Nordic Lam Columns - Axial Loads

CHECKLIST: **Nordic Lam Columns - Axial Loads**

To verify that the tabulated resistances are appropriate for the structure being designed, the following questions should be asked (the appropriate modification factor is given in brackets):

1. Is load duration "standard" (K_D)?
K_D is a load duration factor. The tabulated resistances are based on a standard term load (K_D = 1.0), which includes the effects of dead loads plus live loads due to use and occupancy, and snow loads. For other load durations, the specified strength in compression parallel to grain, f_c, shall be multiplied by the appropriate factor permitted by the code.

2. Is the service condition "dry" (K_S)?
K_S is a service condition factor. The tabulated values are based on dry service conditions (K_S = 1.0). For wet service conditions, multiply the specified strength in compression parallel to grain by the following factor:
K_{Sc} = 0.75 for f_c

3. Is the material free of incising and/or strength-reducing chemicals (K_T)?
K_T is a treatment factor. The tables are based on untreated timber (K_T = 1.0). For glued-laminated timber treated with fire-retardant or other potentially strength-reducing chemicals, strength and stiffness capacities shall be based on documented results of tests that shall take into account the effects of time, temperature, and moisture content. For preservative treatment, the treatment factor for unincised glued-laminated timber may be taken as unity.

4. Is the effective length factor, K_e, equal to 1.0 and the effective column length in the direction of buckling equal to the total column length?

5. Are the columns concentrically loaded?

If the answer to any of these questions is no, the Column Selection Tables may not be used. Instead, calculate Pr from the formula given in CSA O86-09, Clause 6.5.8. Information on eccentrically loaded columns is provided in Technical Note S08. Note that in certain cases the National Building Code of Canada permits a reduction in the loads due to use and occupancy depending upon the size of the tributary area (refer to Article 4.1.5.8 of the 2010 NBCC).

When the conditions of use do not meet the requirements above, the value of P_r given in the selection tables is not valid. Furthermore, the tabulated values cannot be adjusted by a factor that will apply throughout the entire unsupported length range. Therefore, P_r should be calculated from the design standard.

Note: Since column design is an iterative process, the tables may be used to select a trial section. When designing a column with an effective length factor K_e other than 1.0 or 2.0, a preliminary section may be selected by using the table for K_e = 1.0 with L equal to the actual effective length $K_e L$. The preliminary section can then be checked using the design standard (note the difference between the estimated resistance and the actual resistance will not usually exceed 5%).

Column Selection Tables — Nordic Lam 24F-ES/NPG

137 mm

d (mm)	137		178		222		267	
L	P_{rx}	P_{ry}	P_{rx}	P_{ry}	P_{rx}	P_{ry}	P_{rx}	P_{ry}
m	kN	kN	kN	kN	kN	kN	kN	kN
2,0	390	390	573	506	739	621	891	732
2,5	324	324	509	414	682	507	840	600
3,0	257	257	439	328	621	402	787	478
3,5	199	199	372	255	557	314	730	374
4,0	154	154	310	197	493	244	671	291
4,5	119	119	256	153	431	190	611	227
5,0	93,0	93,0	211	120	374	149	551	178
5,5	73,4	73,4	173	94,8	322	118	493	141
6,0	58,6	58,6	143	75,9	276	94,2	439	113
6,5	47,4	47,4	119	61,4	237	76,3	389	91,5
7,0			99,3		204		344	
7,5			83,4		175		304	
8,0			70,6		151		268	
8,5			60,1		131		236	
9,0					114		209	
9,5					99,1		185	
10,0					86,8		164	
10,5					76,4		146	
11,0					67,4		130	
11,5							116	
12,0							104	
12,5							93,8	
13,0							84,5	
13,5								
14,0								

Notes:

1. P_{rx} is the factored resistance to buckling about the x-x (strong) axis. P_{ry} is the factored resistance to buckling about the y-y (weak) axis.
2. For L ≤ 2,0 m, use P_r for L = 2,0 m. Where P_r values are not given, the slenderness ratio exceeds 50 (maximum permitted).
3. A complete design shall include the verifications of bearing resistance and fire safety requirements.
4. L = unsupported length
5. Other dimensions are available on request; please contact Nordic.

Column Selection Tables — Nordic Lam 24F-ES/NPG

184 mm

d (mm)	184		222		267		318	
L	P_{rx}	P_{ry}	P_{rx}	P_{ry}	P_{rx}	P_{ry}	P_{rx}	P_{ry}
m	kN	kN	kN	kN	kN	kN	kN	kN
2,0	778	778	958	918	1153	1081	1362	1261
2,5	695	695	885	822	1089	969	1300	1132
3,0	608	608	808	720	1021	850	1239	996
3,5	521	521	726	619	949	732	1176	859
4,0	440	440	644	524	874	621	1110	730
4,5	368	368	565	439	797	521	1041	614
5,0	306	306	491	366	721	435	970	514
5,5	254	254	425	304	647	363	897	429
6,0	212	212	366	253	577	303	826	358
6,5	177	177	314	212	513	253	756	300
7,0	148	148	270	178	454	213	689	252
7,5	125	125	233	150	402	180	626	213
8,0	106	106	201	128	355	153	567	181
8,5	90,6	90,6	174	109	314	131	513	155
9,0	77,8	77,8	152	93,6	278	112	463	133
9,5			132		246		418	
10,0			116		219		378	
10,5			102		195		341	
11,0			90,2		174		309	
11,5					155		279	
12,0					139		253	
12,5					125		230	
13,0					113		209	
13,5							190	
14,0							174	
14,5							159	
15,0							145	
15,5							133	
16,0								
16,5								

Notes:

1. P_{rx} is the factored resistance to buckling about the x-x (strong) axis. P_{ry} is the factored resistance to buckling about the y-y (weak) axis.
2. For L ≤ 2,0 m, use P_r for L = 2,0 m. Where P_r values are not given, the slenderness ratio exceeds 50 (maximum permitted).
3. A complete design shall include the verifications of bearing resistance and fire safety requirements.
4. L = unsupported length
5. Other dimensions are available on request; please contact Nordic.

Column Selection Tables — Nordic Lam 24F-ES/NPG

228 mm

d (mm)	228		267		318		362	
L	P_{rx}	P_{ry}	P_{rx}	P_{ry}	P_{rx}	P_{ry}	P_{rx}	P_{ry}
m	kN	kN	kN	kN	kN	kN	kN	kN
2,0	1189	1189	1391	1365	1642	1591	1849	1782
2,5	1104	1104	1314	1269	1569	1480	1776	1659
3,0	1014	1014	1233	1166	1496	1362	1707	1528
3,5	918	918	1148	1058	1421	1238	1638	1390
4,0	821	821	1059	948	1342	1110	1566	1249
4,5	726	726	967	839	1260	985	1492	1109
5,0	637	637	876	737	1175	866	1414	976
5,5	554	554	788	642	1089	756	1334	853
6,0	480	480	704	557	1004	657	1252	742
6,5	416	416	627	483	920	570	1170	644
7,0	359	359	556	418	840	494	1089	559
7,5	311	311	492	362	764	428	1009	485
8,0	270	270	436	314	693	372	933	422
8,5	235	235	385	273	628	324	859	367
9,0	205	205	341	239	568	283	790	321
9,5	179	179	303	209	513	248	725	281
10,0	157	157	269	184	464	218	665	247
10,5	139	139	240	162	419	192	609	218
11,0	123	123	214	143	379	170	558	193
11,5			192		344		511	
12,0			172		312		468	
12,5			155		283		429	
13,0			140		258		394	
13,5					235		362	
14,0					214		332	
14,5					196		306	
15,0					180		282	
15,5					165		260	
16,0							240	
16,5							222	

Notes:

1. P_{rx} is the factored resistance to buckling about the x-x (strong) axis. P_{ry} is the factored resistance to buckling about the y-y (weak) axis.
2. For L ≤ 2,0 m, use P_r for L = 2,0 m. Where P_r values are not given, the slenderness ratio exceeds 50 (maximum permitted).
3. A complete design shall include the verifications of bearing resistance and fire safety requirements.
4. L = unsupported length
5. The values shown in grey are for dimensions fabricated using manual techniques.
6. Other dimensions are available on request; please contact Nordic.