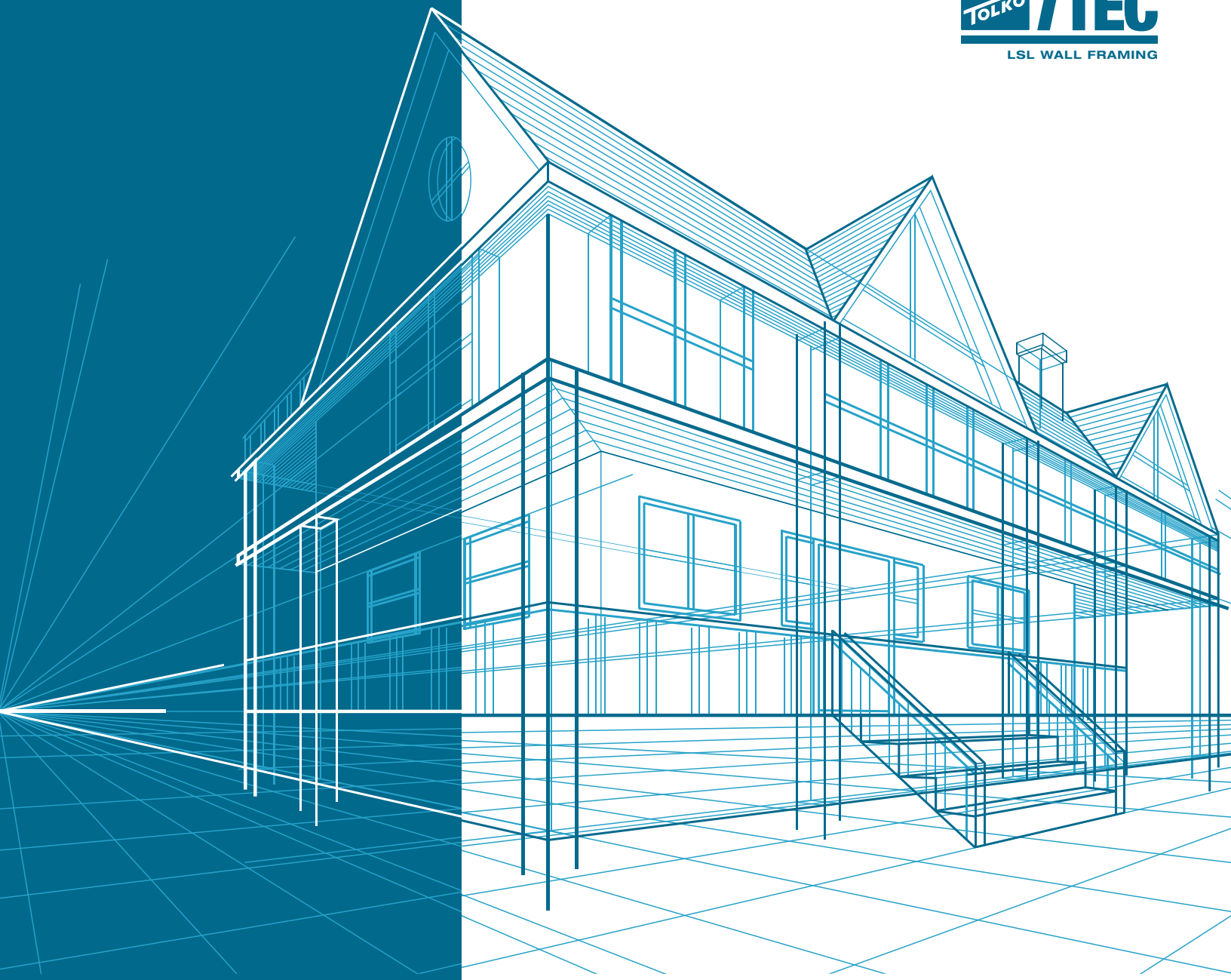
TOLKO

TECHNICAL GUIDE (ASD- USA)

T-TEC 1.35E LSL WALL FRAMING

TOLKO TTEC
LSL WALL FRAMING



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ALLOWABLE STRESS DESIGN

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TOLKO T-TEC LSL PRODUCTS

Tolko's line of Laminated Strand Lumber (LSL) is manufactured from strands of fibre selected to create a solid, consistent, and uniform alternative to traditional structural and non-structural products such as lumber, plywood, OSB and LVL. There is no warp, no wane, and no rot which means no waste and no need to order extra materials.

CREATING VALUE FROM THE STRANDS

Tolko LSL products are produced at our Athabasca mill in Slave Lake, Alberta. This industry-leading facility has the longest continuous press in North America, ensuring a steady stream of uniform engineered wood products and precise mixtures for product consistency and dimensional accuracy. Our continuous press provides contractors with the confidence that T-TEC LSL will perform as intended at every job.

DELIVERING VALUE WITH CONSISTENCY

Our Athabasca Mill is serviced by a combination of truck and rail providing Tolko with the flexibility to reach customers across Canada and the USA.

ACHIEVING VALUE WITH 1.35 E-RATING

The E-Rating of engineered wood products identifies the modulus of elasticity (MOE) or the tendency of the product to deform along an axis when opposing forces are applied. A greater E-Rating means the product is more resistant to changing with force.

WHY CHOOSE T-TEC LSL?

- ✓ Reduce materials and enhance design
- ✓ Improve recovery
- ✓ Reduce installation time
- ✓ Build quieter floors and straighter walls
- ✓ Protect against fungal decay and insects
- ✓ Earn Green Building credits

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CONTENTS

SECTION 1: WALL FRAMING DESIGN AND CONSTRUCTION

1.1) Tolko T-TEC 1.35E LSL: Design Properties (Allowable Stress Design)

TABLE 1: 1.35E TOLKO T-TEC LSL DESIGN PROPERTIES (ALLOWABLE STRESS DESIGN) [a], [b]

Property	Product Orientation	Product Grade 1.35E LSL
Bending, F_b [c] (psi)	Edgewise	1850[d]
	Flatwise	2,060
Modulus of elasticity, E[g] (psi)	Edgewise	1,350,000
	Flatwise	1,350,000
Compression perpendicular to grain, Fc⊥[f] (psi)	Edgewise	750
	Flatwise	690
Longitudinal shear, F_v (psi)	Edgewise	330
	Flatwise	115
Compression parallel to grain, $F_{c||}$ (psi)		1,650
Tension parallel to grain, F_t (psi)		1300[e]

(a) Tabulated values are design values for normal load duration. All values, except E and Fc⊥, 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) Allowable stressed for edgewise orientation refer to loads applied parallel to the wide face of the strands (the edge of the member). Flatwise refers to loads applied perpendicular to the wide face of the strands (the face of the member).

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

(d) 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.

(e) Tabulated value for LSL is based on a reference length of 3 feet. For other lengths, the allowable tensile stress shall be modified by $(3/L)^{(1/16)}$, where L = length in feet. For lengths less than 3 feet, use the allowable tension stress from Table 1 unadjusted.

(f) When designing with the tabulated compression 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.

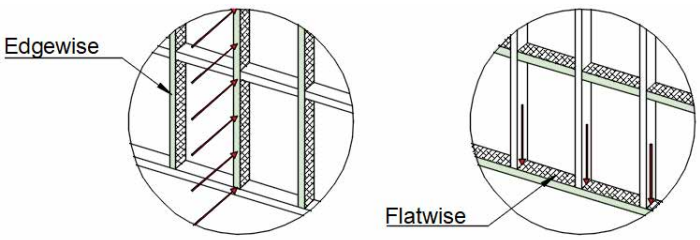
(g) For a simple span member, deflection for a uniform load could be calculated as follows:

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

where:

δT = total deflection (in)
w = applied uniform loads (lbf/ft)
L = design span (ft)
E = modulus of elasticity (lbf/in^2)
b = beam width (in)
h = beam depth (in)

FIGURE 1: PRODUCT ORIENTATION



PROPOSITION 65 WARNING

WARNING

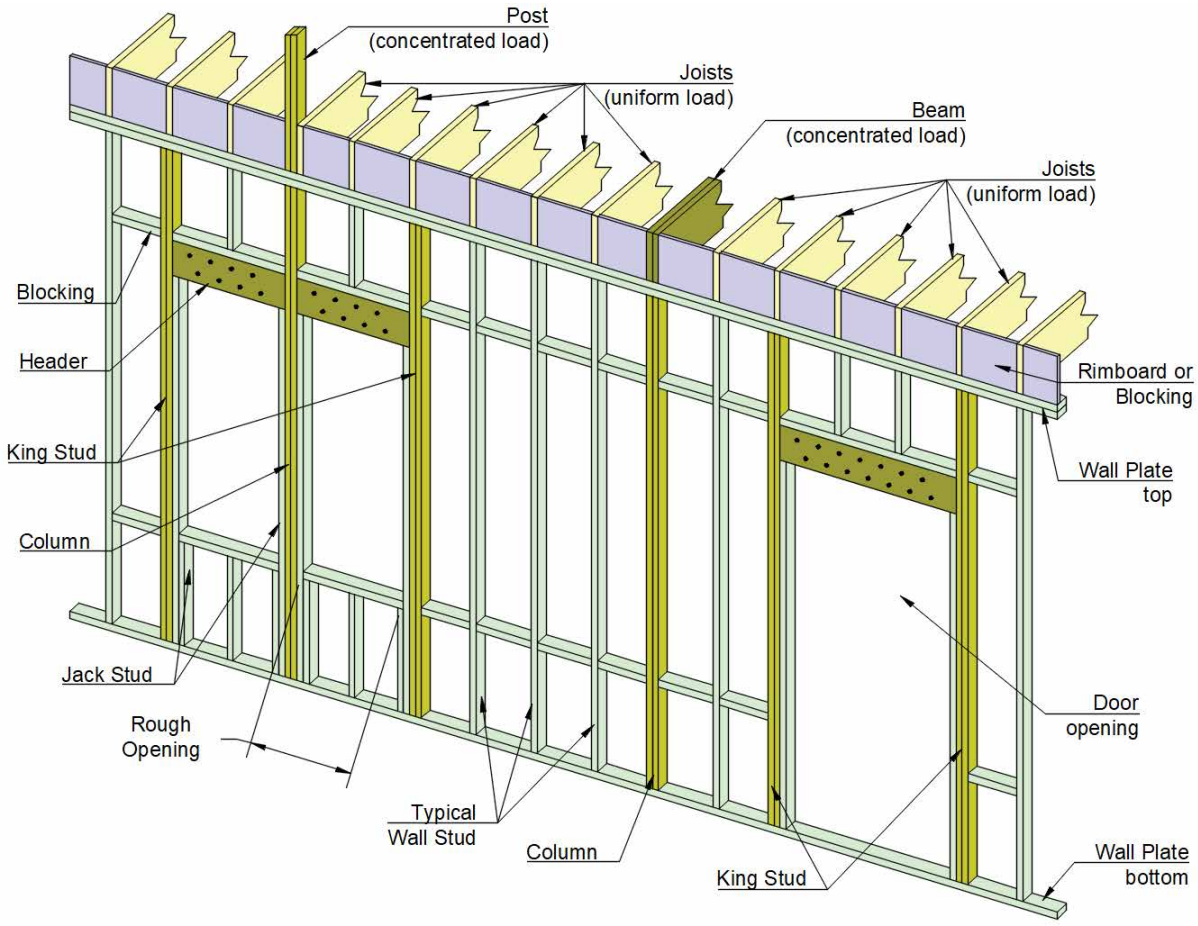
Drilling, sawing, sanding or machining wood products can expose you to wood dust, a substance known to the State of California to cause cancer. Avoid inhailing wood dust or use a dust mask or other safeguards for personal protection. For more information go to www.P65Warnings.ca.gov/wood.

WARNING

This product can expose you to chemicals including methanol, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

1.2) Typical Wall Framing

FIGURE 2: WALL FRAMING COMPONENTS



1.3) Exterior Walls Design Wind Pressure

TABLE 2: EFFECTIVE WIND AREA, A (ft^2)

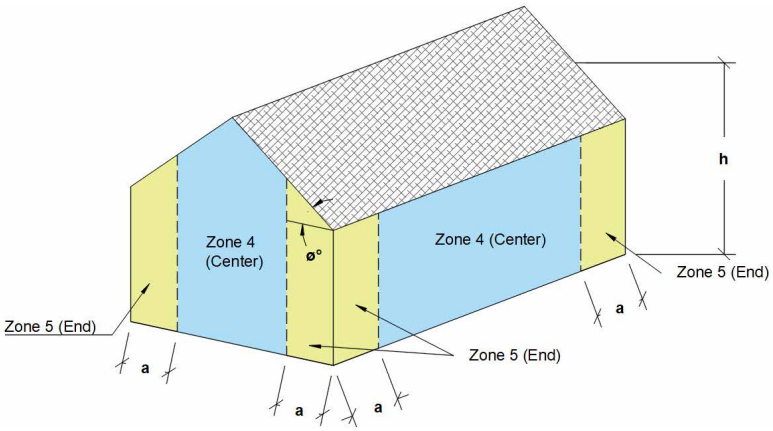
Stud, King-Stud, Column Height (ft)	Effective Wind Area, A (ft^2)
8	21
9	27
10	33
11	40
12	48
13	56
14	65
15	75
16	85
17	96
≥ 18	100

Notes:

1) The effective wind area is used to determine the external pressure coefficients and shall not be confused with the generic load tributary area, which is used to determine the amount of load applied to an individual member.

2) The effective wind area is the span length multiplied by the tributary width, or the span length $^2/3$, whichever is greater.

FIGURE 3: WALL WIND ZONES



Notations:

a (ft) = 10% for least horizontal dimension or 0.4h, whichever is smaller, but not less than either 4% of least horizontal dimension or 3 ft.

Exception: For buildings with Ø = 0° to 7° and a least horizontal dimension greater than 300 ft, dimension "a" shall be limited to a maximum of 0.8h.

h (ft) = Mean roof height, except that eave height shall be used for Ø ≤ 10°

Ø = Roof slope in degrees

TABLE 3: WALL DESIGN WIND PRESSURE (psf) - LOW-RISE BUILDING ENCLOSED

Exposure Category	Wall Zone	Effective Wind Area (ft²)	Ultimate Design Wind Speed, V_{ult} (mph) 2015 and 2018 IRC/IBC (ASCE 7-10 and ASCE 7-16: W)								
			110	115	120	130	140	150	160	170	180
B	Zone 4 (Center)	≤ 10	24.2	26.4	28.8	33.8	39.2	45.0	51.2	57.8	64.8
		50	21.9	23.9	26.0	30.5	35.4	40.7	46.3	52.2	58.5
		A ≥ 100	20.9	22.8	24.8	29.1	33.8	38.8	44.1	49.8	55.9
	Zone 5 (End)	≤ 10	31.8	34.7	37.8	44.4	51.4	59.1	67.2	75.9	85.0
		50	25.2	27.5	30.0	35.2	40.8	46.9	53.3	60.2	67.5
		A ≥ 100	23.2	25.3	27.6	32.4	37.6	43.1	49.1	55.4	62.1
C	Zone 4 (Center)	≤ 10	33.6	36.8	40.0	47.0	54.5	62.5	71.2	80.3	90.1
		50	30.4	33.2	36.2	42.4	49.2	56.5	64.3	72.6	81.4
		A ≥ 100	29.0	31.7	34.5	40.5	47.0	53.9	61.3	69.3	77.6
	Zone 5 (End)	≤ 10	44.1	48.2	52.5	61.7	71.5	82.1	93.4	105.4	118.2
		50	35.0	38.3	41.7	48.9	56.7	65.1	74.1	83.7	93.8
		A ≥ 100	32.2	35.2	38.4	45.0	52.2	59.9	68.2	77.0	86.3
D	Zone 4 (Center)	≤ 10	39.7	43.4	47.2	55.4	64.3	73.8	84.0	94.8	106.3
		50	35.9	39.2	42.7	50.1	58.1	66.7	75.9	85.7	96.1
		A ≥ 100	34.2	37.4	40.7	47.8	55.4	63.6	72.4	81.7	91.6
	Zone 5 (End)	≤ 10	52.1	57.0	62.0	72.8	84.4	96.9	110.2	124.5	139.5
		50	41.3	45.2	49.2	57.8	67.0	76.9	87.5	98.8	110.7
		A ≥ 100	38.1	41.6	45.3	53.1	61.6	70.8	80.5	90.9	101.9

Design Assumptions:

1) Tabulated design wind pressures are for a low-rise building, enclosed, with a mean roof height h ≤ 33 ft, risk/occupancy category II, topographic factor of 1.0, and importance factor of 1.0.
2) The design wind pressures are based on ASCE7-10 & ASCE7-16, Chapter 30, Part 1 for Components and Cladding (C & C).
3) The effective wind area is the span length multiplied by the tributary width, or the span length²/3, whichever is greater.
4) For effective wind areas between those given above, the design wind pressure may be interpolated; otherwise, the wind pressure associated with the lower effective area shall be used.

   Example:

   Wall Zone 4 (Center), Exposure Category B, 8 ft. Stud @ 16" o.c. spacing
   IRC/IBC 2015 Building Code
   Basic Wind Speed, V = 115 (mph)
   Stud, 8 ft., effective wind area, A = 21 ft² from Table 2
   - the wind pressure corresponding to the lower wind effective area (10 ft²) from Table 3 = 26.4 psf, or
   - by interpolation, the wind pressure = 26.4 - [(21-10)x(26.4-23.9)/(50-10)] = 25.7 psf
5) Tabulated wind pressures of this table are not reduced by 0.6 since the load combinations include the 0.6 factor for the wind load.

Exposure B: Urban and suburban areas, or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger. Exposure B shall be assumed unless the site meets the definition of another type exposure.
Exposure C: Open terrain with scattered obstructions having heights generally less than 30 feet.
Exposure D: Flat, unobstructed areas exposed to wind.

Building Enclosed: A building that has the total area of openings in each wall, that receives positive external pressure, less than or equal to 4 sq. ft. or 1% of the area of that wall, whichever is smaller.
Building Partially Enclosed: A building that complies with both of the following conditions:

(a) The total area of openings in a wall that receives positive external pressure exceeds the sum of the areas of openings in the balance of the building envelope (walls and roof) by more than 10%.
(b) The total area of openings in a wall that receives positive external pressure exceeds 4 ft² or 1% of the area of the wall, whichever is smaller, and the percentage of openings in the balance of the building envelope does not exceed 20%.

TABLE 4: WALL DESIGN WIND PRESSURE (psf) - LOW-RISE BUILDING PARTIALLY-ENCLOSED

Exposure Category	Wall Zone	Effective wind area (ft^2)	Ultimate Design Wind Speed, V_{ult} (mph) 2015 and 2018 IRC/IBC (ASCE 7-10 and ASCE 7-16: W)								
			110	115	120	130	140	150	160	170	180
B	Zone 4 (Center)	≤ 10	31.2	34.1	37.1	43.6	50.5	58.0	66.0	74.5	83.5
		50	28.9	31.5	34.3	40.3	46.7	53.7	61.1	68.9	77.3
		A ≥ 100	27.9	30.4	33.1	38.9	45.1	51.8	58.9	66.5	74.6
	Zone 5 (End)	≤ 10	38.8	42.4	46.1	54.1	62.8	72.1	82.0	92.6	103.8
		50	32.2	35.2	38.3	45.0	52.2	59.9	68.1	76.9	86.2
		A ≥ 100	30.2	33.0	35.9	42.2	48.9	56.1	63.9	72.1	80.8
C	Zone 4 (Center)	≤ 10	43.4	47.4	51.6	60.6	70.2	80.6	91.7	103.6	116.1
		50	40.1	43.8	47.7	56.0	65.0	74.6	84.9	95.8	107.4
		A ≥ 100	38.7	42.3	46.1	54.1	62.7	72.0	81.9	92.5	103.7
	Zone 5 (End)	≤ 10	53.9	58.9	64.1	75.2	87.3	100.2	114.0	128.7	144.2
		50	44.8	48.9	53.3	62.5	72.5	83.2	94.7	106.9	119.8
		A ≥ 100	42.0	45.9	49.9	58.6	68.0	78.0	88.8	100.2	112.4
D	Zone 4 (Center)	≤ 10	51.2	55.9	60.9	71.5	82.9	95.2	108.3	122.2	137.0
		50	47.3	51.8	56.3	66.1	76.7	88.0	100.2	113.1	126.8
		A ≥ 100	45.7	49.9	54.4	63.8	74.0	85.0	96.7	109.1	122.4
	Zone 5 (End)	≤ 10	63.6	69.5	75.7	88.8	103.0	118.2	134.5	151.9	170.3
		50	52.8	57.7	62.9	73.8	85.6	98.2	111.8	126.2	141.4
		A ≥ 100	49.5	54.1	58.9	69.2	80.2	92.1	104.8	118.3	132.6

Design Assumptions:

1) Tabulated design wind pressures are for a low-rise building, partially-enclosed, with a mean roof height h ≤ 33 ft, risk/occupancy category II, topographic factor of 1.0, and importance factor of 1.0.
2) The design wind pressures are based on ASCE7-10 & ASCE7-16, Chapter 30, Part 1 for Components and Cladding (C & C).
3) The effective wind area is the span length multiplied by the tributary width, or the span length^2/3, whichever is greater.
4) For effective wind areas between those given above, the design wind pressure may be interpolated; otherwise, the wind pressure associated with the lower effective area shall be used.

   Example:

   Wall Zone 4 (Center), Exposure Category B, 8 ft. Stud @ 16" o.c. spacing

   IRC/IBC 2015 Building Code

   Basic Wind Speed, V = 115 (mph)

   Stud, 8 ft., effective wind area, A = 21 ft^2 from Table 2

   - the wind pressure corresponding to the lower wind effective area (10 ft2) from Table 4 = 34.1 psf, or
   - by interpolation, the wind pressure = 34.1 - [(21-10)x(34.1-31.5)/(50-10)] = 33.4 psf
5) Tabulated wind pressures of this table are not reduced by 0.6 since the load combinations include the 0.6 factor for the wind load.

Exposure B: Urban and suburban areas, or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger. Exposure B shall be assumed unless the site meets the definition of another type exposure.

Exposure C: Open terrain with scattered obstructions having heights generally less than 30 feet.

Exposure D: Flat, unobstructed areas exposed to wind.

Building Enclosed: A building that has the total area of openings in each wall, that receives positive external pressure, less than or equal to 4 sq. ft. or 1% of the area of that wall, whichever is smaller.

Building Partially Enclosed: A building that complies with both of the following conditions:

(a) The total area of openings in a wall that receives positive external pressure exceeds the sum of the areas of openings in the balance of the building envelope (walls and roof) by more than 10%.

(b) The total area of openings in a wall that receives positive external pressure exceeds 4 ft^2 or 1% of the area of the wall, whichever is smaller, and the percentage of openings in the balance of the building envelope does not exceed 20%.

TABLE 5: WIND SPEED CONVERSION (V_{ULT}, V_{ASD})

V_{ult} (mph)	110	115	120	130	140	150	160	170	180
V_{asd} (mph)	85	89	93	101	108	116	124	132	139

Note:

1) Where reference documents are based on the nominal design wind speed, V_{asd} (e.g. 2009 IRC/IBC, ASCE7-05) , the nominal design wind speed, V_{asd}, could be converted to the ultimate design wind speeds, V_{ult}, as shown above.

1.4) Prescriptive Wall Applications

- 1.35E Tolko T-TEC LSL could be used for prescriptive stud wall applications in conventional construction in accordance with Section 2308.5 of the 2018 and 2015 IBC, Section 2308.9 of the 2012 and 2009 IBC, and Section R602.6 of the 2018 through 2009 IRC.
- Cutting, notching and boring of Tolko LSL used as studs in conventional construction is permitted in accordance with Section 2308.5 of the 2018 and 2015 IBC, Section 2308.9 of the 2012 and 2009 IBC, and Section R602.6 of the 2018 through 2009 IRC.
- Free standing columns or unbraced columns in a wall shall not be drilled or notched without the approval of a professional engineer or the manufacturer. Bolts, lag screws, and self-tapping screws shall only be inserted through the face of the column, perpendicular to the face of the strands.
- Built-up columns connections shall be as specified in this guide or as provided by the manufacturer.

1.5) Engineered Wall Applications

- 1.35E Tolko T-TEC LSL is permitted in engineered wall applications when designed in accordance with the National Design Specification for Wood Construction (NDS) and the governing building code.
- Free standing columns or unbraced columns in a wall shall not be drilled or notched without the approval of a professional engineer or the manufacturer. Bolts, lag screws, and self-tapping screws shall only be inserted through the face of the column, perpendicular to the face of the strands.
- Built-up columns connections shall be as specified in this guide or as provided by the manufacturer.
- Cutting, notching and boring of Tolko LSL studs shall be permitted in engineered wall applications as shown in Detail 15 and Detail 16.

1.6) Wall Sheathing - Nailing Restrictions and Requirements

- For sheathing attached with 10d common nails (0.148" x 3.0") with a spacing no closer than 6 inches on center, a single Tolko LSL stud shall be permitted for framing at adjoining panel edges. Nails shall be installed at a min. 3/8" from all panel edges.
- For sheathing attached with 8d common nails (0.131" x 2-1/2") or smaller with a spacing no closer than 4 inches on center, a single Tolko LSL stud shall be permitted for framing at adjoining panel edges. Nails shall be installed at a min. 3/8" from all panel edges.
- For sheathing attached with 8d common nails (0.131" x 2-1/2") spaced closer than 4 inches on center or 10d common nails (0.148" x 3.0") spaced closer than 6 inches on center, a double, stitch-nailed, LSL stud or single 2-1/2-inch-thick LSL Stud is required at adjoining panel edges. Nails shall be installed at a min. 3/8" from all panel edges and shall be staggered a minimum of ½ inch for each row of nails.
- For stud wall applications in accordance with IRC and the conventional light-frame construction provisions of the IBC [Section 2308, Table 2304.10.1 (2018 & 2015 IBC), and Table 2304.9.1 (2012 & 2009 IBC)], double LSL studs shall be stitch-nailed together with 2 staggered rows of nails (minimum 0.120" x 2-7/8") spaced 8" in each row. For engineered stud wall applications, the stitch nailing of double LSL studs shall be designed to transfer the required lateral shear using an assumed equivalent specific gravity of 0.50.
- 10d common nails (0.148" x 3") shall not be spaced closer than 3" on center, and 8d common nails (0.131" x 2-1/2") shall not be spaced closer than 2" on center.
- Maximum nail size is 10d common (0.148" x 3").

1.7) Single Member Header

- Single member header could be used for higher energy efficiency by replacing the wider/multi-ply header with a thinner header, which will provide an increased space for cavity insulation.
- Single 1.35E Tolko T-TEC LSL header shall be framed with a single flat 1-1/2" or 1-3/4" 1.35E Tolko T-TEC LSL member (plate) with the width not less than the wall studs on the top and the bottom of the header and face nailed to the top and bottom of the header with 10d box nails (0.128" x 3") spaced at 12" o.c. spacing.
- Headers shall be supported on each end with one or more trimmer/jack stud or with approved framing connections.
- Single member header shall be fastened to the adjacent King-Studs as per Table 25.

1.8) Exterior Wood Framed Walls Bracing Conditions

- The exterior wall bracing shall be in accordance with IRC 2018 – R602.10.

1.9) Wall Top Plate

- Tolko LSL studs shall be caped with a double top plate.
- End joints in top plates shall be offset not less than 24 inches and the end joints shall not occur over studs.
- Wall plates shall not be less than 1-1/2" in thickness and the width shall not be less than the width of the studs.
- The rafters or joists supported by the wall shall be centered over the studs with a tolerance of no more than 3 inches for double plates.
- As per IRC 2018 R602.3.2, a single top plate can be used as an alternative to a double plate if the rafter/joists from above are centered over the studs below with a tolerance of no more than 1 inch.
- Omission of the top plate is permitted over a header where the headers are adequately tied to the adjacent wall sections with framing connections.
- If the rafter/joists from above the top plate are offset more than the limits indicated above, the maximum vertical load carried by the top plate shall be checked as per Table 24.
- According to IRC 2018 R602.3.3, if the joists/rafters/trusses/studs above the top plate are spaced more than 16" o.c. and the bearing studs below are 24" o.c., such members shall bear within 5" of the studs beneath, with the following exceptions:
    - The top plates are (2) 1-1/2" x 5.25", or (2) 3" x 3.5" members
    - A third top plate is installed

1.10) Wall Bottom Plate

- Studs shall have full bearing on min. 1-1/2" plate with the width not less than the width of the studs.

1.11) Braced Wall Panel Uplift

- Braced wall panels located at exterior walls that support roof rafters or trusses shall have the framing members connected in accordance with one of the following provisions (as per IRC 2018):
- Fastening in accordance with IRC 2018 Table R602.3(1) where:
  a. The ultimate design wind speed, Vult, does not exceed 115 mph, the wind exposure category is B, the roof pitch is 5:12, and the roof span is 32 feet or less.
  b. The net uplift at the top of the wall does not exceed 100 plf.
- Where the net uplift at the top of the wall exceeds 100 plf, uplift framing connectors shall be installed.
- The wall sheathing and the fasteners designed to resist combined uplift and shear forces in accordance with acceptable engineering practice.

1.12) Wall Bracing

- Walls shall be braced as per IRC 2018 R602.10.

1.13) Wood Structural Panel Sheathing for Lateral Wind Pressure

TABLE 6: WOOD STRUCTURAL PANEL SHEATHING USED TO RESIST WIND PRESSURE

Minimum Nail		Min. Wood Structural Panel Span Rating	Min. Nominal Panel Thickness (in)	Max. Wall Stud Spacing (in)	Panel Nail o.c. spacing (in)		Maximum Allowable Stress Design Wind Speed , Vasd, (mph)			Maximum Ultimate Stress Design Wind Speed , Vult, (mph)		
							Wind Exposure Category			Wind Exposure Category		
Size	Penetration (inches)				Edge	Field	B	C	D	B	C	D
6d common nail (0.113" x 2.0")	1.5	24/0	3/8	16	6	12	110	90	85	142	116	110
		24/16	7/16	16	6	12	110	100	90	142	129	116
						6	150	125	110	194	161	142
8d common nail (0.131 x 2.5")	1.75	24/16	7/16	16	6	12	130	110	105	168	142	136
						6	150	125	110	194	161	142
				24	6	12	110	90	85	142	116	110
						6	110	90	85	142	116	110

Reference: IBC 2018 - Table 2304.6.1

Design Assumptions:

1) Enclosed building with a mean roof height not greater than 30 ft. and a topographic factor of 1.0.
2) Table is based on wind pressure acting toward and away from the building surfaces.
3) Panel strength axis shall be parallel or perpendicular to supports.
4) Three-ply plywood sheathing with studs spaced more than 16 inches on center shall be applied with the panel strength axis perpendicular to supports.
5) Wood structural panels with span ratings of wall-16 or wall-24 shall be permitted as an alternative to panels with a 24/0 span rating.
6) Plywood siding rated 16 on center, or 24 on center, shall be permitted as an alternative to panels with a 24/16 span rating.
7) Wall-16 and plywood siding 16 on center shall be used with studs spaced not more than 16 inches on center.

Notes:

1) When the sheathing is exposed to moisture during construction, there is a potential risk that the panel may buckle between studs. Therefore, builders shall pay attention to the moisture management of the wood structural panels on the jobsite.
2) Additional information on preventing wall sheathing from buckling is provided in APA Technical Note: Minimize Buckling of Wood Structural Panels, Form X480.

1.14) Deflection Requirements

TABLE 7: MINIMUM DEFLECTION CRITERIA

Member type	Maximum Deflection
Exterior walls - wind loads with plaster or stucco finish	H/360
Exterior walls - wind loads with other brittle finishes	H/240
Exterior walls with interior gypsum board finish	H/180
Exterior walls - wind loads with flexible finishes	H/120
Lintels supporting masonry veneer walls[a]	L/600

(a) IRC 2015/2018 Table R301.7 & R703.8.2

1.15) Fire-rated Assemblies

- When used as wall studs, Tolko LSL is permitted to be used as a direct replacement for solid-sawn lumber of No.2 or lower grades, having the same dimensions, in any fire-resistance-rated wall assemblies listed in Table 721.1(2) of the 2018, 2015 and 2012 IBC or Table 720.1(2) of the 2009 IBC. A minimum of 2.5 lb/ft^3 mineral wool insulation shall be placed in the stud cavity.

1.16) Design Limitations

- Tolko LSL shall be designed in accordance with the governing building code using the design properties and installation requirements specified in this technical guide.
- Tolko LSL is limited to dry service conditions where the equivalent moisture content of sawn lumber is less than 16 percent.

SECTION 2: STUD LOAD TABLES

TABLE 8: STUDS - MAXIMUM ALLOWABLE LATERAL WIND AND VERTICAL LOAD (1-1/2" WIDTH) - 3.5" & 5.5" THICK WALLS

Wall Height (ft)	1.35E Tolko T-TEC LSL									
	1-1/2" x 3-1/2" Vertical load (lbs) Defl. Ratio (L/_) Lateral Design Wind Load (plf)				1-1/2" x 5-1/2" Vertical load (lbs) Defl. Ratio (L/_) Lateral Design Wind Load (plf)					
	25	35	45	50	25	35	45	50	65	80
8	2780 (L/714)	2575 (L/510)	2375 (L/397)	2275 (L/357)	4380 (L/2646)	4380 (L/1890)	4380 (L/1470)	4380 (L/1323)	4380 (L/1017)	4380 (L/827)
9	2205 (L/505)	1990 (L/361)	1780 (L/280)	1675 (L/252)	4380 (L/1889)	4380 (L/1349)	4380 (L/1049)	4380 (L/944)	4380 (L/726)	4380 (L/590)
10	1755 (L/370)	1530 (L/264)	1310 (L/205)	1200 (L/185)	4380 (L/1393)	4380 (L/995)	4380 (L/774)	4380 (L/696)	4380 (L/536)	4380 (L/435)
11	1395 (L/279)	1165 (L/199)	940 (L/155)	825 (L/139)	4380 (L/1056)	4380 (L/754)	4380 (L/587)	4380 (L/528)	4180 (L/406)	3735 (L/330)
12	1105 (L/215)	870 (L/154)			4380 (L/819)	4320 (L/585)	4000 (L/455)	3840 (L/409)	3370 (L/315)	2900 (L/256)
13	870 (L/170)				4000 (L/647)	3665 (L/462)	3335 (L/359)	3170 (L/323)	2670 (L/249)	2175 (L/202)
14					3455 (L/521)	3105 (L/372)	2760 (L/289)	2590 (L/260)	2075 (L/200)	
15					2980 (L/425)	2620 (L/303)	2265 (L/236)	2090 (L/212)		
16					2570 (L/351)	2205 (L/250)	1840 (L/195)			
17					2215 (L/293)	1840 (L/209)				
18					1905 (L/247)					

Design Assumptions:

1) Tabulated values are as per NDS and IBC/IRC 2015 & 2018, where the first value represents the maximum allowable vertical load in lbs, and the second value is the deflection ratio (L/x) for the horizontal design wind load .
2) The vertical load dead load shall not exceed the vertical live/construction/snow load.
3) Buckling length coefficient Ke = 0.85 (for serviceability, Ke = 1.0).
4) Load duration factor C_D = 1.6
5) Axial load eccentricity = 1/6 of the wall thickness (calculations as per NDS 15.4.1 for combined bending and eccentric axial compression loads).
6) Lateral wind deflection limited to max. 1".
7) Full-width blocking at max. 8 ft. on center.
8) Compression perpendicular to grain for the wall plate = 425 psi
9) A gypsum wall board is assumed to be attached to the interior side of the stud.

Stud Design Example:

Enclosed Building, Wall Zone 5 (End), Exposure Category B, 8 ft. Stud @ 16 " o.c. spacing
IRC/IBC 2015 Building Code, Lateral wind deflection criteria = L/360
Basic Wind Speed, V = 115 (mph), Actual vertical load = 3000 plf

- Determine the effective wind area for the 8 ft. stud from Table 2, A = 21 ft^2
- Determine the design wind load from Table 3 = 34.7 psf
- Calculate the design wind load in plf = 34.7*(16/12) = 46.3 plf ~50 plf
- Calculate the vertical load in lbs = 3000*(16/12) = 4000 lbs
- Scan across the 8 ft. row and the 50 plf lateral wind load columns that will meet the 4000 lbs axial load and deflection ratio of L/360.
- The 1-1/2" x 5-1/2" Stud will be adequate
- Calculate the lateral concentrated reaction for the stud to the plate connections = Lateral wind Load (plf)*Stud Height (ft)/2 = 50 plf* 8 ft/2 = 200 lbs

FIGURE 4: STUD TRIBUTARY WIDTH AND TRIBUTARY AREA

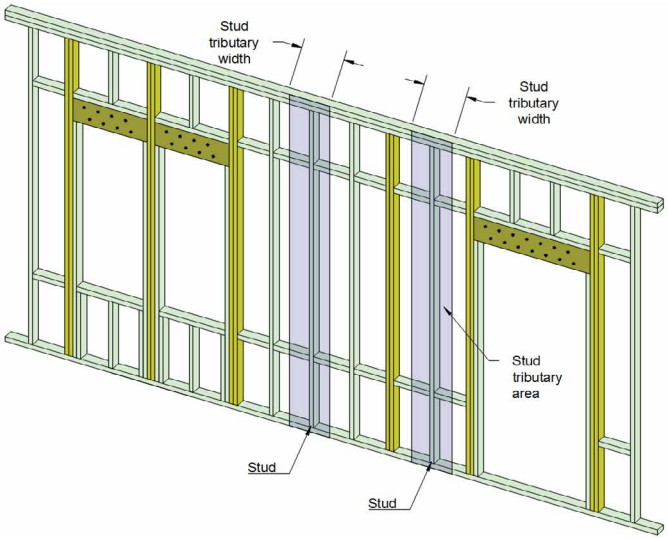


TABLE 9: STUDS - MAXIMUM ALLOWABLE LATERAL WIND AND VERTICAL LOAD (1-1/2" WIDTH) - 7.25 & 9.25" THICK WALLS

Wall Height (ft)	1.35E Tolko T-TEC LSL											
	1-1/2" x 7-1/4" Vertical load (lbs) Defl. Ratio (L/_) Lateral Design Wind Load (plf)						1-1/2" x 9-1/4" Vertical load (lbs) Defl. Ratio (L/_) Lateral Design Wind Load (plf)					
	25	35	45	50	65	80	25	35	45	50	65	80
8	5775 (L/5733)	5775 (L/4095)	5775 (L/3185)	5775 (L/2866)	5775 (L/2205)	5775 (L/1791)	7370 (L/11026)	7370 (L/7876)	7370 (L/6125)	7370 (L/5513)	7370 (L/4240)	7370 (L/3445)
9	5775 (L/4137)	5775 (L/2955)	5775 (L/2298)	5775 (L/2068)	5775 (L/1591)	5775 (L/1293)	7370 (L/8069)	7370 (L/5763)	7370 (L/4483)	7370 (L/4034)	7370 (L/3103)	7370 (L/2521)
10	5775 (L/3076)	5775 (L/2197)	5775 (L/1709)	5775 (L/1538)	5775 (L/1183)	5775 (L/961)	7370 (L/6064)	7370 (L/4332)	7370 (L/3369)	7370 (L/3032)	7370 (L/2332)	7370 (L/1895)
11	5775 (L/2346)	5775 (L/1676)	5775 (L/1303)	5775 (L/1173)	5775 (L/902)	5775 (L/733)	7370 (L/4663)	7370 (L/3331)	7370 (L/2590)	7370 (L/2331)	7370 (L/1793)	7370 (L/1457)
12	5775 (L/1828)	5775 (L/1305)	5775 (L/1015)	5775 (L/914)	5775 (L/703)	5775 (L/571)	7370 (L/3657)	7370 (L/2612)	7370 (L/2031)	7370 (L/1828)	7370 (L/1406)	7370 (L/1142)
13	5775 (L/1451)	5775 (L/1036)	5775 (L/806)	5775 (L/725)	5775 (L/558)	5775 (L/453)	7370 (L/2917)	7370 (L/2084)	7370 (L/1621)	7370 (L/1458)	7370 (L/1122)	7370 (L/911)
14	5775 (L/1170)	5775 (L/835)	5775 (L/650)	5775 (L/585)	5775 (L/450)	5230 (L/365)	7370 (L/2363)	7370 (L/1687)	7370 (L/1312)	7370 (L/1181)	7370 (L/908)	7370 (L/738)
15	5775 (L/957)	5775 (L/683)	5775 (L/531)	5570 (L/478)	4955 (L/368)	4335 (L/299)	7370 (L/1939)	7370 (L/1385)	7370 (L/1077)	7370 (L/969)	7370 (L/745)	7370 (L/606)
16	5775 (L/792)	5470 (L/566)	5035 (L/440)	4820 (L/396)	4180 (L/304)	3535 (L/247)	7370 (L/1610)	7370 (L/1150)	7370 (L/894)	7370 (L/805)	7370 (L/619)	7370 (L/503)
17	5275 (L/663)	4825 (L/473)	4380 (L/368)	4155 (L/331)	3490 (L/255)	2815 (L/207)	7370 (L/1351)	7370 (L/965)	7370 (L/750)	7370 (L/675)	7370 (L/519)	7150 (L/422)
18	4715 (L/560)	4250 (L/400)	3790 (L/311)	3560 (L/280)			7370 (L/1144)	7370 (L/817)	7370 (L/635)	7370 (L/572)	6970 (L/440)	6180 (L/357)
19	4215 (L/478)	3735 (L/341)	3265 (L/265)	3030 (L/239)			7370 (L/977)	7370 (L/698)	7205 (L/543)	6935 (L/488)	6115 (L/375)	5295 (L/305)
20	3765 (L/410)	3275 (L/293)					7370 (L/841)	7030 (L/601)	6465 (L/467)	6180 (L/420)	5335 (L/323)	4480 (L/262)
21	3360 (L/355)	2865 (L/254)					6955 (L/729)	6370 (L/520)	5785 (L/405)	5495 (L/364)	4620 (L/280)	
22	3000 (L/309)						6365 (L/636)	5760 (L/454)	5165 (L/353)	4860 (L/318)		
23							5825 (L/558)	5205 (L/398)	4590 (L/310)	4285 (L/279)		
24							5330 (L/492)	4695 (L/351)				
25							4870 (L/436)	4225 (L/311)				
26							4455 (L/388)					
27							4070 (L/347)					

See Design Assumptions from Table 8

TABLE 10: STUDS - MAXIMUM ALLOWABLE LATERAL WIND AND VERTICAL LOAD (1-3/4" WIDTH) - 3.5" & 5.5" THICK WALLS

Wall Height (ft)	1.35E Tolko T-TEC LSL										
	1-3/4" x 3-1/2" Vertical load (lbs) Defl. Ratio (L/_) Lateral Design Wind Load (plf)				1-3/4" x 5-1/2" Vertical load (lbs) Defl. Ratio (L/_) Lateral Design Wind Load (plf)					
	25	35	45	50	25	35	45	50	65	80
8	3160 (L/834)	3125 (L/595)	2925 (L/463)	2825 (L/417)	4965 (L/3087)	4965 (L/2205)	4965 (L/1715)	4965 (L/1543)	4965 (L/1187)	4965 (L/964)
9	2670 (L/589)	2455 (L/421)	2240 (L/327)	2135 (L/294)	4965 (L/2204)	4965 (L/1574)	4965 (L/1224)	4965 (L/1102)	4965 (L/847)	4965 (L/688)
10	2145 (L/432)	1920 (L/308)	1700 (L/240)	1590 (L/216)	4965 (L/1626)	4965 (L/1161)	4965 (L/903)	4965 (L/813)	4965 (L/625)	4965 (L/508)
11	1725 (L/325)	1495 (L/232)	1270 (L/181)	1155 (L/162)	4965 (L/1232)	4965 (L/880)	4965 (L/684)	4965 (L/616)	4965 (L/474)	4795 (L/385)
12	1390 (L/251)	1155 (L/179)			4965 (L/956)	4965 (L/682)	4935 (L/531)	4775 (L/478)	4305 (L/367)	3840 (L/298)
13	1120 (L/198)				4835 (L/755)	4495 (L/539)	4165 (L/419)	4000 (L/377)	3510 (L/290)	3015 (L/236)
14					4195 (L/607)	3845 (L/434)	3500 (L/337)	3330 (L/303)	2820 (L/233)	2310 (L/189)
15					3645 (L/495)	3285 (L/354)	2930 (L/275)	2755 (L/247)	2230 (L/190)	
16					3170 (L/409)	2800 (L/292)	2440 (L/227)	2260 (L/204)		
17					2760 (L/342)	2380 (L/244)				
18					2400 (L/289)					
19					2085 (L/246)					

See Design Assumptions from Table 8

TABLE 11: STUDS - MAXIMUM ALLOWABLE LATERAL WIND AND VERTICAL LOAD (1-3/4" WIDTH) - 7.25" & 9.25" THICK WALLS

Wall Height (ft)	1.35E Tolko T-TEC LSL											
	1-3/4" x 7-1/4" Vertical load (lbs) Defl. Ratio (L/_) Lateral Design Wind Load (plf)						1-3/4" x 9-1/4" Vertical load (lbs) Defl. Ratio (L/_) Lateral Design Wind Load (plf)					
	25	35	45	50	65	80	25	35	45	50	65	80
8	6545 (L/6689)	6545 (L/4778)	6545 (L/3716)	6545 (L/3344)	6545 (L/2572)	6545 (L/2090)	8350 (L/12864)	8350 (L/9188)	8350 (L/7146)	8350 (L/6432)	8350 (L/4947)	8350 (L/4020)
9	6545 (L/4827)	6545 (L/3448)	6545 (L/2681)	6545 (L/2413)	6545 (L/1856)	6545 (L/1508)	8350 (L/9414)	8350 (L/6724)	8350 (L/5230)	8350 (L/4707)	8350 (L/3620)	8350 (L/2942)
10	6545 (L/3589)	6545 (L/2564)	6545 (L/1994)	6545 (L/1794)	6545 (L/1380)	6545 (L/1121)	8350 (L/7075)	8350 (L/5054)	8350 (L/3930)	8350 (L/3537)	8350 (L/2721)	8350 (L/2211)
11	6545 (L/2737)	6545 (L/1955)	6545 (L/1520)	6545 (L/1368)	6545 (L/1052)	6545 (L/855)	8350 (L/5440)	8350 (L/3886)	8350 (L/3022)	8350 (L/2720)	8350 (L/2092)	8350 (L/1700)
12	6545 (L/2133)	6545 (L/1523)	6545 (L/1185)	6545 (L/1066)	6545 (L/820)	6545 (L/666)	8350 (L/4266)	8350 (L/3047)	8350 (L/2370)	8350 (L/2133)	8350 (L/1641)	8350 (L/1333)
13	6545 (L/1692)	6545 (L/1209)	6545 (L/940)	6545 (L/846)	6545 (L/651)	6545 (L/529)	8350 (L/3404)	8350 (L/2431)	8350 (L/1891)	8350 (L/1702)	8350 (L/1309)	8350 (L/1063)
14	6545 (L/1365)	6545 (L/975)	6545 (L/758)	6545 (L/682)	6545 (L/525)	6545 (L/426)	8350 (L/2756)	8350 (L/1969)	8350 (L/1531)	8350 (L/1378)	8350 (L/1060)	8350 (L/861)
15	6545 (L/1116)	6545 (L/797)	6545 (L/620)	6545 (L/558)	6325 (L/429)	5715 (L/348)	8350 (L/2262)	8350 (L/1616)	8350 (L/1256)	8350 (L/1131)	8350 (L/870)	8350 (L/707)
16	6545 (L/924)	6545 (L/660)	6280 (L/513)	6065 (L/462)	5435 (L/355)	4805 (L/288)	8350 (L/1878)	8350 (L/1341)	8350 (L/1043)	8350 (L/939)	8350 (L/722)	8350 (L/587)
17	6410 (L/773)	5960 (L/552)	5515 (L/429)	5295 (L/386)	4645 (L/297)	3985 (L/241)	8350 (L/1576)	8350 (L/1125)	8350 (L/875)	8350 (L/788)	8350 (L/606)	8350 (L/492)
18	5755 (L/654)	5290 (L/467)	4840 (L/363)	4610 (L/327)	3935 (L/251)		8350 (L/1335)	8350 (L/953)	8350 (L/741)	8350 (L/667)	8350 (L/513)	8245 (L/417)
19	5170 (L/557)	4695 (L/398)	4225 (L/309)	3995 (L/278)			8350 (L/1140)	8350 (L/814)	8350 (L/633)	8350 (L/570)	8015 (L/438)	7225 (L/356)
20	4645 (L/479)	4160 (L/342)	3685 (L/266)				8350 (L/981)	8350 (L/701)	8205 (L/545)	7930 (L/490)	7110 (L/377)	6300 (L/306)
21	4180 (L/415)	3685 (L/296)					8350 (L/850)	7975 (L/607)	7410 (L/472)	7130 (L/425)	6290 (L/327)	5445 (L/265)
22	3755 (L/361)						7855 (L/742)	7265 (L/530)	6685 (L/412)	6395 (L/371)	5530 (L/285)	
23	3380 (L/317)						7220 (L/651)	6615 (L/465)	6020 (L/361)	5725 (L/325)		
24							6640 (L/574)	6020 (L/410)	5410 (L/319)			
25							6100 (L/509)	5470 (L/363)				
26							5610 (L/453)	4970 (L/324)				
27							5155 (L/405)					
28							4745 (L/364)					

See Design Assumptions from Table 8

SECTION 3: COLUMNS/KING-STUDS LOAD TABLES

TABLE 12: COLUMNS/KING-STUDS - MAXIMUM ALLOWABLE LATERAL WIND LOAD (plf)/VERTICAL LOAD (lbs) - 1-1/2" THICKNESS

Deflection Ratio	Wall Height (ft)	Max. Lateral Deflection (in)	1.35E Tolko T-TEC LSL: 1-1/2" thickness								
			3-1/2" Wall Thickness 1-1/2" x 3-1/2"	5-1/2" Wall Thickness 1-1/2" x 5-1/2"		7-1/4" Wall Thickness 1-1/2" x 7-1/4"			9-1/4" Wall Thickness 1-1/2" x 9-1/4"		
			2-plies	2-plies	3-plies	2-plies	3-plies	4-plies	2-plies	3-plies	4-plies
L/180	8	0.53	197/1450	300/3415	300/10515	300/5595	300/13865	300/18485	300/7610	300/17690	300/20000
	10	0.67	102/1720	257/1795	300/6470	300/3505	300/12090	300/18485	300/5795	300/16875	300/20000
	12	0.80	59/1725	178/1600	267/3000	235/2480	300/7310	300/15465	300/3045	300/12590	300/20000
	14	0.93	37/1495	131/1405	196/2480	172/2300	259/4300	300/8965	220/2895	300/7365	300/16880
	16	1.00		90/1695	136/2830	132/2115	198/3825	264/5180	168/2745	253/5050	300/10145
	18	1.00		56/2265	85/3550	104/1930	156/3360	209/4470	133/2590	200/4635	267/6400
	20	1.00		37/2440	55/3695	84/1750	127/2915	169/3890	108/2435	162/4260	216/5770
	22	1.00		25/2375	38/3585	58/2540	87/4090	116/5455	89/2270	134/3900	178/5200
	24	1.00			27/3380	41/2975	61/4595	82/6125	75/2115	112/3525	150/4700
	26	1.00				29/3140	44/4730	59/6310	61/2220	92/3605	123/4810
	28	1.00					33/4675	44/6235	46/2965	69/4735	92/6315
	30	1.00					25/4515	33/6025	34/3435	52/5330	69/7110
L/240	8	0.40	148/2175	300/3415	300/10515	300/5595	300/13865	300/18485	300/7610	300/17690	300/20000
	10	0.50	76/2235	257/1795	300/6470	300/3505	300/12090	300/18485	300/5795	300/16875	300/20000
	12	0.60	44/2115	170/1870	255/3555	235/2480	300/7310	300/15465	300/3045	300/12590	300/20000
	14	0.70	28/1760	107/2320	161/4240	172/2300	259/4300	300/8965	220/2895	300/7365	300/16880
	16	0.80		72/2515	108/4235	132/2115	198/3825	264/5180	168/2745	253/5050	300/10145
	18	0.90		51/2555	76/4010	104/1930	156/3360	209/4470	133/2590	200/4635	267/6400
	20	1.00		37/2440	55/3695	84/1750	127/2915	169/3890	108/2435	162/4260	216/5770
	22	1.00		25/2375	38/3585	58/2540	87/4090	116/5455	89/2270	134/3900	178/5200
	24	1.00			27/3380	41/2975	61/4595	82/6125	75/2115	112/3525	150/4700
	26	1.00				29/3140	44/4730	59/6310	61/2220	92/3605	123/4810
	28	1.00					33/4675	44/6235	46/2965	69/4735	92/6315
	30	1.00					25/4515	33/6025	34/3435	52/5330	69/7110
L/360	8	0.27	98/2830	300/3415	300/10515	300/5595	300/13865	300/18485	300/7610	300/17690	300/20000
	10	0.33	51/2745	194/3155	291/6735	300/3505	300/12090	300/18485	300/5795	300/16875	300/20000
	12	0.40	29/2515	113/3475	170/7135	235/2480	300/7310	300/15465	300/3045	300/12590	300/20000
	14	0.47		71/3580	107/6795	162/2725	244/5215	300/8965	220/2895	300/7365	300/16880
	16	0.53		48/3540	72/6055	109/3255	164/6185	219/8465	168/2745	253/5050	300/10145
	18	0.60		34/3410	51/5350	77/3540	116/6505	154/8675	133/2590	200/4635	267/6400
	20	0.67			37/4725	56/3675	84/6350	113/8465	108/2435	162/4260	216/5770
	22	0.73			28/4180	42/3705	64/6035	85/8045	87/2410	131/4145	175/5530
	24	0.80				32/3655	49/5660	65/7545	67/2865	101/4850	135/6470
	26	0.87				25/3495	38/5260	51/7015	53/3150	80/5210	107/6950
	28	0.93					31/4880	41/6505	42/3330	64/5340	85/7120
	30	1.00					25/4515	33/6025	34/3435	52/5330	69/7110
L/600	8	0.16	59/3325	223/4290	300/10515	300/5595	300/13865	300/18485	300/7610	300/17690	300/20000
	10	0.20	30/3160	116/4530	174/10265	261/4265	300/12090	300/18485	300/5795	300/16875	300/20000
	12	0.24		68/4590	102/9830	153/4775	230/10295	300/15465	300/3045	300/12590	300/20000
	14	0.28		43/4520	64/8805	97/5045	146/10590	195/15350	199/3790	299/7415	300/16880
	16	0.32		29/4355	43/7515	65/5160	98/10465	131/14430	135/4485	202/8820	270/12530
	18	0.36			30/6450	46/5165	69/9910	92/13210	95/4915	143/9595	191/13565
	20	0.40				33/5090	50/8995	67/11995	69/5190	104/9945	139/13700
	22	0.44				25/4940	38/8130	51/10840	52/5325	79/10025	105/13385
	24	0.48					29/7350	39/9805	40/5380	61/9625	81/12835
	26	0.52						31/8875	32/5365	48/9140	64/12185
	28	0.56							25/5295	38/8620	51/11490
	30	0.60								31/8095	41/10795

Design Assumptions:

1) Tabulated values are as per NDS and IBC/IRC 2015 & 2018, where the first value represents the maximum lateral wind load in plf, and the second value is the maximum vertical load in lbs .
2) The vertical dead load shall not exceed the vertical live/construction/snow load.
3) Buckling length coefficient Ke = 0.85 (for serviceability, Ke = 1.0).
4) Load duration factor C_D = 1.6
5) Axial load eccentricity = 1/6 of the wall thickness (calculations as per NDS 15.4.1 for combined bending and eccentric axial compression loads).
6) Lateral wind deflection limited to max. 1".
7) Full-width blocking at max. 8 ft. on center, or a max. unbraced length of 8 ft.
8) Compression perpendicular to grain for the wall plate = 425 psi

Column Design Example:

Enclosed building, Wall Zone 4 (Center), Exposure Category B, 20 ft. Column, Unbraced length = 8 ft. or less, Tributary width = 6 ft.
IRC/IBC 2015 Building Code, Lateral wind deflection criteria = L/360
Basic Wind Speed, V = 115 (mph), Actual vertical load = 4000 lbs

- Determine the effective wind area for the 20 ft. Column from Table 2, A = 100 ft^2
- Determine the design wind load from Table 3 = 22.8 psf
- Calculate the design wind load in plf = 22.8*(6) = 136.8 plf ~140 plf
- The vertical load in lbs = 4000 lbs
- Scan across the 20 ft. row in the L/360 section and find a cell with the lateral wind load and the vertical concentrated load equal or higher than 140/4000.
- 3 plies - 1-1/2" x 9-1/4" Column will be adequate
- Calculate the lateral concentrated reaction for the column to the plate connections = Lateral wind Load (plf)*Column Height (ft)/2 = 140 plf* 20 ft/2 = 1400 lbs

FIGURE 5: COLUMN TRIBUTARY WIDTH AND TRIBUTARY AREA

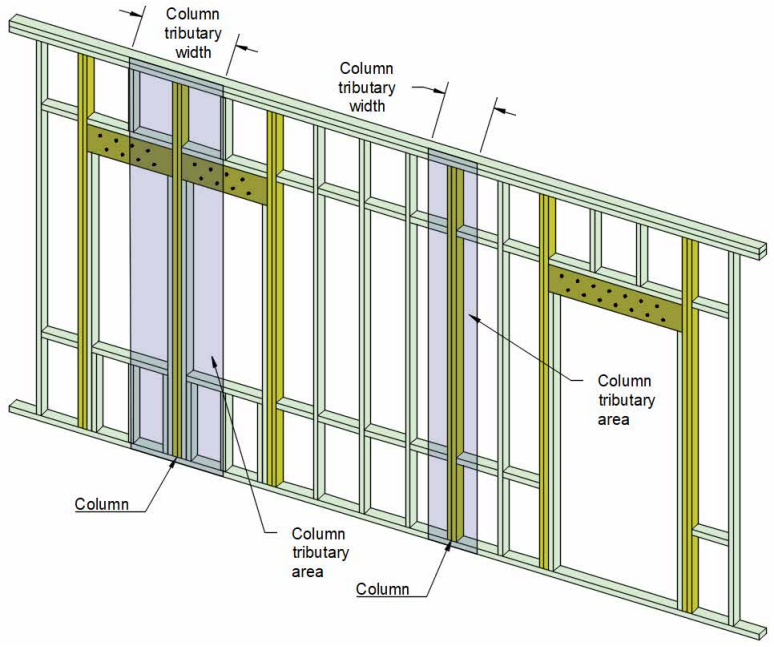


FIGURE 6: KING-STUD TRIBUTARY WIDTH AND TRIBUTARY AREA

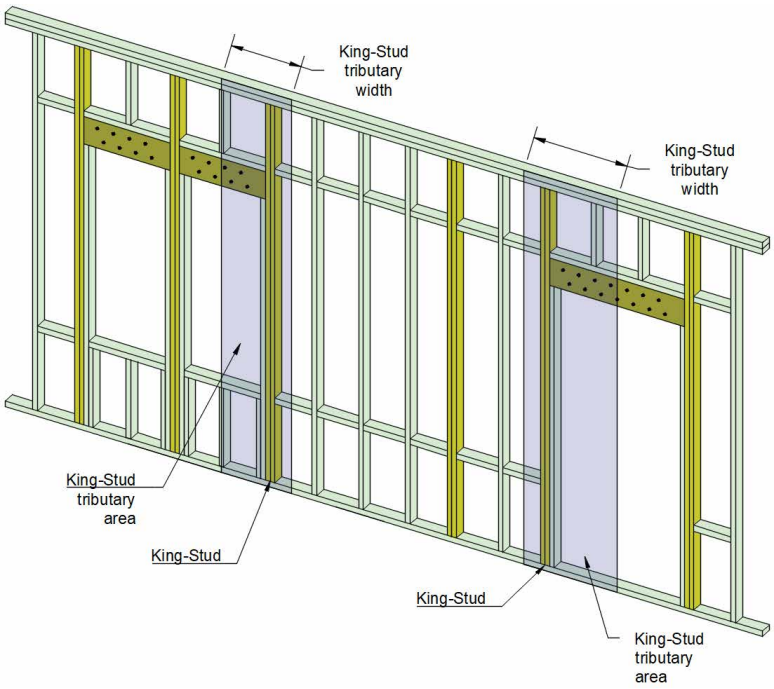


TABLE 13: COLUMNS/KING-STUDS - MAXIMUM ALLOWABLE LATERAL WIND LOAD (plf)/VERTICAL LOAD (lbs) - 1-3/4" THICKNESS

Deflection Ratio	Wall Height (ft)	Max. Lateral Deflection (in)	1.35E Tolko T-TEC LSL: 1-3/4" thickness								
			3-1/2" Wall Thickness	5-1/2" Wall Thickness		7-1/4" Wall Thickness			9-1/4" Wall Thickness		
			1-3/4" x 3-1/2"	1-3/4" x 5-1/2"		1-3/4" x 7-1/4"			1-3/4" x 9-1/4"		
			2-plies	2-plies	3-plies	2-plies	3-plies	4-plies	2-plies	3-plies	4-plies
L/180	8	0.53	230/2240	300/6625	300/12270	300/10050	300/16175	300/20000	300/13200	300/20000	300/20000
	10	0.67	119/2450	300/4075	300/12270	300/8050	300/16175	300/20000	300/11455	300/20000	300/20000
	12	0.80	69/2180	265/1840	300/7230	300/5280	300/16175	300/20000	300/9085	300/20000	300/20000
	14	0.93	43/1840	167/2630	251/4465	274/2690	300/10690	300/19890	300/5940	300/18940	300/20000
	16	1.00	27/1605	105/3250	158/5095	210/2395	300/5145	300/12810	268/3595	300/13215	300/20000
	18	1.00		66/3495	99/5340	150/3065	225/5095	300/6875	212/3330	300/7210	300/17825
	20	1.00		43/3390	65/5155	99/4205	148/6655	198/8875	171/3060	257/5190	300/10835
	22	1.00		29/3170	44/4810	67/4725	101/7160	135/9550	139/2980	209/4890	279/6520
	24	1.00			31/4415	48/4735	72/7160	96/9550	99/4465	148/7175	198/9570
	26	1.00				34/4580	52/6915	69/9220	72/5335	108/8290	144/11055
	28	1.00				25/4350	38/6560	51/8750	53/5795	80/8740	107/11655
	30	1.00					29/6165	39/8220	40/5850	61/8810	81/11750
L/240	8	0.40	173/3195	300/6625	300/12270	300/10050	300/16175	300/20000	300/13200	300/20000	300/20000
	10	0.50	89/3115	300/4075	300/12270	300/8050	300/16175	300/20000	300/11455	300/20000	300/20000
	12	0.60	51/2610	198/3910	298/7300	300/5280	300/16175	300/20000	300/9085	300/20000	300/20000
	14	0.70	32/2135	125/4160	188/7040	274/2690	300/10690	300/19890	300/5940	300/18940	300/20000
	16	0.80		84/4145	126/6440	192/3345	288/5860	300/12810	268/3595	300/13215	300/20000
	18	0.90		59/3795	89/5780	135/3920	203/6545	271/8725	212/3330	300/7210	300/17825
	20	1.00		43/3390	65/5155	99/4205	148/6655	198/8875	171/3060	257/5190	300/10835
	22	1.00		29/3170	44/4810	67/4725	101/7160	135/9550	139/2980	209/4890	279/6520
	24	1.00			31/4415	48/4735	72/7160	96/9550	99/4465	148/7175	198/9570
	26	1.00				34/4580	52/6915	69/9220	72/5335	108/8290	144/11055
	28	1.00				25/4350	38/6560	51/8750	53/5795	80/8740	107/11655
	30	1.00					29/6165	39/8220	40/5850	61/8810	81/11750
L/360	8	0.27	115/4100	300/6625	300/12270	300/10050	300/16175	300/20000	300/13200	300/20000	300/20000
	10	0.33	59/3790	226/5550	300/12270	300/8050	300/16175	300/20000	300/11455	300/20000	300/20000
	12	0.40	34/3060	132/5710	198/10960	298/5315	300/16175	300/20000	300/9085	300/20000	300/20000
	14	0.47		83/5605	125/9535	189/5970	284/11435	300/19890	300/5940	300/18940	300/20000
	16	0.53		56/5320	84/8230	128/6260	192/11465	256/15295	262/3915	300/13215	300/20000
	18	0.60		39/4695	59/7110	90/6310	135/10715	180/14285	185/5000	278/8915	300/17825
	20	0.67		29/4080	43/6175	66/6210	99/9850	132/13135	136/5650	204/9955	272/13290
	22	0.73			32/5395	49/5945	74/8975	99/11970	102/6025	153/10185	205/13585
	24	0.80			25/4745	38/5410	57/8160	76/10880	79/6210	118/10050	158/13405
	26	0.87				30/4920	45/7420	60/9895	62/6250	93/9725	125/12965
	28	0.93					36/6755	48/9010	50/6160	75/9290	100/12390
	30	1.00					29/6165	39/8220	40/5850	61/8810	81/11750
L/600	8	0.16	69/4810	261/7065	300/12270	300/10050	300/16175	300/20000	300/13200	300/20000	300/20000
	10	0.20	35/4350	136/7200	204/12270	300/8050	300/16175	300/20000	300/11455	300/20000	300/20000
	12	0.24		79/7080	119/12270	179/8355	268/16175	300/20000	300/9085	300/20000	300/20000
	14	0.28		50/6755	75/11550	113/8465	170/16175	227/20000	232/8340	300/18940	300/20000
	16	0.32		33/6290	50/9700	76/8380	115/15755	153/20000	157/8825	236/17170	300/20000
	18	0.36			35/8225	54/8140	81/13970	108/18625	111/9065	167/17235	222/20000
	20	0.40			26/7040	39/7790	59/12380	79/16510	81/9120	122/16805	163/20000
	22	0.44				29/7300	44/11000	59/14665	61/9045	92/15660	123/20000
	24	0.48					34/9800	46/13065	47/8855	71/14510	95/19350
	26	0.52					27/8770	36/11695	37/8595	56/13405	75/17875
	28	0.56						29/10510	30/8220	45/12360	60/16480
	30	0.60								36/11405	48/15210

See Design Assumptions from Table 12

SECTION 4: HEADERS LOAD TABLES

TABLE 14: HEADERS - MAXIMUM ALLOWABLE LATERAL WIND LOAD (PLF)/VERTICAL LOAD (PLF) [LATERAL WIND LOAD DEFLECTION = L/360 - 1-1/2" THICKNESS]

Thickness	1.35E Tolko T-TEC LSL - 1-1/2"											
Depth	7-1/4"				9-1/4"				11-1/4"			
# Plies	1	2	3	4	1	2	3	4	1	2	3	4
Rough Opening (ft)	1.35E Tolko T-TEC: Header Maximum Allowable Lateral Wind Load (PLF)/Vertical Load (PLF)											
3	145/575	500/1155	500/1730	500/2310	190/575	500/1150	500/1730	500/2305	230/575	500/1150	500/1725	500/2300
4	65/435	300/870	500/1310	500/1745	80/435	380/870	500/1305	500/1740	100/435	465/870	500/1305	500/1740
5	30/350	155/700	500/1050	500/1400	40/350	200/700	500/1050	500/1400	50/345	245/695	500/1045	500/1395
6		90/540	305/740	500/1015	25/290	115/580	390/875	500/1165	30/290	145/580	475/870	500/1165
7		55/365	195/505	450/620		75/480	250/660	500/850		90/495	305/745	500/995
8		40/255	130/355	305/440		50/330	170/460	390/570		60/405	205/555	475/690
9		25/185	90/260	220/320		35/240	120/330	280/410		40/290	145/400	340/500
10			65/190	160/240		25/175	85/245	205/305		30/210	105/295	250/370
11			50/145	120/185			65/185	155/230			80/225	190/280
12			40/110	95/140			50/145	120/180			60/170	145/215

Design Assumptions:

1) Tabulated values are as per IBC/IRC 2015 & 2018, where the first value represents the maximum allowable lateral wind load (plf), and the second value is the maximum vertical load (plf).
2) Self-weight was considered in the analysis.
3) The vertical dead load shall not exceed the vertical live/construction/snow load.
4) Load duration factor C_D = 1.6 for the combined lateral and vertical load.
5) Load duration factor C_D = 1.0 for the vertical load only.
6) Vertical deflection, L/360 or 5/16", whichever is less.
7) Maximum lateral deflection = L/360.
8) If the header is supported by end trimmers, the header must have the width fully supported.
9) Minimum end bearing support = 1.5".
10) Header's depth is parallel to the face of the wall.

Header Design Example:

Enclosed Building, Wall Zone 4 (Center), Exposure Category B, 6 ft. rough opening, 10 ft. header tributary width
If the header is in both Zones 4 & 5, select the most restrictive zone, which is Zone 5.
IRC/IBC 2015 Building Code, Lateral wind deflection criteria = L/360
Basic Wind Speed, V = 115 (mph), Actual vertical load = 800 plf

Determine the effective wind area, A, for the header = max (6*10, 6*6/3) = max (60,12) = 60 psf
Determine the design wind load from Table 3 = 23.9 psf

- the wind pressure corresponding to the lower wind effective area (50 ft2) from Table 3 = 23.9 psf, or
- by interpolation, the wind pressure = 23.9 - [(60-50)x(23.9-22.8)/(100-50)] = 23.68 psf

Calculate the design wind load in plf = 23.9 psf *10 ft. = 239 plf ~240 plf
Scan across the 6 ft. rough opening row and the column that meets the 240/800 plf for the lateral/vertical loads.
4 plies: 1-1/2" x 7-1/4", or 3 plies: 1-1/2" x 9-1/4" will be adequate.
Calculate the lateral concentrated reaction for the header to the king-stud/column connections = Lateral wind Load (plf)*Rough opening (ft)/2 = 240 plf* 6 ft/2 = 720 lbs
Calculate the vertical reaction transferred by the header to the trimmer, or to the king-stud/column = Vertical load (plf)*Rough opening (ft)/2 = 800 plf * 6 ft/2 = 2400 lbs

Note: Holes shall not be drilled in headers subjected to vertical and lateral wind loads.

FIGURE 7: HEADER TRIBUTARY WIDTH AND TRIBUTARY AREA

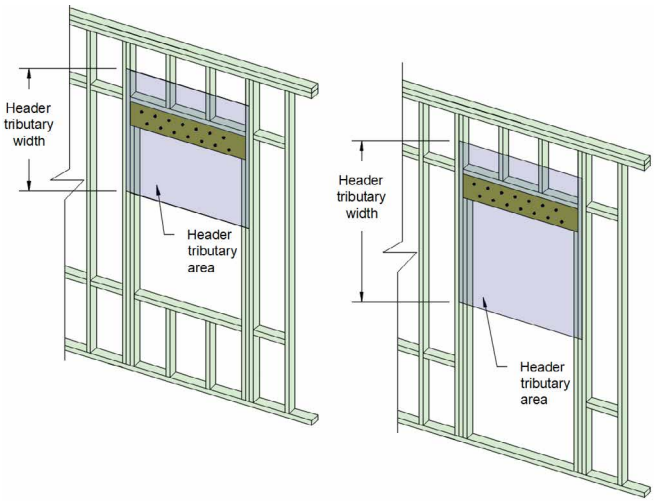


TABLE 15: HEADERS - MAXIMUM ALLOWABLE LATERAL WIND LOAD (plf)/VERTICAL LOAD (plf) [LATERAL WIND LOAD DEFLECTION = L/360 - 1-3/4" THICKNESS]

Thickness	1.35E Tolko T-TEC LSL -1-3/4"											
Depth	7-1/4"				9-1/4"				11-1/4"			
# Plies	1	2	3	4	1	2	3	4	1	2	3	4
Rough Opening (ft)	1.35E Tolko T-TEC: Header Maximum Allowable Lateral Wind Load (PLF)/Vertical Load (PLF)											
3	235/670	500/1345	500/2020	500/2695	300/670	500/1345	500/2020	500/2690	365/670	500/1340	500/2015	500/2685
4	100/505	465/1015	500/1525	500/2035	130/505	500/1015	500/1525	500/2035	155/505	500/1015	500/1520	500/2030
5	50/405	245/815	500/1225	500/1635	65/405	315/815	500/1225	500/1630	80/405	385/815	500/1220	500/1630
6	30/340	145/680	475/970	500/1365	40/340	185/680	500/1020	500/1360	45/340	225/680	500/1020	500/1360
7		90/505	305/695	500/955	25/290	120/585	390/875	500/1170	30/290	145/580	475/870	500/1165
8		60/370	205/510	480/625		80/495	265/685	500/900		95/505	325/760	500/1015
9		45/275	145/380	340/470		55/360	190/500	435/620		65/445	230/610	500/770
10		30/205	105/290	250/360		40/270	140/375	320/465		50/330	170/455	395/565
11			80/225	190/280		30/205	105/285	245/355		35/250	125/350	300/435
12			60/175	150/220			80/225	190/280		25/195	95/270	230/340

See Design Assumptions from Table 14

Note: Holes shall not be drilled in headers subjected to vertical and lateral wind loads.

TABLE 16: HEADERS - MAXIMUM ALLOWABLE LATERAL WIND LOAD (plf)/VERTICAL LOAD (plf) [LATERAL WIND LOAD DEFLECTION = L/600 - 1-1/2" THICKNESS]

Thickness	1.35E Tolko T-TEC LSL -1-1/2"											
Depth	7-1/4"				9-1/4"				11-1/4"			
# Plies	1	2	3	4	1	2	3	4	1	2	3	4
Rough Opening (ft)	1.35E Tolko T-TEC: Header Maximum Allowable Lateral Wind Load (PLF)/Vertical Load (PLF)											
3	85/575	400/1155	500/1730	500/2310	110/575	500/1150	500/1730	500/2305	135/575	500/1150	500/1725	500/2300
4	35/435	180/870	500/1310	500/1745	45/435	225/870	500/1305	500/1740	60/435	275/870	500/1305	500/1740
5		95/700	305/1050	500/1400	25/350	120/700	390/1050	500/1400	30/345	145/695	475/1045	500/1395
6		55/585	180/845	415/1065		70/580	230/875	500/1165		85/580	285/870	500/1165
7		35/400	115/570	270/720		45/500	150/740	345/940		55/495	180/745	420/995
8			80/400	185/505		30/360	100/510	235/650		35/435	120/620	285/790
9			55/285	130/365			70/365	165/465		25/310	85/445	205/565
10			40/210	95/270			50/270	120/345			60/325	150/415
11			30/160	70/205			40/200	90/260			45/245	110/315
12				55/155			30/155	70/200			35/190	85/240

Design Assumptions

1) Tabulated values are as per IBC/IRC 2015 & 2018, where the first value represents the maximum allowable lateral wind load (plf), and the second value is the maximum vertical load (plf).
2) Self-weight was considered in the analysis.
3) The vertical dead load shall not exceed the vertical live/construction/snow load.
4) Load duration factor C_D = 1.6 for the combined lateral and vertical load.
5) Load duration factor C_D = 1.0 for the vertical load only.
6) Vertical deflection, L/360 or 5/16", whichever is less.
7) Maximum lateral deflection = L/600.
8) If the header is supported by end trimmers, the header must have the width fully supported.
9) Minimum end bearing support = 1.5".
10) Header's depth is parallel to the face of the wall.

Note: Holes shall not be drilled in headers subjected to vertical and lateral wind loads.

TABLE 17: HEADERS - MAXIMUM ALLOWABLE LATERAL WIND LOAD (plf)/VERTICAL LOAD (plf) [LATERAL WIND LOAD DEFLECTION = L/600 - 1-3/4" THICKNESS]

Thickness	1.35E Tolko T-TEC LSL -1-3/4"											
Depth	7-1/4"				9-1/4"				11-1/4"			
# Plies	1	2	3	4	1	2	3	4	1	2	3	4
Rough Opening (ft)	1.35E Tolko T-TEC: Header Maximum Allowable Lateral Wind Load (PLF)/Vertical Load (PLF)											
3	140/670	500/1345	500/2020	500/2695	180/670	500/1345	500/2020	500/2690	215/670	500/1340	500/2015	500/2685
4	60/505	280/1015	500/1525	500/2035	75/505	355/1015	500/1525	500/2035	95/505	435/1015	500/1520	500/2030
5	30/405	145/815	475/1225	500/1635	40/405	190/815	500/1225	500/1630	50/405	230/815	500/1220	500/1630
6		85/680	285/1025	500/1365		110/680	360/1020	500/1360	25/340	135/680	440/1020	500/1360
7		55/555	180/795	415/1005		70/585	235/875	500/1170		85/580	285/870	500/1165
8		35/400	125/575	285/730		45/510	160/765	365/975		55/505	195/760	445/1015
9		25/300	85/425	205/540		30/395	110/560	260/710		40/450	135/675	320/865
10			65/320	150/410		25/290	80/415	190/530		30/355	100/505	235/645
11			45/245	115/315			60/315	145/405			75/385	180/490
12			35/180	90/240			45/245	110/315			55/295	135/380

See Design Assumptions from Table 16

Note: Holes shall not be drilled in headers subjected to vertical and lateral wind loads.

SECTION 5: TRIMMERS/JACK-STUDS MAX. VERTICAL LOAD TABLES

TABLE 18: TRIMMER/JACK STUD - MAXIMUM VERTICAL LOAD (lbs) - 1-1/2" WIDTH

Trimmer/Jack Stud Height (ft.)	1.35E Tolko T-TEC LSL: Trimmer/Jack Stud - Maximum Vertical Load (lbs)							
	1-1/2" x 3-1/2"		1-1/2" x 5-1/2"		1-1/2" x 7-1/4"		1-1/2" x 9-1/4"	
	1 ply	2 plies	1 ply	2 plies	1 ply	2 plies	1 ply	2 plies
6	700	3275	1055	4920	1455	6790	1850	8675
7		2730		4105		5665		7230
8		2325		3495		4825		6155
9		2020		3030		4180		5335
10		1765		2650		3670		4685
11		1520		2280		3150		4025
12		1310		1970		2720		3475

Design Assumptions:

1) Tabulated values are for Trimmers/Jack Studs transferring vertical loads only.
2) Trimmers must support the full width of the header/plate.
3) Tabulated values shall not be increased for load durations C_D > 1.0.

How to size a Trimmer/Jack Stud:

1) Determine the clear height of the Trimmer/Jack Stud
2) Scan the cells with the heights higher or equal to the actual trimmer height, and select a size with the vertical load capacity ≥ reaction/vertical load transferred by the header/plate.

Example:

Header Reaction (lbs) = 1000 lbs
Trimmer height = 5 ft.
1-1/2" x 5-1/2" - 1 ply will be adequate.

TABLE 19: TRIMMER/JACK STUD - MAXIMUM VERTICAL LOAD (lbs) - 1-3/4" WIDTH

Trimmer/Jack Stud Height (ft.)	1.35E Tolko T-TEC LSL: Trimmer/Jack Stud - Maximum Vertical Load (lbs)							
	1-3/4" x 3-1/2"		1-3/4" x 5-1/2"		1-3/4" x 7-1/4"		1-3/4" x 9-1/4"	
	1 ply	2 plies	1 ply	2 plies	1 ply	2 plies	1 ply	2 plies
6	990	4570	1490	6855	2060	9475	2630	12090
7	815	3820	1220	5740	1695	7930	2170	10110
8		3265		4910		6770		8645
9		2840		4260		5890		7510
10		2495		3750		5175		6610
11		2220		3330		4610		5880
12		1980		2970		4110		5240
13		1735		2600		3595		4595
14		1525		2295		3175		4050

See Design Assumptions from Table 18

SECTION 6: WALL PLATE MAX. LATERAL WIND LOAD TABLES

TABLE 20: PLATES - MAXIMUM ALLOWABLE LATERAL WIND LOAD (plf)/VERTICAL LOAD (plf) [LATERAL WIND LOAD DEFLECTION = L/360 - 1-1/2" THICKNESS]

Thickness	1-1/2"			
Depth	3-1/2"	5-1/2"	7-1/4"	9-1/4"
# Plies	1	1	1	1
Rough opening (ft)	1.35E Tolko T-TEC: Plate Maximum Allowable Lateral Wind Load (PLF)/Vertical Load (PLF)			
3	255/50	255/140	255/185	255/235
4	160/20	190/60	190/75	190/100
5	85/15	155/30	155/35	155/50
6	50/10	130/15	130/20	130/25
7	30/5	110/5	110/10	110/15

Design Assumptions:

1) Tabulated values are as per IBC/IRC 2015 & 2018, where the first value represents the maximum allowable lateral wind load (plf), and the second value is the maximum vertical load (plf).
2) Self-weight was considered in the analysis.
3) The vertical dead load shall not exceed the vertical live/construction/snow load.
4) Load duration factor CD = 1.0. Tabulated values shall not be increased for a higher load duration.
5) Vertical deflection, L/360 or 5/16", whichever is less.
6) Maximum lateral deflection = L/360.
7) The plate must be supported by end trimmers if the plate transfers a vertical load in addition to the lateral load.
8) Minimum end bearing support = 1.5". Plate width must be fully supported at the bearing supports.
9) Plate's depth is perpendicular on the face of the wall.

Plate Design Example:

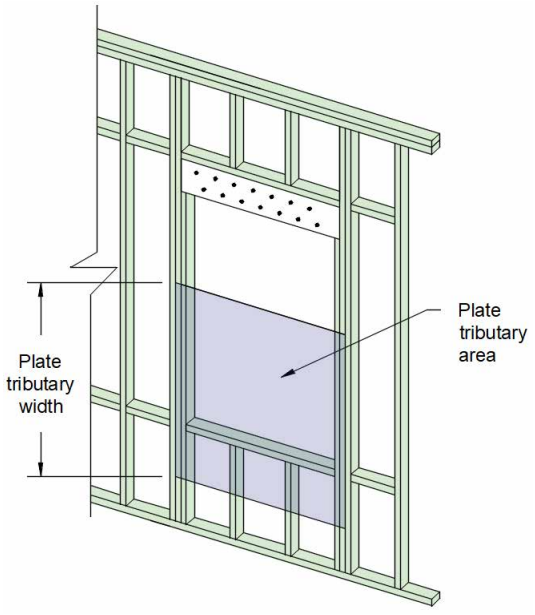
Enclosed Building, Wall Zone 4 (Center), Exposure Category B, 6 ft. rough opening, 2 ft. plate tributary width
If the plate is in both Zones 4 & 5, select the most restrictive zone, which is Zone 5.
IRC/IBC 2015 Building Code, Lateral wind deflection criteria = L/360
Basic Wind Speed, V = 115 (mph), Actual vertical load = 15 plf (it could be just the self-weight if there are no other uniform vertical loads transferred).

Determine the effective wind area, A, for the plate = max (6*2, 6*6/3) = max (12,12) = 12 psf
Determine the design wind load from Table 3 = 26.4 psf

- the wind pressure corresponding to the lower wind effective area (10 ft2) from Table 3 = 26.4 psf, or
- by interpolation, the wind pressure = 26.4 - [(12-10)x(26.4-23.9)/(50-10)] = 26.3 psf

Calculate the design wind load in plf = 26.4 psf *2 ft. = 52.8 plf ~53 plf
Scan across the 6 ft. rough opening row and the column that meets the 53/15 plf for the lateral/vertical loads.
1-ply: 1-3/4" x 3-1/2" will be adequate.
Calculate the lateral concentrated reaction for the plate to the king-stud/column connections = Lateral wind Load (plf)*Rough opening (ft)/2 = 53 plf* 6 ft/2 = 159 lbs
Calculate the vertical reaction transferred by the plate to the trimmer, or to the king-stud/column = Vertical load (plf)*Rough opening (ft)/2 = 15 plf * 6 ft/2 = 45 lbs

FIGURE 8: PLATE TRIBUTARY WIDTH AND TRIBUTARY AREA FOR THE LATERAL WIND LOAD



Note: Holes shall not be drilled in wall plates subjected to vertical and lateral wind loads.

TABLE 21: PLATES - MAXIMUM ALLOWABLE LATERAL WIND LOAD (plf)/VERTICAL LOAD (plf) [LATERAL WIND LOAD DEFLECTION = L/360 - 1-3/4" THICKNESS]

Thickness	1-3/4"			
Depth	3-1/2"	5-1/2"	7-1/4"	9-1/4"
# Plies	1	1	1	1
Rough opening (ft)	1.35E Tolko T-TEC: Plate Maximum Allowable Lateral Wind Load (PLF)/Vertical Load (PLF)			
3	255/90	255/220	255/290	255/375
4	185/30	190/95	190/125	190/160
5	100/25	155/45	155/60	155/80
6	55/15	130/25	130/35	130/45
7	35/10	110/15	110/20	110/25

See Design Assumptions from Table 20

TABLE 22: PLATES - MAXIMUM ALLOWABLE LATERAL WIND LOAD (plf)/VERTICAL LOAD (plf) [LATERAL WIND LOAD DEFLECTION = L/600 - 1-1/2" THICKNESS]

Thickness	1-1/2"			
Depth	3-1/2"	5-1/2"	7-1/4"	9-1/4"
# Plies	1	1	1	1
Rough opening (ft)	1.35E Tolko T-TEC: Plate Maximum Allowable Lateral Wind Load (PLF)/Vertical Load (PLF)			
3	210/65	255/140	255/185	255/235
4	95/35	190/60	190/75	190/100
5	50/15	155/30	155/35	155/50
6	30/10	110/15	130/20	130/25
7		70/5	110/10	110/15

Design Assumptions:

1) Tabulated values are as per IBC/IRC 2015 & 2018, where the first value represents the maximum allowable lateral wind load (plf), and the second value is the maximum vertical load (plf).
2) Self-weight was considered in the analysis.
3) The vertical dead load shall not exceed the vertical live/construction/snow load.
4) Load duration factor C_D = 1.0. Tabulated values shall not be increased for a higher load duration.
5) Vertical deflection, L/360 or 5/16", whichever is less.
6) Maximum lateral deflection = L/600.
7) The plate must be supported by end trimmers if the plate transfers a vertical load in addition to the lateral load.
8) Minimum end bearing support = 1.5". Plate width must be fully supported at the bearing supports.
9) Plate's depth is perpendicular on the face of the wall.

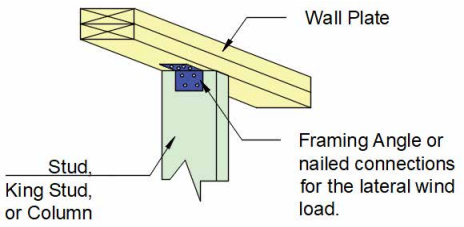
TABLE 23: PLATES - MAXIMUM ALLOWABLE LATERAL WIND LOAD (plf)/VERTICAL LOAD (plf) [LATERAL WIND LOAD DEFLECTION = L/600 - 1-3/4" THICKNESS]

Thickness	1-3/4"			
Depth	3-1/2"	5-1/2"	7-1/4"	9-1/4"
# Plies	1	1	1	1
Rough opening (ft)	1.35E Tolko T-TEC: Plate Maximum Allowable Lateral Wind Load (PLF)/Vertical Load (PLF)			
3	245/90	255/220	255/290	255/375
4	110/60	190/95	190/125	190/160
5	60/30	155/45	155/60	155/80
6	35/15	130/25	130/35	130/45
7		80/15	110/20	110/25

See Design Assumptions from Table 22

SECTION 7: WALL DETAILS

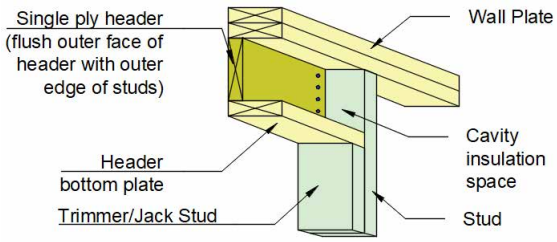
Detail 1. Stud to Wall Plate



Note:

1) Lateral wind load connections as per Table 29.

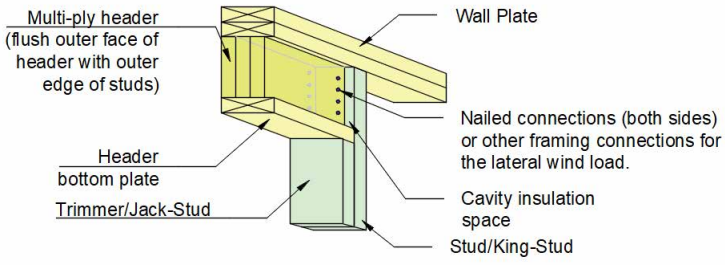
Detail 2. Single Ply Header Supported by Trimmer/Jack-Studs



Notes:

1) Fasten header to the stud/post as per Table 25 and Table 26.
2) Toenail top header to top plates with 8d box nails (0.113" x 2-1/2") at 6 "o.c. spacing.
3) Face nail the header bottom edge through the bottom plate with 8d common nails (0.113" x 2-1/2") at 6" o.c. spacing.

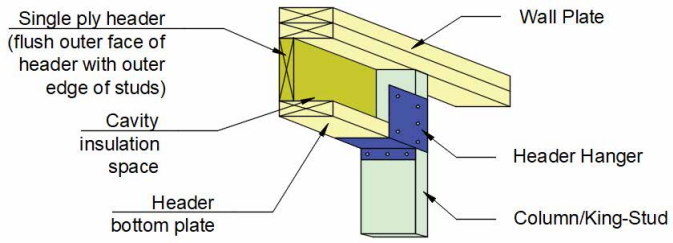
Detail 3. Multi-ply Header Supported by Trimmers/Jack-Studs



Notes:

1) Fasten header to the Stud/King-Stud/Column as per Tables 25 & 26.
2) Toenail top header to top plates with 8d box nails (0.113" x 2-1/2") at 6 "o.c. spacing.
3) Face nail the header bottom edge through the bottom plate with 8d common nails (0.113" x 2-1/2") at 6" o.c. spacing.
4) Multi-ply header connections as per Table 28.
5) Vertical load transferred to the trimmer as per Table 18 and Table 19.

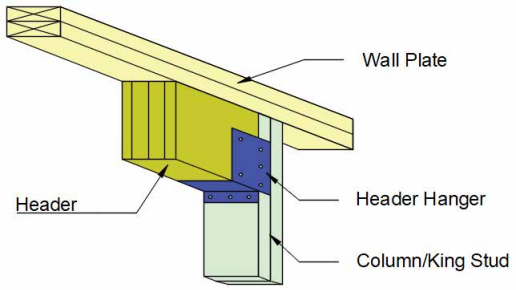
Detail 4. Single Ply Header Supported by Hangers



Notes:

1) Toenail top header to top plates with 8d box nails (0.113" x 2-1/2") at 6 "o.c. spacing.
2) Face nail the header bottom edge through the bottom plate with 8d common nails (0.113" x 2-1/2") at 6" o.c. spacing.
3) Vertical and lateral load capacities as per Table 30.

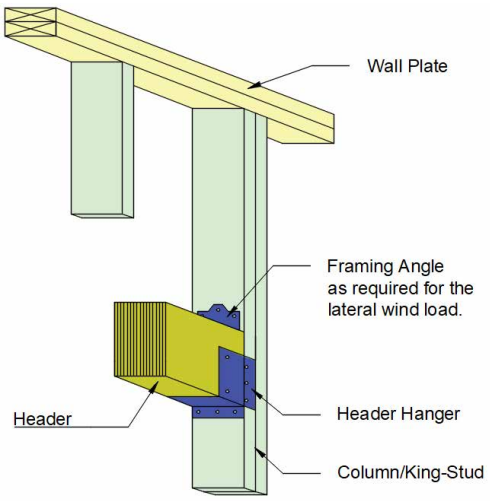
Detail 5. Top Header Supported by Hangers



Notes:

1) Multi-ply header connections as per Table 28.
2) Vertical and lateral load capacities as per Table 30.

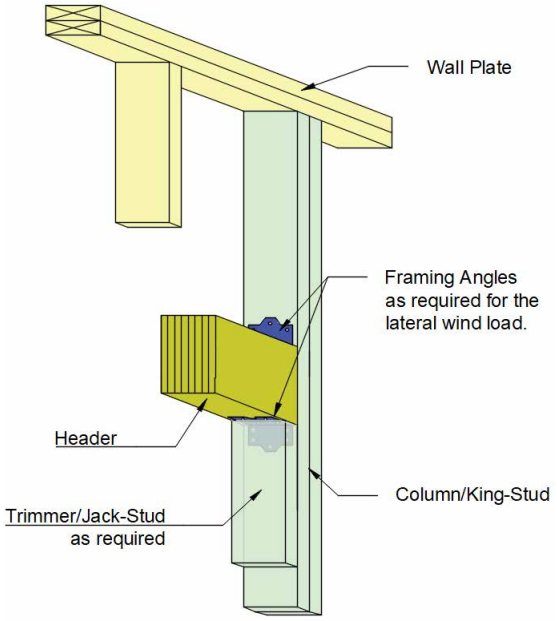
Detail 6. Header with Framing Angle Supported by Hangers



Notes:

1) Multi-ply header connections as per Table 28.
2) Lateral wind load connections as per Table 29 & 30.
3) Vertical load capacities as per Table 30.

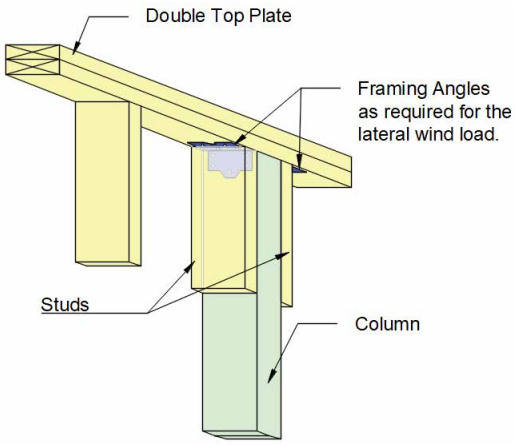
Detail 7. Header with Framing Angles Supported by Trimmers



Notes:

1) Multi-ply header connections as per Table 28.
2) Lateral wind load connections as per Table 29.
3) Vertical load transferred to the trimmer as per Table 18 and Table 19.

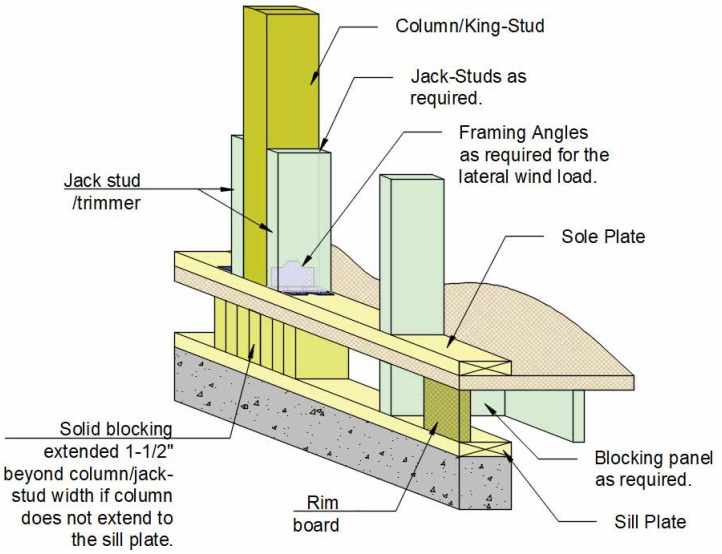
Detail 8. Column/King-Stud to Top Plate



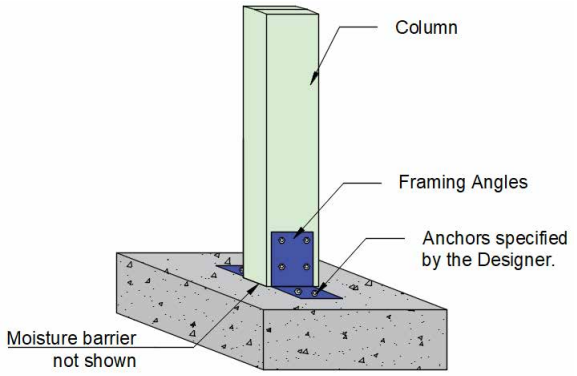
Notes:

1) Lateral wind load connections as per Table 29 (the studs transfer the lateral wind load).
2) The post transfers the concentrated vertical load.

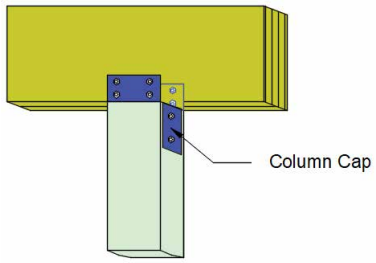
Detail 9. Column/King-Stud to Sill Plate



Detail 10. Column Base



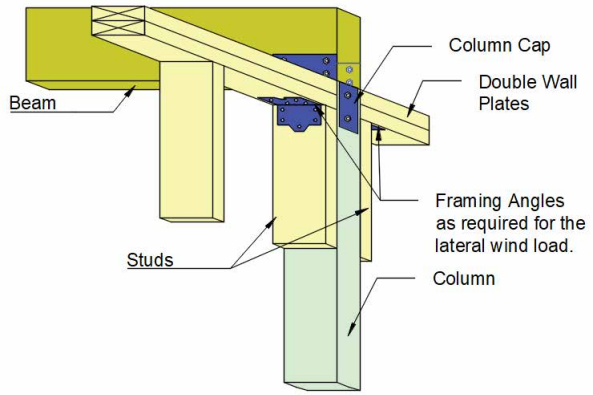
Detail 11. Column Cap



Note:

1) Column cap is used for the vertical load transfer.

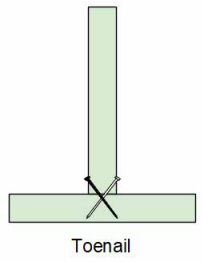
Detail 12. Column to Beam



Notes:

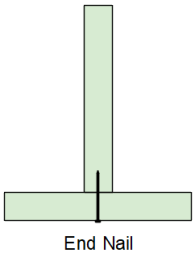
1) Lateral wind load connections as per Table 29 (the studs transfer the lateral wind load).
2) The post transfers the concentrated vertical load.

Detail 13. Toenail



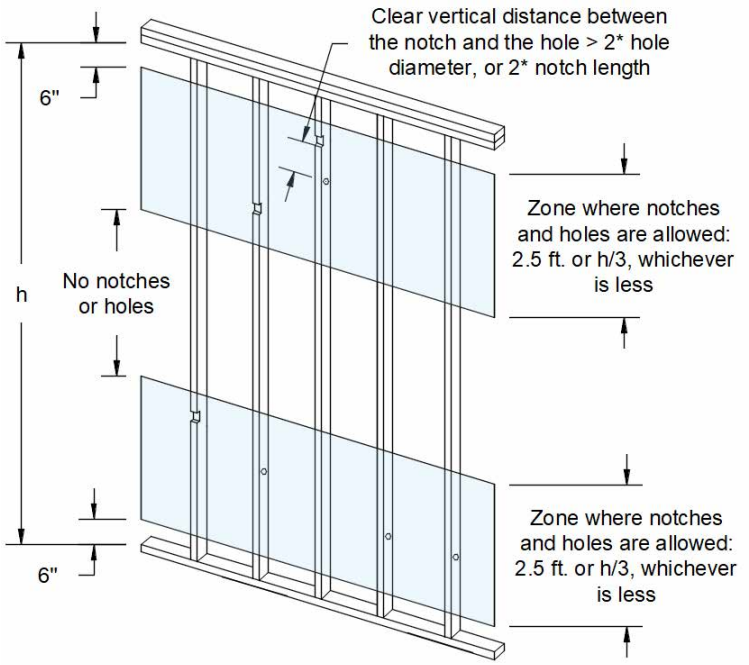
Fasteners capacities as per Table 26.

Detail 14. End Nail

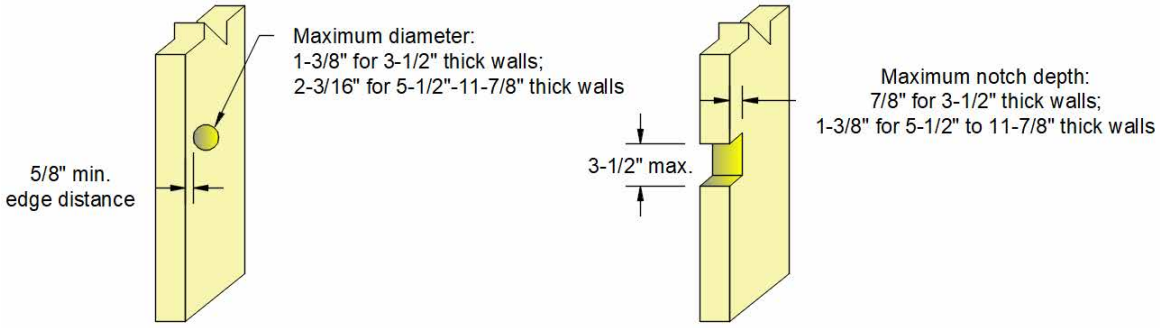


Fasteners capacities as per Table 26.

Detail 15. Allowed Drilling and Notching Zones



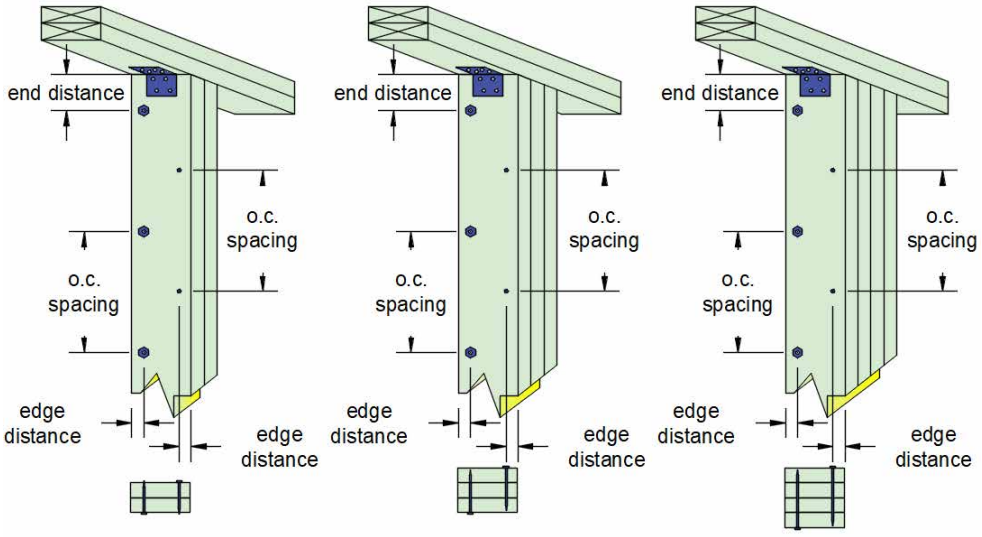
Detail 16. Allowed Holes and Notches Dimensions



Note:

1) Notches are only allowed on the narrow face.

Detail 17. Vertical Members - Multi-ply Connections



Note:

1) Multi-ply member connections as per Table 27.

SECTION 8: WALL TOP PLATE: MAXIMUM OFFSET VERTICAL LOAD

FIGURE 9: OFFSET VERTICAL LOAD

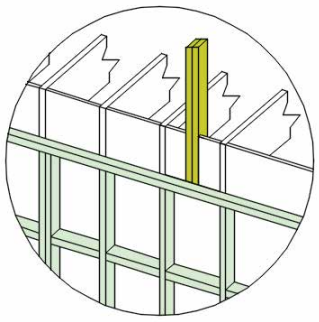


TABLE 24: MAX. CONCENTRATED LOAD (lbs) TRANSFERRED BY THE 1.35E TOLKO T-TEC LSL TOP PLATE

Top Plate Thickness	Plate Width	Max. Vertical Load (lbs)
(2) x 1-1/2"	3.5"	1170
	5.5"	1840
	7.25"	2400
	9.25"	2410
(2) x 1-3/4"	3.5"	1360
	5.5"	2140
	7.25"	2400
	9.25"	2410
(1) x 1-1/2"	3.5"	400
	5.5"	630
	7.25"	830
	9.25"	1060
(1) x 1-3/4"	3.5"	550
	5.5"	860
	7.25"	1140
	9.25"	1450

Design Assumptions:

2) Maximum studs o.c. spacing = 24"
3) Load duration factor C_D = 1.0. Tabulated values shall not be increased for higher load durations.
4) A single concentrated load in between studs is allowed.
5) The offset vertical load shall be transferred to the adjacent studs as follows:
   - Left stud: Concentrated Load (lbs)*Distance to the right stud (in)/o.c. spacing (in)
   - Right stud: Concentrated Load (lbs)*Distance to the left stud (in)/o.c. spacing (in)

Example:

Offset Vertical Load = 1000 lbs, (2) 1-1/2" x 3-1/2" 1.35E Tolko T-TEC LSL Plates will be adequate.
Studs o.c. spacing = 16"
Distance to the right stud = 6"
Distance to the left stud = 10"
Concentrated load transferred to the left stud = 1000 lbs*6"/16" = 375 lbs
Concentrated load transferred to the right stud = 1000 lbs*10"/16" = 625 lbs

SECTION 9: WALL FRAMING NAILED CONNECTIONS

TABLE 25: WALL FRAMING NAILED CONNECTIONS

Connection Type	Fastener type	Header thickness (in)	Fastener size	O.C. Spacing (in)	Number of fasteners	Orientation
Stud to top or bottom plate	8d box, 8d common nail	-	0.113" x 2-1/2", 0.131" x 2-1/2"	-	4	Toenail
	10d box, 10d common nails		0.128" x 3", 0.148" x 3"		4	
	16d common nail	-	0.162" x 3-1/2"	-	2	End nail
	10d box, 10d common nails		0.128" x 3", 0.148" x 3"		3	
Header to stud/king stud/ column	8d box, 8d common nail	1.5 - 3.5	0.113" x 2-1/2", 0.131" x 2-1/2"	-	4 - one side	Toenail
	10d box, 10d common nails		0.128" x 3", 0.148" x 3"			
	8d common nail	4.5 - 7	0.131" x 2-1/2"	-	4 - both sides	Toenail
	10d box, 10d common nails		0.128" x 3", 0.148" x 3"			
Top plate to top plate	16d common nail	-	0.162" x 3-1/2"	16	-	Face nail
	10d box nail		0.128" x 3"	12		
Top plates, laps at corners and intersections	16d common nail	-	0.162" x 3-1/2"	-	2	Face nail
	10d box nail		0.128" x 3"		3	

Reference: IRC 2018 (International Residential Code) - Table R602.3(1)

Design assumptions:

- The ultimate design wind speed shall not exceed 115 mph, the wind exposure category is B, the roof pitch is 5:12 or greater, and the roof span is 32 feet or less
- The net uplift at the top of the wall does not exceed 100 plf, where the net uplift is determined as per IRC - R802.11.
- If the net uplift at the top of the wall exceeds 100 plf, uplift framing connectors shall be installed to provide a continuous load path from the top of the wall to the foundation or to a point where the uplift force is 100 plf or less.

TABLE 26: NAIL CAPACITIES

Tolko T-TEC LSL - main and side members				
Nail type	Size	Lateral capacity (lb)	Toe-Nail capacity (lb)	End-Nail capacity (lb)
8d box	0.113" x 2-1/2"	72	60	48
8d common	0.131" x 2-1/2"	97	81	65
10d box	0.128" x 3"	93	77	62
10d common	0.148" x 3"	118	98	79
16d common	0.162" x 3-1/2"	141	117	94

SPF - main or side member				
Nail type	Size	Lateral capacity (lb)	Toe-Nail capacity (lb)	End-Nail capacity (lb)
8d box	0.113" x 2-1/2"	61	51	41
8d common	0.131" x 2-1/2"	74	61	50
10d box	0.128" x 3"	79	66	53
10d common	0.148" x 3"	100	83	67
16d common	0.162" x 3-1/2"	120	100	80

Notes:

1) Tabulated capacities are for a load duration C_D = 1.0.
2) Tabulated capacities shall not be increased by a higher C_D since the connections are controlled by the fastener metal strength (Yield mode IV governs).

SECTION 10: MULTI-PLY MEMBER CONNECTIONS

TABLE 27: MULTI-PLY CONNECTIONS FOR STUDS/KING-STUDS/COLUMNS (1.35E TOLKO 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
1.5	2	Depth ≤ 7.25"	10d common nail (0.148" x 3")	2	6"	2-1/4"	1"	Staggered; adjacent nails driven from opposite side
		9.25" ≤ Depth < 11.875"		3				
		Depth ≥ 14"		4				
	3	5.5" ≤ Depth ≤ 7.25"	SDS1/4x4-1/2, SDW22458, WSWH45, WS45 screws	2	8"	6"	2"	Staggered; adjacent screws driven from opposite side
		9.25" ≤ Depth < 11.875"		2				
		Depth ≥ 14"		3				
	4	5.5" ≤ Depth ≤ 7.25"	1/2" A307 Through Bolts; SDS1/4x6, SDW22600, WSWHS6, WS6 screws	2	8"	6"	2"	Staggered; adjacent screws driven from opposite side
		9.25" ≤ Depth < 11.875"		2				
		Depth ≥ 14"		3				
1.75	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
		9.25" ≤ Depth < 11.875"		3				
		Depth ≥ 14"		4				
	3	5.5" ≤ Depth ≤ 11.875"	SDW22500, MIFLK005 (F5.0FL), WSWH5, WS5 screws	2	8"	6"	2"	Staggered; adjacent screws driven from opposite side
		Depth ≥ 14"		3				
	4	5.5" ≤ Depth ≤ 11.875"	1/2" A307 Through Bolts; SDW22634, MIFLK634 (F6.7FL), WSWHS634 screws	2	8"	6"	2"	Staggered; adjacent screws driven from opposite side
		Depth ≥ 14"		3				

TABLE 28: MULTI-PLY CONNECTIONS FOR HEADERS (1.35E TOLKO T-TEC LSL)

Depth	Fastener type	No. of rows of fasteners	O.C. spacing	Min. end distance (in)	Min. edge distance (in)
7.25"	1/2" A307 Through Bolts (staggered)	2	6"	2"	2"
9.25", 11.25"		3			

SECTION 11: FRAMING ANGLES, HEADER HANGERS CONNECTORS

TABLE 29: FRAMING ANGLES – CONNECTORS FOR THE LATERAL WIND LOAD

Framing Angle Type	Framing Angle Width - on the supported member (in)	Framing Angle Width - on the supporting member (in)	Framing Angle Length (in)	Max. Lateral Wind Capacity (lbs)
Simpson Strong-Tie® Connectors				
A21	2	1.5	1.375	175
A23	2	1.5	2.75	565
A33	3	3	1.5	330
A34	1.438	1.438	2.5	445
A35	1.438	1.438	4.5	325
GA1	1	1	2.75	330
GA2	1	1	3.25	475
ML24Z	2	2	4	515
ML26Z	2	2	6	1090
Mitek® Connectors				
JA1	1.5	1.5	1.25	255
A3	1.438	1.438	2.75	590
MP34	1.5	1.438	2.813	525
MPA1	1.5	1.438	4.5	680
ML24-TZ	2	2	4	615
ML26-TZ	2	2	6	1060

Notes:

1) Allowable loads have been increased for wind loading (C_D = 1.6); no further increase allowed.
2) Allowable loads are for a product with a specific gravity of 0.5 for connections .
3) Connectors are required on both sides to achieve the tabulated loads values. Fasteners quantity and size shall be as per manufacturer's recommendations.
4) Minimum Stud/King-Stud/Column Thickness = 1.5"

TABLE 30: HEADER HANGERS FOR VERTICAL AND LATERAL WIND LOADS

Manufacturer	Hanger Model	Dimensions (in)		Min. Post Size/ Thickness (in)	Fasteners		Max. Vertical Load (lbs)	Max. Lateral Wind Load (lbs)
		W	H		Column/King-Stud	Header		
Simpson Strong-Tie®	HH4	3.5	2.813	1.5	(7) 10d x 1-1/2"	(4) 10d x 1-1/2"	855	725
				3	(7) 16d x 2-1/2"	(4) 16d x 2-1/2"	1010	750
				4.5	(9) 16d	(4) 16d	1295	1085
	HH6	5.5	5.125	1.5	(10) 10d x 1-1/2"	(6) 10d x 1-1/2"	1220	1025
				3	(10) 16d x 2-1/2"	(6) 16d x 2-1/2"	1440	1025
				4.5	(12) 16d	(6) 16d	1730	1700
Mitek®	HH44	3.563	6.25	4.5	(9) 16d	(4) 16d	1240	1100
	HH66	5.5	5.25	4.5	(12) 16d	(6) 16d	1655	1100

Notes:

1) Use all specified fasteners.
2) Attachment to 1.5" stud/column will result in two round holes not being filled in the stud and load reductions are as noted in the Table 30.
3) Lateral wind loads have been increased for a load duration factor C_D = 1.6 with no further increase allowed.
4) Vertical loads are for a load duration factor C_D = 1.0 and it can be increased by a higher load duration factor as per manufacturer's recommendations.
5) Nails: 10d x 1 1⁄2" = 0.148" x 1-1⁄2", 16d x 2-1⁄2" = 0.162" x 2-1⁄2", 16d = 0.162" x 3-1/2".

SECTION 12: 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
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- Analyze anytime for quick results and guidance
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- Create Flexible and detailed plot layouts
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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:

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