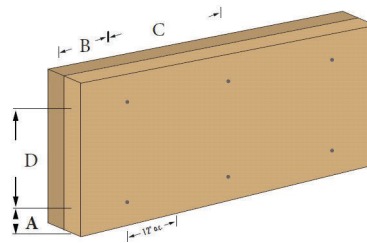


Fastening Requirements

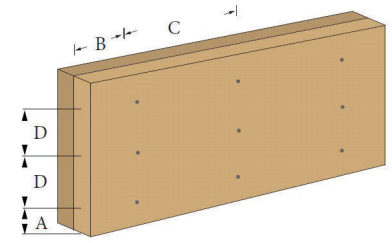
2.0E ES LVL Top-Loaded Definition

For required multiple-ply member fastening, only conditions where the loading is applied evenly across the top of all plies shall be considered "top-loaded." All other conditions must be fastened using the side-loaded recommendations on page 17. All top-loaded multiple-ply LVL members must meet the minimum fastener requirements and required fastener spacing shown above.

Clearances for Multiple-Ply Members						
Fastener	A	B		C		D
	Min.	Min.	Max.	Min.	Max.	Min.
10d & 16d Nails	2"	2"	6"	4"	12"	3"
Bolts & Screws	2"	4"	12"	4"	24"	3"



2 rows "ES" (offset on backside)



3 rows "ES" (offset on backside)

General Notes:

1. Confirm the adequacy of the beam (depth and thickness) for carrying the designated load.
2. Stress level for nail, bolt and screw values is 100%. Increases of 15% for snow loaded roof conditions or 25% for non-snow roof conditions are permitted.
3. Top and bottom rows of fasteners should be as shown in the fastener clearances detail. For staggered fastening patterns, the maximum end distance applies to all rows.
4. All fasteners must have the length fully embedded, but must not be over-driven, countersunk, or over-tightened.
5. Bolt holes are to be 1/32" to 1/16" diameter larger than the bolts. Bolts must meet or exceed ASTM A 307 or SAE J42" Grades 1 or 2. Every bolt must extend through the full thickness of the member. Use washers not less than a standard cut washer under the head and nut meeting ANSI B18.22.1.
6. 7" wide beams should only be side-loaded when loads are applied to both sides, when the lesser side load plf is at least 25% of the opposite side, or when the beam is otherwise restrained to minimize rotation.
7. For beam depths < 7 1/4", the maximum beam thickness must not exceed the beam depth and all fasteners must be staggered up to one-half the required o.c. spacing. For depths ≥ 7 1/4", the maximum beam thickness is 7".
8. Fastening recommendations are based on the 2005 & 2012 National Design Specification for Wood Construction (NDS) or fastener manufacturer's design information.
9. SDS structural screws are produced by Simpson Strong-Tie Company, Inc., WS structural screws are produced by United Steel Products Company, and TrussLok structural screws are produced by FastenMaster-OMG, Inc. Structural screws must be installed per manufacturer's recommendations.

Minimum Fastening Requirements for Top- and Side-Loaded Members		3 1/2" Wide	5 1/4" Wide		7" Wide		
Fastener Type	LVL Depth	2-ply, 1 1/4"	3-ply, 1 1/4"	1 1/4" + 3 1/2"	4-ply, 1 1/4"	2-ply, 1 1/4" + 3 1/2"	2-ply, 3 1/2"
10d (0.128" x 3") Nails	7 1/4" ≤ d < 14"	3 rows @ 12" o.c.	3 rows @ 12" o.c. (ES)	3 rows @ 12" o.c.	-	3 rows @ 12" o.c. (ES)	-
	d ≥ 14"	4 rows @ 12" o.c.	4 rows @ 12" o.c. (ES)	4 rows @ 12" o.c.	-	4 rows @ 12" o.c. (ES)	-
16d (0.162" x 3 1/2") Nails	7 1/4" ≤ d < 14"	2 rows @ 12" o.c.	2 rows @ 12" o.c. (ES)	2 rows @ 12" o.c.	-	2 rows @ 12" o.c. (ES)	-
	d ≥ 14"	3 rows @ 12" o.c.	3 rows @ 12" o.c. (ES)	3 rows @ 12" o.c.	-	3 rows @ 12" o.c. (ES)	-
1/2" Through Bolts	d ≥ 7 1/4"	2 rows @ 24" o.c.	2 rows @ 24" o.c.		2 rows @ 24" o.c.		
SDS 1/4" x 3 1/2", WS35 3/8" TrussLok		2 rows @ 24" o.c.	2 rows @ 24" o.c. (ES)	2 rows @ 24" o.c.	-	2 rows @ 24" o.c. (ES)	-
SDS 1/4" x 6", WS6		-	-		2 rows @ 24" o.c. (ES)		
5" TrussLok		-	2 rows @ 24" o.c.		-		
6 3/4" TrussLok		-	-		2 rows @ 24" o.c.		

NOTES:

1. All fasteners must meet the minimum requirements in the table above. Side-loaded multiple-ply members must meet the minimum fastening and side-loading capacity requirements given on page 17.
2. Minimum fastening requirements for depths less than 7 1/4" require special consideration. Please contact a Gorilla Lam technical representative.
3. Three general rules for staggering or offsetting for a certain fastener schedule: (1) if staggering or offsetting is not referenced, then none is required; (2) if staggering is referenced, then fasteners installed in adjacent rows on the front side are to be staggered up to one-half the o.c. spacing, but maintaining the fastener clearances above; and (3) if "ES" is referenced, then the fastener schedule must be repeated on each side, with the fasteners on the back side offset up to one-half the o.c. spacing of the front side (whether or not it is staggered).

Fastening Requirements

2.0E LVL Side-Loaded Definition

Conditions where the loading is not applied evenly across the top of all plies, where multiple-ply member fastening is used, shall be considered side-loaded. All side-loaded multiple-ply members must meet the minimum fastener requirements on page 16 and the loading capacity requirements below.

Maximum Uniform Load Applied to Either or Both Outside Plies (PLF) (Refer to General Notes on page 16.)

- Numbers in the table indicate load in pounds per lineal foot which may be applied to either side (except as shown in note 6 on page 16), based solely on the connection.
- Framing members must be attached with approved metal hangers. Refer to manufacturer specifications.
- This table applies to uniform loading only. Concentrated (point) side loads may require additional consideration.

Fastener Schedule			3½" Wide	5¼" Wide		7" Wide		
Fastener Type	Number of Fastener Rows	Fastener On-Center Spacing (in.)	3½" Wide			7" Wide		
			2-ply, 1¼"	3-ply, 1¼"	1¼" + 3½"	4-ply, 1¼"	2-ply, 1¼" + 3½"	2-ply, 3½"
10d (0.128" x 3") Nails	3	12	500	370 (ES)	370	-	330 (ES)	-
	4	12	665	500 (ES)	500	-	445 (ES)	-
16d (0.162" x 3½") Nails	2	12	515	390 (ES)	390	-	345 (ES)	-
	3	12	775	580 (ES)	580	-	515 (ES)	-
½" Through Bolts	2	24	460	350	480	310	425	785
		19.2	580	435	600	300	535	985
		16	695	520	725	460	640	1180
SDS ¼" x 3½"	2	24	625	465 (ES)	465	-	415 (ES)	-
		19.2	780	585 (ES)	585	-	515 (ES)	-
		16	935	700 (ES)	700	-	625 (ES)	-
SDS ¼" x 6"	2	24	-	-	-	510 (ES)	510 (ES)	625 (ES)
		19.2	-	-	-	635 (ES)	635 (ES)	780 (ES)
		16	-	-	-	765 (ES)	765 (ES)	935 (ES)
USP WS35	2	24	460	345 (ES)	345	-	305 (ES)	-
		19.2	570	430 (ES)	430	-	380 (ES)	-
		16	685	515 (ES)	515	-	460 (ES)	-
USP WS6	2	24	-	-	-	305 (ES)	305 (ES)	460 (ES)
		19.2	-	-	-	380 (ES)	380 (ES)	570 (ES)
		16	-	-	-	460 (ES)	460 (ES)	685 (ES)
3⅝" TrussLok	2	24	490	365 (ES)	365	-	325 (ES)	-
		19.2	615	460 (ES)	460	-	405 (ES)	-
		16	730	550 (ES)	550	-	490 (ES)	-
5" TrussLok	2	24	-	400	400	-	355 (ES)	530 (ES)
		19.2	-	500	500	-	445 (ES)	665 (ES)
		16	-	600	600	-	530 (ES)	795 (ES)
6¾" TrussLok	2	24	-	-	-	355	355	530
		19.2	-	-	-	445	445	665
		16	-	-	-	530	530	795

Notes:

1. "ES" indicates fasteners must be installed from each side of the beam with the given fastening schedule. Stagger fasteners on opposite side of beam by up to one-half the required fastener on-center spacing.
2. For nails, tabulated values may be multiplied by 2.0 for 6" o.c. spacing and by 3.0 for 4" o.c. spacing. For bolts, tabulated values for 24" o.c. may be multiplied by 2.0 for 12" o.c. spacing. For structural screws, tabulated values for 24" o.c. may be multiplied by 2.0 for 12" o.c. spacing, by 4.0 for 6" o.c. spacing and by 6.0 for 4" o.c. spacing.
3. For 3 rows of fasteners, multiply tabulated values for 2 rows by 1.5. Center and stagger middle row by one-half the required o.c. spacing for depths less than 11¼".
4. Do not use fastener schedule if fastener clearances, required staggering and offsetting, or required fastening cannot be met. Consult technical representative for other options.