

Fastener Spacing in Weyerhaeuser Engineered Lumber Products

This technical bulletin provides fastener spacing and placement information for Weyerhaeuser engineered lumber products. It is intended to supplement what is included in Weyerhaeuser's code evaluation reports and product literature. Specifically, the document provides recommended on-center spacing and minimum end distances for fasteners in continuous patterns (i.e. diaphragm nailing). These guidelines do not apply to conditions including joist hangers, straps, and nailing of TJI® joists at bearing locations or other localized nailing applications. As with any connection in wood or wood based material, avoiding unacceptable splitting often dictates fastener spacing and placement. The recommendations given in the following tables are based on preventing splitting that propagates from fastener to fastener within the connection. Splitting can be reduced by installing nails at slight angles and by using staggered or offset patterns.

The following tables provide general guidelines for fastener spacing as well as information relevant to determining the capacity of fastener connections. For additional information regarding TJI® joists, reference *Specifier's Guide for TJI® Joists* (US: [TJ-4000](#) \ Canada-East (s-Series): [TJ-4510](#) \ Canada-West: [TJ-4500](#)). For additional information regarding structural composite lumber, reference *Specifier's Guide for Trus Joist® Beams, Headers, and Columns* (US: [TJ-9000](#) \ US-California: [TJ-9020](#) \ Canada-East: [TJ-9500](#) \ Canada-West: [TJ-9505](#)). For other applications, see *Attaching Fire Sprinkler Components to Weyerhaeuser Engineered Wood Products* ([TB-203](#)). If closer on-center spacing patterns are required, please consult your Weyerhaeuser representative.

TABLE 1: TJI® JOISTS, RIM JOISTS, AND BLOCKING PANELS^{[1][2][3][4]}

Nail Size ^[5]		Nails into Wide Face of Flange ^[6]				Nails into Narrow Edge of Flange ^[7]			
		TJI® Joist Series				TJI® Joist Series			
		110 \ 210 \ 230		360 \ 560 \ 560D \ s31 \ s33 \ s47		110 \ 210 \ 230		360 \ 560 \ 560D \ s31 \ s33 \ s47	
		On-Center Spacing	Min. End Distance	On-Center Spacing	Min. End Distance	On-Center Spacing	Min. End Distance	On-Center Spacing	Min. End Distance
6d (2") common & 8d (2 1/2") box	[0.113"]	4"	2 1/2"	3"	2"	6"	6"	3"	4"
8d (2 1/2") common	[0.131"]	4"	2 1/2"	3"	2"	6"	6"	6"	6"
8d (1 1/2") N8 or NA11^[8]	[0.131"]	3"	2 1/2"	3"	2"	6"	6"	6"	6"
10d (3") box	[0.128"]	4"	3"	3"	2"	6"	6"	5"	5"
12d (3 1/4") box	[0.128"]	4"	3"	3"	2"	6"	6"	5"	5"
10d (3") common	[0.148"]	4"	4 1/2"	4"	3"	6"	6"	6"	6"
12d (3 1/4") common	[0.148"]	4"	4 1/2"	4"	3"	6"	6"	6"	6"
10d (1 1/2") N10 or NA9D^[8]	[0.148"]	3"	4 1/2"	3"	3"	6"	6"	6"	6"
16d (3 1/2") box	[0.135"]	4"	4 1/2"	4"	3"	6"	6"	6"	6"
16d (3 1/4") sinker	[0.148"]	4"	4 1/2"	4"	3"	6"	6"	6"	6"
16d (3 1/2") common	[0.162"]	6"	6"	6"	4"	Not Recommended			
Framing Angles: A34, A35, LTP4, LTP5, MP34, MPA1, MPA1F, and MP4F		N/A		N/A		Not Recommended			

- [1] Fastener spacings in this table may be used for wood screws provided the lengths and root diameters are less than or equal to the nail sizes listed in the table. Always use screws intended for structural assembly of wood structures. Drywall screws should never be used since they tend to be brittle and may easily break.
- [2] Includes attachment of the bottom flange of TJI® rim joists and blocking panels to the wall plate below.
- [3] Recommended edge distance is 1/2" for TJI® 110 joists and 5/8" for all other TJI® joist series (does not apply to diaphragm construction, see note 6).
- [4] Maximum spacing of nails should not exceed lateral stability requirements. See applicable literature.
- [5] Length of nail shown in parentheses (); diameter of nail shown in brackets [].
- [6] One row of nails permitted (two at abutting panel edges) for diaphragms. Stagger nails when using 4" on-center spacing or less and maintain 3/8" joist and panel edge distance. For other applications, multiple rows of fasteners are permitted if the rows are offset at least 1/2" and staggered.
- [7] One (1) row of nails only.
- [8] Nail spacing values shown are intended for use with only light-gauge steel straps. Multiple rows of nails must be offset at least 1/2" and staggered.

TABLE 2: STRUCTURAL COMPOSITE LUMBER⁽¹⁾

Nail Size		Nails into Wide Face (Perpendicular to Strands)		Nails into Narrow Edge (Parallel to Strands)						Min. End Distance
		Microllam® LVL, Parallam® PSL	TimberStrand® LSL, TJ® Rim Board	Microllam® LVL	Parallam® PSL	TimberStrand® LSL ⁽²⁾ , TJ® Rim Board				
						1 1/8"	1 1/4"	1 1/2"	1 3/4" - 3 1/2"	
On-Center Spacing		On-Center Spacing		On-Center Spacing		On-Center Spacing		On-Center Spacing		
6d (2") common & 8d (2 1/2") box	[0.113"]	2"	2"	3"	3"	6"	4"	3"	3"	2 1/2"
8d (2 1/2") common	[0.131"]	2"	2"	4"	4"	6"	4"	3"	3"	2 3/4"
8d (1 1/2") N8 or NA11	[0.131"]	2"	2"	4"	4"	6"	4"	3"	3"	2 3/4"
10d (3") box	[0.128"]	2"	2"	4"	4"	6"	4"	3"	3"	2 3/4"
12d (3 1/4") box	[0.128"]	2"	2"	4"	4"	6"	4"	3"	3"	2 3/4"
10d (3") common	[0.148"]	3"	2 1/2"	5"	4"	6"	4"	3"	3"	3"
12d (3 1/4") common	[0.148"]	3"	2 1/2"	5"	4"	6"	4"	3"	3"	3"
10d (1 1/2") N10 or NA9D	[0.148"]	3"	2 1/2"	5"	4"	6"	4"	3"	3"	3"
16d (3 1/2") box	[0.135"]	3"	2 1/2"	5"	4"	16" ^[3]	4"	3"	3"	2 3/4"
16d (3 1/4") sinker	[0.148"]	3"	2 1/2"	5"	4"	16" ^[3]	4"	3"	3"	3"
16d (3 1/2") common	[0.162"]	4"	3"	8" ^[3]	6"	16" ^[3]	6" ^[4]	6" ^[4]	6" ^[5]	3 1/4"
Proprietary Wood Screws⁽⁶⁾⁽⁷⁾	[0.250"]	- [11]		- [8]	- [8][9]	N/A	- [8][10]			- [11]
Framing Angles: A34, A35, LTP4, LTP5, MP34, MPA1, MPA1F, and MP4F		OK		N/A		N/A	N/A			2 3/4"

- [1] See **General Notes** on page 3.
- [2] Closest on-center edge nailing for StrandGuard® TimberStrand® LSL sill plates is one (1) row at 4" o.c. for 2x_ (1 1/2" thick) and two (2) rows @ 4" o.c. staggered for 3x_ (2 1/2" thick).
- [3] Can be reduced to 5" o.c. with maximum nail penetration of 1 1/4" into narrow edge (e.g. nails that connect sole plate above to block or rim).
- [4] Can be reduced to 4" o.c. with maximum nail penetration of 1 1/4" into narrow edge (e.g. nails that connect sole plate above to block or rim).
- [5] Can be reduced to 3 1/2" o.c. with maximum nail penetration of 1 1/4" into narrow edge (e.g. nails that connect sole plate above to block or rim).
- [6] Proprietary wood screws are Simpson Strong-Tie® SDS, USP® WS, and FastenMaster® TrussLok® structural wood screws; nominal fastener shank diameter = 0.25".
- [7] 6" long USP® WS structural wood screws are not recommended for TimberStrand® LSL nor Parallam® PSL.
- [8] Space proprietary wood screws at 6" o.c. minimum, into the narrow edge.
- [9] Two (2) staggered rows of proprietary wood screws are permitted in the narrow edge of Parallam® PSL for members 3 1/2" thick. Three (3) staggered rows of proprietary wood screws are permitted in the narrow edge of Parallam® PSL for members greater than or equal to 5 1/4" thick. For multiple rows, edge distance is a minimum of 1" and spacing between staggered rows is a minimum of 1 1/2".
- [10] One (1) row of proprietary wood screws is permitted in the narrow edge of TimberStrand® LSL for members 1 1/4", 1 1/2", and 1 3/4" thick. Two (2) staggered rows of proprietary wood screws are permitted in the narrow edge of TimberStrand® LSL for members 3 1/2" thick. For multiple rows, edge distance is a minimum of 1" and spacing between staggered rows is a minimum of 1 1/2".
- [11] See screw manufacturer's recommendations for spacing and capacity of connections. End distances, edge distances, and capacity of the screws must be sufficient to minimize splitting.

Fastener spacing not applicable for shear wall applications. See appropriate code report for grade specific TimberStrand® LSL nailing requirements.

General Notes for Table 2

- Fastener spacings in this table may be used for wood screws provided the lengths and root diameters are less than or equal to the nail sizes listed in the table. Always use screws intended for structural assembly of wood structures. Drywall screws should never be used since they tend to be brittle and may easily break.
- Maximum permissible rows is two (2) for 1 ¼" and 1 ½" thicknesses, three (3) for 1 ¾" thickness, and six (6) for thicknesses greater than or equal to 3 ½".
- To minimize splitting, member edge distance and spacing between rows shall be the greater of (2.5 x nail diameter) or ¾". Where multiple rows are used, fasteners in adjacent rows must be staggered and the rows must be equally spaced from the centerline of the narrow face axis.
- Slant sheathing nails to maintain minimum required structural composite lumber edge distance.
- Length of nail shown in parenthesis (). Diameter of nail shown in brackets [].
- To determine connection capacities for applications such as TimberStrand® LSL shearwalls, reference Table 3 below.

TABLE 3: EQUIVALENT SPECIFIC GRAVITY FOR CONNECTION DESIGN^[1]

Product	Lateral		Withdrawal		Shearwalls ^{[2][3]}
	Face	Edge	Face	Edge	
Microllam® LVL \ Parallam® PSL	0.50	0.50	0.50	0.50	Not Evaluated
1.3E TimberStrand® LSL	0.50	0.50 ^[4]	0.50	0.42	0.42 ^[5]
1.5E TimberStrand® LSL	0.50	0.50 ^[4]	0.50	0.42	0.42
1.55E TimberStrand® LSL	0.50	0.50 ^[4]	0.50	0.42	0.42
1.6E TimberStrand® LSL	0.50	0.50 ^[4]	0.50	0.42	0.50
1 ½" TJ® Rim Board	0.50	Not Evaluated	0.38	Not Evaluated	Not Evaluated

[1] Specific gravity of 0.55 is equivalent to Southern Pine; 0.50 is equivalent to Douglas-Fir; 0.42 is equivalent to Spruce-Pine-Fir.
 [2] For US, design shearwall applications per ANSI/AWC SDPWS-2015. If equivalent specific gravity is equal to 0.42, multiply values in Table 4.3A by 0.92.
 - For Canada, design shearwall applications per CCMC Report [No. 12627-R](#).
 [3] When StrandGuard® TimberStrand® LSL sill plates are used in shearwall construction, use the specific gravity of the studs (up to 0.50) when determining the allowable shear.
 [4] Specific gravity for proprietary wood screws installed into the edge of TimberStrand® LSL for lateral connections is 0.42.
 [5] As per ICC-ES [ESR-1387](#) and CCMC Report [No. 12627-R](#), minimum boundary nail spacing must be 6" o.c. Studs at boundary locations, where two panels abut, are allowed two (2) rows @ 6" o.c.

TABLE 4: COMMON ADJUSTMENT FACTORS FOR CONNECTIONS^[1]

Property	United States			Canada		
	Notation	Lateral	Withdrawal	Notation	Lateral	Withdrawal
Duration of Load (Live Load)	C_d	1.00	1.00	K_D	1.00	1.00
Duration of Load (Snow Load)	C_d	1.15	1.15	K_D	1.00	1.00
Duration of Load (Construction Load)	C_d	1.25	1.25	K_D	1.15	1.15
Duration of Load (Wind/Seismic Load)	C_d	1.60	1.60	K_D	1.15	1.15
End Grain Factor	C_{eg}	0.67	N/A	J_E	0.67	N/A
Diaphragm Factor	C_{di}	1.10	N/A	J_D	1.30	N/A
Toe-nail Factor	C_{tn}	0.83	0.67	J_A	0.83	0.67

[1] Assumes non-treated wood, moisture content < 19%, and temperatures < 100° F.