

ICC-ES Evaluation Report

ESR-5300

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This report also contains:


- CBC Supplement

Subject to renewal September 2025

- FBC Supplement

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<p>DIVISION: 06 00 00— WOOD, PLASTICS AND COMPOSITES</p> <p>Section: 06 05 23— Wood, Plastic, and Composite Fastenings</p>	<p>REPORT HOLDER: THE HILLMAN™ GROUP</p>	<p>EVALUATION SUBJECT: HILLMAN™ CARBON STEEL AND STAINLESS STEEL STRUCTURAL SCREWS</p>	
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1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2021, 2018, 2015 and 2012 [International Building Code® \(IBC\)](#)
- 2021, 2018, 2015 and 2012 [International Residential Code® \(IRC\)](#)

Properties evaluated:

- Structural
- Corrosion resistance

2.0 USES

The Hillman™ Carbon Steel and Stainless Steel Structural Screws are used for wood-to-wood connections that are designed in accordance with the IBC. For structures regulated under the IRC, the screws may be used where an engineered design is submitted in accordance with IRC Section R301.1.3. Hillman™ Carbon Steel and Stainless Steel Structural Screws are sold under the following product (brand) names: Everbilt, Binder and PaulinPro. The screws are intended for use in the Exposure Conditions shown in [Table 7](#).

3.0 DESCRIPTION

3.1 Notation and Symbols:

- D = Outside thread diameter
- D_H = Diameter of fastener head or integral washer
- D_{nom} = Fastener size designation
- D_r = Minor thread (root) diameter
- D_s = Unthreaded shank diameter
- $F_{yb,spec}$ = Minimum specified bending yield strength
- L = Fastener length
- $L_{emb,l}$ = Minimum required embedded thread length in holding member, including tip, applicable to tabulated lateral design values
- $L_{emb,w}$ = Minimum required embedded thread length in holding member, including tip, applicable to tabulated withdrawal design values

L_{thread}	=	Length of thread including the tip
N_a	=	Allowable tension strength of the fastener for use in ASD
N_u	=	Design tension strength of the fastener, for use in LRFD
SG_{NDS}	=	Assigned specific gravity (See Section 3.2.)
$t_{s,w}$	=	Thickness of wood side member
W	=	Reference unit withdrawal design value for fasteners installed perpendicular to face of the wood
W_H	=	Reference head pull-through design value
Z	=	Reference lateral design value
$Z_{ }$	=	Reference lateral design value for fasteners loaded parallel to the wood grain
Z_{\perp}	=	Reference lateral design value for fasteners loaded perpendicular to the wood grain

3.2 Hillman™ Carbon Steel and Stainless Steel Structural Wood Screws:

The Hillman™ Carbon Steel and Stainless Steel Structural Wood Screws are proprietary screws (differing from the requirements of ANSI/ASME B18.2.1). The screws are partially-threaded, dowel-type fasteners designed to be installed in wood without drilling a lead hole. The screws have a reamer knurl between the smooth shank of the screw and the screw threads and a Type 17 point.

3.2.1 Hillman™ Carbon Steel Screws:

The Carbon Steel screws are manufactured from carbon steel and are case hardened. The screws are coated with a zinc layer and an organic topcoat, except for the Large Hex Washer Head Screws, which are hot dip galvanized in accordance with ASTM A153 Class C. See [Table 1](#) for screw dimensions and [Figure 1](#) for depictions of the screws.

3.2.1.1 Structural Lag Screws: The Hillman™ Structural Lag Screws have a truss head™ with a star drive recess. The coating on these screws is gold-bronze in color.

3.2.1.2 Lumber (LumberBinder™) Screws: The Hillman™ Lumber (LumberBinder™) screws have a flat head with a star drive recess. The coating on these screws is black in color.

3.2.1.3 Large Hex Washer Head Screws: The Hillman™ Large Hex Washer Head Screws have a hex head with a large integral washer.

3.2.1.4 Timber (TimberBinder™), Ledger (LedgerBinder™) and Truss (TrussBinder™) Screws: The Hillman™ Timber (TimberBinder™), Ledger (LedgerBinder™) and Truss (TrussBinder™) screws have a hex washer head. The coating on the Timber (TimberBinder™) screws is black in color. The coating on the Ledger (LedgerBinder™) screws is gray in color. The coating on the Truss (TrussBinder™) Screws is red in color.

3.2.1.5 Wafer Head Screws: The Hillman™ Wafer Head Screws have a conical shaped head with a star drive recess. The coating on these screws is gold-bronze in color.

3.2.1.6 Flat Head Screws: The Hillman™ Flat Head Screws have a conical shaped head with a large flat flange and a star drive recess. The coating on these screws is gold-bronze in color.

3.2.2 Hillman™ Stainless Steel Screws:

The Hillman™ Stainless Steel Screws are manufactured from Type 316 stainless steel. See [Table 5](#) for screw dimensions and [Figure 1](#) for depictions of the screws.

3.2.2.1 Structural Lag Screws: The Structural Lag Screws have a truss head with a star drive recess.

3.2.2.2 Lumber (LumberBinder™) Screws: The Lumber (LumberBinder™) screws have a flat head with a star drive recess.

3.2.2.3 TImber (TimberBinder™) and Ledger (LedgerBinder™) Screws: The Timber (TimberBinder™) and Ledger (LedgerBinder™) screws have a hex washer head.

3.2.2.4 Wafer Head Screws: The Wafer Head Screws have a conical shaped head with a star drive recess.

3.3 Wood Members:

Wood members may be sawn lumber or structural glued laminated timber (glulam). Screws may also be used in the face of cross-laminated timber (CLT) panels. Use of the screws in engineered wood products (EWP) other than those addressed above is outside the scope of this report.

For purposes of connection design, sawn lumber, glulam and CLT members must have SG_{NDS} as indicated in the tables in this report, and the moisture content must be less than or equal to 19 percent at the time of screw installation and while in service. SG_{NDS} for sawn lumber is the assigned specific gravity for the applicable grade mark, which must be determined in accordance with Table 12.3.3A of the ANSI/AWC National Design

Specification for Wood Construction[®] (NDS) (Table 11.3.3A of the NDS for the 2012 IBC) or the latest NDS Supplement. SG_{NDS} for glulam members is the Specific Gravity for Fastener Design addressed in Tables 5A through 5D of the NDS Supplement. When designing connections with screws installed into CLT panels, all of the laminations must have a minimum SG_{NDS} as indicated in the tables in this report.

For wood-to-wood connections, the tabulated side member thickness is an absolute value (not a minimum or maximum value). The thickness of the wood main member must be sufficient to ensure that the tip of the screw is fully embedded in the wood.

4.0 DESIGN AND INSTALLATION

4.1 Design:

The design values in this report are intended to aid the designer in meeting the requirements of IBC Section 1604.2. For connections not completely described in this report, determination of the suitability of the Hillman™ screws for the specific application is the responsibility of the designer and is outside the scope of this report. The designer is responsible for determining the available strengths for the connection, considering all applicable limit states, and for considering serviceability issues. The designer is responsible for determining the required spacing, edge distance and end distance for the screws, based on [Table 9](#) of this report and the material being connected.

4.1.1 Screw Strength: Allowable screw tension strengths (ASD), design screw tension strengths (LRFD) and minimum specified bending yield strengths for the screws are shown in [Table 1](#) for Carbon Steel screws and [Table 5](#) for Stainless Steel screws.

4.1.2 Reference Withdrawal Design Values: Reference withdrawal (W) design values in pounds per inch of thread penetration, for screws installed perpendicular to the face of the wood member are shown in [Table 2](#) for Carbon Steel Screws and [Table 6](#) for Stainless Steel screws.

4.1.3 Reference Pull-through Design Values: Reference head pull-through values (W_H) are shown in [Table 3](#) for Carbon Steel screws and [Table 7](#) for Stainless Steel screws.

4.1.4 Lateral Connections in Accordance with the NDS: For Hillman™ screw types included in [Table 4](#) or [Table 8](#), the reference lateral design strength for other connections of two or more wood members may be designed in accordance with the NDS, subject to the following conditions:

1. The applicable $F_{yb,spec}$ from [Table 1](#) for Carbon Steel screws and [Table 5](#) for Stainless steel screws must be used for design, as applicable.
2. D_r must be used where 'D' is referenced in Tables 12.3.1A, 12.3.1B and 12.3.3 of the NDS (Tables 11.3.1A, 11.3.1B and 11.3.3 of the 2012 NDS for the 2012 IBC). For partially-threaded screws, when determining if Footnote 1 to Table 12.3.1 applies, D_s must be considered the nominal diameter.
3. Wood species combinations must have $SG_{NDS} \leq 0.50$.
4. $t_{s,w}$ must be a minimum of $\frac{3}{4}$ inch (19.1 mm).
5. Screw penetration into the main member must be a minimum of $6D$.
6. Dowel bearing length shall be determined in accordance with Section 12.3.5.3 of the NDS (Section 11.3.5.2 of the 2012 NDS for the 2012 IBC), using $2*D$ as the tapered tip length, E .
7. Spacing, edge and end distance must be in accordance with [Table 9](#), and as needed to prevent splitting of the wood.

4.1.5 Reference Lateral Design Values Based on Testing: Reference lateral design values based on testing are shown in [Table 4](#) for Carbon Steel screws and [Table 8](#) for Stainless Steel screws.

4.1.6 Adjustments to Reference Design Values: Reference design values must be adjusted in accordance with the NDS provisions for dowel-type fasteners to determine the allowable strengths for use in ASD and the design strengths for use in LRFD.

4.1.7 Connections with Multiple Screws: Connections made with multiple screws must be designed in accordance with Sections 11.1.2, 11.2.2 and 12.6 of the NDS (Sections 10.1.2, 10.2.2 and 11.6 of the NDS for the 2012 IBC).

4.1.8 Combined Loading: Where the screws are subjected to combined lateral and withdrawal loads, connections shall be designed in accordance with Section 12.4.1 of the NDS (Section 11.4.1 of the NDS for the 2012 IBC).

4.1.9 Capacity Requirements for Wood Members: When designing a connection, the structural members must be checked for load-carrying capacity in accordance with Section 11.1.2 of the NDS (Section 10.1.2 of the NDS for the 2012 IBC), and local stresses within multiple-fastener connections must be checked against Appendix E of the NDS to ensure the capacity of the connection and fastener group.

4.2 Corrosion Resistance:

The Hillman™ Carbon Steel screws with the proprietary coating may be used in wood treated with ACQ-D preservatives with a retention of 0.40 pcf (6.4 kg/m³), or wood treated with preservatives with lesser corrosion effects, as alternates to hot-dip galvanized fasteners prescribed in IBC Section 2304.10.6 (2018 and 2015 IBC Section 2304.10.5; 2012 IBC Section 2304.9.5), when subject to the Exposure Conditions (1 through 4) shown in [Table 10](#).

The hot-dip galvanized Hillman™ Carbon Steel screws and Hillman™ Stainless Steel screws may be used in accordance with the code, without limitation.

4.3 Installation:

Hillman™ screws must be installed in accordance with the report holder's published installation instructions and this report. The screws must be installed perpendicular to the face of the wood member. 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 9](#), whichever is more restrictive. The underside of the flat portion of the screw head must bear against the surface of the wood side member or steel plate. Screws must not be overdriven. Installation must be performed without predrilling. The screws must be installed by turning with a power driver, not by driving with a hammer.

5.0 CONDITIONS OF USE:

The Hillman™ screws 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 The screws must be installed in accordance with the report holder's published installation instructions and this report. In the case of a conflict between this report and the report holder's instructions, this report governs.
- 5.2 Design loads for the screws must not exceed the available strengths described in Section 4.1.
- 5.3 Calculations and details demonstrating compliance with this report must be submitted to the code official. The calculations and details must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.
- 5.4 Connection design for lateral loading applications using inclined fasteners is outside the scope of this report.
- 5.5 The screws have only been evaluated for use in dry service applications. Use in wet service conditions is outside the scope of this report.
- 5.6 The 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 Dowel-type Threaded Fasteners Used in Wood \(AC233\)](#), dated June 2023.
- 6.2 Data in accordance with the [ICC-ES Acceptance Criteria for Corrosion-resistant Fasteners and Evaluation of Corrosion Effects of Wood Treatments \(AC257\)](#), dated October 2009 (editorially revised October 2022).

7.0 IDENTIFICATION

- 7.1 The ICC-ES mark of conformity, electronic labeling, or the evaluation report number (ICC-ES ESR-5300) along with the name, registered trademark, or registered logo of the report holder must be included in the product label.
- 7.2 In addition, the packaging for the screws is labeled with the applicable brand name from Section 2.0, the screw type [such as Lumber (LumberBinder™)], the screw size and length, and the coating designation or material designation (zinc with organic topcoat, HDG, or stainless steel). Each screw head is marked with the applicable brand name from Section 2.0, such as "Everbilt" [except for Timber (TimberBinder™) and Truss (TrussBinder™) screws] and a mark designating the screw length, as shown in [Figure 1](#).
- 7.3 The report holder's contact information is the following:

THE HILLMAN GROUP
1280 KEMPER MEADOW DRIVE
FOREST PARK, OHIO 45240
(800) 800-4900
www.hillmangroup.com

TABLE 1—HILLMAN™ CARBON STEEL SCREW DIMENSIONS AND STEEL STRENGTHS

D_{nom} (inch)	L (inches)	L_{thread}^1 (inches)	D_H^3 (inch), (DRIVE SIZE / HEX SIZE)	D_s (inch)	D_r (inch)	D (inch)	$F_{yb,spec}$ (psi)	N_a (lbf)	N_u (lbf)
Structural Lag Screws²									
$3/16$	3	2.00	0.475 (T25)	0.149	0.133	0.214	180,000	680	1125
$1/4$	$1\frac{1}{2}$	Full	0.540 (T25)	0.174	0.155	0.239	180,000	780	1170
	2	1.30							
	$2\frac{1}{2}$	1.58							
	3	1.80							
	$3\frac{1}{2}$	1.96							
	4	2.38							
	5	2.38							
$5/16$	$2\frac{1}{2}$	1.50	0.630 (T30)	0.204	0.181	0.284	180,000	970	1460
	3	2.10							
	$3\frac{1}{2}$	2.20							
	4	2.60							
	5	3.50							
	6	4.00							
	8	5.50							
$3/8$	4	2.80	0.700 (T40)	0.221	0.191	0.317	180,000	1450	2175
	5	3.40							
	6	4.20							
	$7\frac{1}{4}$	5.00							
	8	5.20							
	10	7.20							
	12	9.20							
Lumber (LumberBinder™) Screws²									
$1/4$	$2\frac{7}{8}$	2.00	0.610 (T25)	0.174	0.155	0.239	180,000	780	1170
	$4\frac{1}{2}$								
	6								
	7								
	8								
	9								
	10								
12	3.00								

TABLE 1—HILLMAN™ CARBON STEEL SCREW DIMENSIONS AND STEEL STRENGTHS (cont.)

D_{nom} (inch)	L (inches)	L_{thread}^1 (inches)	D_H^3 (inch), (DRIVE SIZE / HEX SIZE)	D_s (inch)	D_r (inch)	D (inch)	$F_{yb,spec}$ (psi)	N_a (lbf)	N_u (lbf)
Large Hex Washer Head Screws²									
$\frac{3}{8}$	4	3.00	0.935 (0.35" across flats)	0.294	0.251	0.407	150,000	2330	3500
	6								
	8								
	10								
	12								
Timber (TimberBinder™) Screws²									
$\frac{1}{4}$	2½	1.25	0.460 (0.31" across flats)	0.174	0.155	0.239	180,000	780	1170
	4								
	6								
	8								
	10								
	12								
	14								
Ledger (LedgerBinder™) Screws²									
$\frac{5}{16}$	3⅝	2.00	0.610 (0.31" across flats)	0.204	0.181	0.284	180,000	970	1460
	5								
Truss (TrussBinder™) Screws²									
$\frac{5}{16}$	2⅞	1.50	0.500 (0.37" across flats)	0.204	0.181	0.284	180,000	970	1460
	3⅞								
	4								
	4½								
	5								
	6								
	6¾								
Wafer Head Screws²									
$\frac{3}{8}$	3	2.00	0.654 (T50)	0.294	0.251	0.407	150,000	2330	3500
	4								
	5								
	6								
	8								
	10								
Flat Head Screws²									
$\frac{5}{16}$	2½	1.50	0.630 (T30)	0.204	0.181	0.284	180,000	970	1460
	3								
	4								
	5								
	6								
$\frac{3}{8}$	8	5.20	0.700 (T40)	0.221	0.191	0.317	180,000	1450	2175
	10								

For **SI**: 1 inch = 25.4 mm, 1 psi = 6.89 kPa, 1 lbf = 4.45 N.

¹Length of thread includes tip.

²Overall length is measured from the underside of the screw head to the tip.

³Diameter includes integral washer where applicable.

TABLE 2—REFERENCE WITHDRAWAL DESIGN VALUES (W) FOR INSTALLATION INTO THE FACE OF THE WOOD MEMBER FOR HILLMAN™ CARBON STEEL SCREWS^{1,2,3}

<i>D_{nom}</i> (inch)	<i>L</i> (inches)	<i>L_{emb,w}</i> ⁴ (inch)	<i>W</i> FOR SELECTED <i>SG_{NDS}</i> VALUES (lbf/in)	
			$0.42 \leq SG_{NDS} < 0.50$	$SG_{NDS} \geq 0.50$
Structural Lag Screws				
³ / ₁₆	3	2.00	135	135
¹ / ₄	1 ¹ / ₂ , 2, 2 ¹ / ₂ , 3, 3 ¹ / ₂ , 4, 5, 6	1.00	110	150
	4, 5, 6	2.38	145	185
⁵ / ₁₆	2 ¹ / ₂ , 3, 3 ¹ / ₂ , 4, 5, 6, 8, 10	1.50	165	245
³ / ₈	4, 5, 6, 7 ¹ / ₄ , 8, 10, 12	2.80	155	215
Lumber (LumberBinder™) Screws				
¹ / ₄	2 ⁷ / ₈ , 4 ¹ / ₂ , 6, 7, 8, 9, 10, 12	2.00	110	150
Large Hex Washer Head Screws				
³ / ₈	4, 6, 8, 10, 12	3.00	200	275
Timber (TimberBinder™) Screws				
¹ / ₄	2 ¹ / ₂ , 4, 6, 8, 10, 12, 14	1.25	110	150
Ledger (LedgerBinder™) Screws				
⁵ / ₁₆	3 ⁵ / ₈ , 5	2.00	165	245
Truss (TrussBinder™) Screws				
⁵ / ₁₆	2 ⁷ / ₈ , 3 ³ / ₈ , 4, 4 ¹ / ₂ , 5, 6, 6 ³ / ₄	1.50	165	245
Wafer Head Screws				
³ / ₈	3, 4, 5, 6, 8, 10	2.00	165	240
³ / ₈	4, 5, 6, 8, 10	3.00	200	275
Flat Head Screws				
⁵ / ₁₆	2 ¹ / ₂ , 3, 4, 5, 6	1.50	165	245
³ / ₈	8, 10	2.80	155	215

For **SI**: 1 inch = 25.4 mm, 1 lbf/in = 175N/m; 1 lbf = 4.45 N.

¹ Tabulated values must be multiplied by all adjustment factors included in the NDS for dowel-type fasteners to determine allowable loads for use with ASD and/or design loads for use with LRFD.

² Tabulated values are applicable to screws installed perpendicular to the faces of the wood members.

³ The tabulated reference withdrawal design value is in pounds-force per inch of thread embedment into the main member.

⁴ *L_{emb,w}* is the minimum required portion of the screw held in the main member including the screw tip including the screw tip needed to achieve the tabulated design values.

TABLE 3—REFERENCE PULL THROUGH DESIGN VALUES (W_H) FOR HILLMAN™ CARBON STEEL SCREWS^{1,2}

D_{nom} (inch)	$t_{s,w}$ (inch)	W_H FOR SELECTED SG_{NDS} VALUES (lbf)	
		$0.42 \leq SG_{NDS} < 0.50$	$SG_{NDS} \geq 0.50$
Structural Lag Screws			
$3/16$	$3/4$	185	195
$1/4$		185	195
$5/16$		185	230
$3/8$		235	340
Lumber (LumberBinder™) Screws			
$1/4$	$3/4$	175	195
Large Hex Washer Head Screws			
$3/8$	$3/4$	235	340
Timber (TimberBinder™) Screws			
$1/4$	$3/4$	175	195
Ledger (LedgerBinder™) Screws			
$5/16$	$3/4$	155	230
Truss (TrussBinder™) Screws			
$5/16$	$3/4$	155	230
Wafer Head Screws			
$3/8$	$1\frac{1}{2}$	280	n/a
	2	n/a	400
Flat Head Screws			
$5/16$	$3/4$	155	230
$3/8$	$1\frac{1}{2}$	280	n/a
	2.	n/a	400

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

¹ Tabulated values must be multiplied by all adjustment factors included in the NDS for dowel-type fasteners to determine allowable loads for use with ASD and/or design loads for use with LRFD.

² Tabulated values are applicable to screws installed perpendicular to the faces of the wood members.

TABLE 4—REFERENCE LATERAL DESIGN VALUES (Z) FOR TWO MEMBER WOOD-TO-WOOD CONNECTIONS FOR HILLMAN™ CARBON STEEL SCREWS^{1,2,3,4}

D _{nom} (inch)	L (inches)	t _{s,w} (inch)	L _{emb,l} (inches)	Z (lbf) FOR SELECTED SG _{NDS} VALUES:			
				0.42 ≤ SG _{NDS} < 0.50		SG _{NDS} ≥ 0.50	
				Parallel to Grain, Z	Perp. to Grain, Z _⊥	Parallel to Grain, Z	Perp. to Grain, Z _⊥
Structural Lag Screws							
3/16	3	3/4	2 1/4	185	205	185	230
1/4	2 1/2, 3, 3 1/2, 4, 5, 6	3/4	1 3/4	160	170	180	-
1/4	4, 5, 6	1 1/2	2 1/2	-	-	-	225
5/16	3, 3 1/2, 4, 5, 6, 8, 10	3/4	2 1/4	230	240	-	-
5/16	4, 5, 6, 8, 10	1 1/2	2 1/2	-	-	235	255
3/8	8, 10, 12	3 1/2	4 1/2	430	500	650	560
Lumber (LumberBinder™) Screws							
1/4	2 7/8, 4 1/2, 6, 7, 8, 9, 10, 12	3/4	2 1/8	200	220	200	290
Large Hex Washer Head Screws							
3/8	4, 6, 8, 10, 12	3/4	3 1/4	340	340	-	-
Timber (TimberBinder™) Screws							
1/4	2 1/2, 4, 6, 8, 10, 12, 14	3/4	1 3/4	120	-	-	-
1/4	4, 6, 8, 10, 12, 14	3/4	3 1/4	-	145	-	-
1/4	4, 6, 8, 10, 12, 14	1 1/2	2 1/2	-	-	155	205
Ledger (LedgerBinder™) Screws							
5/16	3 5/8, 5	3/4	2 7/8	200	205	260	260
Truss (TrussBinder™) Screws							
5/16	2 7/8, 3 3/8, 4, 4 1/2, 5, 6, 6 3/4	3/4	2 1/8	155	170	175	170
Wafer Head Screws							
3/8	4, 5, 6, 8, 10	1 1/2	2 1/2	350	300	-	-
3/8	4, 5, 6, 8, 10	2	2	-	-	315	335
Flat Head Screws							
5/16	3, 4, 5, 6	3/4	2 1/4	230	240	-	-
5/16	4, 5, 6	1 1/2	2 1/2	-	-	235	255
3/8	8, 10	3 1/2	4 1/2	430	500	650	560

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

¹ Tabulated values must be multiplied by all adjustment factors included in the NDS for dowel-type fasteners to determine allowable loads for use with ASD and/or design loads for use with LRFD.

² Tabulated values are applicable to screws installed perpendicular to the faces of the wood members.

³ The wood main member thickness must be equal to or greater than the screw length less the thickness of the wood side member.

⁴ The tabulated lateral design values are based on both wood members having the same specific gravity.

TABLE 5—HILLMAN™ STAINLESS STEEL SCREW DIMENSIONS AND STEEL STRENGTHS

D_{nom} (inch)	L (inches)	L_{thread} (inches)	D_H^3 (inch), (DRIVE SIZE / HEX SIZE)	D_s (inch)	D_r (inch)	D (inch)	$F_{yb,spec}$ (psi)	N_a (lbf)	N_u (lbf)
Structural Lag Screws									
1/4	1 1/2	1.00	0.540 (T25)	0.174	0.155	0.235	105,000	660	990
	2	1.00							
	2 1/2	1.58							
	3	1.80							
	3 1/2	1.96							
	4	2.38							
	5	2.38							
6	2.38								
5/16	3	2.10	0.571 (T30)	0.204	0.181	0.281	105,000	830	1250
	3 1/2	2.20							
	4	2.60							
	5	3.50							
	6	4.00							
	8	5.50							
	10	7.00							
3/8	6	4.20	0.700 (T40)	0.221	0.191	0.313	105,000	935	1400
	8	5.20							
	10	7.20							
	12	9.20							
Lumber (LumberBinder™) Screws									
1/4	2 7/8	2.00	0.532 (T25)	0.174	0.155	0.235	105,000	660	990
	4 1/2								
	6								
	7								
	8								
	9								
	10								
	12								
Timber (TimberBinder™) Screws									
1/4	2 1/2	1.25	0.475 (0.31" across flats)	0.174	0.155	.235	105,000	660	990
	4	2.00							
	6								
	8								
	10								
Ledger (LedgerBinder™) Screws									
5/16	3 5/8	2.00	0.610 (0.31" across flats)	0.204	0.181	0.281	105,000	890	1340
	5	3.00							
Wafer Head Screws									
3/8	3	2	0.650 (T50)	0.294	0.248	0.402	105,000	1680	2525
	4	3							
	5								
	6								
	8								
	10								

For SI: 1 inch = 25.4 mm, 1 psi = 6.89 kPa, 1 lbf = 4.45 N.

¹Overall length is measured from the underside of the screw head to the tip.

²Length of thread includes tip.

TABLE 6—REFERENCE WITHDRAWAL DESIGN VALUES (*W*) FOR INSTALLATION INTO THE FACE OF THE WOOD MEMBER FOR HILLMAN™ STAINLESS STEEL SCREWS^{1,2,3}

<i>D_{nom}</i> (inch)	<i>L</i> (inches)	<i>L_{emb,w}</i> ⁴ (inch)	<i>W</i> FOR SELECTED <i>SG_{NDS}</i> VALUES (lbf/in)	
			0.42 ≤ <i>SG_{NDS}</i> < 0.50	<i>SG_{NDS}</i> ≥ 0.50
Structural Lag Screws				
1/4	1 1/2, 2, 2 1/2, 3, 3 1/2, 4, 5, 6	1.00	110	140
	4, 5, 6	2.38	130	150
5/16	3, 3 1/2, 4, 5, 6, 8, 10	2.10	150	170
	10	7.00	80	80
3/8	6, 8, 10, 12	4.20	125	130
	12	9.20	70	70
Lumber (LumberBinder™) Screws				
1/4	2 7/8, 4 1/2, 6, 7, 8, 9, 10, 12	2.00	110	140
Timber (TimberBinder™) Screws				
1/4	2 1/2, 4, 6, 8, 10	1.25	110	140
Ledger (LedgerBinder™) Screws				
5/16	3 5/8, 5	2.00	150	170
Wafer Head Screws				
3/8	3, 4, 5, 6, 8, 10	2.00	160	210
	4, 5, 6, 8, 10	3.00	165	230

For **SI**: 1 inch = 25.4 mm, 1 lbf/in = 175N/m; 1 lbf = 4.45 N.

¹ Tabulated values must be multiplied by all adjustment factors included in the NDS for dowel-type fasteners to determine allowable loads for use with ASD and/or design loads for use with LRFD.

² Tabulated values are applicable to screws installed perpendicular to the faces of the wood members.

³ The tabulated reference withdrawal design value is in pounds-force per inch of thread embedment into the main member.

⁴ *L_{emb,w}* is that the minimum required portion of the screw held in the main member including the screw tip, needed to achieve the tabulated design values.

TABLE 7—REFERENCE PULL THROUGH DESIGN VALUES (*W_H*) FOR HILLMAN™ STAINLESS STEEL SCREWS^{1,2}

<i>D_{nom}</i> (inch)	<i>t_{s,w}</i> (inch)	<i>W_H</i> FOR SELECTED <i>SG_{NDS}</i> VALUES (lbf)		
		0.42 ≤ <i>SG_{NDS}</i> < 0.50	0.50 ≤ <i>SG_{NDS}</i> < 0.55	<i>SG_{NDS}</i> ≥ 0.55
Structural Lag Screws				
1/4	3/4	175	195	n/a
5/16		230	240	460
3/8		240	290	305
Lumber (LumberBinder™) Screws				
1/4	3/4	165	185	240
Timber (TimberBinder™) Screws				
1/4	3/4	165	185	240
Ledger (LedgerBinder™) Screws				
5/16	3/4	230	240	460
Wafer Head Screws				
3/8	1 1/2	280	n/a	n/a
	2	n/a	400	n/a

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

¹ Tabulated values must be multiplied by all adjustment factors included in the NDS for dowel-type fasteners to determine allowable loads for use with ASD and/or design loads for use with LRFD.

² Tabulated values are applicable to screws installed perpendicular to the faces of the wood members.

TABLE 8—REFERENCE LATERAL DESIGN VALUES (Z) FOR TWO MEMBER WOOD-TO-WOOD CONNECTIONS FOR HILLMAN™ STAINLESS STEEL SCREWS^{1,2,3,4}

D_{nom} (inch)	L (inches)	$t_{s,w}$ (inch)	$L_{emb,l}$ (inches)	Z (lbf) FOR SELECTED SG_{NDS} VALUES:			
				$0.42 \leq SG_{NDS} < 0.50$		$SG_{NDS} \geq 0.50$	
				Parallel to Grain, $Z_{ }$	Perp. to Grain, Z_{\perp}	Parallel to Grain, $Z_{ }$	Perp. to Grain, Z_{\perp}
Structural Lag Screws							
$1/4$	$2\ 1/2$, 3, $3\ 1/2$, 4, 5, 6	$3/4$	$1\ 3/4$	180	185	290	295
$5/16$	$3\ 1/2$, 4, 5, 6, 8, 10	$3/4$	$2\ 3/4$	185	220	320	375
$3/8$	8, 10, 12	$3\ 1/2$	$4\ 1/2$	585	615	655	650
Lumber (LumberBinder™) Screws							
$1/4$	$2\ 7/8$, $4\ 1/2$, 6, 7, 8, 9, 10, 12	$3/4$	$2\ 1/8$	195	195	240	260
Timber (TimberBinder™) Screws							
$1/4$	$2\ 1/2$	$3/4$	$1\ 3/4$	145	150	230	235
$1/4$	4, 6, 8, 10	$3/4$	$3\ 1/4$	180	185	290	295
Ledger (LedgerBinder™) Screws							
$5/16$	$3\ 5/8$, 5	$3/4$	$2\ 7/8$	200	200	235	260
Wafer Head Screws							
$3/8$	4, 5, 6, 8, 10	$1\ 1/2$	$3\ 1/2$	340	315	n/a	n/a

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

¹ Tabulated values must be multiplied by all adjustment factors included in the NDS for dowel-type fasteners to determine allowable loads for use with ASD and/or design loads for use with LRFD.

² Tabulated values are applicable to screws installed perpendicular to the faces of the wood members.

³ The wood main member thickness must be equal to or greater than the screw length less the thickness of the wood side member.

⁴ The tabulated lateral design values are based on both wood members having the same specific gravity.

TABLE 9—CONNECTION GEOMETRY REQUIREMENTS^{1,2,3}

CONDITION		REQUIRED DIMENSION			
		Large Hex Washer Head and Wafer Head Screws		All other Power-Pro® screws	
		$SG < 0.50$	$SG \geq 0.50$	$SG < 0.50$	$SG \geq 0.50$
End distance (see Figure 2)	Loading toward end, $a_{end,1}$	15D	20D	15D	20D
	Loading perpendicular to grain or away from end, $a_{end,2}$	10D	15D	10D	15D
	Axial loading, $a_{end,2}$ (fastener withdrawal or pull-through)	10D	10D	10D	10D
Edge distance (see Figure 2)	Loading toward edge, $a_{edge,1}$	10D	12D	10D	12D
	Loading parallel to grain or away from edge, $a_{edge,2}$	5D	7D	5D	7D
	Axial Loading, $a_{edge,2}$	4D	4D	4D	4D
Spacing between fasteners, parallel to grain (see Figure 3)	Loading parallel to grain, a_1	15D	15D	15D	15D
	Loading perpendicular to grain, a_1	10D	10D	10D	10D
	Axial loading, a_1	7D	7D	7D	7D
Spacing between fasteners, perpendicular to grain (see Figure 3)	Loading parallel to grain, a_2	5D	7D	5D	7D
	Loading perpendicular to grain, a_2	5D	7D	5D	7D
	Axial loading, a_2	5D	5D	4D	4D

¹ End distances, edge distances and fastener spacing must be sufficient to prevent splitting of the wood, or as required by this table, whichever is the more restrictive.

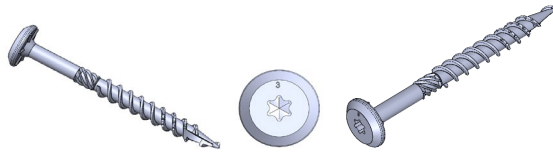
² Wood member stresses must be checked in accordance with Section 11.1.2 and Appendix E of the NDS, and end distances, edge distances and fastener spacing may need to be increased accordingly.

³ D refers to the outside thread diameter.

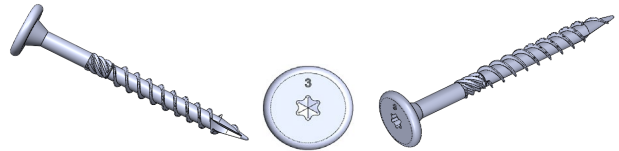
⁴ For CLT products, parallel and perpendicular-to-grain descriptions apply to the grain orientation at the shear plane for lateral loading and to the face grain orientation for withdrawal loading.

TABLE 10—APPLICABLE EXPOSURE CONDITIONS IN ACCORDANCE WITH AC257

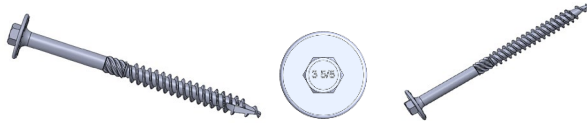
EXPOSURE CONDITION	TYPICAL APPLICATIONS	LIMITATIONS
1	Treated wood in dry use applications	Limited to use where equilibrium moisture content of the chemically treated wood meets the dry service conditions as described in the NDS.
2	Aboveground with coastal salt exposure	Limited to use in clean untreated wood and materials without known corrosion effects greater than that of clean untreated wood.
3	General construction	Limited to freshwater and chemically treated wood exposure, i.e., no saltwater exposure.
4	Coastal construction	No limitations with respect to moisture and chemically treated wood except that chemical wood treatment must have the same or lesser corrosion effects as qualification conditions.



Structural Lag



Lumber (LumberBinder™)



Large Hex Washer Head (Carbon Steel Only)



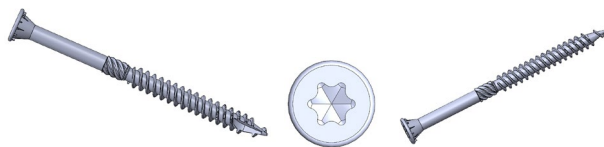
Ledger (LedgerBinder™)



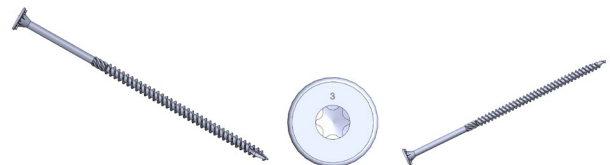
Truss (TrussBinder™)
(Carbon Steel Only)



Timber (TimberBinder™)



Wafer Head



Flat Head (Carbon Steel Only)

FIGURE 1 – HILLMAN™ CARBON STEEL AND 316 STAINLESS STEEL STRUCTURAL SCREWS

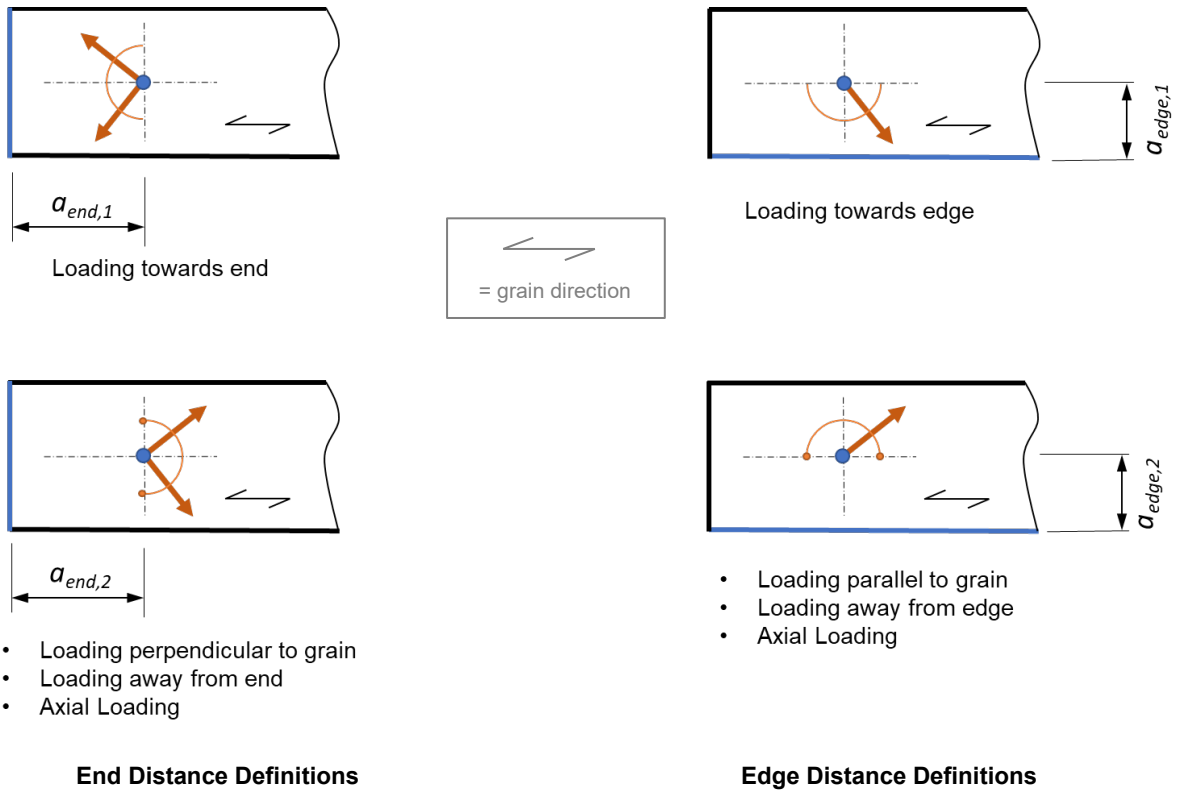


FIGURE 2—END AND EDGE DISTANCE DEFINITIONS FOR SCREWS INSTALLED PERPENDICULAR TO GRAIN

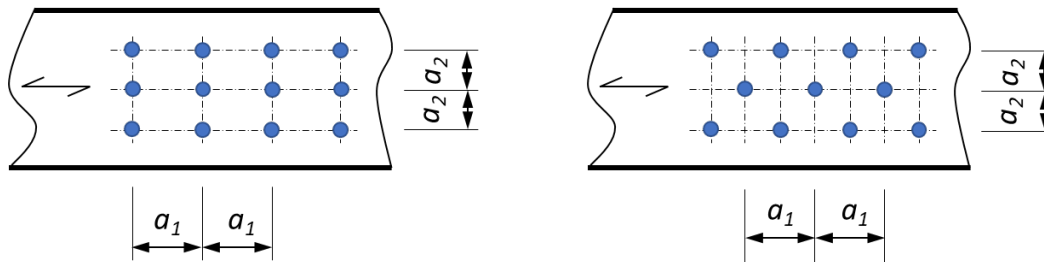


FIGURE 3—SPACING DEFINITIONS FOR SCREWS INSTALLED PERPENDICULAR TO GRAIN

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

REPORT HOLDER:

THE HILLMAN GROUP

EVALUATION SUBJECT:

HILLMAN™ CARBON STEEL AND STAINLESS STEEL STRUCTURAL SCREWS

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that the Hillman™ Carbon Steel and Stainless Steel Structural Screws, described in ICC-ES evaluation report ESR-5300, have also been evaluated for compliance with the code(s) noted below.

Applicable code edition:

- 2022 California Building Code (CBC)

For evaluation of applicable Chapters adopted by the California Office of Statewide Health Planning and Development (OSHPD) AKA: California Department of Health Care Access and Information (HCAI) and the Division of State Architect (DSA), see Sections 2.1.1 and 2.1.2 below.

- 2022 California Residential Code (CRC)

2.0 CONCLUSIONS

2.1 CBC:

The Hillman™ Carbon Steel and Stainless Steel Structural Screws, described in Sections 2.0 through 7.0 of the evaluation report ESR-5300, comply with 2022 CBC Chapter 23, provided the design and installation are in accordance with the 2021 *International Building Code*® (IBC) provisions noted in the evaluation report and the additional requirements of Chapters 16, 17 and 23, as applicable.

2.1.1 OSHPD: The applicable OSHPD Sections and Chapters of the CBC are beyond the scope of this supplement.

2.1.2 DSA: The applicable DSA Sections and Chapters of the CBC are beyond the scope of this supplement.

2.2 CRC:

The Hillman™ Carbon Steel and Stainless Steel Structural Screws, described in Sections 2.0 through 7.0 of the evaluation report ESR-5300, comply with the 2022 CRC, provided the design and installation are in accordance with the 2021 *International Residential Code*® (IRC) provisions noted in the evaluation report and the additional requirements of CRC Chapter 3, as applicable.

This supplement expires concurrently with the evaluation report, reissued September 2024.

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

REPORT HOLDER:

THE HILLMAN GROUP

EVALUATION SUBJECT:

HILLMAN™ CARBON STEEL AND STAINLESS STEEL STRUCTURAL SCREWS

1.0 REPORT PURPOSE AND SCOPE**Purpose:**

The purpose of this evaluation report supplement is to indicate that the Hillman™ Carbon Steel and Stainless Steel Structural Screws, subject of ICC-ES evaluation report ESR-5300, have also been evaluated for compliance with the codes noted below.

Applicable code editions:

- 2023 Florida Building Code—Building
- 2023 Florida Building Code—Residential

2.0 CONCLUSIONS

The Carbon Steel and Stainless Steel Structural Screws, described in Sections 2.0 through 7.0 of ICC-ES evaluation report ESR-5300, comply with the 2023 Florida Building Code—Building or the Florida Building Code—Residential. The design requirements must be determined in accordance with the Florida Building Code—Building or the Florida Building Code—Residential, as applicable. The installation requirements noted in ICC-ES evaluation report ESR-5300 for the 2021 International Building Code® meet the requirements of the Florida Building Code—Building or the Florida Building Code—Residential, as applicable, with the following conditions:

Use of the Carbon Steel and Stainless Steel Structural Screws for compliance with the High-Velocity Hurricane Zone provisions of the Florida Building Code—Building or the Florida Building Code—Residential has not been evaluated, and is outside the scope of this supplemental report.

For products falling under Florida Rule 61G20-3, verification that the report holder's quality assurance program is audited by a quality assurance entity approved by the Florida Building Commission for the type of inspections being conducted is the responsibility of an approved validation entity (or the code official when the report holder does not possess an approval by the Commission).

This supplement expires concurrently with the evaluation report, reissued September 2024.