5	4
		SP	2x Sawn Lumber	12	9	7	6	5	4	4
			1 1/8" OSB	14	10	8	7	6	5	4
BL 17 x 4" BL 17 x 5" BL 17 x 6" GL 17 x 4" GL 17 x 5" GL 17 x 6"	LL + DL 40 + 10	HF	2x Sawn Lumber	22	17	12	10	8	7	6
			1 1/8" OSB	23	17	11	9	8	7	6
		SP	2x Sawn Lumber	24	18	12	10	8	7	6
			1 1/8" OSB	26	20	16	13	11	10	9
	SL + DL	HF	2x Sawn Lumber	18	12	10	8	7	6	5

[14] 2015 IRC Table R507.2

[15] 2015 IRC Section R507.2

[16] 2015 IRC Table R507.2

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Table 2. Screw Spacing for Items in IRC Table R507.9.1.3(1)[16] and Other Materials and Loading Conditions[1]

Fastener Designation[2,8] (in)	Load Case[9]	2x Nominal Ledger Species[3,4,5]	Band Joist Material[6,7]	Maximum On-center Spacing of Fasteners (in)						
				Maximum Deck Joist Spans (ft)						
				Up to 6'	Up to 8'	Up to 10'	Up to 12'	Up to 14'	Up to 16'	Up to 18'
	50 + 10		1 1/8" OSB	19	12	9	8	6	6	5
		SP	2x Sawn Lumber	20	13	10	8	7	6	5
			1 1/8" OSB	22	16	13	11	9	8	7
	SL + DL 60 + 10	HF	2x Sawn Lumber	16	10	8	7	6	5	4
			1 1/8" OSB	16	10	8	6	5	5	4
		SP	2x Sawn Lumber	17	11	8	7	6	5	4
			1 1/8" OSB	19	14	11	9	8	7	6
	SL + DL 70 + 10	HF	2x Sawn Lumber	12	9	7	6	5	4	4
			1 1/8" OSB	12	9	7	6	5	4	4
		SP	2x Sawn Lumber	13	9	7	6	5	4	4
			1 1/8" OSB	16	13	10	8	7	6	5

SI: 1 in = 25.4 mm, 1 psf = 0.0479 kN/m^2

1. Based on load duration of 1.0. Spacing may be adjusted by the applicable load duration as specified in NDS.
2. Fasteners are required to have full thread penetration into the main member. Excess fastener length extending beyond the main member is not reflected in the table above.
3. Solid-sawn ledgers shall be HF or SP species (specific gravity of 0.43 and 0.55, respectively) and designed by others.
4. Minimum ledger board requirements: 1 1/2" thickness and 7 1/4" depth
5. Ledger materials tested in the wet service condition.
6. A maximum 1/2" structural sheathing may be installed between the ledger and band joist. Up to 1/2" thickness of stacked washers shall be permitted to substitute for up to 1/2" on allowable sheathing thickness where combined with wood structural panel or lumber sheathing.
7. Minimum band joist requirements: SPF (specific gravity of 0.42) solid-sawn lumber 1 1/2" thick and 7 1/4" depth; OSB 1 1/8" thick and 7 1/4" depth
8. Fasteners shall be installed per **Section 6** of this TER.
9. Snow load shall not be assumed to act concurrently with live load.

5.8 *Reference Lateral Design Values for Deck Ledger to Stud Attachment*

5.8.1 *Without GWB Interlayer:*

5.8.1.1 Installation details for ledger to stud connections without GWB for 2"x6", 2"x8", and 2"x10" ledgers are shown in **Figure 6**, **Figure 7** and **Figure 8**, respectively.

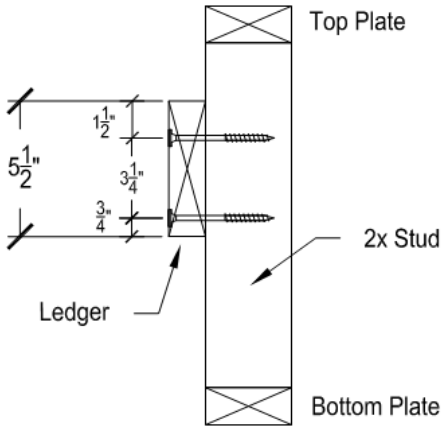

Figure 6. 2"x6" Ledger Directly Attached to Stud

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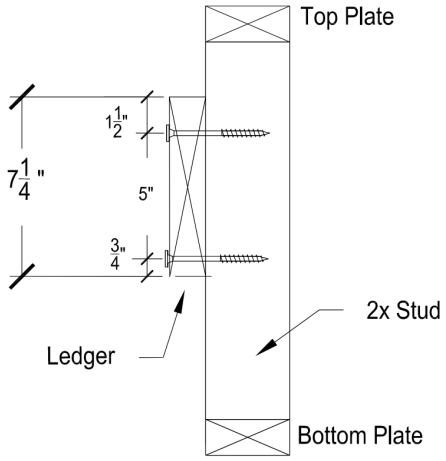

Figure 7. 2"x8" Ledger Directly Attached to Stud

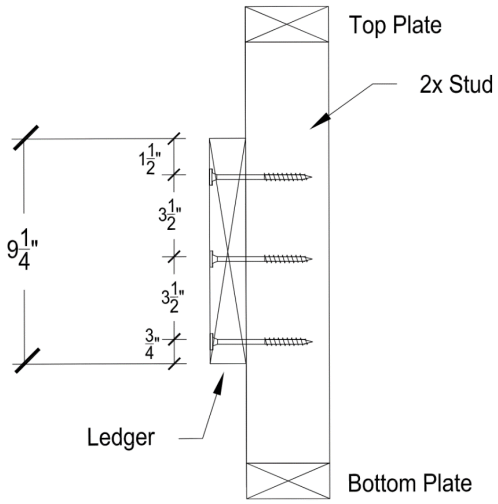

Figure 8. 2"x10" Ledger Directly Attached to Stud

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5.8.2 *With One Layer GWB Interlayer:*

5.8.2.1 Installation details for ledger to stud connections with a single layer of GWB for 2"x6", 2"x8", and 2"x10" ledgers are shown in **Figure 9**, **Figure 10** and **Figure 11**, respectively.

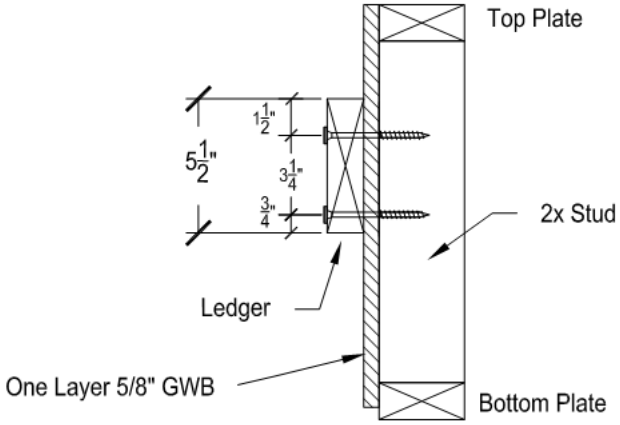

Figure 9. 2"x6" Ledger Attached to Stud Through One Layer of GWB

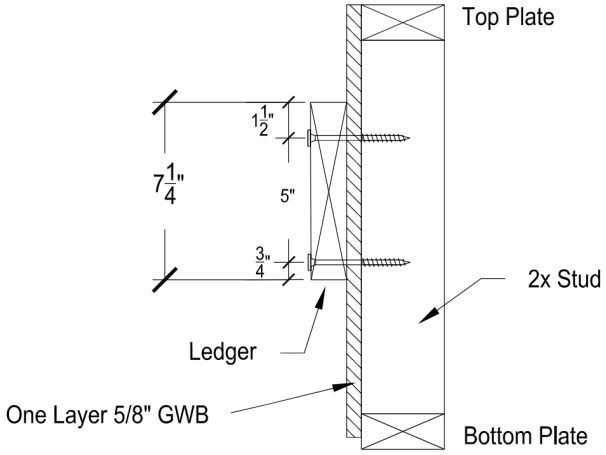

Figure 10. 2"x8" Ledger Attached to Stud Through One Layer of GWB

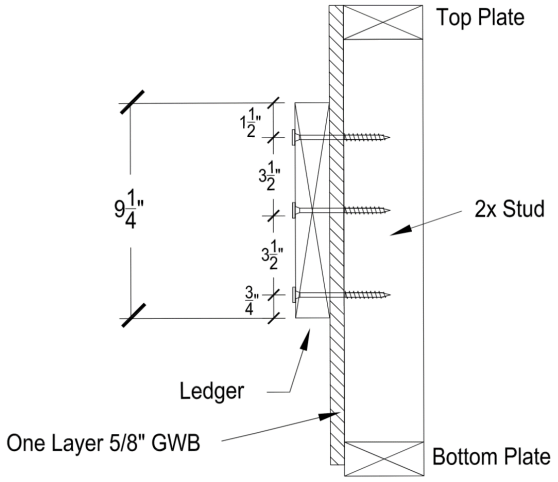

Figure 11. 2"x10" Ledger Attached to Stud Through One Layer of GWB

5.8.3 *With Two Layers GWB Interlayer:*

5.8.3.1 Installation details for ledger to stud connections with a double layer of GWB for 2"x6", 2"x8", and 2"x10" ledgers are shown in **Figure 12**, **Figure 13** and **Figure 14**, respectively.

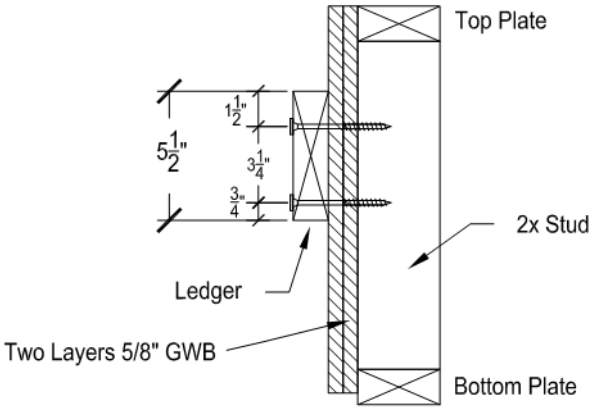

Figure 12. 2"x6" Ledger Attached to Stud Through Two Layers of GWB

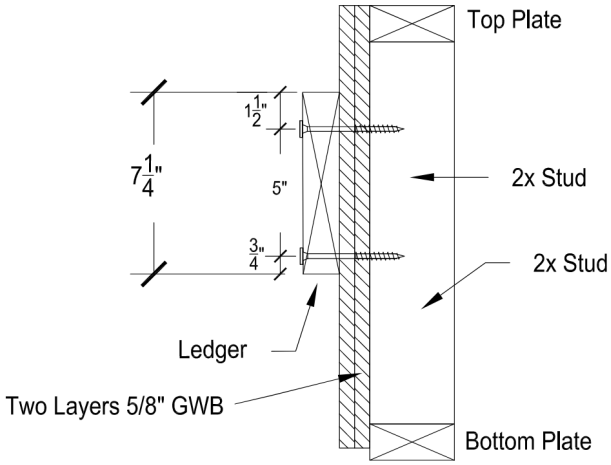

Figure 13. 2"x8" Ledger Attached to Stud Through Two Layers of GWB

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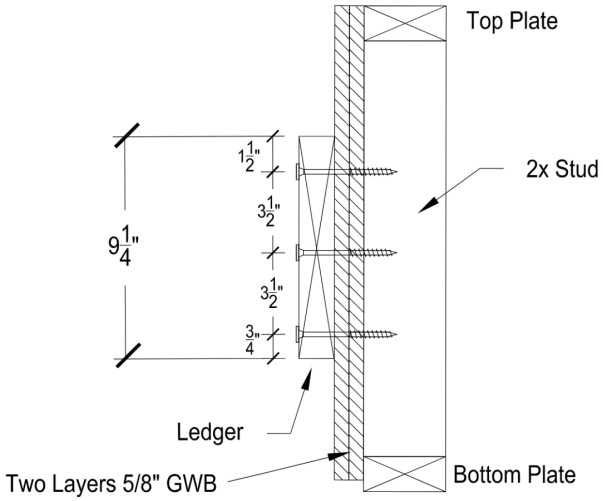

Figure 14. 2"x10" Ledger Attached to Stud Through Two Layers of GWB

5.9 Reference lateral design values for the deck ledger to stud connections detailed in **Figure 6** through **Figure 14** are provided in **Table 3**. The values in **Table 3** apply where the ledger is applied either directly over the studs or with up to two layers of 5/8" GWB between the ledger and studs.

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Table 3. Design Values for Ledger to Stud Attachment

Fastener	Minimum Fastener Length[6] (in)	Minimum Penetration into Main Member (in)	Layers of GWB[8]	Allowable Load per Stud Connection[3,4,5,7] (lb)		
				Ledger Size[1,2]		
				2x6	2x8	2x10
CTX 15	3 1/2	2	0	295	295	475
		1 3/8	1	320	320	475
	5	2 1/4	2	570	570	570
BL 17	4	2 1/2	0	370	370	370
		1 7/8	1	315	315	435
	5	2 1/4	2	370	370	435
GL 17	4	2 1/2	0	370	370	370
		1 7/8	1	315	315	435
	5	2 1/4	2	370	370	435
WTX 15	3 1/2	2	0	265	265	500
		1 3/8	1	380	380	575
	5	2 1/4	2	470	470	650

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

1. Two fasteners are required for 2x6 and 2x8 ledger connections. Three fasteners are required for 2x10 ledger connections. Additional fasteners prohibited.
2. SPF ledger with minimum specific gravity of 0.42.
3. The tabulated values apply where the ledger is installed either directly over the studs or with up to two layers of ⅝" gypsum between the ledger and studs.
4. Allowable loads shall be limited to parallel-to-grain loaded solid sawn main members (minimum 2" nominal). Wood side members shall be loaded perpendicular to grain.
5. Allowable loads are shown at the wood load duration factor of C_D = 1.00. Loads may be increased for load duration as permitted by the building code up to a C_D = 1.60. All adjustment factors shall be applied per NDS. For in-service moisture content greater than 19%, use Wet Service Factor (C_M) = 0.70.
6. Fasteners shall be centered in the stud and spaced as shown in **Figure 6** through **Figure 14**. The stud minimum end distance is 6¾" when loaded toward the end and 4" when loaded away from the end. The ledger end distance is 6" for full values. For ledger end distances under 6", the reference connection design values shall be adjusted in accordance with NDS Section 12.5.
7. For LRFD values, the reference connection design values shall be adjusted in accordance with NDS Section 11.3.
8. Gypsum wall board (GWB) must be attached as required per the building code.

5.10 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.

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

6.4 Big Timber screws shall be installed with the appropriate rotating powered driver. Do not overdrive.

6.5 Install Big Timber screws so that the threads fully engage the band joist material and the fastener tip extends beyond the back face of the band joist material when fully seated against the installed ledger.

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6.6 For deck ledger connections, stagger the Big Timber screws from the top to the bottom along the length of the ledger while maintaining the required edge and end distances.

6.6.1 **Figure 5** provides a deck ledger installation detail, including minimum required spacing, end and edge distances.

6.7 For applications outside the scope of this TER, an engineered design is required.

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 Deck ledger assembly testing in accordance with ASTM D1761

7.2 Properties for Big Timber CTX Construction Lag Screws from TER 1907-01

7.3 Properties for Big Timber BL and GL Screws from TER 1907-02

7.4 Properties for Big Timber WTX Wood Screws from TER 1911-04

7.5 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.

7.6 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.

7.7 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.

7.8 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.[17]

7.9 Where additional condition of use and/or code compliance information is required, please search for Big Timber CTX, BL, GL and WTX Screws on the DrJ Certification website.

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

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8 Findings

8.1 As delineated in **Section 3**, Big Timber CTX, BL, GL and WTX 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, Big Timber CTX, BL, GL and WTX Screws shall be approved for the following applications:

8.2.1 Big Timber screws provide an equivalent connection as that required by the IBC Section 1604.8.3 and IRC Section R507.9.[18]

8.3 Unless exempt by state statute, when Big Timber CTX, BL, GL and WTX 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[19] 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**:[20] Building codes require that the building official shall accept duly authenticated reports[21] or research reports[22] 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.

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*."[23]

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[18] 2015 IRC Section R507.2

[19] 2018 IFC Section 104.9

[20] 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.

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

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

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

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

9.4 Design properties shall not exceed those described in **Section 5**.

9.5 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:

9.5.1 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.

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

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

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

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

9.5.6 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.

9.5.7 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.

9.6 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.

9.7 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).

9.8 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.

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10 Identification

10.1 The innovative products listed in **Section 1.1** through **Section 1.4** 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 Big Timber CTX, BL, GL and WTX 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 Big Timber CTX, BL, GL and WTX 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),[24] where providing test reports, engineering analysis and/or other related IP/TS is subject to prison of not more than 10 years[25] and/or a $5,000,000 fine or 3 times the value of[26] 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[27] 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.[28]

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.[29]

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

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

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

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

[28] IBC 2021, Section 1706.1 Conformance to Standards

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

1.3 **Approved**[30] **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.[31] 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.[32]

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[33] 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[34] (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).

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

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

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

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

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

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,[35] 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)".[36] 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[37] and Part 3280,[38] 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.[39]

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.[40] A building official approved agency is deemed to be approved via certification from an accreditation body that is listed by the International Accreditation Forum[41] or equivalent.

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

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

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

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

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

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

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

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.[42] 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.

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