



CERTIFICATION



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Technical Evaluation Report

TER 2204-01

**5/16" GripRite Structural Screw for Use
in Deck Ledger Applications**

**PrimeSource Building Products,
Inc.**

Product:

5/16" GripRite Structural Screws

Issue Date:

July 20, 2022

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July 20, 2022

Subject to Renewal:

October 1, 2023



COMPANY
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DIVISION: 06 00 00 - WOOD, PLASTICS AND COMPOSITES

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

SECTION: 06 11 00 - Wood Framing

SECTION: 06 15 00 - Wood Decking

1 PRODUCTS EVALUATED¹

- 1.1 5/16" GripRite Structural Screws

2 APPLICABLE CODES AND STANDARDS^{2,3}

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 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 F1575: Standard Test Method for Determining Bending Yield Moment of Nails*
- 2.2.8 *ASTM G85: Standard Practice for Modified Salt Spray (Fog) Testing*

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

² 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.

³ All terms defined in the applicable building codes are italicized.

3 PERFORMANCE EVALUATION

- 3.1 The 5/16" GripRite Structural Screws were evaluated to determine:
- 3.1.1 Use for attachment of deck ledgers to the building structure. This application includes attachments to Spruce-Pine-Fir (SPF) band joists⁴ and oriented strand board (OSB) band joists.
 - 3.1.2 Lateral strength of ledger connections to wood-framed walls. This application includes zero, one, or two layers of 5/8" gypsum wallboard (GWB) between the ledger and the wall studs.
- 3.2 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 R507.9⁵ as applicable.
- 3.2.1 Where a band joist is not used, as in some truss installations, an engineered design is required.
- 3.3 Corrosion resistance was evaluated in accordance with *ASTM B117* and *ASTM G85*.
- 3.4 Use of fasteners in locations exposed to saltwater or saltwater spray is outside the scope of this TER.
- 3.5 Any code compliance issues not specifically addressed in this section are outside the scope of this TER.
- 3.6 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 The products evaluated in this TER is shown in Figure 1.

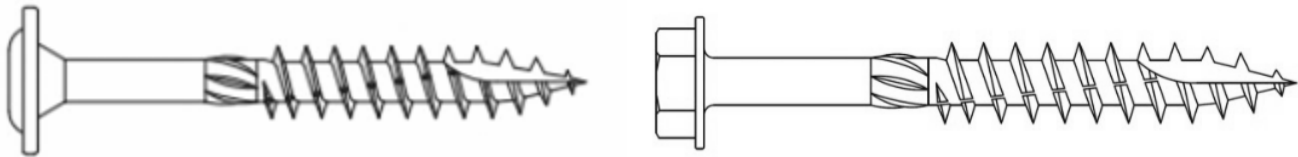


FIGURE 1. GRIPRITE STRUCTURAL SCREW WITH FLAT HEAD (LEFT) AND HEX HEAD (RIGHT)

- 4.2 GripRite Structural Screws are partially-threaded, self-drilling screws with flat heads with a star shaped driving recess or hex-washer heads. The screws have a Type 17 point. The screws have a reamer knurl between the screw thread and the smooth portion of the shank.
- 4.3 GripRite Structural Screws are formed from carbon steel wire, hardened after forming and then coated with a proprietary coating.
- 4.3.1 The coating consists of a layer of zinc and a proprietary black outer coating.
- 4.4 *Treated Wood Applications*
- 4.4.1 GripRite Structural Screws may be used in preservative-treated and fire-resistant-treated lumber as alternatives to hot-dip galvanized fasteners prescribed in IBC Section 2304.10.6⁶. GripRite Structural Screws have been evaluated for use in wood treated with ACQ-D preservatives with a maximum retention of 0.40 pcf.
 - 4.4.2 Corrosion resistance applications are limited to the following:
 - 4.4.2.1 Where equilibrium moisture content of the chemically treated wood meets the dry service conditions as described in *NDS*.
 - 4.4.2.2 Exposure is freshwater and chemically treated wood (no saltwater exposure).
 - 4.4.3 Fastener design values for preservative-treated and fire-resistant-treated lumber must be reduced as stated by the manufacturer of the lumber treatment.

⁴ 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.

⁵ 2015 IRC Section R507.2

⁶ 2018 IBC Section 2304.10.5

4.5 Wood Material

4.5.1 Wood main and side members must be solid-sawn lumber or boards having an assigned specific gravity as given in the respective tables of this TER.

4.6 The GripRite Structural Screws evaluated in this TER are set forth in Table 1.

TABLE 1. FASTENER SPECIFICATIONS – GRIPRITE STRUCTURAL SCREW

Fastener Designation	Head			Length (in)		Diameter (in)			Bending Yield Strength ³ , f_{yb} , (psi)	Allowable Steel Strength (lbs)	
	Style	Drive System	Diameter (in)	Fastener ¹	Thread ²	Shank	Minor	Major		Tensile	Shear
5/16" x 4"	Hex Washer	T-25	0.571	4	2	0.202	0.179	0.281	230,000	1,970	1,070
5/16" x 5"				5	2 ¼						
5/16" x 4"	Flat	T-30	0.610	4	2	0.202	0.179	0.281	230,000	1,970	1,070
5/16" x 5"				5	2 ¼						

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

- Fastener length is measured from the underside of the head to the tip.
- Thread length includes tapered tip.
- Bending yield strength, F_{yb} , is determined in accordance with *ASTM F1575* using minor thread diameter.

5 APPLICATIONS

- 5.1 GripRite 5/16" Structural 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 R507.9⁷*. See Section 6 for installation requirements.
- 5.2 GripRite 5/16" Structural Screws can be used for attaching ledger boards to wall studs with zero, one, or two layers of gypsum wall board (GWB) between the ledger and the wall studs.
- 5.3 Where the application exceeds the limitations set forth herein, design shall be permitted in accordance with accepted engineering procedures, experience, and technical judgment.
- 5.4 General
 - 5.4.1 GripRite 5/16" Structural Screws are installed without lead holes, as prescribed in *NDS*.
 - 5.4.2 GripRite 5/16" Structural Screws are governed by the applicable code and the provisions for dowel-type fasteners in *NDS*.
 - 5.4.3 GripRite 5/16" Structural Screws may be used where screws are required to exhibit corrosion resistance when exposed to adverse environmental conditions and/or in chemically treated wood.
 - 5.4.4 GripRite 5/16" Structural Screws are subject to the limitations of this report and are approved as alternatives to hot-dipped galvanized screws with a coating weight in compliance with *ASTM A153*, Class D.
 - 5.4.5 Unless otherwise noted, adjustment of the design stresses for duration of load shall be in accordance with the applicable code.

⁷ 2015 *IRC Section R507.2*

5.5 Reference Design Values for Deck Ledger to Band Joist Attachment

5.5.1 GripRite 5/16" Structural 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 R507.9⁹. This connection is shown in Figure 2 and Figure 3.

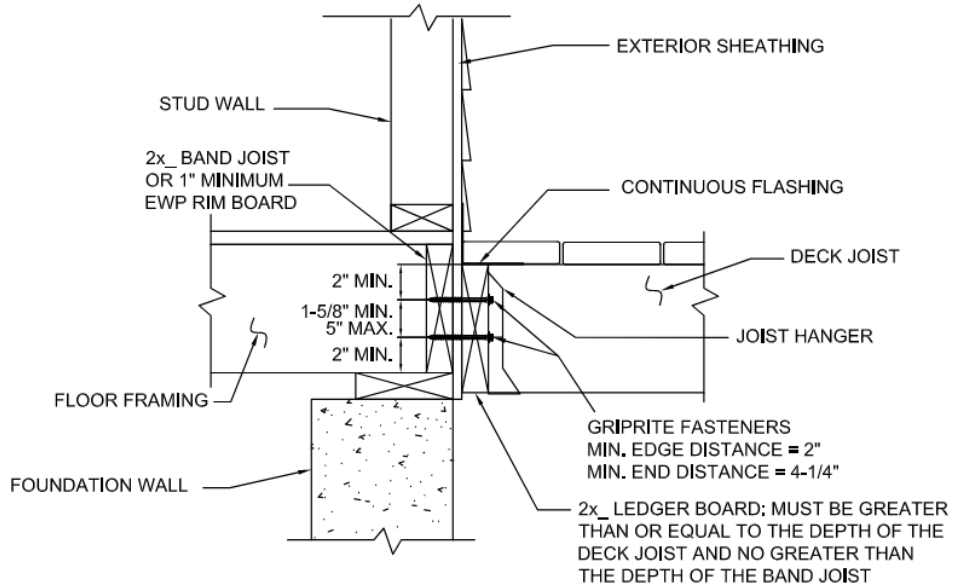


FIGURE 2. GRIPRITE DECK LEDGER CONNECTION TO BAND JOIST

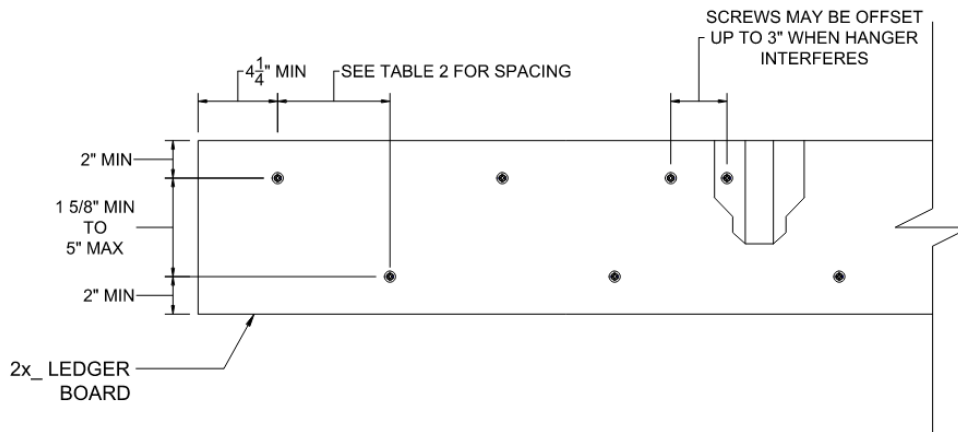


FIGURE 3: GRIPRITE DECK LEDGER CONNECTION TO BAND JOIST: SCREW SPACING

- 5.5.2 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).⁸
- 5.5.2.1 Table 2 provides the GripRite Structural Screw spacing required to provide performance at least equivalent to the lag screws found in *IRC* Table R507.9.1.3(1)⁸ in accordance with *IBC* Section 104.11 and Section 1604.8.3 and *IRC* Section R104.11 and Section R507.9⁹ in accordance with generally accepted engineering practice.
- 5.5.2.1.1 Table 2 provides screw spacing for materials found in *IRC* Section R507.9¹¹, as well as a wider range of materials commonly used for rim joists. Screw spacing values are provided for four loading conditions.
- 5.5.2.2 When installed in accordance with the spacing requirements of Table 2, the listed GripRite 5/16" Structural Screws provide equivalent performance to *IRC* Table R507.9.1.3(1).⁸

⁸ 2015 *IRC* Table R507.2

⁹ 2015 *IRC* Section R507.2

TABLE 2. GRIPRITE 5/16" X 4" STRUCTURAL SCREW SPACING FOR ITEMS IN IRC TABLE R507.9.1.3(1)¹⁰ AND OTHER MATERIALS AND LOADING CONDITIONS¹

Fastener Designation ^{2,3} (in)	Load Case ⁹	2x Nominal Ledger Species ^{4,5,6}	Band Joist Material ^{7,8}	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'
5/16" x 4" Structural	LL + DL 40 + 10	HF	2x Sawn Lumber	18	11	9	7	6	5	5
			1 1/8" OSB	27	20	16	10	9	7	7
		SP	2x Sawn Lumber	20	13	11	9	7	6	6
			1 1/8" OSB	18	14	11	9	8	7	6
	SL + DL 50 + 10	HF	2x Sawn Lumber	13	9	7	6	5	4	4
			1 1/8" OSB	22	16	10	8	7	6	5
		SP	2x Sawn Lumber	17	11	9	7	6	5	5
			1 1/8" OSB	16	12	9	8	6	6	5
	SL + DL 60 + 10	HF	2x Sawn Lumber	11	8	6	5	4	4	3
			1 1/8" OSB	19	11	9	7	6	5	5
		SP	2x Sawn Lumber	13	9	7	6	5	4	4
			1 1/8" OSB	13	10	8	6	5	5	4
	SL + DL 70 + 10	HF	2x Sawn Lumber	9	7	5	4	4	3	3
			1 1/8" OSB	16	9	7	6	5	4	4
		SP	2x Sawn Lumber	11	8	6	5	4	4	3
			1 1/8" OSB	12	9	7	6	5	4	4

SI: 1 in = 25.4 mm, 1 psf = 0.0479 kN/m²

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. Fasteners shall be installed per Section 5 of this TER.
4. Solid-sawn ledgers shall be HF or SP species (specific gravity of 0.43 and 0.55, respectively) and designed by others.
5. Minimum ledger board requirements: 1 1/2" thickness and 7/4" depth.
6. Ledger materials tested in the wet service condition.
7. 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.
8. Minimum band joist requirements: SPF (specific gravity of 0.42) solid-sawn lumber 1 1/2" thick and 7/4" depth; OSB 1" thick and 7/2" depth.
9. Snow load shall not be assumed to act concurrently with live load.

¹⁰ 2015 *IRC Table R507.2*

5.6 Reference Lateral Design Values for Deck Ledger to Stud Attachment

5.6.1 Without GWB Interlayer:

5.6.1.1 Installation details for ledger to stud connections without GWB for 2"x6", 2"x8", and 2"x10" ledgers are shown in Figure 4, Figure 5, and Figure 6, respectively.

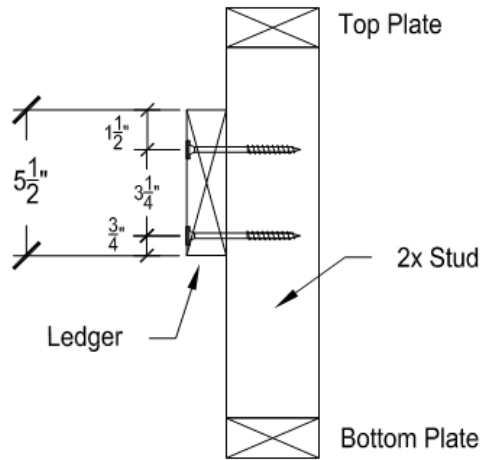


FIGURE 4. 2"x6" LEDGER DIRECTLY ATTACHED TO STUD

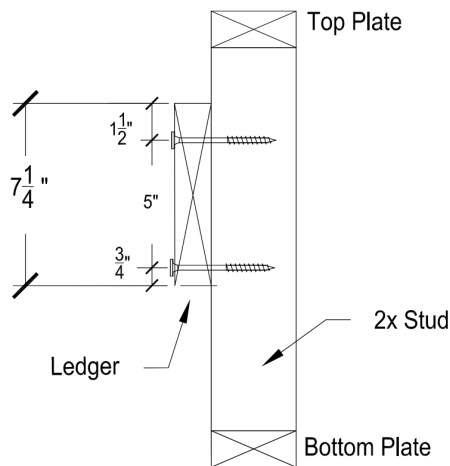


FIGURE 5. 2"x8" LEDGER DIRECTLY ATTACHED TO STUD

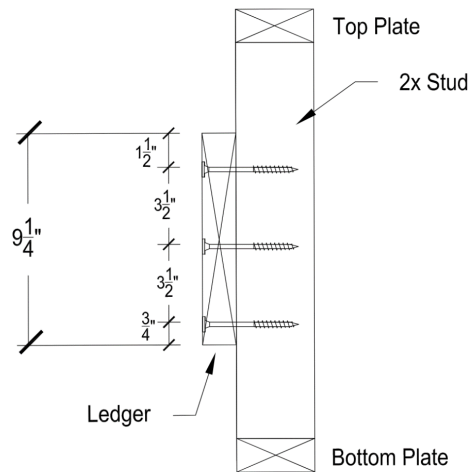


FIGURE 6. 2"x10" LEDGER DIRECTLY ATTACHED TO STUD

5.6.2 With One Layer of GWB Interlayer:

5.6.2.1 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 7, Figure 8, and Figure 9, respectively.

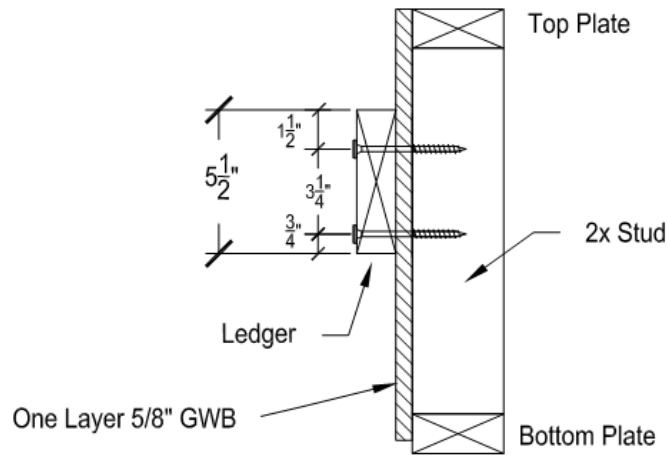


FIGURE 7. 2"x6" LEDGER ATTACHED TO STUD THROUGH ONE LAYER OF GWB

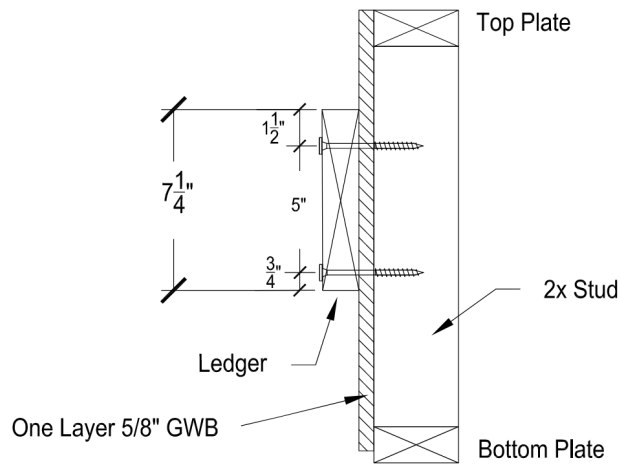


FIGURE 8. 2"x8" LEDGER ATTACHED TO STUD THROUGH ONE LAYER OF GWB

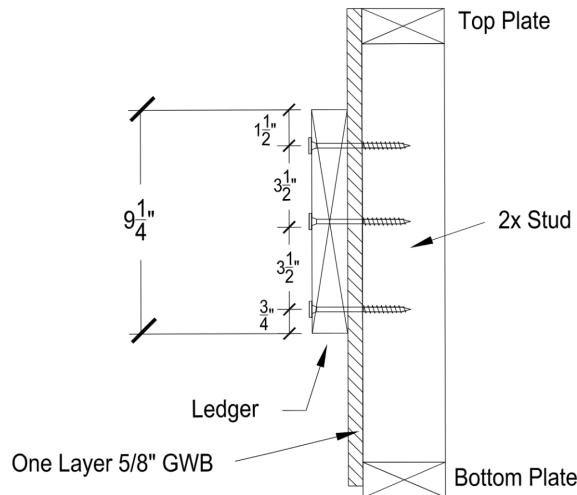


FIGURE 9. 2"x10" LEDGER ATTACHED TO STUD THROUGH ONE LAYER OF GWB

5.6.3 With Two Layers GWB Interlayer:

5.6.3.1 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 10, Figure 11, and Figure 12, respectively.

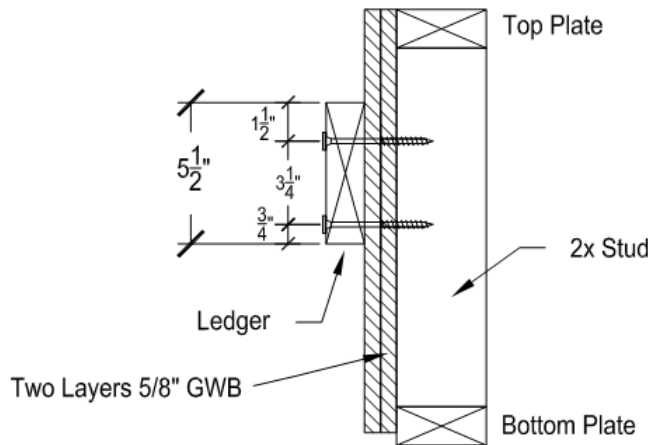


FIGURE 10. 2"x6" LEDGER ATTACHED TO STUD THROUGH TWO LAYERS OF GWB

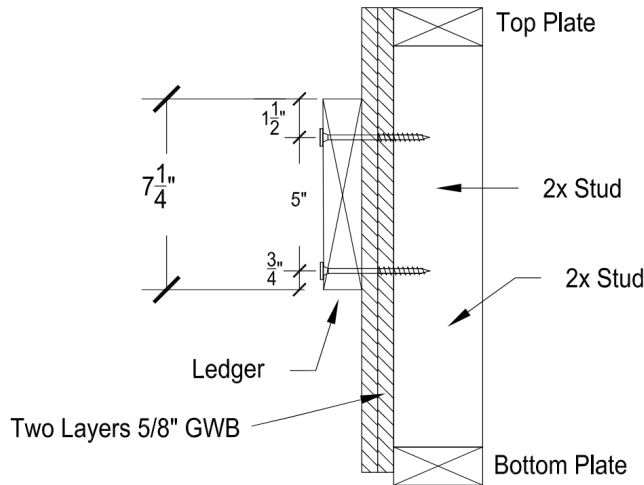


FIGURE 11. 2"x8" LEDGER ATTACHED TO STUD THROUGH TWO LAYERS OF GWB

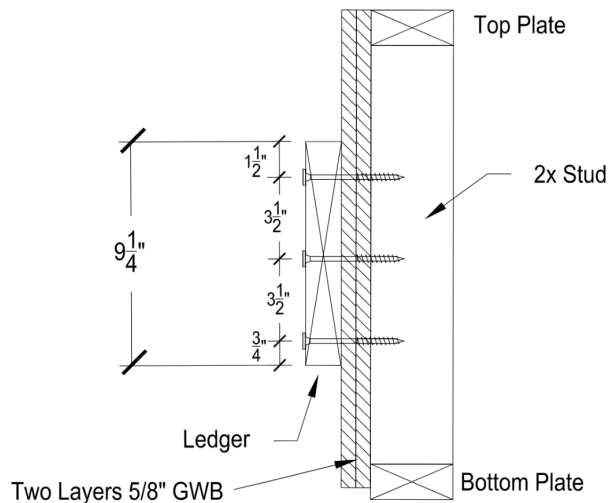


FIGURE 12. 2"x10" LEDGER ATTACHED TO STUD THROUGH TWO LAYERS OF GWB

5.6.4 Reference lateral design values for the deck ledger to stud connections detailed in Figure 4 through Figure 12 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.

TABLE 3. DESIGN VALUES FOR LEDGER TO STUD ATTACHMENT

Fastener	Minimum Thread Penetration into Main Member (in)	Layers of GWB ⁸	Allowable Load per Stud Connection ^{3,4,5,6,7} (lb)		
			Ledger Size ^{1,2}		
			2x6	2x8	2x10
5/16" x 4"	2½	0	655	655	1050
	17/8	1	570	570	815
5/16" x 5"	2¼	2	500	500	700

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

1. Two fasteners are required for 2x6 ledger connections. Three fasteners are required for 2"x10" 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 5/8" 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. For LRFD values, the reference connection design values shall be adjusted in accordance with NDS Section 11.3.
7. Fasteners shall be centered in the stud and spaced as shown in Figure 4 through Figure 12. 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.
8. Gypsum wall board (GWB) must be attached as required per the building code.

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 Lead holes are not required.
- 6.3 Screws shall be installed with a low-speed (450 rpm) drill and manufacturer's supplied bits.
- 6.4 Screws shall not be struck with a hammer during installation.
- 6.5 Install 5/16" GripRite Structural Screws such 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. Do not overdrive fasteners.
- 6.6 For deck ledger connections, stagger the 5/16" GripRite Structural Screws from the top to the bottom of the ledger along its length while maintaining the required edge and end distances.
 - 6.6.1 Figure 2 and Figure 3 provide a deck ledger installation detail, including minimum required spacing, end, and edge distances.
- 6.7 For ledger to stud connections, fasteners shall be centered in the stud and spaced as shown in Figure 4 through Figure 12.
 - 6.7.1 The stud minimum end distance is 6¾" when loaded toward the end and 4" when loaded away from the end.
 - 6.7.2 The fasteners shall be installed with a minimum 4¼" end distance on the ledger.

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 Ledger assembly testing in accordance with *ASTM D1761*
 - 7.1.2 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 products 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 products listed in Section 1.1 is approved for the following:
- 8.1.1 To provide a connection equivalent to the connection required by the IBC Section 1604.8.3 and IRC Section R507.9.¹¹
 - 8.1.2 To connect ledger boards to studs through zero, one, or two layers of gypsum.
- 8.2 Building codes require data from valid research reports be obtained from approved sources (i.e., licensed registered design professionals [RDPs]).
- 8.2.1 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.
- 8.3 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.
- 8.4 Through ANAB accreditation and the IAF MLA, DrJ certification can be used to obtain products approval in any jurisdiction or country that has IAF MLA Members & Signatories to meet the Purpose of the MLA – “certified once, accepted everywhere.”
- 8.5 IBC Section 104.11 (IRC Section R104.11 and IFC Section 104.10¹² 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*.

¹¹ 2015 IRC Section R507.2

¹² 2018 IFC Section 104.9

9 CONDITIONS OF USE

- 9.1 5/16" GripRite Structural Screws covered by this TER shall be installed in accordance with this report and the manufacturer's installation instructions.
- 9.2 5/16" GripRite Structural Screws spacing in ledger to band joist applications shall not exceed those listed in Table 2.
- 9.3 5/16" GripRite Structural Screws loading in ledger to stud applications shall not exceed those listed in Table 3.
- 9.4 Use of fasteners in locations exposed to saltwater or saltwater spray is outside the scope of this evaluation report.
- 9.5 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.
- 9.6 Any generally accepted engineering calculations needed to show compliance with this TER shall be submitted to the AHJ for review and approval.
- 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 (e.g., owner or RDP).
- 9.8 At a minimum, this products shall be installed per Section 6 of this TER.
- 9.9 This products 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.
- 9.10 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.
- 9.11 This TER shall be reviewed for code compliance by the AHJ in concert with IBC Section 104.
- 9.12 The implementation of this TER for this products 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.

10 IDENTIFICATION

- 10.1 The products listed in Section 1.1 is 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 primesourcecbp.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 current status of this TER, contact DrJ Certification.