TIMBER TECHNOLOGIES LLC

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Axial Column Capacity (lbs) using Allowable Stress Design

Titan Timbers using #1 SYP Treated Bases and SPF MSR Uppers

Effective Column Length (ft) l_{e1} or l_{e2}	3Ply 2x6		3Ply 2x8		4Ply 2x6		4Ply 2x8		5Ply 2x6		5Ply 2x8	
	P_1	P_2	P_1	P_2	P_1	P_2	P_1	P_2	P_1	P_2	P_1	P_2
	d_1 = 5.38"	d_2 = 4.13"	d_1 = 7.13"	d_2 = 4.13"	d_1 = 5.38"	d_2 = 5.50"	d_1 = 7.13"	d_2 = 5.50"	d_1 = 5.38"	d_2 = 6.88"	d_1 = 7.13"	d_2 = 6.88"
5	36,600	35,500	47,900	46,200	48,900	49,000	63,900	63,300	61,200	61,900	79,900	79,800
6	35,900	33,900	47,600	44,700	48,100	48,200	63,500	62,500	60,300	61,400	79,400	79,300
7	35,000	31,500	47,200	42,300	47,000	47,200	63,000	61,500	59,000	60,800	78,900	78,700
8	33,700	28,100	46,600	38,900	45,400	45,700	62,400	60,100	57,100	60,000	78,100	77,900
9	31,800	24,300	45,900	34,600	43,200	43,700	61,600	58,100	54,600	58,900	77,100	76,800
10	29,300	20,700	45,100	30,100	40,200	40,900	60,500	55,400	51,100	57,500	75,900	75,400
11	26,400	17,700	43,900	25,900	36,600	37,600	59,200	51,900	46,900	55,700	74,400	73,600
12	23,500	15,100	42,500	22,400	32,900	33,900	57,400	47,900	42,300	53,300	72,400	71,400
13	20,800	13,100	40,700	19,400	29,200	30,300	55,300	43,500	37,700	50,400	69,900	68,500
14	18,400	11,400	38,500	16,900	25,900	27,000	52,700	39,200	33,600	47,100	66,800	65,100
15	16,300	10,000	36,000	14,900	23,100	24,000	49,600	35,200	29,900	43,500	63,300	61,100
16	14,500	8,800	33,400	13,200	20,600	21,400	46,300	31,600	26,700	39,900	59,300	56,900
17	13,000	7,800	30,800	11,700	18,400	19,200	42,900	28,400	23,900	36,500	55,200	52,600
18	11,700		28,200		16,600	17,300	39,600	25,600	21,500	33,300	51,000	48,400
19	10,500		25,900		15,000	15,600	36,500	23,200	19,500	30,400	47,100	44,500
20	9,600		23,800		13,600	14,200	33,500	21,100	17,700	27,800	43,400	40,900
21	8,700		21,900		12,400	12,900	30,900	19,300	16,100	25,500	40,000	37,600
22	8,000		20,100		11,300	11,800	28,500	17,600	14,700	23,400	36,900	34,700
23			18,600				26,300			21,600	34,100	32,000
24			17,200				24,300			19,900	31,600	29,600
25			15,900				22,600			18,400	29,300	27,400
26			14,800				21,000			17,100	27,300	25,500
27			13,800				19,500			15,900	25,400	23,700
28			12,800				18,200			14,900	23,700	22,200
29			12,000				17,100				22,200	
30												

Table Footnotes:

1 Table is valid for Axially Loads without eccentricity and without horizontal bending or shear loads, such as wind.

2 Column Capacity is the lesser of P_1 (based on $\ell_{e1} = K_1 \times \ell_1$) and P_2 (based on $\ell_{e2} = K_2 \times \ell_2$). See diagram to the right.

3 Allowable Stress Design method is used; no duration of load modifications reflected in capacity values.

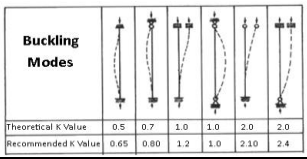
4 Capacities apply to members in a dry service condition, $C_M = 1.0$; normal temperature, $C_t = 1.0$; and unincised members, $C_i = 1.0$

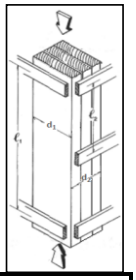
5 For a more detailed discussion of buckling modes and the use of the K factors (as shown in the figure at right), refer to NDS Appendix G.

6 Column Capcities are rounded to the nearest 100 lbs and are limited to a maximum slenderness ratio (ℓ_e/d) of 50.

Interpolation between effective lengths is allowed.

7 See Timber Technolgoies Column Specification for complete design values and section properties.





While this capacity table has been prepared in accordance with recognized engineering principles and is based on the most accurate and reliable technical data available, it should not be used or relied upon for any general or specific application without competent examination and verification of its accuracy and applicability by a competent designer or professional engineer.

Example problem: An interior building column is 18ft high from concrete floor to the rafter it supports with a reaction force of 9,500 lbs. A lateral brace is being considered along the d_2 face which would cut the length of the ℓ_2 in half (9ft). a) What size Titan Timber columns can be used without the lateral brace? and b) What size columns can be used if the lateral brace is installed?

Solution: Assume Effective Length Factor (K) = 1.0 in both directions. If the lateral brace is not used across the d2 face, the effective length will be the same in each direction: $\ell_{e1} = \ell_{e2}$ = 18ft x 1.0 = 18ft. The smallest column that has a capacity of at least 11,500 lbs for both directions is a 4Ply2x6 column with P_1 = 16,600 and P_2 = 17,300. Note that the 3Ply2x6 and 3Ply2x8 columns are not eligible for use because the P_2 capacity for effective length of 18ft appears below the dark line indicating that it exceeds the slenderness ratio limit of 50 (NDS 3.7.1.4).

If a properly restrained lateral brace is installed at mid-height, ℓ_{e1} remains 18ft but ℓ_{e2} becomes 9ft. The 3Ply2x6 column has a P1 capacity of 11,700lbs for 18ft and a P2 capacity of 24,300lbs for 9ft. The smaller of these two values (11,700) governs the capacity and since it exceeds the 11,500 lbs required, the 3Ply2x6 column can be used in this configuration.

For both solutions it should be noted that a larger column size can be used for increased safety factor and redundancy in the overall design, and may be advisable, especially if there is uncertainty about the accuracy of the load requirements, buckling mode, or the lateral restraint provided to the column at its ends. A professional engineer familiar with post frame construction should be consulted to confidently maximize efficiency in the final design.