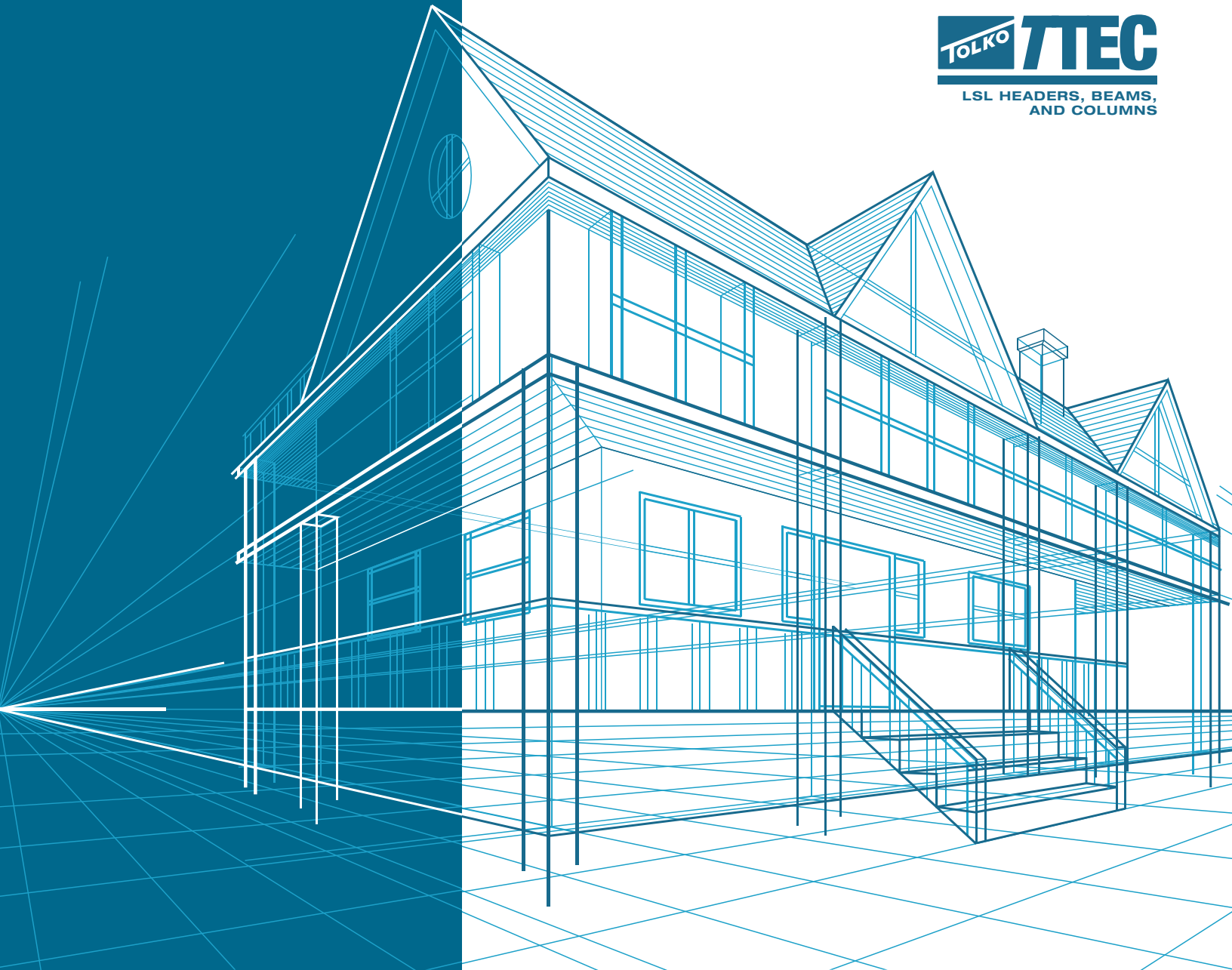


TOLKO

TECHNICAL GUIDE (LSD - CANADA)

T-TEC 1.35E LSL (1-1/2" & 1-3/4")
AND 1.55E LSL (1-1/8", 1-1/4" & 1-1/2")
HEADERS, BEAMS, AND COLUMNS



**TRUE.
TRUSTED.
TOLKO.**

Tolko Marketing and Sales
3000 - 28th Street
Vernon, BC V1T 9W9
Tel 250.545.4411 - Fax 250.550.2550



LIMIT STATES DESIGN
Published: July 11, 2023

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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", 1-1/2", 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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DESIGN PROPERTIES EDGEWISE BENDING

TABLE 1: SPECIFIED STRENGTHS, FACTORED RESISTANCES, AND MOE (LIMIT STATES DESIGN) FOR TOLKO LSL^(a)

Product Grade	E ^(e) (x 10 ⁶ psi)	Specified Bending Strength, fb ^{(b),(c)} (psi)	Specified Compression Perp. to Grain, fc _{L,edge} (psi)	SG Equivalent Specific Gravity ^(f)	Specified Shear Strength, fv (psi)	Width	Depth (in)	Self-weight (plf)	Factored Bending Moment Resistance ^(d) (lb-ft)	Factored Shear Resistance (lb)	Moment of inertia (in ⁴)	
1.35E T-TEC LSL	1.35	3,420	1,370	0.5	580	1-1/2"	5.5	2.6	2,138	2,871	21	
							7.25	3.4	3,590	3,785	48	
							9.25	4.3	5,668	4,829	99	
							9.5	4.5	5,959	4,959	107	
							11.25	5.3	8,182	5,873	178	
							11.875	5.6	9,054	6,199	209	
							14	6.6	12,329	7,308	343	
							16	7.5	15,836	8,352	512	
						1-3/4"	5.5	3.0	2,495	3,350	24	
							7.25	4.0	4,188	4,415	56	
							9.25	5.1	6,613	5,633	115	
							9.5	5.2	6,952	5,786	125	
							11.25	6.2	9,545	6,851	208	
							11.875	6.5	10,564	7,232	244	
							14	7.7	14,383	8,526	400	
							16	8.8	18,476	9,744	597	
1.55E T-TEC LSL	1.55	4,360	1,640	0.5	845	1-1/8"	5.5	1.9	2,045	3,137	16	
							7.25	2.5	3,432	4,135	36	
							9.25	3.3	5,420	5,276	74	
							9.5	3.3	5,697	5,419	80	
							11.25	4.0	7,823	6,417	133	
							11.875	4.2	8,657	6,773	157	
						14	4.9	11,788	7,985	257		
						16	5.6	15,142	9,126	384		
						1-1/4"	5.5	2.1	2,272	4,022	17	
							7.25	2.8	3,814	5,302	40	
							9.25	3.6	6,022	6,764	82	
							9.5	3.7	6,330	6,947	89	
					11.25		4.4	8,692	8,227	148		
					11.875		4.6	9,619	8,684	174		
					1-1/2"	14	5.5	13,098	10,238	286		
						16	6.3	16,824	11,700	427		
						975	1-1/2"	5.5	2.6	2,726	4,826	21
								7.25	3.4	4,576	6,362	48
								9.25	4.3	7,226	8,117	99
								9.5	4.5	7,597	8,336	107
					11.25			5.3	10,430	9,872	178	
					11.875			5.6	11,543	10,420	209	
					14	6.6	15,717	12,285	343			
					16	7.5	20,189	14,040	512			

Highlighted depths shall be used in multiple members only.

- Notes:
- (a) The tabulated values are the specified strengths and modulus of elasticity for standard-term load duration. All values, except E, 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 equilibrium moisture content does not exceed 15 percent over a year and does not exceed 19% at any time as in most covered structures.
 - (b) Tabulated specified bending strength (fb) may be increased by 4 percent when the member qualifies as a repetitive member as defined in CSAO86.
 - (c) Tabulated value is based on a reference depth of 12 inches. For other depths, when loaded edgewise, Fb 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) Factored bending moment has been adjusted by the size factor as per (c), but the repetitive factor of 1.04 has not been applied.
 - (e) The E values are for the apparent modulus of elasticity (MOE) and include the effect of shear deformation.

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

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

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

NAILING MINIMUM DISTANCES ON THE EDGE AND FACETABLE 2: NAILING MINIMUM DISTANCES ON THE EDGE AND FACE^(a)

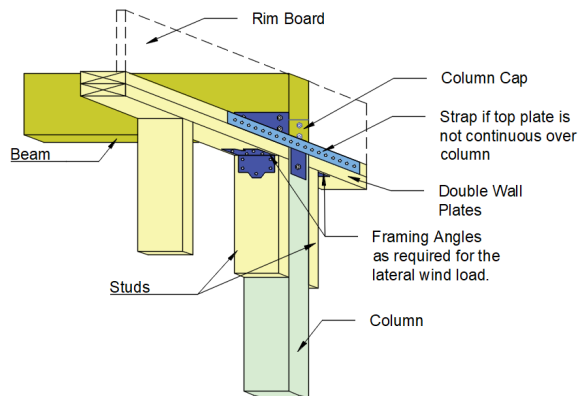
Product	Thickness (in.)	Orientation ^(d)	Pennyweight/Type ^(e, f)	Max. Diameter (in.)	Max. Length (in.)	Min. End Distance (in.)	Minimum Nail Spacing per Row (in.)	
							Single Row	Multiple Rows ^(b, c, i)
1.35E T-TEC LSL	1-1/4 ≤ thickness < 1-1/2	Edge ^(g)	8d and smaller	0.131	2-1/2	2	4	Not recommended
			10d; 12d	0.148	3-1/4	2	4	
			16d	0.162	3-1/2	2-1/2	5	
		Face ^(h)	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 ^(g)	8d and smaller	0.131	2-1/2	1	2	3
			10d; 12d	0.148	3-1/4	2	3	4
			16d	0.162	3-1/2	2-1/2	3	6
		Face ^(h)	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 ^(g)	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 ^(h)	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 ^(g)	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 ^(h)	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 ^(g)	8d and smaller	0.131	2-1/2	1	2	3	
		10d; 12d	0.148	3-1/4	2	3	4	
		16d	0.162	3-1/2	2-1/2	3	6	
	Face ^(h)	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:

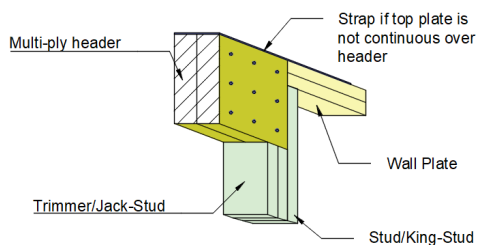
- (a) Edge distance shall be sufficient to prevent splitting, but not less than permitted in CSAO86.
- (b) Multiple rows must be spaced 1/2 inch or more from each other and offset one-half of the tabulated minimum nailing spacing, as shown in APA PR-284C Figure 1.
- (c) Multiple rows must be equally spaced about the centerline of the edge of face (whichever applies).
- (d) 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.
- (e) 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").
- (f) 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.
- (g) 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 10d and 12d nails (common or box).
- (h) 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 member.
- (i) The multiple row end spacing is 1-1/2 inches.

BEAM DETAILS

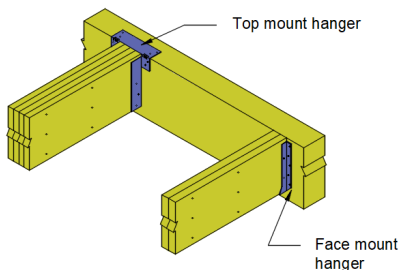
Detail 1: Bearing at Wall



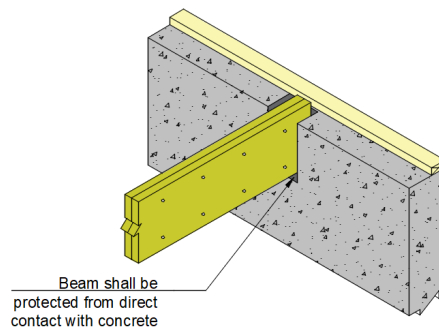
Detail 2: Bearing for Door or Window Header



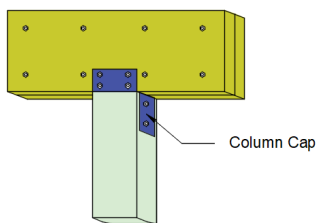
Detail 3: Beam to Beam Connection



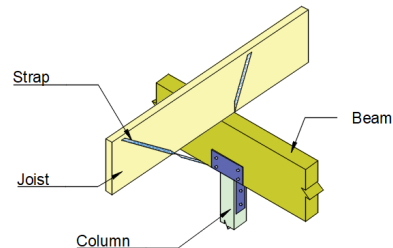
Detail 4: Bearing at Concrete Wall



Detail 5: Bearing at Column

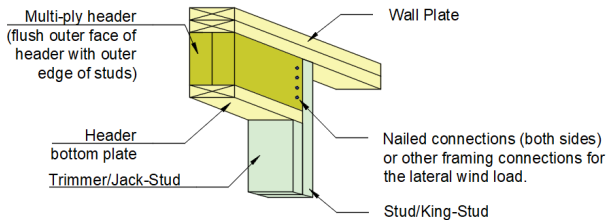


Detail 6: Beam to Column Lateral Brace

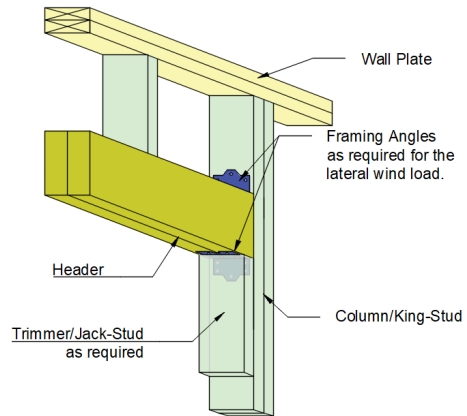


HEADER DETAILS

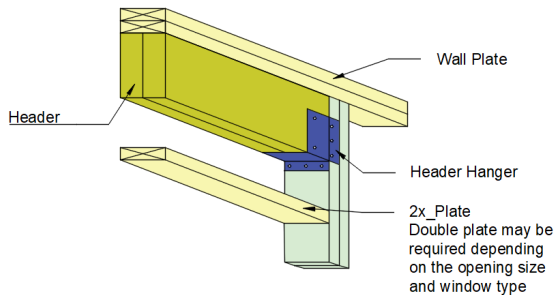
Detail 7: Full Depth Header



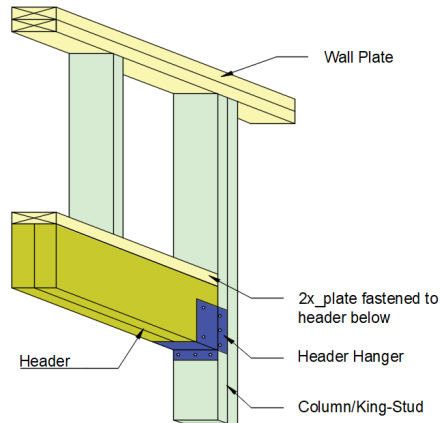
Detail 8: Low Header with Framing Angles



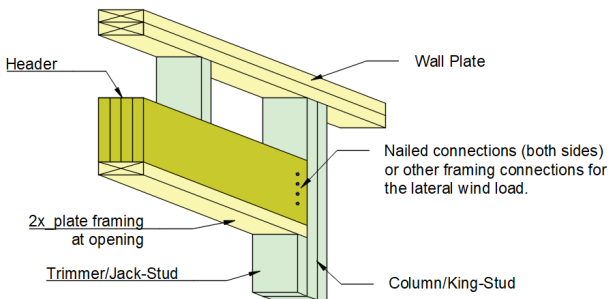
Detail 9: High Header



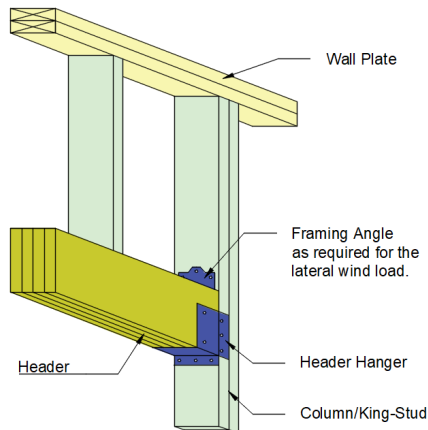
Detail 10: Low Header with Top Plate



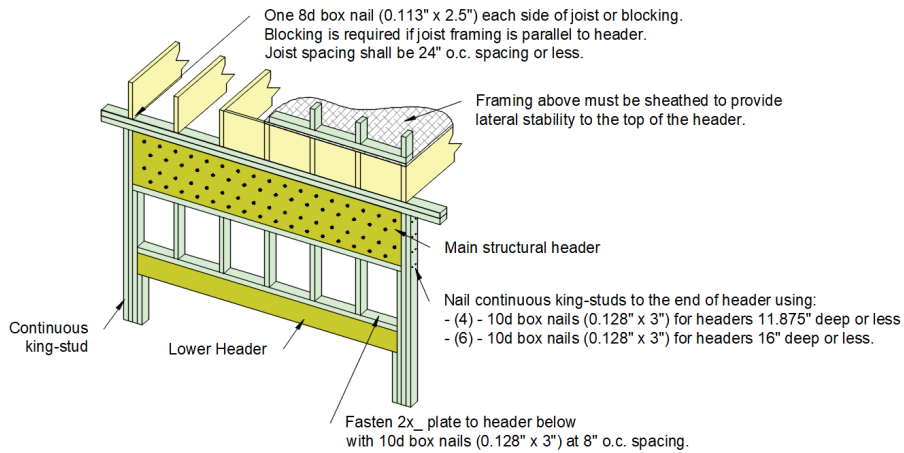
Detail 11: Low Header with Bottom Plate



Detail 12: Low Header with Hanger and Framing Angles

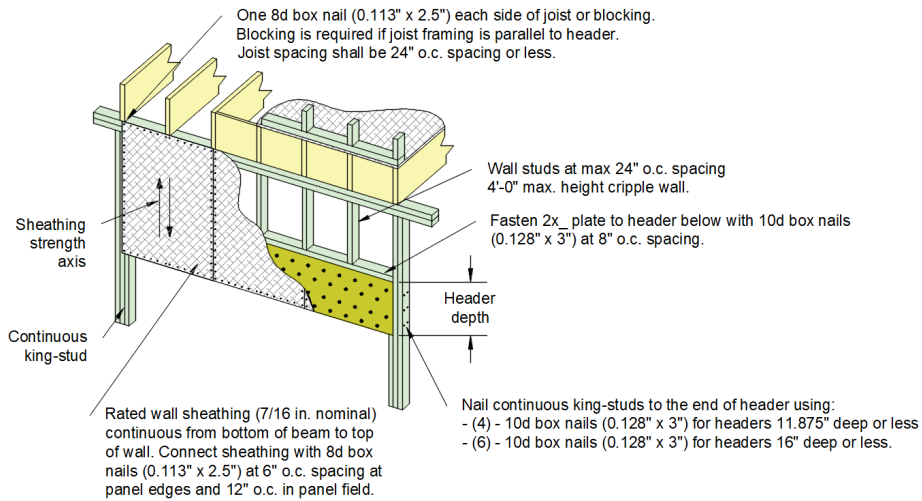


Detail 13: Dropped Header with Full Lateral Bracing



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
1½" width; 9 1/2" deep or less	Up to four 11/8", 11/4", 7 ¼" deep or less
1¾" width; 11 7/8" deep or less	Up to four 1½" plies; 9 ½" deep or less
	Up to four 1¾" plies; 11 7/8" deep or less

Else, the lateral stability factor shall be included in the header design as per CSA086.

ALLOWABLE HOLES

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	1-1/8, 1 1/4"	7-1/4	1.5
T-TEC LSL	1-1/2, 1-3/4	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)

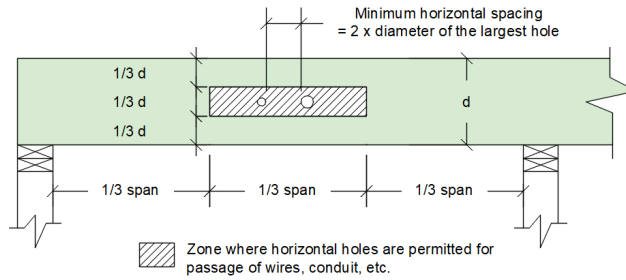
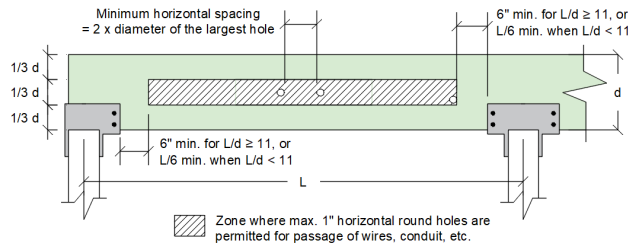


FIGURE 2: MAXIMUM 1" DIAMETER ROUND HOLES (SINGLE OR MULTIPLE SPANS)



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

BEARING LENGTH REQUIREMENTS

TABLE 13: BEARING LENGTHS REQUIREMENTS - 1.55E T-TEC LSL 1-1/8" WIDTH

Reaction (lbs)	1.55E T-TEC 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
3000	2-1/4	1-3/4	1-3/4	1-3/4	1-3/4	1-3/4	1-3/4
6000	4-1/4	2-1/4	1-3/4	1-3/4	1-3/4	1-3/4	1-3/4
9000	6-1/4	3-1/4	2-1/4	1-3/4	2-1/2	1-3/4	1-3/4
12000		4-1/4	2-3/4	2-1/4	3-1/4	2	1-3/4
15000		5-1/4	3-1/2	2-3/4	4	2-1/2	2
18000		6-1/4	4-1/4	3-1/4	4-3/4	3	2-1/4
21000		7-1/4	4-3/4	3-3/4	5-1/2	3-1/2	2-3/4
24000			5-1/2	4-1/4	6-1/4	4	3
27000			6-1/4	4-3/4	7	4-1/2	3-1/2
30000			7	5-1/4	7-3/4	5	3-3/4
33000			7-1/2	5-3/4		5-1/2	4-1/4
36000				6-1/4		6	4-1/2
39000				6-3/4		6-1/2	5
42000				7-1/4		7	5-1/4
45000				7-3/4		7-1/2	5-3/4

Notes:

- 1) Bearing lengths are based on fcp_plank (specified strength) = 1405 psi; fcp_edge (specified strength) = 1640 psi; K_D (load duration) = 1.0
- 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 14: BEARING LENGTHS REQUIRED - 1.55E T-TEC LSL - 1-1/4" WIDTH

Factored 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
3000	2	1 3/4	1 3/4	1 3/4	1 3/4	1 3/4	1 3/4
6000	3 3/4	2	1 3/4	1 3/4	1 3/4	1 3/4	1 3/4
9000	5 1/2	2 3/4	2	1 3/4	2 1/2	1 3/4	1 3/4
12000	7 1/2	3 3/4	2 1/2	2	3 1/4	2	1 3/4
15000		4 3/4	3 1/4	2 1/2	4	2 1/2	2
18000		5 1/2	3 3/4	2 3/4	4 3/4	3	2 1/4
21000		6 1/2	4 1/2	3 1/4	5 1/2	3 1/2	2 3/4
24000		7 1/2	5	3 3/4	6 1/4	4	3
27000			5 1/2	4 1/4	7	4 1/2	3 1/2
30000			6 1/4	4 3/4	7 3/4	5	3 3/4
33000			6 3/4	5 1/4		5 1/2	4 1/4
36000			7 1/2	5 1/2		6	4 1/2
39000				6		6 1/2	5
42000				6 1/2		7	5 1/4
45000				7		7 1/2	5 3/4

Notes:

- 1) Bearing lengths are based on fcp_plank (specified strength) = 1405 psi; fcp_edge (specified strength) = 1640 psi; K_D (load duration) = 1.0
- 2) Min. end bearing lengths = 1-3/4", and 3-1/2" for the interior bearing supports.
- 3) Member shall be supported across full width at all bearing supports.

TABLE 15: BEARING LENGTHS REQUIRED - 1.55E T-TEC LSL - 1-1/2" WIDTH

Factored 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
3000	1 3/4	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
6000	3 1/4	1 3/4	1 1/2	1 1/2	1 3/4	1 1/2	1 1/2
9000	4 3/4	2 1/2	1 3/4	1 1/2	2 1/2	1 1/2	1 1/2
12000	6 1/4	3 1/4	2 1/4	1 3/4	3 1/4	2	1 1/2
15000	7 3/4	4	2 3/4	2	4	2 1/2	2
18000		4 3/4	3 1/4	2 1/2	4 3/4	3	2 1/4
21000		5 1/2	3 3/4	2 3/4	5 1/2	3 1/2	2 3/4
24000		6 1/4	4 1/4	3 1/4	6 1/4	4	3
27000		7	4 3/4	3 1/2	7	4 1/2	3 1/2
30000		7 3/4	5 1/4	4	7 3/4	5	3 3/4
33000			5 3/4	4 1/4		5 1/2	4 1/4
36000			6 1/4	4 3/4		6	4 1/2
39000			6 3/4	5		6 1/2	5
42000			7 1/4	5 1/2		7	5 1/4
45000			7 3/4	5 3/4		7 1/2	5 3/4

Notes:

- 1) Bearing lengths are based on f_{cp_plank} (specified strength) = 1405 psi; f_{cp_edge} (specified strength) = 1640 psi; K_b (load duration) = 1.0
- 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 16: BEARING LENGTHS REQUIRED - SPF

Factored Reaction (lbs)	SPF						
	Width (in)						
	Beam Orientation				Plank Orientation		
	1 1/2	3	4 1/2	6	3 1/2	5 1/2	7 1/4
3000	3 1/2	1 3/4	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2
6000	6 3/4	3 1/2	2 1/4	1 3/4	3	2	1 1/2
9000		5	3 1/2	2 1/2	4 1/4	2 3/4	2 1/4
12000		6 3/4	4 1/2	3 1/2	5 3/4	3 3/4	2 3/4
15000			5 1/2	4 1/4	7	4 1/2	3 1/2
18000			6 3/4	5		5 1/2	4 1/4
21000			7 3/4	5 3/4		6 1/4	4 3/4
24000				6 3/4		7 1/4	5 1/2
27000				7 1/2			6 1/4
30000							6 3/4
33000							7 1/2

Notes:

- 1) Bearing lengths are based on f_{cp_plank} (specified strength) = 769 psi; f_{cp_edge} (specified strength) = 769 psi; K_b (load duration) = 1.0
- 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 17: BEARING LENGTHS REQUIREMENTS- 1.35E T-TEC LSL 1-1/2" WIDTH

Reaction (lbs)	1.35E T-TEC LSL						
	Width (in)						
	Beam Orientation				Plank Orientation		
	1-1/2	3	4-1/2	6	3-1/2	5-1/2	7-1/4
3000	2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2
6000	3-3/4	2	1-1/2	1-1/2	1-3/4	1-1/2	1-1/2
9000	5-1/2	2-3/4	2	1-1/2	2-3/4	1-3/4	1-1/2
12000	7-1/2	3-3/4	2-1/2	2	3-1/2	2-1/4	1-3/4
15000		4-3/4	3-1/4	2-1/2	4-1/2	2-3/4	2-1/4
18000		5-1/2	3-3/4	2-3/4	5-1/4	3-1/2	2-1/2
21000		6-1/2	4-1/2	3-1/4	6	4	3
24000		7-1/2	5	3-3/4	7	4-1/2	3-1/2
27000			5-1/2	4-1/4		5	3-3/4
30000			6-1/4	4-3/4		5-1/2	4-1/4
33000			6-3/4	5-1/4		6	4-3/4
36000			7-1/2	5-1/2		6-3/4	5
39000				6		7-1/4	5-1/2
42000				6-1/2			6
45000				7			6-1/4

Notes:

- 1) Bearing lengths are based on fcp_plank (specified strength) = 1250 psi; fcp_edge (specified strength) = 1370 psi; K_p (load duration) = 1.0
- 2) Min. end bearing lengths = 1-1/2", and 3-1/2" for the interior bearing supports.
- 3) Member shall be supported across the full width at all bearing supports.

TABLE 18: BEARING LENGTHS REQUIREMENTS - 1.35E T-TEC LSL 1-3/4" WIDTH

Reaction (lbs)	1.35E T-TEC 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
3000	1-3/4	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2	1-1/2
6000	3-1/4	1-3/4	1-1/2	1-1/2	1-3/4	1-1/2	1-1/2
9000	4-3/4	2-1/2	1-3/4	1-1/2	2-3/4	1-3/4	1-1/2
12000	6-1/2	3-1/4	2-1/4	1-3/4	3-1/2	2-1/4	1-3/4
15000		4	2-3/4	2	4-1/2	2-3/4	2-1/4
18000		4-3/4	3-1/4	2-1/2	5-1/4	3-1/2	2-1/2
21000		5-1/2	3-3/4	2-3/4	6	4	3
24000		6-1/2	4-1/4	3-1/4	7	4-1/2	3-1/2
27000		7-1/4	4-3/4	3-3/4		5	3-3/4
30000			5-1/4	4		5-1/2	4-1/4
33000			5-3/4	4-1/2		6	4-3/4
36000			6-1/2	4-3/4		6-3/4	5
39000			7	5-1/4		7-1/4	5-1/2
42000			7-1/2	5-1/2			6
45000				6			6-1/4

Notes:

- 1) Bearing lengths are based on fcp_plank (specified strength) = 1250 psi; fcp_edge (specified strength) = 1370 psi; K_p (load duration) = 1.0
- 2) Min. end bearing lengths = 1-1/2", and 3-1/2" for the interior bearing supports.
- 3) Member shall be supported across the full width at all bearing supports.

TAPERED END CUTS

TABLE 19: ALLOWABLE REACTIONS FOR TAPERED END CUTS – 1.55E T-TEC LSL 1-1/8" WIDTH

Bearing Support	Beam Depth	Allowable Reactions (lbs) for 3-3/8" wide - 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"	7267	7267	7267	7267				
	9-1/4"		7267	7267	7267	7267	7267	7267	7267
	9-1/2"		7267	7267	7267	7267	7267	7267	7267
	11-1/4"				7267	7267	7267	7267	7267
	11-7/8"					7267	7267	7267	7267
	14"								7267
5-1/4" Wood Plate	7-1/4"	9972	10901	10901	10901				
	9-1/4"	9946	10801	10901	10901	10901	10901	10901	10901
	9-1/2"	9946	10801	10901	10901	10901	10901	10901	10901
	11-1/4"			10901	10901	10901	10901	10901	10901
	11-7/8"				10901	10901	10901	10901	10901
	14"							10901	10901
3-1/2" Column	7-1/4"	9197	10203	11584	12266				
	9-1/4"		10053	10908	11764	12620	14185	15202	15498
	9-1/2"		10053	10908	11764	12620	13961	15221	15498
	11-1/4"				11764	12620	13475	14331	15186
	11-7/8"					12620	13475	14331	15186
	14"								15186

Notes:

- 1) For 1-1/8", 2-1/4", and 4-1/2" wide beams, multiply tabulated reactions by 0.33, 0.66, and 1.33, respectively.
- 2) For 1-1/8" single ply beams, the max. depth = 7.25".
- 3) Bearing length is based on the bearing resistance (specified strength) of 769 psi for the Wood Plates and 1640 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 $K_D = 1.0$
- 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 20: ALLOWABLE REACTIONS FOR TAPERED END CUTS – 1.55E T-TEC LSL 1-1/4" WIDTH

Bearing Support	Beam Depth	Allowable Factored Reactions (lbs) for 3 3/4" wide - 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"	8,075	8,075	8,075	8,075				
	9 1/4"		8,075	8,075	8,075	8,075	8,075	8,075	8,075
	9 1/2"		8,075	8,075	8,075	8,075	8,075	8,075	8,075
	11 1/4"				8,075	8,075	8,075	8,075	8,075
	11 7/8"					8,075	8,075	8,075	8,075
	14"								8,075
5 1/4" Wood Plate	7 1/4"	11,080	12,112	12,112	12,112				
	9 1/4"	11,051	12,002	12,112	12,112	12,112	12,112	12,112	12,112
	9 1/2"	11,051	12,002	12,112	12,112	12,112	12,112	12,112	12,112
	11 1/4"			12,112	12,112	12,112	12,112	12,112	12,112
	11 7/8"				12,112	12,112	12,112	12,112	12,112
	14"							12,112	12,112
3 1/2" Column	7 1/4"	10,219	11,337	12,871	13,629				
	9 1/4"		11,170	12,120	13,071	14,022	15,761	16,891	17,220
	9 1/2"		11,170	12,120	13,071	14,022	15,512	16,913	17,220
	11 1/4"				13,071	14,022	14,972	15,923	16,874
	11 7/8"					14,022	14,972	15,923	16,874
	14"								16,874

Notes:

- 1) For 1 1/4", 2 1/2", and 5" wide beams, multiply tabulated reactions by 0.33, 0.66, and 1.33, respectively.
- 2) For 1 1/4" wide beams, the max. depth = 9.5".
- 3) Bearing length is based on the bearing resistance (specified strength) of 769 psi for the Wood Plates and 1640 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 $K_D = 1.0$
- 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 21: ALLOWABLE REACTIONS FOR TAPERED END CUTS – 1.35E & 1.55E 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"	5612	6225	6460	6460				
	9-1/4"		6134	6460	6460	6460	6460	6460	6460
	9-1/2"		6134	6460	6460	6460	6460	6460	6460
	11-1/4"				6460	6460	6460	6460	6460
	11-7/8"					6460	6460	6460	6460
14"								6460	
5-1/4" Wood Plate	7-1/4"	6084	6988	7452	7569				
	9-1/4"	6068	6590	7112	7634	8552	9215	9566	9657
	9-1/2"	6068	6590	7112	7634	8396	9210	9689	9689
	11-1/4"			7112	7634	8156	8678	9200	9689
	11-7/8"				7634	8156	8678	9200	9689
14"							9200	9689	
3-1/2" Column	7-1/4"	5612	6225	7067	7484				
	9-1/4"		6134	6656	7178	7700	8654	9275	9591
	9-1/2"		6134	6656	7178	7700	8518	9287	9734
	11-1/4"				7178	7700	8222	8744	9266
	11-7/8"					7700	8222	8744	9266
14"								9266	

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" single-ply beams, the max. depth = 11.875".
- 3) Bearing length is based on the bearing resistance (specified strength) of 769 psi for the Wood Plates and 1370 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 $K_D = 1.0$
- 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 22: 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"	6547	7263	7536	7536				
	9-1/4"		7156	7536	7536	7536	7536	7536	7536
	9-1/2"		7156	7536	7536	7536	7536	7536	7536
	11-1/4"				7536	7536	7536	7536	7536
	11-7/8"					7536	7536	7536	7536
14"								7536	
5-1/4" Wood Plate	7-1/4"	7098	8152	8694	8831				
	9-1/4"	7080	7689	8298	8907	9978	10751	11161	11267
	9-1/2"	7080	7689	8298	8907	9795	10745	11304	11304
	11-1/4"			8298	8907	9516	10125	10734	11304
	11-7/8"				8907	9516	10125	10734	11304
14"							10734	11304	
3-1/2" Column	7-1/4"	6547	7263	8245	8731				
	9-1/4"		7156	7765	8374	8983	10097	10821	11189
	9-1/2"		7156	7765	8374	8983	9937	10835	11357
	11-1/4"				8374	8983	9592	10201	10810
	11-7/8"					8983	9592	10201	10810
14"								10810	

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 (specified strength) of 769 psi for the Wood Plates and 1370 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 $K_D = 1.0$
- 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

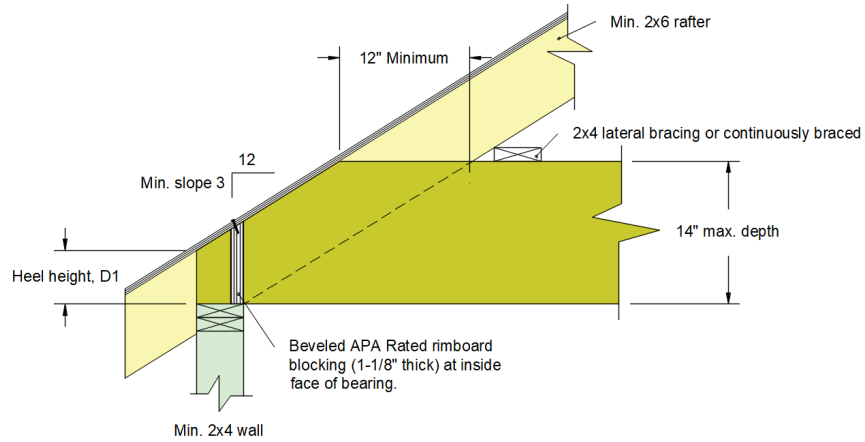


FIGURE 4: TAPERED END CUT – COLUMN CONNECTIONS

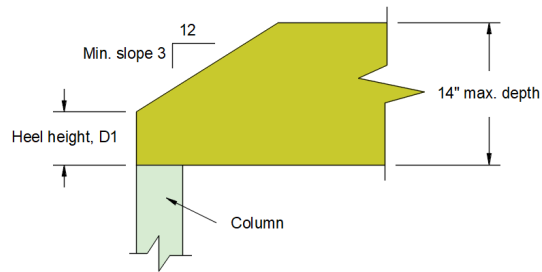
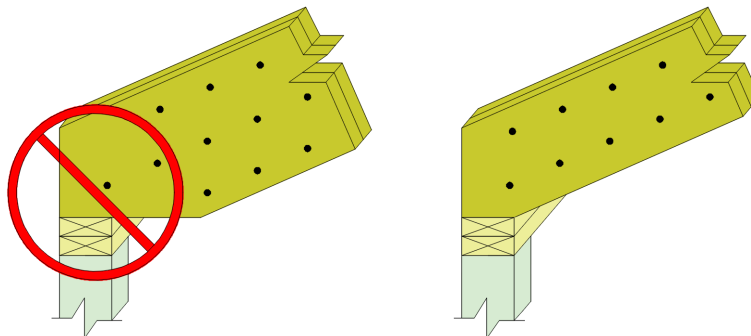


FIGURE 5: DO NOT OVERHANG SEAT CUT BEYOND INSIDE FACE OF THE BEARING SUPPORT



MULTIPLE MEMBER CONNECTIONS: TOP LOADED MEMBERS

TABLE 23: MULTIPLE MEMBER CONNECTIONS: TOP LOADED MEMBERS- 1.35E & 1.55E LSL

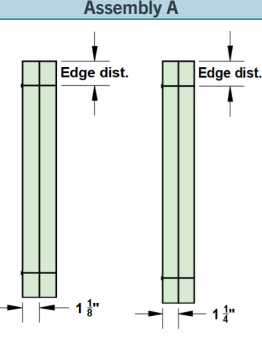
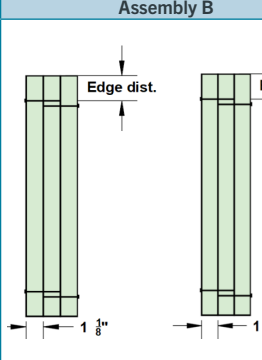
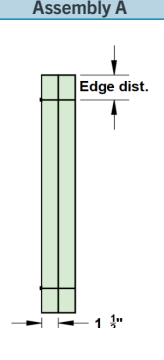
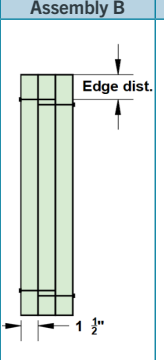
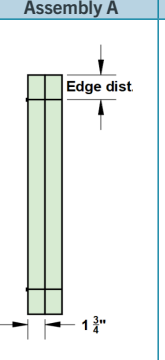
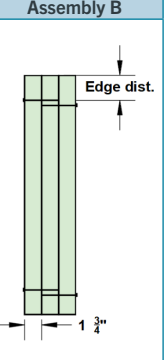
Ply Thickness (in)	# of Plies	Fastener Type	Depth (in)	# Rows	On-Center Spacing (in)	Location	Min. Edge Distance (in)	Min. End Distance (in)	Min. Distance Between Rows of Fasteners (in)
1 1/8, 1 1/4	2	8d box nail (0.113" x 2.5")	7-1/4	2	12	One side (front or back)	1.5	3	3
			9-1/4, 9-1/2, 11-1/4, 11-7/8	3					
			14	4					
	3		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		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		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		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					

Notes:

- 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.

MULTIPLE MEMBER CONNECTIONS: UNIFORM SIDE LOADS

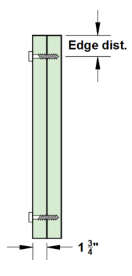
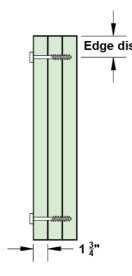
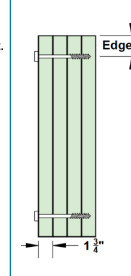
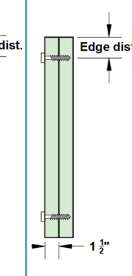
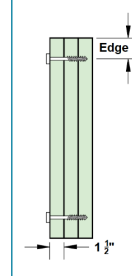
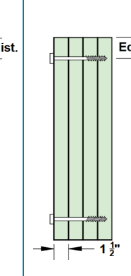
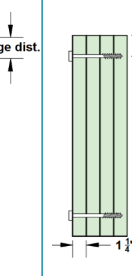
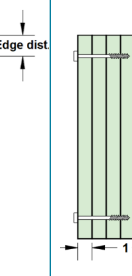
TABLE 24: MULTIPLE MEMBER CONNECTIONS FOR MAX. FACTORED UNIFORM SIDE LOADS - NAILS

Min. depth (in)	Number of Rows	Fastener o.c. spacing (in)	Assembly A	Assembly B	Assembly A	Assembly B	Assembly A	Assembly B
								
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"	
7.25	2	12	400		300		500	
9.25	3		600		450		750	
14	4		800		600		1000	
			375		560		420	
			565		840		630	
			750		1120		840	

Notes:

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

TABLE 25: MULTIPLE MEMBER CONNECTIONS FOR MAX. FACTORED UNIFORM SIDE LOADS - SIMPSON STRONG-DRIVE® SDW SCREWS

Min. depth (in)	No. of rows of fasteners	Fastener o.c. spacing (in)	Assembly A	Assembly B	Assembly F	Assembly A	Assembly B	Assembly F	Assembly F	Assembly F
										
Fastener type			SDW22338	SDW22500	SDW22634	SDW22300	SDW22458	SDW22600	SDW22500	SDW22438
Fastener nominal length (in)			3 3/8	5	6 3/4	3	4 5/8	6	5	4.375
Side Member Thickness			1 3/4"	1 3/4"	1 3/4"	1 1/2"	1 1/2"	1 1/2"	1 1/4"	1 1/8"
Main Member Thickness			1 3/4"	1 3/4"	1 3/4"	1 1/2"	1 1/2"	1 1/2"	1 1/4"	1 1/8"
7.25	2	12	1265	1070	950	1220	1200	1095	795	730
11.25	3		1895	1605	1425	1830	1800	1640	1190	1095
16	4		2530	2135	1900	2440	2395	2190	1585	1460

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.

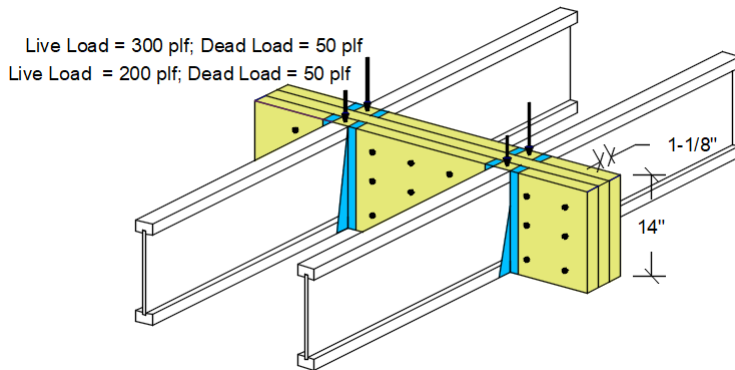
TABLE 26: MULTIPLE MEMBER CONNECTIONS FOR UNIFORM SIDE LOADS - MITEK MIFLK® SCREWS

Min. depth (in)	No. of rows of fasteners	Fastener o.c. spacing (in)	Assembly A	Assembly B	Assembly F	Assembly A	Assembly B	Assembly F	Assembly F	
			Fastener type	MIFLK312	MIFLK005	MIFLK634	MIFLK278	MIFLK412	MIFLK22600	MIFLK005
			Fastener nominal length (in)	3 1/2	5	6 3/4	3	4 5/8	6	5
			Side Member Thickness	1 3/4"	1 3/4"	1 3/4"	1 1/2"	1 1/2"	1 1/2"	1 1/4"
Main Member Thickness	1 3/4"	1 3/4"	1 3/4"	1 1/2"	1 1/2"	1 1/2"	1 1/4"			
7.25	2	12	1540	1200	1060	1180	1005	895	690	
11.25	3		2310	1800	1590	1770	1505	1340	1030	
16	4		3080	2400	2120	2360	2005	1785	1375	

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.

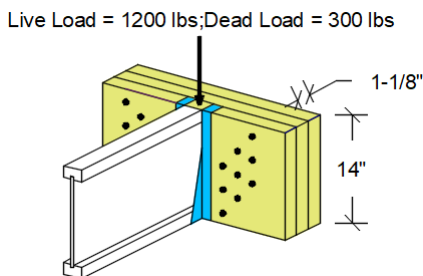
FIGURE 6: UNIFORM SIDE LOAD DESIGN EXAMPLE



Notes:

- 1) Verify that a 3-ply, 1-1/8" x 14" header can support the total factored load of $1.5 \times 300 + 1.25 \times 50 = 513$ PLF with proper live and total deflection criteria.
- 2) The actual factored uniform load applied to the outer ply member is 513 PLF.
- 3) Three 1-1/8" plies (Assembly B), 4 rows of 8d Box nails (0.113" x 2.5") at 12" o.c. spacing fastened on both sides (face and back) are good for 600 PLF factored uniform side load. Therefore, use 4 rows of 8d Box nails (0.113" x 2.5") 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.

FIGURE 7: CONCENTRATED SIDE LOAD EXAMPLE



Notes:

- 1) Verify that a 3-ply, 1-1/8" x 14" header can support a factored concentrated side load of $1.5 \times 1200 + 1.25 \times 300 = 2250$ lbs and all other loads applied.
- 2) The 2250 lbs factored side point load is transferred to the header with a face mount hanger.
- 3) For an assembly of three 1-1/8" plies (Assembly B), 16 – 8d box nails (0.113" x 2.5") are good for 2400 lbs.
- 4) Verify hanger capacity. Capacity reduction may be required for the selected header thickness. Refer to hanger manufacturer for appropriate reductions.

MULTIPLE MEMBER CONNECTIONS: CONCENTRATED SIDE LOADS

TABLE 27: MULTIPLE MEMBER CONNECTIONS FOR CONCENTRATED SIDE LOADS – NAILS

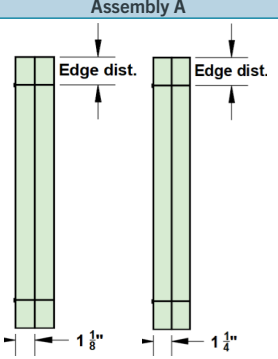
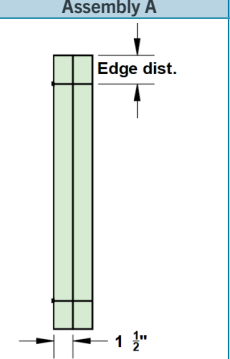
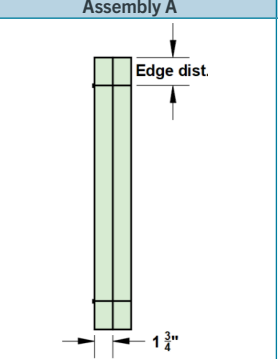
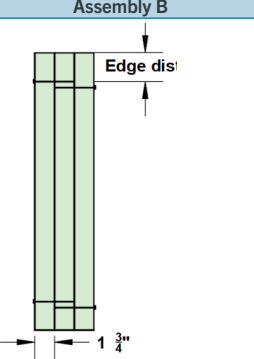
Min. depth (in)	Total Number of Fasteners	Assembly A	Assembly A	Assembly A	Assembly B
					
		8d Box Nail (0.113" x 2.5")	10d Box Nail (0.128" x 3")	16d Box Nail (0.135" x 3.5")	
		Side Member thickness 1 1/8" or 1 1/4"	1 1/2"	1 3/4"	
		Main member thickness 1 1/8" or 1 1/4"	1 1/2"	1 3/4"	
7.25	6	1200	1500	1680	1260
9.25	8	1600	2000	2240	1680
9.5	12	2400	3000	3360	2520
11.25	16	3200	4000	4480	3360
14	18	3600	4500	5040	3780
16	24	4800	6000	6720	5040

FIGURE 8: 6 NAILS

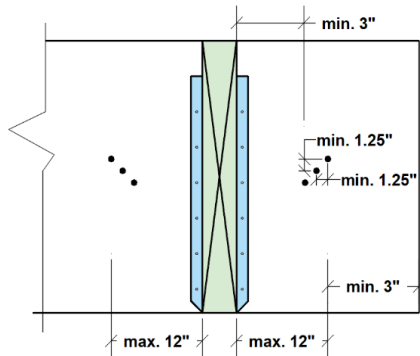


FIGURE 9: 8 NAILS

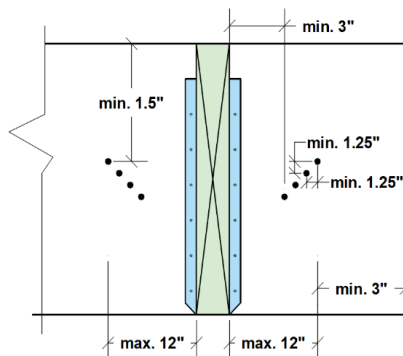


FIGURE 10: 12 NAILS

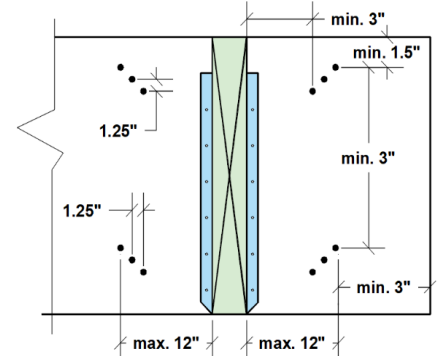


FIGURE 11: 16 NAILS

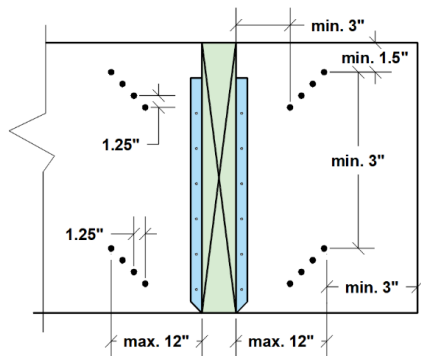


FIGURE 12: 18 NAILS

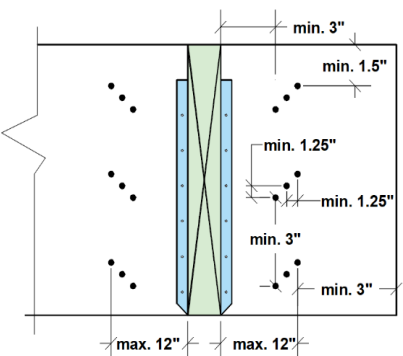


FIGURE 13: 24 NAILS

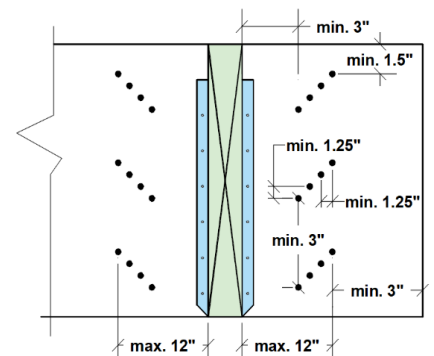


TABLE 28: MULTIPLE MEMBER CONNECTIONS FOR MAX. FACTORED CONCENTRATED SIDE LOADS - SIMPSON STRONG-DRIVE® SDW SCREWS

		Max. Concentrated Load (lbs)								
Min depth (in.)	Total # of Fasteners	Assembly A	Assembly B	Assembly F	Assembly A	Assembly B	Assembly F	Assembly F	Assembly F	
		Fastener type	SDW22338	SDW22500	SDW22634	SDW22300	SDW22458	SDW22600	SDW22500	SDW22438
		Fastener nominal length (in)	3 3/8	5	6 3/4	3	4 5/8	6	5	4.375
		Side Member	1 3/4"	1 3/4"	1 3/4"	1 1/2"	1 1/2"	1 1/2"	1 1/4"	1 1/8"
Main Member	1 3/4"	1 3/4"	1 3/4"	1 1/2"	1 1/2"	1 1/2"	1 1/4"	1 1/8"		
7.25	6	3790	3205	2850	3660	3595	3280	2375	2190	
9.25	8	5055	4270	3795	4880	4790	4375	3165	2920	
9.5	12	7580	6405	5695	7320	7185	6560	4745	4375	
11.25	16	10105	8540	7590	9760	9575	8750	6325	5835	
14	18	11370	9605	8540	10980	10775	9840	7115	6560	

Tabulated values shall not be increased for a load duration $K_D > 1.0$

FIGURE 14: 6 SDW SCREWS

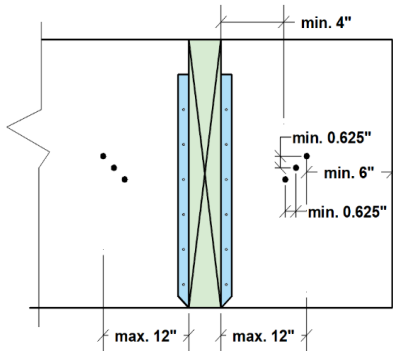


FIGURE 15: 8 SDW SCREWS

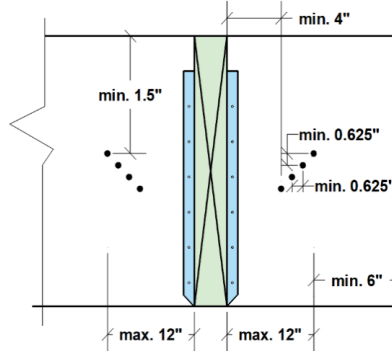


FIGURE 16: 12 SDW SCREWS

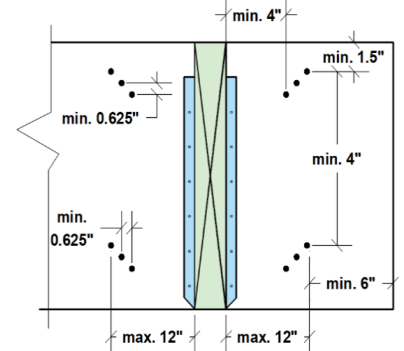


FIGURE 17: 16 SDW SCREWS

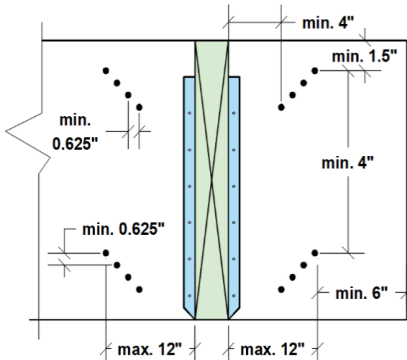


FIGURE 18: 18 SDW SCREWS

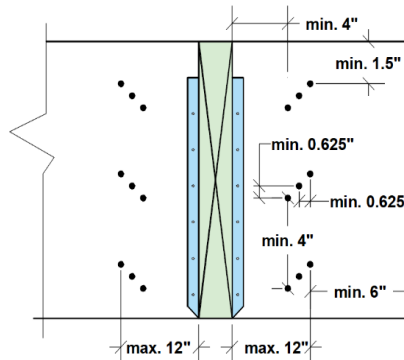
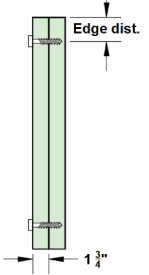
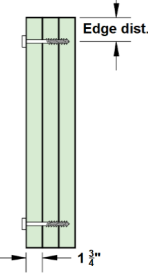
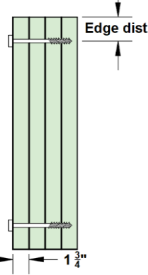
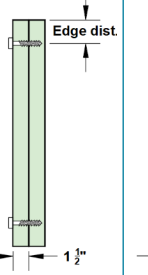
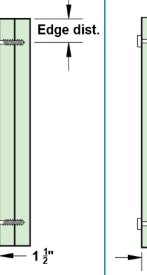
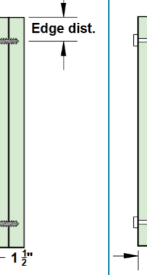
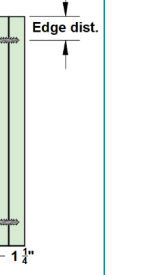


TABLE 29: MULTIPLE MEMBER CONNECTIONS FOR MAX. FACTORED CONCENTRATED SIDE LOADS – MITEK MIFLK® SCREWS

		Max. Concentrated Load (lbs)							
		Assembly A	Assembly B	Assembly F	Assembly A	Assembly B	Assembly F	Assembly F	
Min depth (in.)	Total # of Fasteners								
	Fastener type	MIFLK312	MIFLK005	MIFLK634	MIFLK278	MIFLK412	MIFLK22600	MIFLK005	
	Fastener nominal length (in)	3 1/2	5	6 3/4	3	4 5/8	6	5	
	Side Member	1 3/4"	1 3/4"	1 3/4"	1 1/2"	1 1/2"	1 1/2"	1 1/4"	
	Main Member	1 3/4"	1 3/4"	1 3/4"	1 1/2"	1 1/2"	1 1/2"	1 1/4"	
7.25	6	4620	3600	3180	3540	3010	2675	2060	
9.25	8	6160	4800	4240	4720	4010	3565	2745	
9.5	12	9240	7200	6360	7080	6015	5345	4115	
11.25	16	12320	9600	8480	9440	8020	7130	5490	
14	18	13860	10800	9540	10620	9020	8020	6175	

Tabulated values shall not be increased for a load duration $K_D > 1.0$

FIGURE 19: 6 MIFLK SCREWS

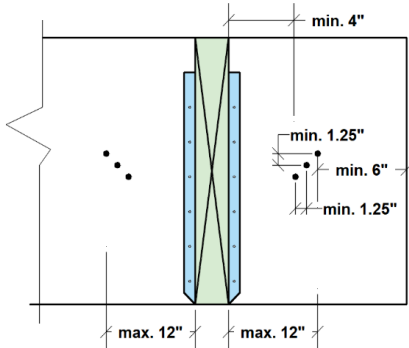


FIGURE 20: 8 MIFLK SCREWS

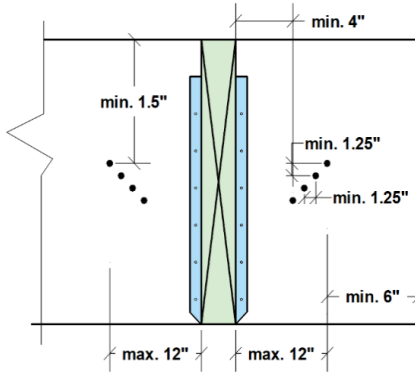


FIGURE 21: 12 MIFLK SCREWS

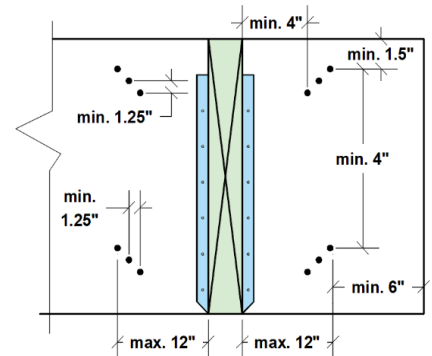


FIGURE 22: 16 MIFLK SCREWS

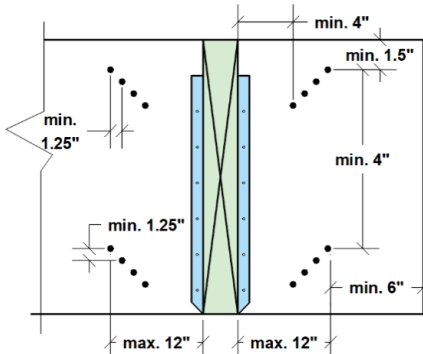
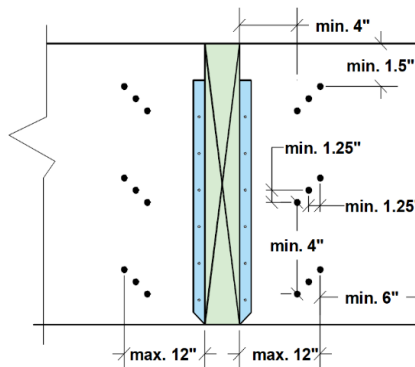


FIGURE 23: 18 MIFLK SCREWS



COLUMNS: ALLOWABLE AXIAL LOADS

TABLE 30: ALLOWABLE FACTORED AXIAL LOADS (LBS) FOR 1.35E T-TEC LSL 1 -1/2" WIDTH

Column Height (ft.)	ALLOWABLE FACTORED AXIAL LOAD (LBS) FOR 1.35E T-TEC LSL 1-1/2" WIDTH					
	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
6	4544	6816	13706	9413	18928	20391
7	3511	5267	12350	7273	17055	17478
8	2693	4039	10887	5578	15034	15293
9	2071	3107	9430	4291	13022	13594
10	1607	2411	8066	3330	11139	12234
11	1262	1893	6847	2614	9455	11122
12	1003	1505	5791	2078	7998	10195
13		1211	4896	1673	6762	9411
14		987	4147	1363	5727	8739

Design Assumptions:

- Columns shall be only designed for the max. tabulated factored 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)
- Live load deflection criteria = L/180

How to size a Column:

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

TABLE 31: ALLOWABLE FACTORED AXIAL LOAD (LBS) FOR 1.35E T-TEC LSL 1-3/4" WIDTH

Column Height (ft.)	ALLOWABLE FACTORED AXIAL LOAD (LBS) FOR 1.35E T-TEC LSL 1-3/4" WIDTH					
	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
6	6496	9745	16957	13458	23417	27755
7	5301	7952	15991	10982	22083	23790
8	4253	6380	14645	8811	20225	20816
9	3389	5084	13194	7021	18220	18503
10	2702	4053	11722	5597	16187	16653
11	2165	3248	10302	4485	14226	15139
12	1748	2622	8985	3621	12408	13877
13	1424	2136	7800	2949	10772	12810
14	1170	1756	6757	2425	9331	11895

Design Assumptions:

- Columns shall be only designed for the max. tabulated factored 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)
- Live load deflection criteria = L/180

How to size a Column:

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

TABLE 32: ALLOWABLE FACTORED AXIAL LOAD (LBS) FOR 1.55E T-TEC LSL 1-1/2" WIDTH

Column Height (ft.)	ALLOWABLE FACTORED AXIAL LOAD (LBS) FOR 1.55E T-TEC LSL 1-1/2" WIDTH					
	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
6	5116	7675	14534	10599	20071	23412
7	3970	5955	13952	8223	19267	20067
8	3055	4583	12311	6328	17001	17559
9	2356	3534	10678	4881	14746	15608
10	1832	2748	9148	3796	12633	14047
11	1441	2161	7777	2985	10740	12770
12	1146	1720	6588	2375	9097	11706
13		1386	5577	1914	7702	10805
14		1130	4729	1560	6530	10033

Design Assumptions:

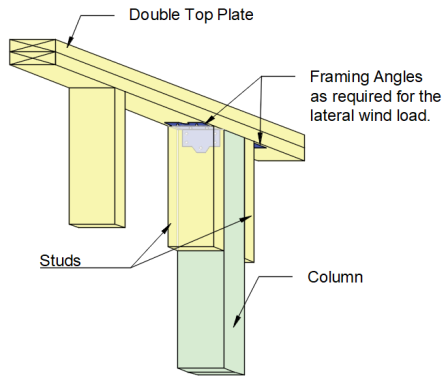
- Columns shall be only designed for the max. tabulated factored vertical loads
- Bracing in both directions must be provided at column ends
- Dry service conditions only
- Eccentricity of 1/6 of the column width or depth has been applied (the worst case scenario)
- Live load deflection criteria = L/180

How to size a Column:

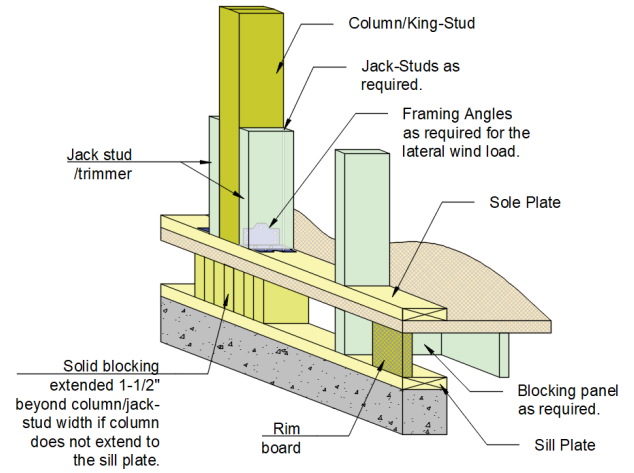
- Determine the clear height of the Column
- Scan the cells with the height higher or equal to the actual column height, and select a size with the factored vertical load capacity \geq factored reaction/vertical load transferred

COLUMN DETAILS

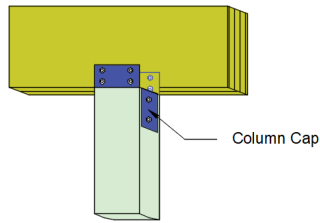
Detail 15: Column to Top Plate



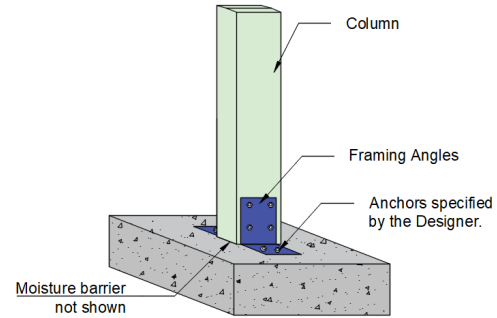
Detail 16: Column to Bottom Plate



Detail 17: Beam to Column Cap



Detail 18: Column Base



Detail 19: Beam on Column

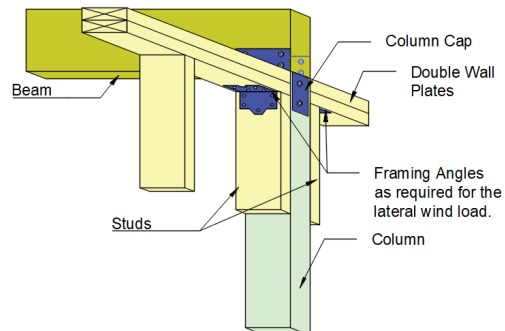


TABLE 33: MULTI-PLY CONNECTIONS FOR COLUMNS 1.35E & 1.55E T-TEC LSL

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, WSWH56, 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), WSWH5634 screws	2	8"	6"	2"	staggered; adjacent screws driven from opposite side

Note:
1) Columns shall not be drilled or notched.

TABLE 34: 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	Factored Normal Resistance (lbs)	Connector	Factored Normal Resistance (lbs)
3"	3" x 3 1/2"	End	ECC3 1/4-4	8,880	KECCQ325-4	21,095
		Intermediate	CC3 1/4-4	23,080	KCCQ325-4	30,940
	3" x 5 1/4"	End	ECC3 1/4-6	13,955	KECCQ325-6	21,095
		Intermediate	CC3 1/4-6	27,915	KCCQ325-6	30,940
4-1/2"	4 1/2" x 5 1/4"	End	ECC4.62-5.50	20,095	-	-
		Intermediate	CC4.62-5.50	40,195	-	-
3-1/2"	3 1/2" x 3 1/2"	End	ECC44	9,945	KECCQ44	24,430
		Intermediate	CC44	19,850	KCCQ44	34,655
	3 1/2" x 5 1/4"	End	ECC46	15,630	KECCQ46	26,775
		Intermediate	CC46	31,260	KCCQ46	34,655
	3 1/2" x 7 1/4"	End	ECC48	21,315	KECCQ48	26,775
		Intermediate	CC48	31,260	KCCQ48	34,655
5-1/4"	5 1/4" x 5 1/4"	End	ECC66	24,565	KECCQ66	41,630
		Intermediate	CC66	49,125	KCCQ66	54,455
	5 1/4" x 7 1/4"	End	ECC68	33,495	KECCQ68	42,075
		Intermediate	CC68	49,125	KCCQ68	54,455
7"	7" x 7 1/4"	End	ECC7 1/8-7 1/8	53,510	KECCQ71-8	53,555
		Intermediate	CC7 1/8-7 1/8	99,370	KCCQ71-8	69,300

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 $K_p > 1.0$.

TABLE 35: COLUMN BASES FOR 1.35E & 1.55E T-TEC LSL

Column Size	Simpson Strong-Tie®		USP Structural Connectors®	
	Connector	Factored Normal Resistance (lbs)	Connector	Factored Normal Resistance (lbs)
4 1/2" x 5 1/4"	CB5-4.5	Post or concrete control	KCBQ5	Post or concrete control
4 1/2" x 7 1/4"	CB5-4.5		KCBQ5	
6" x 7 1/4"	CB5-6		KCBQ5	
3 1/2" x 3 1/2"	CB44		KCBQ44	
3 1/2" x 5 1/4"	CB46		KCBQ46	
3 1/2" x 7 1/4"	CB48		KCBQ48	
5 1/4" x 5 1/4"	CB64		KCBQ64	
5 1/4" x 7 1/4"	CB6-7		-	
7" x 7 1/4"	CB7 1/8-7		KCBQ71-7	

Notes:
1) Concrete shall have a minimum compressive strength of $f'_c = 2,500$ psi or greater at 28 days.
2) Designer is responsible for concrete design.

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/

DRAW

- 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.



isWall®

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.

To become a Tolko authorized user, please contact your Tolko EWP sales representative at:

Phone: 250-549-5311

Email: EWPsales@tolko.com

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