

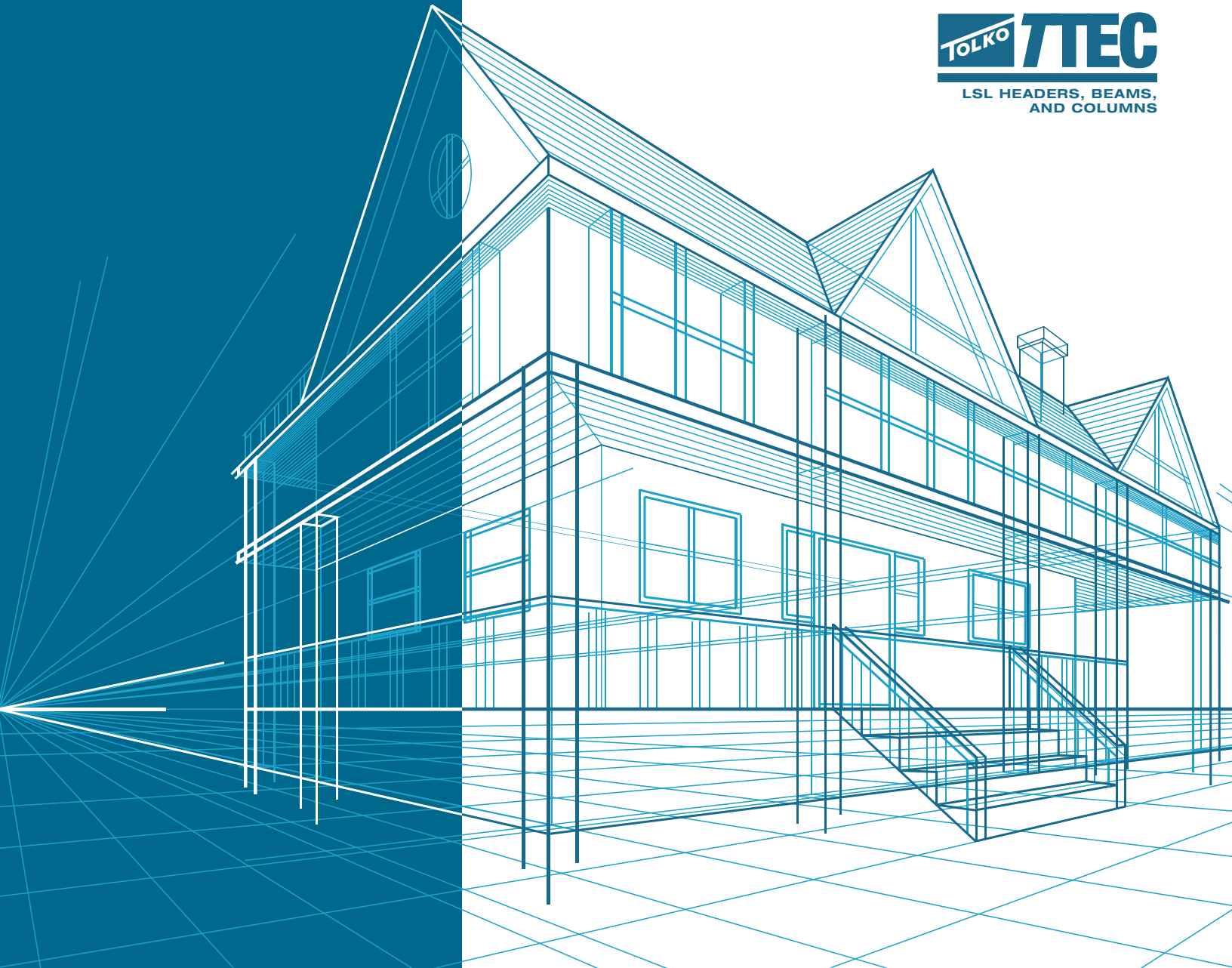
TOLKO

TECHNICAL GUIDE (ASD - USA)

T-TEC 1.35E LSL (1-1/2" & 1-3/4")

T-TEC 1.55E LSL (1-1/8" & 1-1/4" & 1-1/2")

HEADERS, BEAMS, AND COLUMNS



**TRUE.
TRUSTED.
TOLKO.**

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ALLOWABLE STRESS DESIGN

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WWW.TOLKO.COM



TOLKO HEADERS, BEAMS, AND COLUMNS

Tolko produces T-TEC LSL Headers, Beams, and Columns from laminated strand lumber (LSL). Tolko's Headers, Beams, and Columns offerings are manufactured from highly predictable and uniform engineered wood that is sawn to consistent sizes and resists warping and splitting making them preferred by builders.



BUILDING WITH CONFIDENCE

T-TEC LSL Headers, Beams, and Columns are engineered for performance and consistency, resulting in a straighter finished product that will not twist, warp, or bend like traditional lumber. T-TEC LSL products are designed to accommodate larger holes and multiple holes without compromising the structural integrity of the product. Produced with a continuous press, these products accommodate longer spans saving time and money for builders.

T-TEC 1.35E and 1.55E LSL Headers, Beams, and Columns

Thickness¹	1-1/8", 1-1/4", 1-1/2", 1-3/4"
Depths¹	5-1/2", 7-1/4", 9-1/2", 11-7/8", 14", 16"
Lengths¹	12', 16', 24'
E-Rating	1.35E, 1.55E
Zinc Borate Protection	Optional

1. For promotional purposes, lengths and widths are the actual sizes.

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SECTION 1: DESIGN PROPERTIES EDGEWISE BENDING

TABLE 1: ALLOWABLE EDGEWISE BENDING PROPERTIES^(a)

Product/Grade	Modulus of Elasticity, E ^(d) (psi)	Flexural Stress, F _b ^(b) (psi)	Compression perpendicular to grain, F _{c⊥} ^(e) (psi)	Equivalent Specific Gravity - nails and wood screws lateral resistance		Horizontal Shear parallel to grain, F _v (psi)	Width, b	Depth, h	Weight (plf)	Bending Moment ^(f) (lbs-ft)	Shear (lbs)	Moment of Inertia (in. ⁴)	
				Installed on Edge	Installed on Face								
1.35E T-TEC LSL	1.35 X 10 ⁶	1850 ^(c)	750	0.47	0.5	330	1-1/2"	5-1/2"	2.6	1285	1815	21	
								7-1/4"	3.4	2158	2393	48	
								9-1/4"	4.4	3407	3053	99	
								9-1/2"	4.5	3581	3135	107	
								11-1/4"	5.3	4917	3713	178	
								11-7/8"	5.6	5442	3919	209	
								14"	6.6	7410	4620	343	
								16"	7.6	9518	5280	512	
							1-3/4"	5-1/2"	3.0	1500	2118	24	
								7-1/4"	4.0	2517	2791	56	
								9-1/4"	5.1	3975	3561	115	
								9-1/2"	5.3	4178	3658	125	
								11-1/4"	6.2	5737	4331	208	
								11-7/8"	6.6	6349	4572	244	
								14"	7.7	8645	5390	400	
								16"	8.8	11105	6160	597	
1.55E T-TEC LSL	1.55 X 10 ⁶	2360 ^(c)	900	0.47	0.5	455	1-1/8"	5-1/2"	2.0	1230	1877	16	
								7-1/4"	2.6	2064	2474	36	
								9-1/4"	3.3	3259	3157	74	
								9-1/2"	3.4	3427	3242	80	
								11-1/4"	4.0	4705	3839	133	
								11-7/8"	4.2	5207	4052	157	
							14"	5.0	7090	4778	257		
							16"	5.7	9107	5460	384		
							525	1-1/4"	5-1/2"	2.2	1366	2406	17
									7-1/4"	2.9	2294	3172	40
									9-1/4"	3.7	3622	4047	82
									9-1/2"	3.8	3807	4156	89
						11-1/4"			4.4	5228	4922	148	
						11-7/8"			4.7	5785	5195	174	
						14"		5.5	7877	6125	286		
						16"		6.3	10118	7000	427		
						1-1/2"		5-1/2"	2.6	1640	2888	21	
								7-1/4"	3.4	2752	3806	48	
								9-1/4"	4.4	4346	4856	99	
								9-1/2"	4.5	4569	4988	107	
							11-1/4"	5.3	6273	5906	178		
							11-7/8"	5.6	6942	6234	209		
						14"	6.6	9453	7350	343			
						16"	7.6	12142	8400	512			

Highlighted depths shall be used in multiple members only.

Notes:

(a) The tabulated values are design values for normal load duration. All values, except E and F_{c⊥}, are permitted to be adjusted for other load durations as permitted by the code. The design stresses are limited to conditions in which the average equivalent moisture content of sawn lumber does not exceed 16 percent.

(b) Tabulated flexural stress (F_b) may be increased by 4 percent when the member qualifies as a repetitive member as defined in NDS.

(c) Tabulated value is based on a reference depth of 12 inches. For other depths, when loaded edgewise, F_b shall be modified by (12/d)^{0.125}, where d = depth in inches. For depths less than 2-1/2 inches, the factor for the 2-1/2-inch depth shall be used.

(d) For a simple span member, deflection for a uniform load could be calculated as follows:

$$\delta_T = \frac{270wL^4}{Ebh^3}$$

where:

- δ_T = total deflection (in)
- w = applied uniform loads (lb/ft)
- L = design span (ft)
- E = modulus of elasticity (lb/in²)
- b = beam width (in)
- h = beam depth (in)

(e) When designing with the tabulated compressive stress perpendicular to grain F_{c⊥}, the bearing area factor (C_b) stipulated in Section 3.10.4 of the NDS shall be permitted to be applied.

(f) Bending Moment values are adjusted by the depth factor mentioned in note (c); repetitive factor from note (b) has not been applied.

SECTION 2: NAILING MINIMUM DISTANCES ON THE EDGE AND FACE

TABLE 2: NAILING MINIMUM DISTANCES ON THE EDGE AND FACE

Product	Thickness (in)	Orientation	Pennyweight/ Type	Max. Diameter (in.)	Max. Length (in.)	Minimum End Distance (in.)	Minimum Nail Spacing per Row (in)		
							Single Row	Multiple Rows	
Tolko OSB Rim Board Plus	1-1/4 & 1-1/8	Edge	8d; 10d; 12d	0.148	3-1/4	2-1/2	6		
		Face	8d; 10d; 12d	0.148	3-1/4	2-1/2	2		
1.35E T-TEC LSL	1-1/4 ≤ thickness < 1-1/2	Edge	8d and smaller	0.131	2-1/2	2	4	Not recommended	
			10d; 12d	0.148	3-1/4	2	4		
			16d	0.162	3-1/2	2-1/2	5		
		Face	8d and smaller	0.131	2-1/2	7/8	1		1
			10d; 12d	0.148	3-1/4	7/8	1		1
			16d	0.162	3-1/2	7/8	1-1/2		1-1/2
	1-1/2 ≤ thickness < 3-1/2	Edge	8d and smaller	0.131	2-1/2	1 (1-1/2) ⁽⁶⁾	2	3	
			10d; 12d	0.148	3-1/4	2	3	4	
			16d	0.162	3-1/2	2-1/2	3	6	
		Face	8d and smaller	0.131	2-1/2	1/2	1	1	
			10d; 12d	0.148	3-1/4	1/2	1	1	
			16d	0.162	3-1/2	7/8	1-1/2	1-1/2	
1.55E T-TEC LSL	1-1/8	Edge	8d and smaller	0.131	2-1/2	2	4	Not recommended	
			10d; 12d	0.148	3-1/4	2-1/2	5		
			16d	0.162	3-1/2	3	6		
		Face	8d and smaller	0.131	2-1/2	7/8	1		1
			10d; 12d	0.148	3-1/4	7/8	1		1
			16d	0.162	3-1/2	7/8	1-1/2		1-1/2
	1-1/4	Edge	8d and smaller	0.131	2-1/2	2	4	Not recommended	
			10d; 12d	0.148	3-1/4	2	4		
			16d	0.162	3-1/2	2-1/2	5		
		Face	8d and smaller	0.131	2-1/2	7/8	1		1
			10d; 12d	0.148	3-1/4	7/8	1		1
			16d	0.162	3-1/2	7/8	1-1/2		1-1/2
1-1/2	Edge	8d and smaller	0.131	2-1/2	1 (1-1/2) ⁽⁶⁾	2	3		
		10d; 12d	0.148	3-1/4	2	3	4		
		16d	0.162	3-1/2	2-1/2	3	6		
	Face	8d and smaller	0.131	2-1/2	1/2	1	1		
		10d; 12d	0.148	3-1/4	1/2	1	1		
		16d	0.162	3-1/2	7/8	1-1/2	1-1/2		

Notes:

- 1) Face orientation applies to nails driven into the face of the member, such that the long axis of the nail is perpendicular to the wide face of the strands. Edge orientation applies to nails driven into the edge of the member.
- 2) 16d sinker nails (0.148" x 3-1/4") may be spaced the same as the 12d common wire nails (0.14" x 3-1/4").
- 3) Nails listed are common wire nails. For box nails, the spacing and end distance requirements of the next lower penny weight common nail may be used: e.g. a 16d box nail may be spaced the same as a 10d or 12d common nail.
- 4) Nail penetration for edge nailing shall not exceed 2 inches for 16d common wire nails (0.162" x 3-1/2") and 2-1/2" for nails with a smaller diameter.
- 5) Tabulated closest on-center spacing for face orientation is applicable to nails that are installed in rows parallel to the grain (length) of the member. For nails installed in rows perpendicular to the direction of the grain (width/depth) of the member, the closest on-center spacing for face orientation shall be sufficient to prevent splitting of the LSL.
- 6) The multiple row end spacing is 1-1/2 inches.
- 7) Edge distance shall be sufficient to prevent splitting.
- 8) Multiple rows must be spaced 1/2 inch or more from each other and offset one-half of the tabulated minimum nail spacing.
- 9) Multiple rows must be equally spaced about the centerline of the edge or face (whichever applies).

TABLE 13: ALLOWABLE UNIFORM PLF ROOF SNOW LOADS (115%) - 1.55E TOLKO T-TEC LSL **1-1/8"** WIDTH (LIVE LOAD DEFLECTION **L/240**; TOTAL LOAD DEFLECTION **L/180**); ROOF PITCH ≤ 6/12

Product Grade	Single Ply Thickness (in)	No. of plies	Depth (in)	Horizontal Span (ft)																																						
				3			4			5			6			7			8			10			12			14			16			18			20			24		
				Snow Load (PLF)	Total Load (PLF)	Min. End/Int. Bearing (in)	Snow Load (PLF)	Total Load (PLF)	Min. End/Int. Bearing (in)	Snow Load (PLF)	Total Load (PLF)	Min. End/Int. Bearing (in)	Snow Load (PLF)	Total Load (PLF)	Min. End/Int. Bearing (in)	Snow Load (PLF)	Total Load (PLF)	Min. End/Int. Bearing (in)	Snow Load (PLF)	Total Load (PLF)	Min. End/Int. Bearing (in)	Snow Load (PLF)	Total Load (PLF)	Min. End/Int. Bearing (in)	Snow Load (PLF)	Total Load (PLF)	Min. End/Int. Bearing (in)	Snow Load (PLF)	Total Load (PLF)	Min. End/Int. Bearing (in)	Snow Load (PLF)	Total Load (PLF)	Min. End/Int. Bearing (in)	Snow Load (PLF)	Total Load (PLF)	Min. End/Int. Bearing (in)						
1.55E LSL	1-1/8	1	5.5	766	3.50\5.25																																					
			7.25	848	3.50\5.25																																					
			9.25	1532	3.50\5.25																																					
		2	5.5	1697	3.50\5.25	1314	3.50\5.25	1028	3.50\5.25	733	3.50\5.25	549	3.50\5.25	391	3.50\5.25	206	3.50\5.25	122	3.50\5.25																							
			7.25	1697	3.50\5.25	1314	3.50\5.25	1028	3.50\5.25	733	3.50\5.25	549	3.50\5.25	391	3.50\5.25	206	3.50\5.25	122	3.50\5.25	78	1.75\3.50																					
			9.25	1697	3.50\5.25	1314	3.50\5.25	1028	3.50\5.25	733	3.50\5.25	549	3.50\5.25	391	3.50\5.25	206	3.50\5.25	122	3.50\5.25	78	1.75\3.50																					
		3	5.5	1697	3.50\5.25	1314	3.50\5.25	1028	3.50\5.25	733	3.50\5.25	549	3.50\5.25	391	3.50\5.25	206	3.50\5.25	122	3.50\5.25	78	1.75\3.50	53	1.75\3.50																			
			7.25	1697	3.50\5.25	1314	3.50\5.25	1028	3.50\5.25	733	3.50\5.25	549	3.50\5.25	391	3.50\5.25	206	3.50\5.25	122	3.50\5.25	78	1.75\3.50	53	1.75\3.50																			
			9.25	1697	3.50\5.25	1314	3.50\5.25	1028	3.50\5.25	733	3.50\5.25	549	3.50\5.25	391	3.50\5.25	206	3.50\5.25	122	3.50\5.25	78	1.75\3.50	53	1.75\3.50																			
		4	5.5	1697	3.50\5.25	1314	3.50\5.25	1028	3.50\5.25	733	3.50\5.25	549	3.50\5.25	391	3.50\5.25	206	3.50\5.25	122	3.50\5.25	78	1.75\3.50	53	1.75\3.50																			
			7.25	1697	3.50\5.25	1314	3.50\5.25	1028	3.50\5.25	733	3.50\5.25	549	3.50\5.25	391	3.50\5.25	206	3.50\5.25	122	3.50\5.25	78	1.75\3.50	53	1.75\3.50																			
			9.25	1697	3.50\5.25	1314	3.50\5.25	1028	3.50\5.25	733	3.50\5.25	549	3.50\5.25	391	3.50\5.25	206	3.50\5.25	122	3.50\5.25	78	1.75\3.50	53	1.75\3.50																			

- Design Assumptions**
- 1) Tabulated span is the center-to-center horizontal distance between supports and is valid for simple or continuous span applications.
 - 2) The allowable load represents the capacity in pounds per lineal foot (plf) of length
 - 3) Tabulated values are valid for uniform loads only.
 - 4) Minimum end/interior bearings as indicated in the table.
 - 5) Tabulated values assume full lateral support on the compression edge. Full support is considered to be a maximum unbraced length of 24".
 - 6) Tabulated values are valid for dry service conditions, where the moisture content in service does not exceed 16%, as in most covered structures.
 - 7) It is recommended to use a live load deflection of L/360 and a total load deflection of L/240 for beams/headers over doors or windows.
 - 8) For continuous spans, ratio of short span to long span should be ≥ 0.4 to prevent uplift.

- How to use this table**
- 1) Both total and snow loads shall be checked. Where the snow load is blank the total load governs the design.
 - 2) Member weight shall be included in the total load.
 - 3) Select the appropriate Horizontal Span .
 - 4) Scan vertically to find the proper thickness and depth with the capacities that exceed the actual total load.
 - 5) Verify the min. end/interior bearing lengths.
 - 6) The resulting snow load shall not exceed the total load.
 - 7) For loading conditions not shown, use CSD* software or contact your Tolko representative.

TABLE 30: ALLOWABLE UNIFORM PLF ROOF SNOW LOADS (115%) - 1.35E TOLKO T-TEC LSL **1-3/4"** WIDTH (LIVE LOAD DEFLECTION **L/240**; TOTAL LOAD DEFLECTION **L/180**); 6/12 < ROOF PITCH ≤ 12/12

Table with 30 columns and 118 rows. Columns include Product Grade, Single Ply Thickness, No. of plies, Depth, and Horizontal Span (ft) with sub-columns for 3, 4, 5, 6, 7, 8, 10, 12, 14, 16, 18, 20, 24 ft spans, each with Snow Load, Total Load, and Min. End/Int. Bearing.

See Notes and Design Assumptions from Table 13.

TABLE 31: ALLOWABLE UNIFORM PLF ROOF SNOW LOADS (115%) - 1.35E TOLKO T-TEC LSL **1-3/4"** WIDTH (LIVE LOAD DEFLECTION **L/360**; TOTAL LOAD DEFLECTION **L/240**); NO SLOPE

Table with 30 columns and 118 rows. Columns include Product Grade, Single Ply Thickness, No. of plies, Depth, and Horizontal Span (ft) with sub-columns for 3, 4, 5, 6, 7, 8, 10, 12, 14, 16, 18, 20, 24 ft spans, each with Snow Load, Total Load, and Min. End/Int. Bearing.

See Notes and Design Assumptions from Table 13.

TABLE 42: ALLOWABLE UNIFORM PLF ROOF LIVE LOADS (125%) - 1.55E TOLKO T-TEC LSL **1-1/2"** WIDTH (LIVE LOAD DEFLECTION **L/240**; TOTAL LOAD DEFLECTION **L/180**); 6/12 < ROOF PITCH ≤ 12/12

Table with columns: Product Grade, Single Ply Thickness (in), No. of plies, Depth (in), and Horizontal Span (ft). Sub-columns include 3, 4, 5, 6, 7, 8, 10, 12, 14, 16, 18, 20, 24. Each sub-column contains Roof Live Load, Total Load, and Min. End/Int. Bearing.

See Notes and Design Assumptions from Table 33.

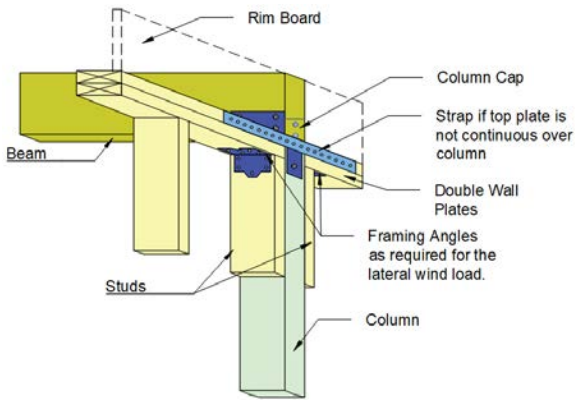
TABLE 43: ALLOWABLE UNIFORM PLF ROOF LIVE LOADS (125%) - 1.55E TOLKO T-TEC LSL **1-1/2"** WIDTH (LIVE LOAD DEFLECTION **L/360**; TOTAL LOAD DEFLECTION **L/240**); NO SLOPE

Table with columns: Product Grade, Single Ply Thickness (in), No. of plies, Depth (in), and Horizontal Span (ft). Sub-columns include 3, 4, 5, 6, 7, 8, 10, 12, 14, 16, 18, 20, 24. Each sub-column contains Roof Live Load, Total Load, and Min. End/Int. Bearing.

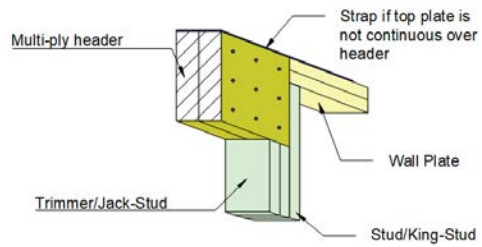
See Notes and Design Assumptions from Table 33.

SECTION 4: BEAM DETAILS

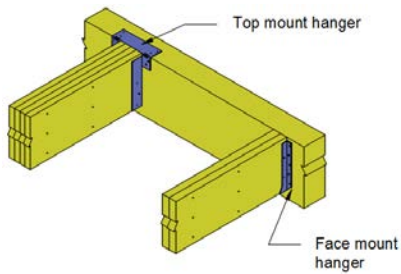
Detail 1: Bearing at Wall



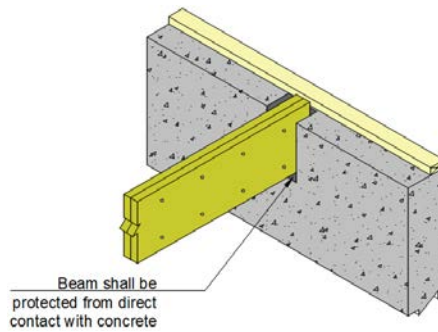
Detail 2: Bearing for Door or Window Header



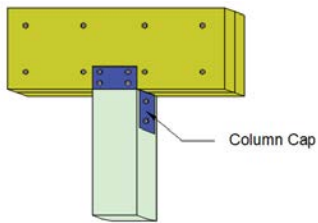
Detail 3: Beam to Beam Connection



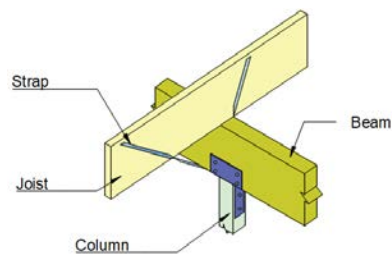
Detail 4: Bearing at Concrete Wall



Detail 5: Bearing at Column

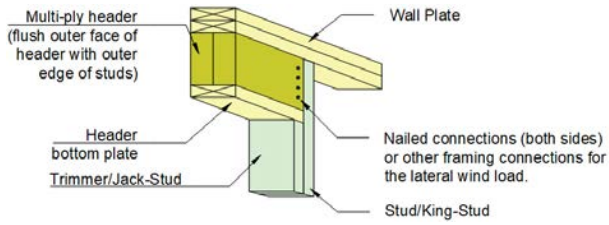


Detail 6: Beam to Column Lateral Brace

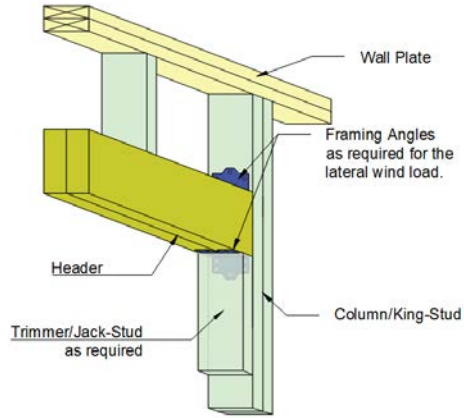


SECTION 5: HEADER DETAILS

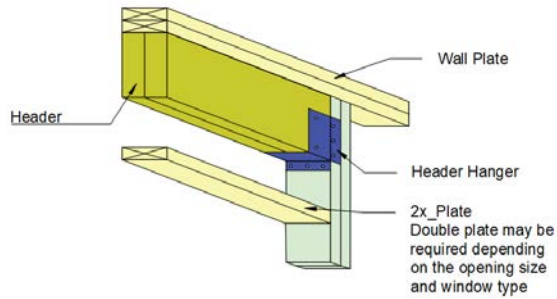
Detail 7: Full Depth Header



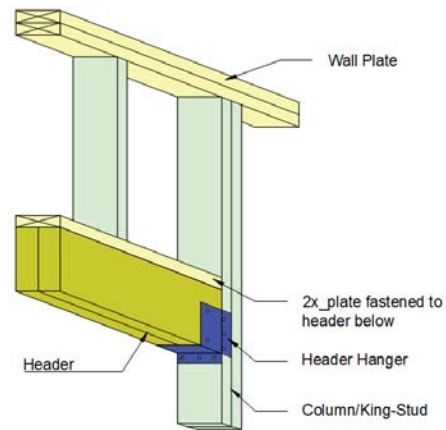
Detail 8: Low Header with Framing Angles



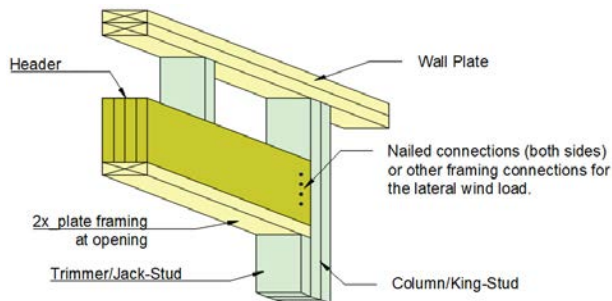
Detail 9: High Header



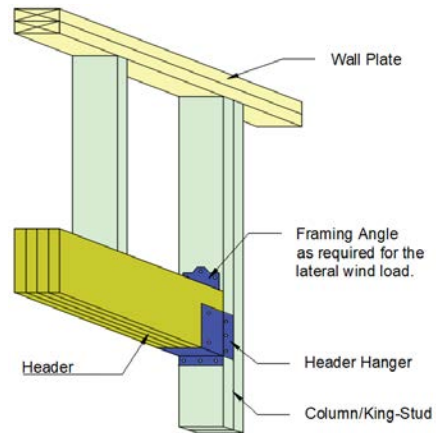
Detail 10: Low Header with Top Plate



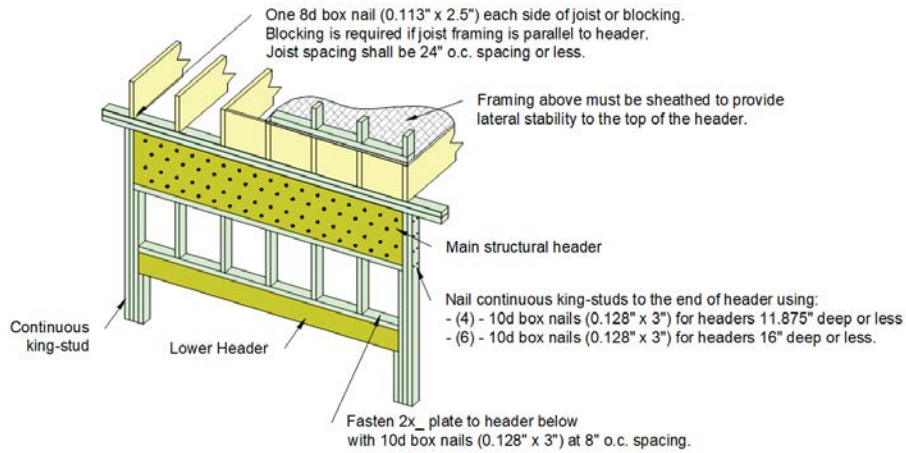
Detail 11: Low Header with Bottom Plate



Detail 12: Low Header with Hanger and Framing Angles

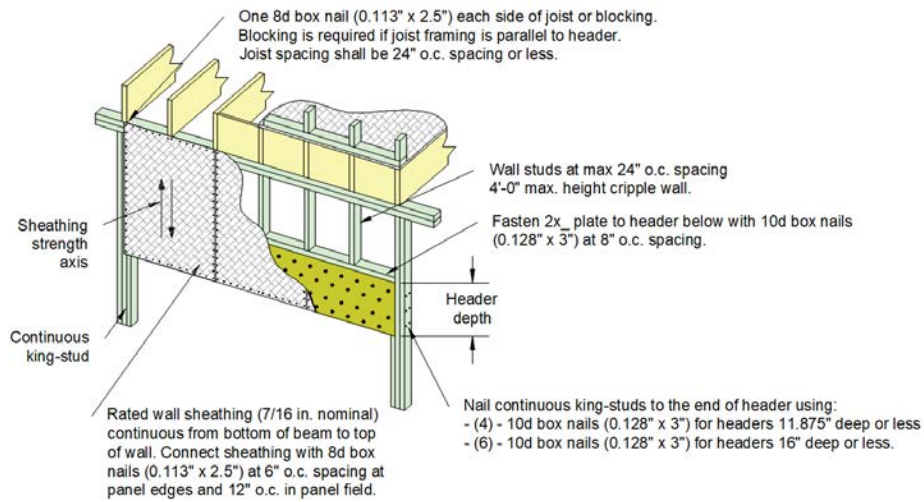


Detail 13: Dropped Header with Full Lateral Bracing



Reference: WIJMA – Dropped Header Design Guide

Detail 14: Dropped Header with Acceptable Lateral Bracing



Reference: WIJMA – Dropped Header Design Guide

Notes:

When framed as shown above, the dropped header is considered fully braced under uniform-load, for the following simple/multiple span conditions:

Single-ply Headers	Multiply-ply Headers
1 1/2" width; 9 1/2" deep or less	Up to four 1-1/8" or 1-1/4 plies; 7-1/4" deep or less
1 3/4" width; 11 7/8" deep or less	Up to four 1-1/2" plies; 9-1/2" deep or less
	Up to four 1-3/4" plies; 11-7/8" deep or less

Else, the lateral stability factor shall be included in the header design as per NDS (National Design Specification for Wood Construction).

SECTION 6: ALLOWABLE HOLES

TABLE 53: MAXIMUM 1.5" – 2" DIAMETER ROUND HOLES (SINGLE OR MULTIPLE SPANS)

Product Grade	Width (in)	Depth (in)	Max. Round Hole Diameter (in)
1.35E / 1.55E T-TEC LSL	1-1/8, 1-1/4, 1-1/2, 1-3/4	7-1/4	1.5
		9-1/4 to 16	2

Notes:

- 1) Holes allowed for single or continuous spans for uniform loads only.
- 2) No more than 3 holes per span are permitted.
- 3) Holes shall not be cut in cantilevers.
- 4) The horizontal spacing must be a minimum of two diameters clear distance between adjacent holes based on the diameter of the larger hole.
- 5) When holes are required to be drilled outside the allowable zones, an engineering analysis shall be conducted and approved by a professional engineer.

Reference: APA - The Engineered Wood Association: Form No. EWS G535A

FIGURE 1: MAXIMUM 1.5" – 2" DIAMETER ROUND HOLES (SINGLE OR MULTIPLE SPANS)

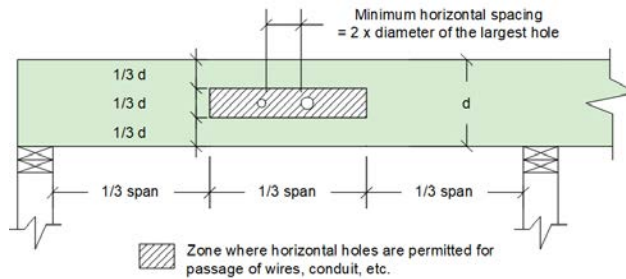
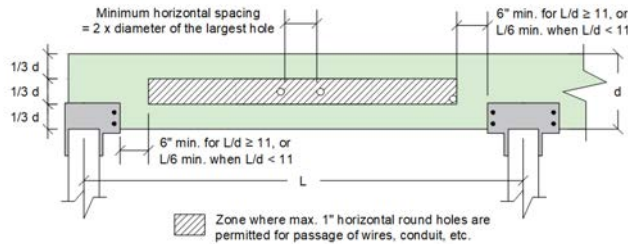


FIGURE 2: MAXIMUM 1" DIAMETER ROUND HOLES (SINGLE OR MULTIPLE SPANS)



Notes:

- 1) A 1-inch diameter hole may be cut at the middle 1/3 of the beam depth anywhere along the span, except for the area that is within 6 inches of clear distance between the face of the support and the nearest edge of the hole for $L/d \geq 11$, or $L/6$ when $L/d < 11$.
- 2) Holes allowed for single or continuous spans for uniform loads only.
- 3) No more than 3 holes per span are permitted.
- 4) Holes shall not be cut in cantilevers.
- 5) Beam depth shall be at least 7.25 inches.
- 6) The horizontal spacing must be a minimum of two diameters clear distance between adjacent holes based on the diameter of the larger hole.
- 7) When holes are required to be drilled outside the allowable zones, an engineering analysis shall be conducted and approved by a professional engineer.

Reference: APA - The Engineered Wood Association: Form No. EWS G535A

SECTION 7: BEARING LENGTHS REQUIREMENTS

TABLE 54: BEARING LENGTHS REQUIRED (IN) - 1.55E T-TEC LSL
1-1/8" WIDTH

Reaction (lbs)	1.55E LSL						
	Width (in)						
	Beam Orientation			Plank Orientation			
	1-1/8	2-1/4	3-3/8	4-1/2	3-1/2	5-1/2	7-1/4
2000	2	1-3/4	1-3/4	1 3/4	1-3/4	1-3/4	1-3/4
4000	4	2	1-3/4	1 3/4	1-3/4	1-3/4	1-3/4
6000	6	3	2	1 3/4	2-1/4	1-3/4	1-3/4
8000		4	2-3/4	2	3	2	1-3/4
10000		5	3-1/2	2 1/2	3-3/4	2-1/2	2
12000		6	4	3	4-1/2	3	2-1/4
14000		7	4-3/4	3 1/2	5-1/4	3-1/2	2-1/2
16000			5-1/2	4	6	4	3
18000			6	4 1/2	6-3/4	4-1/4	3-1/4
20000			6-3/4	5	7-1/2	4-3/4	3-3/4
22000			7-1/4	5 1/2		5-1/4	4
24000				6		5-3/4	4-1/2
26000				6 1/2		6-1/4	4-3/4
28000				7		6-3/4	5
30000				7 1/2		7-1/4	5-1/2

Notes

- 1) Bearing lengths are based on fcp_plank = 775 psi and fcp_edge = 900 psi
- 2) Min. end bearing lengths = 1-3/4", and 3-1/2" for the interior bearing supports.
- 3) Member shall be supported across the full width at all bearing supports.

TABLE 55: BEARING LENGTHS REQUIRED (IN) - 1.55E T-TEC LSL
1-1/4" WIDTH

Reaction (lbs)	1.55E LSL						
	Width (in)						
	Beam Orientation				Plank Orientation		
	1-1/4	2-1/2	3-3/4	5	3-1/2	5-1/2	7-1/4
2000	2	1-3/4	1-3/4	1-3/4	1-3/4	1-3/4	1-3/4
4000	3-3/4	2	1-3/4	1-3/4	1-3/4	1-3/4	1-3/4
6000	5-1/2	2-3/4	2	1-3/4	2-1/4	1-3/4	1-3/4
8000		3-3/4	2-1/2	2	3	2	1-3/4
10000		4-1/2	3	2-1/4	3-3/4	2-1/2	2
12000		5-1/2	3-3/4	2-3/4	4-1/2	3	2-1/4
14000		6-1/4	4-1/4	3-1/4	5-1/4	3-1/2	2-1/2
16000			4-3/4	3-3/4	6	4	3
18000			5-1/2	4	6-3/4	4-1/4	3-1/4
20000			6	4-1/2	7-1/2	4-3/4	3-3/4
22000			6-3/4	5		5-1/4	4
24000				5-1/2		5-3/4	4-1/2
26000				6		6-1/4	4-3/4
28000				6-1/4		6-3/4	5
30000				6-3/4		7-1/4	5-1/2

Notes:

- 1) Bearing lengths are based on fcp_plank = 775 psi and fcp_edge = 900 psi
- 2) Min. end bearing lengths = 1-3/4", and 3-1/2" for the interior bearing supports.
- 3) Member shall be supported across the full width at all bearing supports.

TABLE 56: BEARING LENGTHS REQUIRED (IN) - 1.55E T-TEC LSL
1-1/2" WIDTH

Reaction (lbs)	1.55E LSL						
	Width (in)						
	Beam Orientation			Plank Orientation			
	1-1/2	3	4-1/2	6	3-1/2	5-1/2	7-1/4
2000	1-3/4	1-3/4	1-3/4	1-3/4	1-3/4	1-3/4	1-3/4
4000	3	1-3/4	1-3/4	1-3/4	1-3/4	1-3/4	1-3/4
6000	4-1/2	2-1/4	1-3/4	1-3/4	2-1/4	1-3/4	1-3/4
8000		3	2	1-3/4	3	2	1-3/4
10000		3-3/4	2-1/2	2	3-3/4	2-1/2	2
12000		4-1/2	3	2-1/4	4-1/2	3	2-1/4
14000		5-1/4	3-1/2	2-3/4	5-1/4	3-1/2	2-1/2
16000			4	3	6	4	3
18000			4-1/2	3-1/2	6-3/4	4-1/4	3-1/4
20000			5	3-3/4	7-1/2	4-3/4	3-3/4
22000			5-1/2	4-1/4		5-1/4	4
24000				4-1/2		5-3/4	4-1/2
26000				5		6-1/4	4-3/4
28000				5-1/4		6-3/4	5
30000				5-3/4		7-1/4	5-1/2

Notes:

- 1) Bearing lengths are based on fcp_plank = 775 psi and fcp_edge = 900 psi
- 2) Min. end bearing lengths = 1-3/4", and 3-1/2" for the interior bearing supports.
- 3) Member shall be supported across the full width at all bearing supports.

TABLE 57: BEARING LENGTHS REQUIRED (IN) - 1.35E T-TEC LSL
1-1/2" WIDTH

Reaction (lbs)	1.35E LSL						
	Width (in)						
	Beam Orientation				Plank Orientation		
	1-1/2	3	4-1/2	6	3-1/2	5-1/2	7-1/4
2000	2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2
4000	3-3/4	2	1-1/2	1-1/2	1-3/4	1-1/2	1-1/2
6000	5-1/2	2-3/4	2	1-1/2	2-1/2	1-3/4	1-1/2
8000	7-1/4	3-3/4	2-1/2	2	3-1/2	2-1/4	1-3/4
10000		4-1/2	3	2-1/4	4-1/4	2-3/4	2
12000		5-1/2	3-3/4	2-3/4	5	3-1/4	2-1/2
14000		6-1/4	4-1/4	3-1/4	6	3-3/4	3
16000		7-1/4	4-3/4	3-3/4	6-3/4	4-1/4	3-1/4
18000			5-1/2	4	7-1/2	4-3/4	3-3/4
20000			6	4-1/2		5-1/2	4
22000			6-3/4	5		6	4-1/2
24000			7-1/4	5-1/2		6-1/2	5
26000				6		7	5-1/4
28000				6-1/4		7-1/2	5-3/4
30000				6-3/4			6

Notes:

- 1) Bearing lengths are based on fcp_plank = 690 psi; fcp_edge = 750 psi
- 2) Min. end bearing lengths = 1-1/2", and 3-1/2" for the interior bearing supports.
- 3) Member shall be supported across full width at all bearing supports.

TABLE 58: BEARING LENGTHS REQUIRED (IN) - 1.35E T-TEC LSL 1-3/4" WIDTH

Reaction (lbs)	1.35E LSL						
	Width (in)						
	Beam Orientation			Plank Orientation			
	1-3/4	3-1/2	5-1/4	7	3-1/2	5-1/2	7-1/4
2000	1-3/4	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2
4000	3-1/4	1-3/4	1-1/2	1-1/2	1-3/4	1-1/2	1-1/2
6000	4-3/4	2-1/2	1-3/4	1-1/2	2-1/2	1-3/4	1-1/2
8000	6-1/4	3-1/4	2-1/4	1-3/4	3-1/2	2-1/4	1-3/4
10000	7-3/4	4	2-3/4	2	4-1/4	2-3/4	2
12000		4-3/4	3-1/4	2-1/2	5	3-1/4	2-1/2
14000		5-1/2	3-3/4	2-3/4	6	3-3/4	3
16000		6-1/4	4-1/4	3-1/4	6-3/4	4-1/4	3-1/4
18000		7	4-3/4	3-1/2	7-1/2	4-3/4	3-3/4
20000		7-3/4	5-1/4	4		5-1/2	4
22000			5-3/4	4-1/4		6	4-1/2
24000			6-1/4	4-3/4		6-1/2	5
26000			6-3/4	5		7	5-1/4
28000			7-1/4	5-1/2		7-1/2	5-3/4
30000			7-3/4	5-3/4			6

Notes:

- 1) Bearing lengths are based on fcp_plank = 690 psi; fcp_edge = 750 psi
- 2) Min. end bearing lengths = 1-1/2", and 3-1/2" for the interior bearing supports.
- 3) Member shall be supported across full width at all bearing supports.

SECTION 8: TAPERED END CUTS

TABLE 59: ALLOWABLE REACTIONS FOR TAPERED END CUTS - 1.35E T-TEC LSL - 1-1/2" WIDTH

Bearing Support	Beam Depth	Allowable Reactions (lbs) for 3" wide - 1.35E LSL Beams							
		Heel Height - D1							
		4-1/2"	5"	5-1/2"	6"	6-1/2"	7"	7-1/2"	8"
3-1/2" Wood Plate	7-1/4"	3548	3935	4463	4463				
	9-1/4"		3878	4208	4463	4463	4463	4463	4463
	9-1/2"		3878	4208	4463	4463	4463	4463	4463
	11-1/4"				4463	4463	4463	4463	4463
	11-7/8"					4463	4463	4463	4463
	14"								4463
5-1/4" Wood Plate	7-1/4"	3846	4417	4711	4785				
	9-1/4"	3836	4166	4496	4826	5407	5826	6048	6105
	9-1/2"	3836	4166	4496	4826	5308	5822	6128	6260
	11-1/4"			4496	4826	5156	5486	5816	6361
	11-7/8"				4826	5156	5486	5816	6146
	14"							5816	6146
3-1/2" Column	7-1/4"	3548	3935	4468	4731				
	9-1/4"		3878	4208	4538	4868	5471	5864	6063
	9-1/2"		3878	4208	4538	4868	5385	5871	6154
	11-1/4"				4538	4868	5198	5528	5858
	11-7/8"					4868	5198	5528	5858
	14"								5858

Notes:

- 1) For 1-1/8", 2-1/4", and 4-1/2" wide beams (solid or multi-ply members), multiply tabulated reactions by 0.33, 0.66, and 1.33, respectively.
- 2) 1-1/8" wide beams are limited to 7.25" max. depth.
- 3) Bearing length is based on the bearing resistance of 425 psi for the Wood Plates and 900 psi for the Column bearing supports.
- 4) Table considers only downward loading conditions. For beams with uplift loads contact Tolko's representative.
- 5) Load duration factor C_D = 1.0. No increase for the other load durations is permitted.
- 6) Holes or concentrated loads are not allowed within the tapered cut.
- 7) Tapered cut length should not exceed (1/3) of the span.
- 8) Min. tapered cut slope = 3/12.
- 9) Contact Tolko's representative for other design conditions.

TABLE 60: ALLOWABLE REACTIONS FOR TAPERED END CUTS - 1.55E T-TEC LSL 1-1/4" WIDTH

Bearing Support	Beam Depth	Allowable Reactions (lbs) for 3-3/4" - 1.55E LSL Beams							
		Heel Height - D1							
		4-1/2"	5"	5-1/2"	6"	6-1/2"	7"	7-1/2"	8"
3-1/2" Wood Plate	7-1/4"	5,578	5,578	5,578	5,578				
	9-1/4"		5,578	5,578	5,578	5,578	5,578	5,578	5,578
	9-1/2"		5,578	5,578	5,578	5,578	5,578	5,578	5,578
	11-1/4"			5,578	5,578	5,578	5,578	5,578	5,578
	11-7/8"					5,578	5,578	5,578	5,578
	14"								5,578
5-1/4" Wood Plate	7-1/4"	7,649	8,367	8,367	8,367				
	9-1/4"	7,629	8,285	8,367	8,367	8,367	8,367	8,367	8,367
	9-1/2"	7,629	8,285	8,367	8,367	8,367	8,367	8,367	8,367
	11-1/4"			8,367	8,367	8,367	8,367	8,367	8,367
	11-7/8"				8,367	8,367	8,367	8,367	8,367
	14"							8,367	8,367
3-1/2" Column	7-1/4"	7,055	7,826	8,885	9,408				
	9-1/4"		7,711	8,367	9,023	9,680	10,880	11,661	11,813
	9-1/2"		7,711	8,367	9,023	9,680	10,708	11,675	11,813
	11-1/4"				9,023	9,680	10,336	10,992	11,648
	11-7/8"					9,680	10,336	10,992	11,648
	14"								11,648

Notes:

- 1) For 1-1/4", 2-1/2", and 5" beams, multiply tabulated reactions by 0.33, 0.66, and 1.33, respectively.
- 2) For 1-1/4" width, max. depth = 7.25".
- 3) Bearing length is based on the bearing resistance of 425 psi for the Wood Plates and 900 psi for the Column bearing supports.
- 4) Table considers only downward loading conditions. For beams with uplift loads contact Tolko's representative.
- 5) Load duration factor $C_D = 1.0$. No increase for the other load durations is permitted.
- 6) Holes or concentrated loads are not allowed within the tapered cut.
- 7) Tapered cut length should not exceed (1/3) of the span.
- 8) Min. tapered cut slope = 3/12.
- 9) Contact Tolko's representative for other design conditions.

TABLE 61: ALLOWABLE REACTIONS FOR TAPERED END CUTS - 1.55E T-TEC LSL 1-1/2" WIDTH

Bearing Support	Beam Depth	Allowable Reactions (lbs) for 3" - 1.55E LSL Beams							
		Heel Height - D1							
		4-1/2"	5"	5-1/2"	6"	6-1/2"	7"	7-1/2"	8"
3-1/2" Wood Plate	7-1/4"	4,463	4,463	4,463	4,463				
	9-1/4"		4,463	4,463	4,463	4,463	4,463	4,463	4,463
	9-1/2"		4,463	4,463	4,463	4,463	4,463	4,463	4,463
	11-1/4"				4,463	4,463	4,463	4,463	4,463
	11-7/8"					4,463	4,463	4,463	4,463
	14"								4,463
5-1/4" Wood Plate	7-1/4"	6,119	6,694	6,694	6,694				
	9-1/4"	6,103	6,628	6,694	6,694	6,694	6,694	6,694	6,694
	9-1/2"	6,103	6,628	6,694	6,694	6,694	6,694	6,694	6,694
	11-1/4"			6,694	6,694	6,694	6,694	6,694	6,694
	11-7/8"				6,694	6,694	6,694	6,694	6,694
	14"								6,694
3-1/2" Column	7-1/4"	5,644	6,261	7,108	7,527				
	9-1/4"		6,169	6,694	7,219	7,744	8,704	9,329	9,450
	9-1/2"		6,169	6,694	7,219	7,744	8,567	9,340	9,450
	11-1/4"				7,219	7,744	8,269	8,794	9,319
	11-7/8"					7,744	8,269	8,794	9,319
	14"								9,319

Notes:

- 1) For 1-1/2", 4-1/2", and 6" beams, multiply tabulated reactions by 0.5, 1.5, and 2, respectively.
- 2) For 1-1/2" width, max. depth = 11.875".
- 3) Bearing length is based on the bearing resistance of 425 psi for the Wood Plates and 900 psi for the Column bearing supports.
- 4) Table considers only downward loading conditions. For beams with uplift loads contact Tolko's representative.
- 5) Load duration factor $C_D = 1.0$. No increase for the other load durations is permitted.
- 6) Holes or concentrated loads are not allowed within the tapered cut.
- 7) Tapered cut length should not exceed (1/3) of the span.
- 8) Min. tapered cut slope = 3/12.
- 9) Contact Tolko's representative for other design conditions.

TABLE 62: ALLOWABLE REACTIONS FOR TAPERED END CUTS - 1.35E T-TEC LSL 1-1/2" WIDTH

Bearing Support	Beam Depth	Allowable Reactions (lbs) for 3" wide - 1.35E LSL Beams							
		Heel Height - D1							
		4-1/2"	5"	5-1/2"	6"	6-1/2"	7"	7-1/2"	8"
3-1/2" Wood Plate	7-1/4"	3548	3935	4463	4463				
	9-1/4"		3878	4208	4463	4463	4463	4463	4463
	9-1/2"		3878	4208	4463	4463	4463	4463	4463
	11-1/4"				4463	4463	4463	4463	4463
	11-7/8"					4463	4463	4463	4463
	14"								4463
5-1/4" Wood Plate	7-1/4"	3846	4417	4711	4785				
	9-1/4"	3836	4166	4496	4826	5407	5826	6048	6105
	9-1/2"	3836	4166	4496	4826	5308	5822	6128	6260
	11-1/4"			4496	4826	5156	5486	5816	6361
	11-7/8"				4826	5156	5486	5816	6146
	14"							5816	6146
3-1/2" Column	7-1/4"	3548	3935	4468	4731				
	9-1/4"		3878	4208	4538	4868	5471	5864	6063
	9-1/2"		3878	4208	4538	4868	5385	5871	6154
	11-1/4"				4538	4868	5198	5528	5858
	11-7/8"					4868	5198	5528	5858
	14"								5858

Notes:

- 1) For 1-1/2", 4-1/2", and 6" wide beams, multiply tabulated reactions by 0.5, 1.5, and 2, respectively.
- 2) For 11/2" wide beams, the max. depth = 11-7/8".
- 3) Bearing length is based on the bearing resistance of 425 psi for the Wood Plates and 750 psi for the Column bearing supports.
- 4) Table considers only downward loading conditions. For beams with uplift loads contact Tolko's representative.
- 5) Load duration factor CD = 1.0. No increase for the other load durations is permitted.
- 6) Holes or concentrated loads are not allowed within the tapered cut.
- 7) Tapered cut length should not exceed (1/3) of the span.
- 8) Min. tapered cut slope = 3/12.
- 9) Contact Tolko's representative for other design conditions.

TABLE 63: ALLOWABLE REACTIONS FOR TAPERED END CUTS - 1.35E T-TEC LSL 1-3/4" WIDTH

Bearing Support	Beam Depth	Allowable Reactions (lbs) for 3-1/2" wide - 1.35E LSL Beams							
		Heel Height - D1							
		4-1/2"	5"	5-1/2"	6"	6-1/2"	7"	7-1/2"	8"
3-1/2" Wood Plate	7-1/4"	4139	4591	5206	5206				
	9-1/4"		4524	4909	5206	5206	5206	5206	5206
	9-1/2"		4524	4909	5206	5206	5206	5206	5206
	11-1/4"				5206	5206	5206	5206	5206
	11-7/8"					5206	5206	5206	5206
	14"								5206
5-1/4" Wood Plate	7-1/4"	4488	5154	5496	5583				
	9-1/4"	4476	4861	5246	5631	6308	6797	7056	7123
	9-1/2"	4476	4861	5246	5631	6192	6793	7150	7303
	11-1/4"			5246	5631	6016	6401	6786	7421
	11-7/8"				5631	6016	6401	6786	7171
	14"							6786	7171
3-1/2" Column	7-1/4"	4139	4591	5213	5520				
	9-1/4"		4524	4909	5294	5679	6383	6841	7074
	9-1/2"		4524	4909	5294	5679	6282	6850	7179
	11-1/4"				5294	5679	6064	6449	6834
	11-7/8"					5679	6064	6449	6834
	14"								6834

Notes:

- 1) For 1-3/4", 5-1/4", and 7" wide beams, multiply tabulated reactions by 0.5, 1.5, and 2, respectively.
- 2) Bearing length is based on the bearing resistance of 425 psi for the Wood Plates and 750 psi for the Column bearing supports.
- 3) Table considers only downward loading conditions. For beams with uplift loads contact Tolko's representative.
- 4) Load duration factor C_D = 1.0. No increase for the other load durations is permitted.
- 5) Holes or concentrated loads are not allowed within the tapered cut.
- 6) Tapered cut length should not exceed (1/3) of the span.
- 7) Min. tapered cut slope = 3/12.
- 8) Contact Tolko's representative for other design conditions.

FIGURE 3: TAPERED END CUT – WOOD PLATE CONNECTION

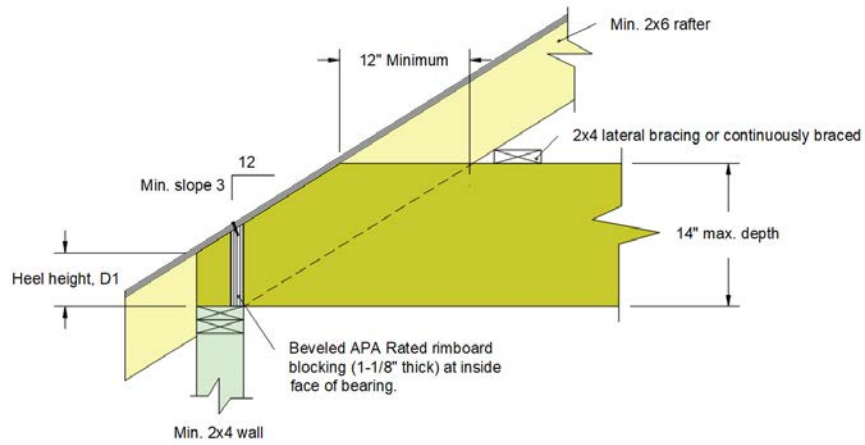


FIGURE 4: TAPERED END CUT – COLUMN CONNECTIONS

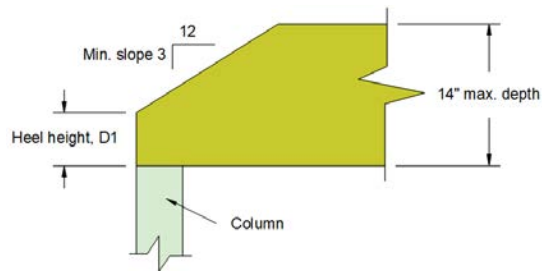
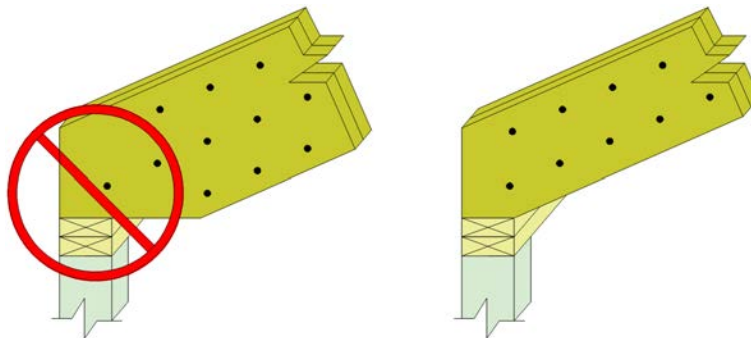


FIGURE 5: DO NOT OVERHANG SEAT CUT BEYOND INSIDE FACE OF THE BEARING SUPPORT



SECTION 9: MULTIPLE MEMBER CONNECTIONS: TOP LOADED MEMBERS

TABLE 64: MULTIPLE MEMBER CONNECTIONS: TOP LOADED MEMBERS

Product Grade	Ply Thickness (in)	# of Plies	Fastener Type	Depth (in)	# Rows	On-Center Spacing (in)	Location	Min. Edge Distance (in)	Min. End Distance (in)	Min. Distance Between Rows of Fasteners (in)
1.35 E & 1.55E T-TEC LSL	1-1/8 & 1-1/4	2	8d box nail (0.113" x 2.5")	7-1/4	2	12	One side (front or back)	1.5	3	3
				9-1/4, 9-1/2, 11-1/4, 11-7/8	3					
				14	4					
		3	8d box nail (0.113" x 2.5")	7-1/4	2	12	Both side (front and back) - stagger nails on the opposite side by 6"	1.5	3	3
				9-1/4, 9-1/2, 11-1/4, 11-7/8	3					
				14, 16	4					
	1-1/8	4	SDW22438	7-1/4, 9-1/4, 9-1/2	2	12	One side (front or back)	1.5	6	4
				11-1/4, 11-7/8, 14	3					
				16	4					
	1-1/4	4	SDW22500, WS5, WSWH5	7-1/4, 9-1/4, 9-1/2	2	12	One side (front or back)	1.5	6	4
				11-1/4, 11-7/8, 14	3					
				16	4					
	1-1/2	2	10d box nail (0.128" x 3")	7-1/4	2	12	One side (front or back)	1.5	3	3
				9-1/4, 9-1/2, 11-1/4, 11-7/8	3					
				14, 16	4					
		3	10d box nail (0.128" x 3")	7-1/4	2	12	Both side (front and back) - stagger nails on the opposite side by 6"	1.5	3	3
				9-1/4, 9-1/2, 11-1/4, 11-7/8	3					
				14, 16	4					
		4	SDW22600, WS6, WSWH6	7-1/4, 9-1/4, 9-1/2	2	12	One side (front or back)	1.5	6	4
				11-1/4, 11-7/8, 14	3					
				16	4					
	1-3/4	2	16d box nail (0.135" x 3.5")	7-1/4	2	12	One side (front or back)	1.5	3	3
				9-1/4, 9-1/2, 11-1/4, 11-7/8	3					
				14, 16	4					
3		16d box nail (0.135" x 3.5")	7-1/4	2	12	Both side (front and back) - stagger nails on the opposite side by 6"	1.5	3	3	
			9-1/4, 9-1/2, 11-1/4, 11-7/8	3						
			14, 16	4						
4		SDW22634, WSWH634	7-1/4, 9-1/4, 9-1/2	2	12	One side (front or back)	1.5	6	4	
			11-1/4, 11-7/8, 14	3						
			16	4						

Note:

- 1) Top Loads (uniform or concentrated) must be applied evenly across the entire total width.
- 2) Otherwise, the side-loaded connections (uniform or concentrated) shall be used.

SECTION 10: MULTIPLE MEMBER CONNECTIONS: UNIFORM SIDE LOADS

TABLE 65: MULTIPLE MEMBER CONNECTIONS FOR UNIFORM SIDE LOADS - NAILS

			Assembly A	Assembly B	Assembly A	Assembly B	Assembly A	Assembly B
Product Grade			1.55E T-TEC LSL		1.35E & 1.55E T-TEC LSL		1.35E T-TEC LSL	
Fastener type			8d Box Nail (0.113" x 2.5")		10d Box Nail (0.128" x 3")		16d Box Nail (0.135" x 3.5")	
Side Member thickness			1-1/8" or 1-1/4"		1-1/2"		1-3/4"	
Main member thickness			1-1/8" or 1-1/4"		1-1/2"		1-3/4"	
Min. depth (in.)	# of Rows	Fastener o.c. spacing (in.)	Max. Allowable Uniform Side Loads (PLF)					
7.25	2	12	290	220	375	280	415	310
9.25	3	12	435	325	560	420	620	465
14	4	12	580	435	745	560	825	620

Notes:

- 3) Min. nail edge distance = 1.5"
- 4) Min. nail end distance = 3"
- 5) Min. distance between rows of nails = 3"
- 6) Min. distance between nails in a row = 6"
- 7) Nails staggering distance = o.c. spacing/2
- 8) For other nails o.c. spacings, multiply the tabulated PLF load by 12/o.c. spacing (max. fasteners o.c. spacing = 24")
- 9) For three-ply members (Assembly B), min. o.c. spacing = 12"

TABLE 66: MULTIPLE MEMBER CONNECTIONS FOR UNIFORM SIDE LOADS - SIMPSON STRONG-DRIVE® SDW SCREWS

			Assembly F	Assembly F	Assembly A	Assembly B	Assembly F	Assembly A	Assembly B	Assembly F
Product grade			1.55E T-TEC LSL		1.35E & 1.55E T-TEC LSL			1.35E T-TEC LSL		
Fastener type			SDW22438	SDW22500	SDW22300	SDW22458	SDW22600	SDW22338	SDW22500	SDW22634
Fastener nominal length (in)			4-3/8	5	3	4-5/8	6	3-3/8	5	6-3/4
Side Member Thickness			1-1/8"	1-1/4"	1-1/2"	1-1/2"	1-1/2"	1-3/4"	1-3/4"	1-3/4"
Main Member Thickness			1-1/8"	1-1/4"	1-1/2"	1-1/2"	1-1/2"	1-3/4"	1-3/4"	1-3/4"
Min. depth (in.)	# of Rows	Fastener o.c. spacing (in.)	Max. Allowable Uniform Side Loads (PLF)							
7.25	2	12	630	630	1100	825	735	1600	900	800
11.25	3	12	940	940	1650	1240	1100	2400	1350	1200
16	4	12	1255	1255	2200	1650	1470	3200	1800	1600

Notes:

- 1) Min. fastener edge distance = 1.5"
- 2) Min. fastener end distance = 6"
- 3) Min. distance between rows of fasteners = 4"
- 4) Fasteners staggering distance = o.c. spacing/2
- 5) For other fasteners o.c. spacings, multiply the tabulated PLF load by 12/o.c. spacing (max. fasteners o.c. spacing = 24")
- 6) Fasteners installed on one side only.

TABLE 67: MULTIPLE MEMBER CONNECTIONS FOR UNIFORM SIDE LOADS - UPS WSWH/WS SCREWS

			Assembly F	Assembly A	Assembly B	Assembly F	Assembly A	Assembly B	Assembly F
Product grade			1.55E T-TEC LSL	1.35E & 1.55E T-TEC LSL			1.35E T-TEC LSL		
Fastener type			USP: WSWH5, WS5	USP: WSWH278, WS3	USP: WSWH45, WS45	USP: WSWH6, WS6	USP: WSWH338	USP: WSWH5, WS5	USP: WSWH634
Fastener nominal length (in)			5	3	4-5/8	6	3-3/8	5	6-3/4
Side Member Thickness			1-1/4"	1-1/2"	1-1/2"	1-1/2"	1-3/4"	1-3/4"	1-3/4"
Main Member Thickness			1-1/4"	1-1/2"	1-1/2"	1-1/2"	1-3/4"	1-3/4"	1-3/4"
Min. depth (in.)	# of Rows	Fastener o.c. spacing (in.)	Max. Allowable Uniform Side Loads (PLF)						
7.25	2	12	745	910	840	745	910	1075	955
11.25	3	12	1120	1365	1260	1120	1365	1615	1435
16	4	12	1490	1820	1675	1490	1820	2150	1910

Notes:

- 1) Min. fastener edge distance = 1.5"
- 2) Min. fastener end distance = 6"
- 3) Min. distance between rows of fasteners = 4"
- 4) Fasteners staggering distance = o.c. spacing/2
- 5) For other fasteners o.c. spacings, multiply the tabulated PLF load by 12/o.c. spacing (max. fasteners o.c. spacing = 24")
- 6) Fasteners installed on one side only.

SECTION 11: MULTIPLE MEMBER CONNECTIONS: CONCENTRATED SIDE LOADS

TABLE 68: 1.35E/1.55E LSL - MULTIPLE MEMBER CONNECTIONS FOR MAX. FACTORED CONCENTRATED SIDE LOADS - NAILS

		Assembly A	Assembly B	Assembly A	Assembly B	Assembly A	Assembly B
Product grade		1.55E T-TEC LSL		1.35E & 1.55E T-TEC LSL		1.35E T-TEC LSL	
Fastener type		8d Box Nail (0.113" x 2.5")		10d Box Nail (0.128" x 3")		16d Box Nail (0.135" x 3.5")	
Side Member Thickness		1-1/8" or 1-1/4"		1-1/2"		1-3/4"	
Main Member Thickness		1-1/8" or 1-1/4"		1-1/2"		1-3/4"	
Min depth (in.)	Total # of Fasteners	Max. Allowable Concentrated Side Loads (lbs)					
7.25	6	865	650	1120	840	1240	930
9.25	8	1155	865	1490	1120	1650	1240
9.5	12	1730	1300	2235	1675	2475	1855
11.25	16	2305	1730	2980	2235	3300	2475
14	18	2595	1945	3350	2515	3710	2785
16	24	-	2595	4465	3350	4945	3710

Notes:

- 1) Min. fastener edge distance = 1.5"
- 2) Min. fastener end distance = 3"
- 3) Min. distance between rows of fasteners = 3"

FIGURE 6: 6 NAILS

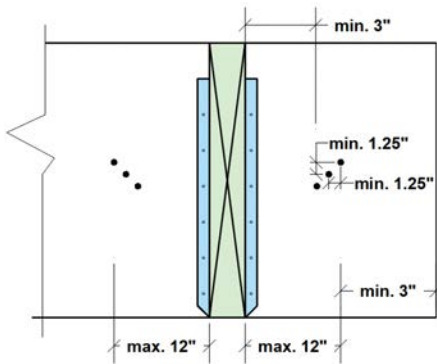


FIGURE 7: 8 NAILS

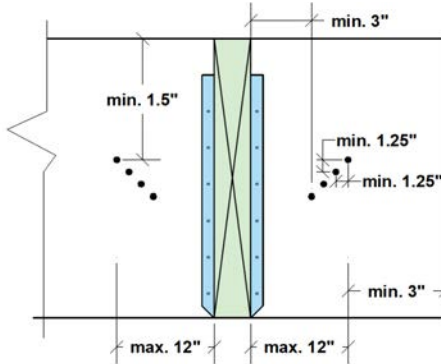


FIGURE 8: 12 NAILS

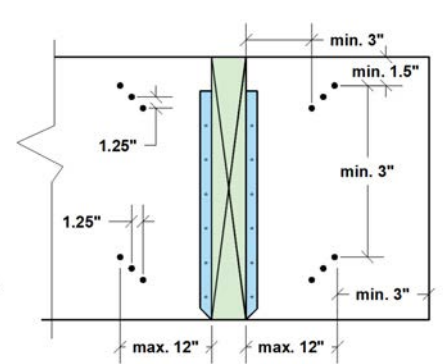


FIGURE 9: 16 NAILS

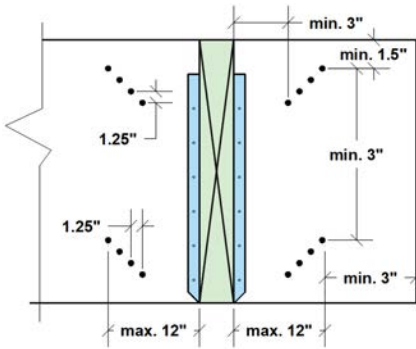


FIGURE 10: 18 NAILS

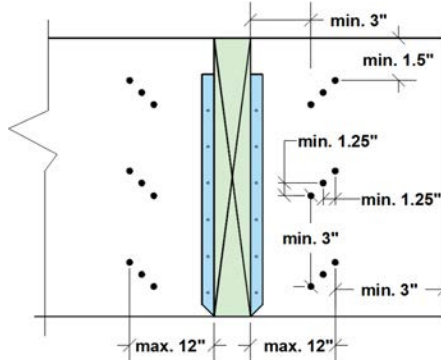


FIGURE 11: 24 NAILS

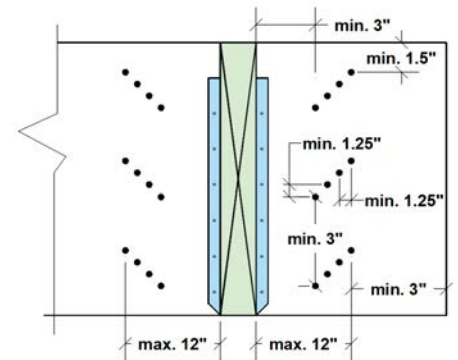


TABLE 69: MULTIPLE MEMBER CONNECTIONS FOR CONCENTRATED SIDE LOADS - SIMPSON STRONG-DRIVE® SDW SCREWS

		Assembly F	Assembly F	Assembly A	Assembly B	Assembly F	Assembly A	Assembly B	Assembly F
Product grade		1.55E T-TEC LSL		1.35E & 1.55E T-TEC LSL			1.35E T-TEC LSL		
Fastener type		SDW22438	SDW22500	SDW22300	SDW22458	SDW22600	SDW22338	SDW22500	SDW22634
Fastener nominal length (in)		4-3/8"	5	3	4-5/8"	6	3-3/8"	5	6-3/4"
Side Member Thickness		1-1/8"	1-1/4"	1-1/2"	1-1/2"	1-1/2"	1-3/4"	1-3/4"	1-3/4"
Main Member Thickness		1-1/8"	1-1/4"	1-1/2"	1-1/2"	1-1/2"	1-3/4"	1-3/4"	1-3/4"
Min depth (in.)	Total # of Fasteners	Max. Allowable Concentrated Side Loads (lbs)							
7.25	6	1880	1880	3300	2475	2200	4800	2700	2400
9.25	8	2510	2510	4400	3300	2935	6400	3600	3200
9.5	12	3760	3760	6600	4950	4400	9600	5400	4800
11.25	16	5015	5015	8800	6600	5870	12800	7200	6400
14	18	5640	5640	9900	7425	6600	14400	8100	7200

Notes:

- 1) Min. fastener edge distance = 1.5"
- 2) Min. fastener end distance = 6"
- 3) Min. distance between rows of fasteners = 4"

FIGURE 12: 6 SDW SCREWS

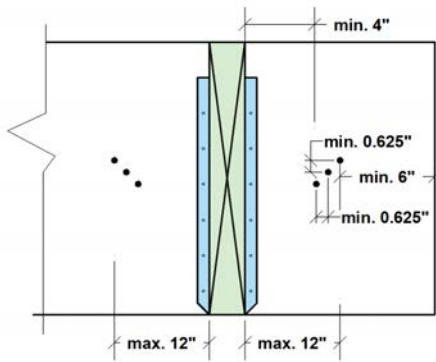


FIGURE 13: 8 SDW SCREWS

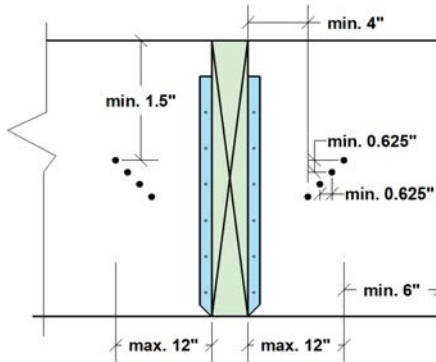


FIGURE 14: 12 SDW SCREWS

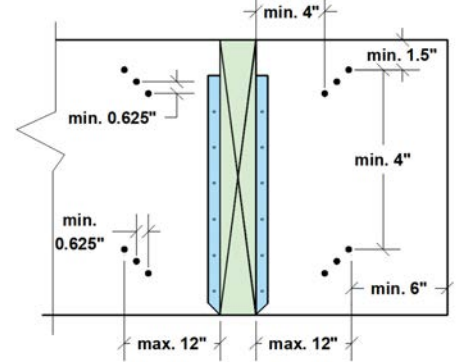


FIGURE 15: 16 SDW SCREWS

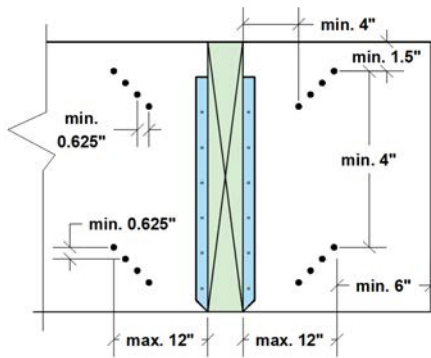


FIGURE 16: 18 SDW SCREWS

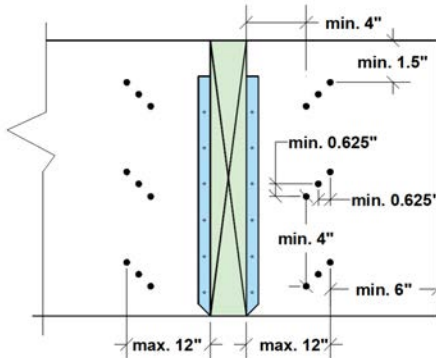


TABLE 70: MULTIPLE MEMBER CONNECTIONS FOR CONCENTRATED SIDE LOADS - UPS WSWH/WS SCREWS

		Assembly F	Assembly A	Assembly B	Assembly F	Assembly A	Assembly B	Assembly F
Product grade		1.55E T-TEC LSL	1.35E & 1.55E T-TEC LSL			1.35E T-TEC LSL		
Fastener type		USP: WSWH5, WS5	USP: WSWH278, WS3	USP: WSWH45, WS45	USP: WSWH6, WS6	USP: WSWH338	USP: WSWH5, WS5	USP: WSWH634
Fastener nominal length (in)		5	3	4-5/8	6	3-3/8	5	6-3/4
Side Member Thickness		1-1/4"	1-1/2"	1-1/2"	1-1/2"	1-3/4"	1-3/4"	1-3/4"
Main Member Thickness		1-1/4"	1-1/2"	1-1/2"	1-1/2"	1-3/4"	1-3/4"	1-3/4"
Min depth (in.)	Total # of Fasteners	Max. Allowable Concentrated Side Loads (lbs)						
7.25	6	2235	2725	2515	2235	2725	3225	2865
9.25	8	2980	3635	3350	2980	3635	4300	3820
9.5	12	4465	5450	5025	4465	5450	6445	5730
11.25	16	5955	7265	6700	5955	7265	8595	7640
14	18	6700	8175	7535	6700	8175	9670	8595

Notes:

- 1) Min. fastener edge distance = 1.5"
- 2) Min. fastener end distance = 6"
- 3) Min. distance between rows of fasteners = 4"

FIGURE 17: 6 WSWH/WS SCREWS

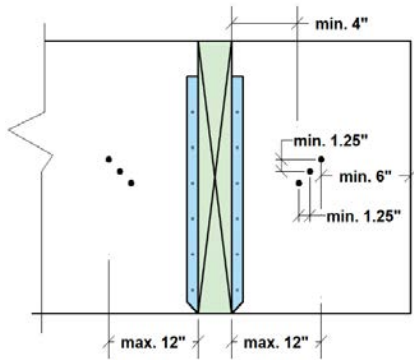


FIGURE 18: 8 WSWH/WS SCREWS

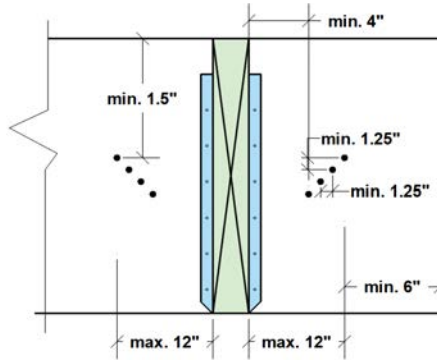


FIGURE 19: 12 WSWH/WS SCREWS

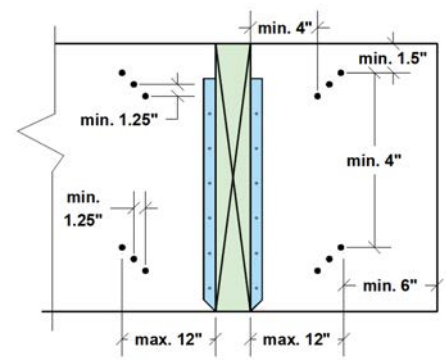


FIGURE 20: 16 WSWH/WS SCREWS

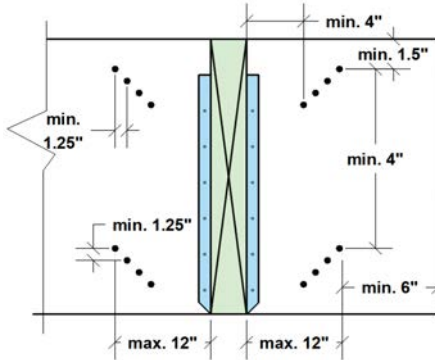


FIGURE 21: 18 WSWH/WS SCREWS

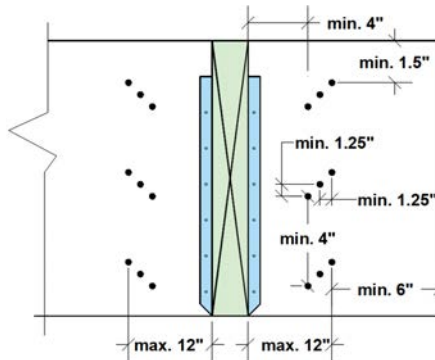


FIGURE 22: UNIFORM SIDE LOAD DESIGN EXAMPLE

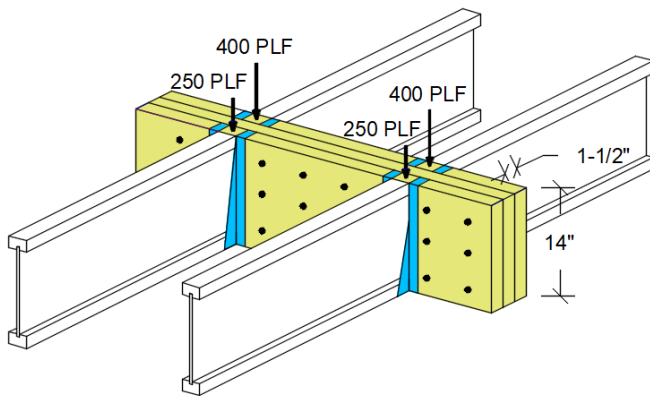
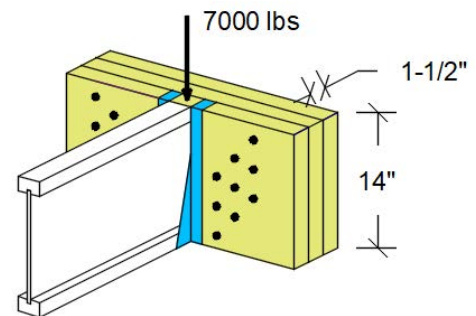


FIGURE 23: CONCENTRATED SIDE LOAD EXAMPLE



Notes:

- 1) Verify that a 3-ply, 1-1/2" x 14" header can support the total load of 650 PLF with proper live and total deflection criteria.
- 2) Maximum load applied to the outer ply member is 400 PLF.
- 3) For an assembly of three 1-1/2" plies (Assembly B - Table 65), 4 rows of 10d Box nails (0.128" x 3") at 12" o.c. spacing fastened on both sides (face and back) are good for 560 PLF. Therefore, use 4 rows of 10d Box nails (0.128" x 3") at 12" o.c. spacing.
- 4) Since nails are required on both sides (face and back) for 3-ply members, stagger fasteners on the back side by half the distance between the fasteners on the face side.
- 5) Verify hanger capacity. Capacity reduction may be required for the selected header thickness. Refer to hanger manufacturer for appropriate reductions.

Notes:

- 1) Verify that a 3-ply, 1-1/2" x 14" header can support a 7000 lbs side point load and all other loads applied.
- 2) The 7000 lbs side point load is transferred to the header with a face mount hanger.
- 3) For an assembly of three 1-1/2" plies (Assembly B - Table 69), 18 - SDW22458 screws are good for 7425 lbs with a face mount hanger.
- 4) Verify hanger capacity. Capacity reduction may be required for the selected header thickness. Refer to hanger manufacturer for appropriate reductions.

SECTION 12: COLUMNS: ALLOWABLE AXIAL LOADS

TABLE 71: ALLOWABLE AXIAL LOADS (LBS) FOR 1.35E T-TEC LSL 1-1/2" WIDTH

Column Height (ft.)	1.35E T-TEC LSL- Columns - Maximum Vertical Load (lbs)																	
	Column Size																	
	1-1/2" x 3-1/2"			1-1/2" x 5-1/4"						1-1/2" x 7-1/4"								
	2 plies			2 plies			3 plies			2 plies			3 plies			4 plies		
	100%	115%	125%	100%	115%	125%	100%	115%	125%	100%	115%	125%	100%	115%	125%	100%	115%	125%
6	3675	3885	4005	5530	5840	6010	9700	10040	10040	7640	8060	8310	13405	13865	13865	16510	18485	18485
7	3020	3160	3230	4545	4745	4855	8890	9710	10040	6275	6555	6715	12280	13420	13865	15880	17850	18485
8	2505	2595	2645	3765	3895	3975	8010	8630	9000	5195	5385	5495	11065	11925	12435	15155	16895	17975
9	2100	2160	2200	3150	3250	3300	7155	7625	7905	4350	4480	4560	9880	10540	10920	14330	15810	16720
10	1775	1825	1845	2660	2730	2770	6370	6740	6950	3690	3780	3840	8800	9310	9600	13435	14675	15425
11	1520	1550	1570	2280	2330	2360	5675	5965	6135	3150	3220	3260	7840	8240	8470	12510	13550	14170
12	1310	1340	1350	1970	2010	2030	5070	5300	5430	2720	2780	2810	7005	7325	7505	11600	12470	12990
13							4535	4725	4835				6275	6535	6685	10735	11465	11895
14							4090	4240	4320				5645	5855	5975	9925	10545	10905

Design Assumptions:

- Columns shall be only designed for the max. tabulated vertical loads.
- Bracing in both directions must be provided at column ends.
- Dry service conditions only.
- Eccentricity of 1/6 of the column width or depth has been applied (the worst case scenario).
- Multi-ply members shall be fastened as per Table 74.

How to size a Column:

- Determine the clear height of the Column.
- Scan the cells with the heights higher or equal to the actual column height, and select a size with the vertical load capacity \geq reaction/vertical load transferred.

TABLE 72: ALLOWABLE AXIAL LOADS (LBS) FOR 1.55E T-TEC LSL 1-1/2" WIDTH

Column Height (ft.)	1.55E Tolko T-TEC LSL- Columns - Maximum Vertical Load (lbs)																	
	Column Size																	
	1-1/2" x 3-1/2"			1-1/2" x 5-1/4"						1-1/2" x 7-1/4"								
	2 plies			2 plies			3 plies			2 plies			3 plies			4 plies		
	100%	115%	125%	100%	115%	125%	100%	115%	125%	100%	115%	125%	100%	115%	125%	100%	115%	125%
6	4,410	4,460	4,460	6,630	6,690	6,690	10,040	10,040	10,040	9,150	9,240	9,240	13,865	13,865	13,865	18,485	18,485	18,485
7	3,595	3,735	3,825	5,395	5,615	5,735	10,040	10,040	10,040	7,450	7,760	7,930	13,865	13,865	13,865	18,485	18,485	18,485
8	2,960	3,060	3,110	4,435	4,585	4,675	9,755	10,040	10,040	6,135	6,345	6,455	13,475	13,865	13,865	18,485	18,485	18,485
9	2,460	2,530	2,570	3,705	3,805	3,865	8,630	9,160	9,470	5,110	5,260	5,340	11,930	12,660	13,090	17,775	18,485	18,485
10	2,080	2,130	2,150	3,120	3,200	3,240	7,630	8,040	8,280	4,315	4,415	4,475	10,550	11,120	11,450	16,525	17,955	18,485
11	1,770	1,810	1,830	2,660	2,720	2,750	6,775	7,095	7,275	3,680	3,760	3,800	9,350	9,800	10,050	15,275	16,465	17,165
12	1,530	1,560	1,570	2,295	2,335	2,365	6,015	6,275	6,415	3,175	3,235	3,265	8,320	8,670	8,870	14,075	15,065	15,645
13							5,370	5,580	5,690				7,430	7,710	7,880	12,960	13,790	14,270
14							4,825	4,985	5,085				6,670	6,890	7,020	11,935	12,625	13,035

Design Assumptions:

- Columns shall be only designed for the max. tabulated vertical loads.
- Bracing in both directions must be provided at column ends.
- Dry service conditions only.
- Eccentricity of 1/6 of the column width or depth has been applied (the worst case scenario).
- Multi-ply members shall be fastened as per Table 74.

How to Size a Column:

- Determine the clear height of the Column.
- Scan the cells with the heights higher or equal to the actual column height, and select a size with the vertical load capacity \geq reaction/vertical load transferred.

TABLE 73: ALLOWABLE AXIAL LOADS (LBS) FOR 1.35E T-TEC LSL 1 -3/4" WIDTH

Column Height (ft.)	1.35E T-TEC LSL- Columns - Maximum Vertical Load (lbs)																	
	Column Size																	
	1-3/4" x 3-1/2"			1-3/4" x 5-1/4"						1-3/4" x 7-1/4"								
	2 plies			2 plies			3 plies			2 plies			3 plies			4 plies		
	100%	115%	125%	100%	115%	125%	100%	115%	125%	100%	115%	125%	100%	115%	125%	100%	115%	125%
6	5060	5205	5205	7605	7805	7805	11710	11710	11710	10515	10780	10780	16175	16175	16175	19810	21565	21565
7	4290	4530	4670	6450	6810	7010	11315	11710	11710	8910	9410	9690	15630	16175	16175	19265	21565	21565
8	3625	3795	3885	5450	5700	5840	10510	11510	11710	7530	7870	8070	14525	15905	16175	18630	20970	21565
9	3080	3200	3270	4630	4810	4910	9635	10425	10885	6400	6640	6780	13320	14410	15050	17925	20035	21355
10	2635	2725	2775	3960	4090	4160	8765	9385	9745	5475	5655	5755	12110	12970	13470	17135	18995	20135
11	2270	2340	2370	3420	3520	3570	7940	8430	8720	4720	4860	4930	10975	11655	12055	16275	17885	18855
12	1980	2030	2050	2970	3040	3090	7185	7585	7815	4110	4210	4270	9935	10485	10805	15355	16735	17565
13	1735	1775	1795	2600	2660	2700	6515	6835	7025	3595	3675	3725	8995	9445	9705	14430	15620	16320
14	1525	1555	1575	2295	2345	2365	5910	6180	6330	3175	3245	3275	8170	8540	8760	13525	14545	15145

Design Assumptions:

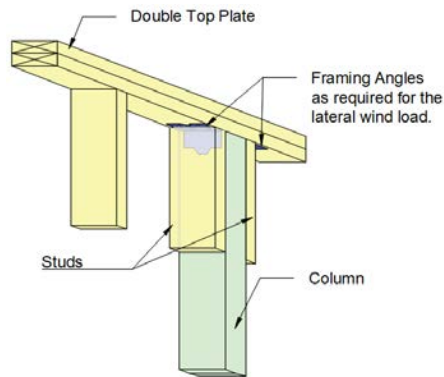
- 1) Columns shall be only designed for the max. tabulated vertical loads.
- 2) Bracing in both directions must be provided at column ends.
- 3) Dry service conditions only.
- 4) Eccentricity of 1/6 of the column width or depth has been applied (the worst case scenario).
- 5) Multi-ply members shall be fastened as per Table 74 .

How to size a Column:

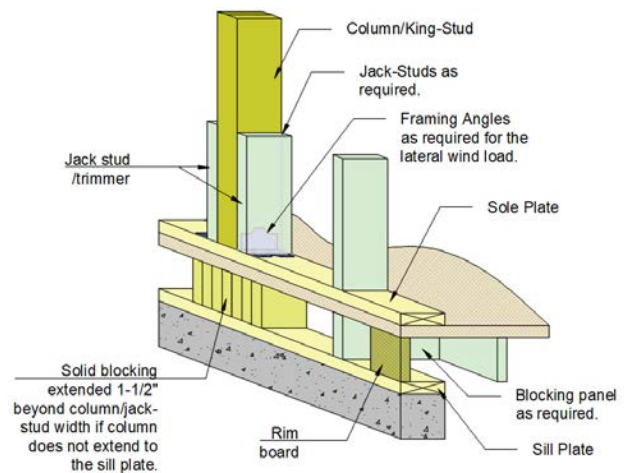
- 1) Determine the clear height of the Column.
- 2) Scan the cells with the heights higher or equal to the actual column height, and select a size with the vertical load capacity \geq reaction/vertical load transferred.

SECTION 13: COLUMN DETAILS

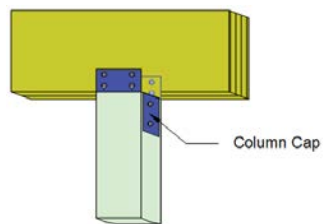
Detail 15: Column to Top Plate



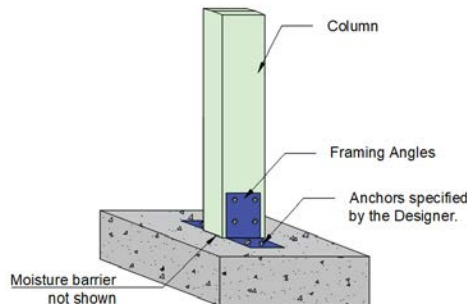
Detail 16: Column to Bottom Plate



Detail 17: Beam to Column Cap



Detail 18: Column Base



Detail 19: Beam on Column

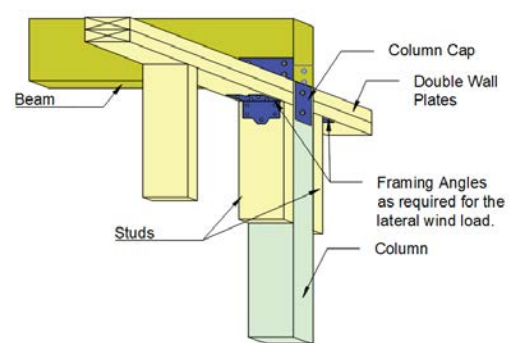


TABLE 74: MULTI-PLY CONNECTIONS FOR COLUMNS 1.35E/1.55E T-TEC LSL

Ply thickness (in)	No. of plies	Depth range	Fastener type	No. of rows of fasteners	o.c. spacing	Min. end distance (in)	Min. edge distance (in)	Notes
1-1/2	2	Depth ≤ 7.25"	10d common nail (0.148" x 3")	2	6"	2-1/4"	1"	staggered; adjacent nails driven from opposite side
	3	5.25" ≤ Depth ≤ 7.25"	SDS1/4x4-1/2, SDW22458, WSWH45, WS45 screws	2	8"	6"	2"	staggered; adjacent screws driven from opposite side
	4	5.25" ≤ Depth ≤ 7.25"	SDS1/4x6, SDW22600, WSWHS6, WS6 screws	2	8"	6"	2"	staggered; adjacent screws driven from opposite side
1-3/4	2	Depth ≤ 7.25"	16d common nail (0.162" x 3-1/2")	2	6"	2-1/4"	1"	staggered; adjacent nails driven from opposite side
	3	5.25" ≤ Depth ≤ 7.25"	SDW22500, MIFLK005 (F5.0FL), WSWH5, WS5 screws	2	8"	6"	2"	staggered; adjacent screws driven from opposite side
	4	5.25" ≤ Depth ≤ 7.25"	SDW22634, MIFLK634 (F6.7FL), WSWHS634 screws	2	8"	6"	2"	staggered; adjacent screws driven from opposite side

Note:

- 1) Columns shall not be drilled or notched.

TABLE 75: COLUMN CAPS FOR 1.35E/1.55E T-TEC LSL

Beam Total Width	Column Size	Location of Beam	Simpson Strong-Tie®		USP Structural Connectors®	
			Connector	Download (lbs)	Connector	Download (lbs)
3"	3" x 3 1/2"	End	ECC3 1/4-4	6,835	KECC325-4	14,650
		Intermediate	CC3 1/4-4	16,980	KCC325-4	21,485
	3" x 5 1/4"	End	ECC3 1/4-6	10,740	KECC325-6	14,650
		Intermediate	CC3 1/4-6	21,485	KCC325-6	21,485
4-1/2"	4 1/2" x 5 1/4"	End	ECC4.62-5.50	15,470	-	-
		Intermediate	CC4.62-5.50	30,940	-	-
3-1/2"	3 1/2" x 3 1/2"	End	ECC44	7,655	KECC44	12,030
		Intermediate	CC44	19,020	KCC44	15,315
	3 1/2" x 5 1/4"	End	ECC46	12,030	KECC46	18,595
		Intermediate	CC46	24,065	KCC46	24,065
	3 1/2" x 7 1/4"	End	ECC48	16,405	KECC48	20,780
		Intermediate	CC48	24,065	KCC48	24,065
5-1/4"	5 1/4" x 5 1/4"	End	ECC66	18,905	KECC66	25,780
		Intermediate	CC66	33,275	KCC66	37,815
	5 1/4" x 7 1/4"	End	ECC68	25,780	KECC68	32,655
		Intermediate	CC68	37,815	KCC68	37,815
7"	7" x 7 1/4"	End	ECC7 1/8-8	39,375	KECC77X	45,950
		Intermediate	CC7 1/8-8	52,500	KCC77X	56,875

Notes:

- 1) Splice conditions must be detailed by the Designer to transfer tension loads between spliced members by means other than the column cap.
 2) Tabulated downloads shall be reduced where limited by allowable loads of the column or the beam.
 3) Tabulated values shall not be increased by load duration factors $C_D > 1.0$.

TABLE 76: COLUMN BASES FOR 1.35E/1.55E T-TEC LSL

Column Size	Simpson Strong-Tie®		USP Structural Connectors®	
	Connector	Download (lbs)	Connector	Download (lbs)
4 1/2" x 5 1/4"	CB5-4.5	Post or concrete control	KCB5	Post or concrete control
4 1/2" x 7 1/4"	CB5-4.5		KCB5	
6" x 7 1/4"	CB5-6		KCB6	
3 1/2" x 3 1/2"	CB44		KCB44	
3 1/2" x 5 1/4"	CB46		KCB46	
3 1/2" x 7 1/4"	CB48		KCB48	
5 1/4" x 5 1/4"	CB64		KCB64	
5 1/4" x 7 1/4"	CB6-7		-	
7" x 7 1/4"	CB7 1/8-7		KCB77	

Notes:

- 1) Concrete shall have a minimum compressive strength of $f'_c = 2,500$ psi.
 2) Designer is responsible for concrete design.

SECTION 14: STORAGE AND HANDLING

INTRODUCTION

Proper storage and handling of engineered wood products (EWP) including T-TEC LSL and Tolko LSL Industrials is required to protect the products during distribution and at the jobsite. APA – The Engineered Wood Association recommends the following storage and handling practices for EWP products. For full details on proper storage and handling, refer to *APA Technical Note: Proper Storage and Handling of I-Joists and LVL, Form E705* available at www.apawood.org.

SAFE HANDLING DURING DISTRIBUTION

1. Bundle wrap can be slippery. Avoid walking on wrapped bundles. Stacks of product may be unstable or slippery, especially when wet. Avoid walking on the material.
2. Follow good forklift safety procedures when handling T-TEC LSL and Tolko LSL Industrials at the yard.
3. Store longest material lowest to the ground.
4. When handling with a crane, pick up the load using a spreader if necessary to minimize handling stresses.
5. Post and follow load limits on storage racks.

STORAGE DURING DISTRIBUTION

1. Keep wrapped to protect from weather.
2. Use stickers to separate bundles.
3. Use stickers every 8 feet and maintain vertical alignment of the stickers.
4. Do not store T-TEC LSL and Tolko LSL Industrials in direct contact with the ground.
5. For optimal moisture protection, keep at least 12 inches up from the ground.
6. To protect from dirt and weather, delay unwrapping the bundles until the time of the installation or cut-up for delivery.
7. Take care to avoid forklift damage. If the ground is unlevel in the storage area, reduce forklift speed to avoid “bouncing” the load.
8. When handling with a crane, pick up the load using a spreader if necessary to minimize handling stresses.
9. Maintain stack height within safe limits.
10. Do not stack other material on top of T-TEC LSL and Tolko LSL Industrials.

PROPER HANDLING AT THE JOBSITE

1. Do not drop the product off the delivery truck. Best practice is to use a forklift or boom.
2. Store on level, well-drained area.
3. Keep on stickers spaced every 8’ and at least every 6” off the ground at the jobsite.
4. Keep material covered to protect from weather.
5. Do not stack other material on top of the product.
6. Never use or try to repair damaged products. If defective material is discovered prior to or during installation, cease installation and contact the supplier.

MOISTURE EFFECTS

T-TEC LSL and Tolko LSL Industrials products are manufactured under carefully controlled conditions that assure they are dry. Moisture content can be affected by humidity, exposure to wetting and drying conditions. While T-TEC LSL and Tolko LSL Industrials products are engineered to withstand normal exposure, excessive exposure to moisture may lead to dimensional change.

If moisture is present, mold, mildew and wood decay fungi may grow on any engineered wood products, thus it is important to properly store T-TEC LSL and Tolko LSL Industrials to control exposure to moisture. Moisture increase is expected under normal construction situations and does not adversely affect the performance of the products if good building practices are followed to minimize exposure and to provide proper conditions for the products to re-equilibrate to dry conditions.

Reference: *APA Technical Note: Proper Storage and Handling of I-Joists and LVL, Form E705* available at www.apawood.org.

CSD SOFTWARE

Calculated Structured Designs Inc. (CSD®) is a software development company providing solutions for the engineered wood, engineering, design, and building industries for all of North America and Australia.

Building with the most recent cutting edge development tools, CSD® offers solutions for our industry leading designers, drafters, engineers, and builders.

Website: csdsoftware.com/csd/software/

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- Multiple input styles for quick and easy drawing
- Real Time 3D feedback
- Create realistic model the way it will be built
- Draw the way you want. iStruct® will follow
- Robust graphics tools allow custom detailing in the model

DESIGN

- Analyze anytime for quick results and guidance
- Precision load development for accurate designs
- Solution Seeker finds the optimum product solution
- Easily create required engineering reports
- Automatic load distribution analyzes all components at once

BUILD

- Create Flexible and detailed plot layouts
- Add any type of data to your plot
- Integrate customer details and information
- Create dynamic quotes with exports to point of sale systems
- Send materials to automated saw files or create manual cut lists

ACCESS THE CSD SOFTWARE

Tolko offers authorized customers access to engineered wood design software by CSD. This software includes:



isPlan®

A 3D layout and design solution that allows users to model an entire structure with 2D and 3D views. isPlan® develops and transfers gravity loads through the structure and designs the structural members.



isDesign®

A single member sizing solution that allows users to size floor and roof joists, beams and posts by inputting span and load information. Innovative tools allow selection of the most cost effective solution.



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The first stand alone wall design application that allows users to model a tall wall and run gravity and wind analysis for all the components of the wall.

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