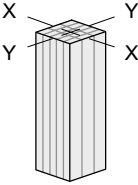


ES12 Columns – Design Properties

Limit States Design Properties

Application	Columns
Axonometry	
Appearance grade	Industrial
Stress grade	ES12/NPG
Bending about X-X axis	
Bending moment, f_{bx} ^(a)	4 453 psi
Longitudinal shear, f_{vx} ^(b)	319 psi
Compression perpendicular to grain, f_{cpx}	1 088 psi
Shear-free modulus of elasticity, E_x	1.9E+06 psi
Apparent modulus of elasticity, $E_{x,app}$ ^(c)	1.8E+06 psi
Bending about Y-Y axis	
Bending moment, f_{by} ^(a)	4 453 psi
Longitudinal shear, f_{vy} ^(b)	319 psi
Compression perpendicular to grain, f_{cpy}	1 088 psi
Shear-free modulus of elasticity, E_y	1.9E+06 psi
Apparent modulus of elasticity, $E_{y,app}$ ^(c)	1.8E+06 psi
Axially loaded	
Compression parallel to grain, f_c	4 786 psi
for 3 laminations	3 539 psi
Tension parallel to grain, f_t	2 959 psi
Tension perpendicular to grain, f_{tp}	74 psi
Modulus of elasticity, E_a	1.9E+06 psi
Mean relative density, G	0.47 -
Density (for member weight), ρ	35 pcf

- a) The size factor, K_{Zbg} , shall be calculated as per Clause 7.5.6.5.1 of CSA O86-14, where the beam width, b , is taken as the full member width.
- b) The specified fracture shear strength at a notch, f_i , shall be calculated as per Clause 7.5.7.4.2 of CSA O86-14, where the effective lamination width, b_{eff} , is taken as the full member width.
- c) The apparent modulus of elasticity values include a 5% shear deflection. For column stability calculations, E_{05} shall be determined by multiplying the tabulated apparent modulus of elasticity by 0.87.

Notes:

- The tabulated values are for dry service conditions and standard-term duration of load.
- Nordic Lam ES12/NPG members are symmetrical throughout the depth and the width of the member (homogeneous layups). It should be noted that Clause 7.5.3 of CSA O86-14 is not applicable.
- The tabulated values apply to members consisting of 4 or more laminations, unless otherwise indicated. It should be noted that only 3-1/2 x 3-1/2 inches columns consist of 3 laminations.
- Design of glulam members shall be in accordance with CSA O86-14.
- Nordic Lam products are listed in CCMC Evaluation Report 13216-R and APA Product Report PR-L294C.

ES12 Columns – Selection Tables

Maximum Factored Axial Load, P_f (lbf)

Effective length (ft)	Width = 3-1/2"			Width = 5-1/2"		Width = 7"
	Depth			Depth		Depth
	3-1/2"	5-1/2"	7"	5-1/2"	7"	7"
6	17 720	31 345	39 895	65 565	83 445	111 195
7	14 915	25 590	32 565	61 785	78 485	106 715
8	12 345	20 835	26 520	57 335	72 240	101 705
9	10 185	16 990	21 625	51 875	65 325	96 195
10	8 400	13 900	17 690	45 515	57 395	90 270
11	6 940	11 405	14 510	39 870	50 335	84 065
12	5 750	9 390	11 935	34 920	44 130	77 015
13	4 780	7 765	9 860	30 610	38 705	69 670
14	3 990	6 450	8 185	26 860	33 985	62 945
15	-	-	-	23 605	29 880	56 840
16	-	-	-	20 770	26 305	51 325
17	-	-	-	18 305	23 190	46 365
18	-	-	-	16 155	20 475	41 905
19	-	-	-	14 275	18 100	37 895
20	-	-	-	12 640	16 030	34 295
21	-	-	-	11 210	14 220	31 060
22	-	-	-	9 960	12 640	28 155
23	-	-	-	-	-	25 540
24	-	-	-	-	-	23 185

Factored Bearing Resistances (lbf)

Species combination or stress grade	Bearing area (in. ²)					
	12.25	19.25	24.50	30.25	38.50	49.00
	3-1/2" x 3-1/2"	3-1/2" x 5-1/2"	3-1/2" x 7"	5-1/2" x 5-1/2"	5-1/2" x 7"	7" x 7"
Douglas Fir-Larch	11 440	17 980	22 885	28 255	35 960	45 770
Hem-Fir	7 520	11 815	15 040	18 565	23 630	30 075
Spruce-Pine-Fir	8 665	13 615	17 325	21 395	27 225	34 655
Northern Species	5 720	8 990	11 440	14 125	17 980	22 885
Nordic Lam ES11	9 480	14 900	18 960	23 410	29 795	37 920
Nordic Lam 24F-1.9E	12 260	19 265	24 520	30 275	38 530	49 035

Notes:

- For preliminary design use only. Final design shall include a complete analysis including the verification of the factored bearing resistance.
- The tabulated values are for dry service conditions and standard-term duration of load.
- Values shown in the table above are the maximum factored axial loads, in pounds (lbf), that can be applied to the column in addition to its own weight.
Values shown in the bottom table are the factored bearing resistances, in pounds (lbf).
- The tabulated factored axial loads are based on simply axially loaded columns subjected to an eccentricity of either 1/6 member width or depth, whichever is worse.
- The tabulated factored bearing resistances are based on the compression perpendicular to grain resistance of the supporting material.