

## Nordic Lam Beams

### CHECKLIST: Nordic Lam Beams

To verify that the tabulated resistances and  $E_s I$  values 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 tabulated values  $W_{FR}$  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 tabulated values by the following factors:

$$K_{Sb} = 0.80 \text{ for } M'_r$$

$$K_{Sv} = 0.87 \text{ for } V_r \text{ and } W_r L^{0.18}$$

$$K_{SE} = 0.90 \text{ for } E_s I$$

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. Does the construction provide lateral stability for the beam ( $K_L$ ) ?

$K_L$  is a lateral stability factor. The tables are based on beams that are restrained against lateral displacement and rotation at their ends ( $K_L = 1.0$ ). It is assumed that the compressive edge of the bending member is supported throughout its length by decking so as to provide a rigid diaphragm. If glulam lacks this restraint, refer to Clause 6.5.6.4 of CSA O86-09 to modify the tabulated  $M'_r$  value.

5. Is a size factor applicable ( $K_{zbg}$ )?

$K_{zbg}$  is a size factor for bending applied to glulam beams and is only applicable if it is less than the value of  $K_L$ . The values of  $M'_r$  in the Beam Selection Tables do not include  $K_{zbg}$ . Values of  $K_{zbg}$  shall be taken as:

$$K_{zbg} = 1.03 (BL)^{-0.18} \leq 1.0$$

where: B = beam width, m (in the case of Nordic Lam products, the full beam width)

L = length of beam segment from point of zero moment to point of zero moment, m

6. Is the beam free of notches ( $K_N$ ) ?

$K_N$  is a notch factor. The tables are based on beams that are not notched ( $K_N = 1.0$ ). If the members are notched, refer to technical note S04, item 4 or to CSA O86-09 Clause 6.5.7.2.2.

7. For  $W_r L^{0.18}$  only, is the beam simply supported and the loading uniformly distributed ( $C_v$ )?

$C_v$  is a shear load coefficient. The tables are based on a simply supported beam with a uniformly distributed load ( $C_v = 3.69$ ). If the beam is not simply supported or the loading is not uniformly distributed, select the appropriate  $C_v$  value from Clause 6.5.7.3 of CSA O86-09 and multiply the tabulated  $W_r L^{0.18}$  value by  $C_v/3.69$ .

If the answer to any of these questions is no, refer to the description of modification factors above and make the necessary adjustments to tabulated resistances and  $E_s I$  values. Note that the  $M'_r$  values must be adjusted by the lesser of  $K_L$  or  $K_{zbg}$ . Otherwise, the Beam Selection Tables may be used directly. The beams self weight has not been considered in the calculations. 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).

## Beam Selection Tables

## Nordic Lam 24F-ES/NPG

Depth mm	86 mm				137 mm			
	M' <sub>r</sub> kN-m	V <sub>r</sub> kN	W <sub>r</sub> L <sup>0,18</sup> kN-m <sup>0,18</sup>	E <sub>s</sub> I 10 <sup>9</sup> N-mm <sup>2</sup>	M' <sub>r</sub> kN-m	V <sub>r</sub> kN	W <sub>r</sub> L <sup>0,18</sup> kN-m <sup>0,18</sup>	E <sub>s</sub> I 10 <sup>9</sup> N-mm <sup>2</sup>
127	6,39	14,4	86,4	182				
178	12,5	20,2	114	501	20,0	32,2	167	798
222	19,5	25,2	137	972	31,1	40,1	200	1 549
267	28,2	30,3	159	1 692	45,0	48,3	233	2 695
318	40,0	36,1	183	2 858	63,8	57,5	269	4 552
362	51,9	41,1	204	4 216	82,7	65,5	299	6 716
406	65,3	46,1	224	5 947	104	73,4	328	9 474
457	82,7	51,9	247	8 482	132	82,6	362	13 512
502	99,8	57,0	267	11 242	159	90,8	390	17 909
546	118	62,0	286	14 465	188	98,7	418	23 043
597	141	67,8	307	18 909	225	108	450	30 122
641	163	72,8	326	23 405	259	116	477	37 285
686	186	77,9	344	28 689	297	124	504	45 702
737	215	83,7	365	35 575	343	133	535	56 671
781	242	88,7	383	42 334	385	141	561	67 439
826	270	93,8	401	50 082	430	149	587	79 781
870	300	98,8	418	58 519	478	157	613	93 222
921	336	105	438	69 425	535	167	642	110 596
965	369	110	456	79 858	587	175	667	127 216
1010	404	115	473	91 559	644	183	693	145 856
1054					701	191	717	165 761
1105					770	200	746	191 006
1149					833	208	770	214 744
1194					899	216	795	240 976
1245					978	225	822	273 193
1289					1048	233	846	303 193
1334					1123	241	870	336 069
1384					1208	250	897	375 292
1429					1288	258	921	413 102
1473					1369	266	944	452 449
1524					1465	276	971	501 090
1568					1551	284	994	545 757
1613					1641	292	1017	594 106
1664								
1708								

## Notes:

1. V<sub>r</sub> may only be used as a simplified check of shear capacity, if the beam volume is less than 2.0 m<sup>3</sup>.
2. W<sub>r</sub>L<sup>0,18</sup> may be used for beams of any volume to check shear capacity.
3. A complete design shall include the verifications of bearing resistance and fire safety requirements.
4. The dimensions showed in black are the optimum dimensions for straight beams (maximum length of 18.9 m).
5. Beams of dimensions in light grey are fabricated using manual techniques (maximum length of 24.4 m).
6. Other dimensions are available on request; please contact Nordic.

## Beam Selection Tables

## Nordic Lam 24F-ES/NPG

Depth mm	184 mm				228 mm			
	M' <sub>r</sub> kN-m	V <sub>r</sub> kN	W <sub>r</sub> L <sup>0,18</sup> kN-m <sup>0,18</sup>	E <sub>s</sub> I 10 <sup>9</sup> N-mm <sup>2</sup>	M' <sub>r</sub> kN-m	V <sub>r</sub> kN	W <sub>r</sub> L <sup>0,18</sup> kN-m <sup>0,18</sup>	E <sub>s</sub> I 10 <sup>9</sup> N-mm <sup>2</sup>
222	41,8	53,9	255	2 080	51,7	66,8	304	2 578
267	60,4	64,8	296	3 619	74,8	80,4	353	4 484
318	85,7	77,2	342	6 114	106	95,7	408	7 576
362	111	87,9	380	9 020	138	109	454	11 176
406	140	98,6	418	12 724	173	122	498	15 767
457	177	111	460	18 147	219	138	549	22 487
502	214	122	497	24 053	265	151	593	29 805
546	253	133	533	30 948	313	164	635	38 349
597	302	145	573	40 456	374	180	683	50 130
641	348	156	608	50 076	431	193	725	62 051
686	399	167	642	61 381	494	206	766	76 058
737	460	179	681	76 113	570	222	812	94 314
781	517	190	715	90 576	640	235	852	112 235
826	578	201	748	107 152	716	249	892	132 775
870	641	211	781	125 203	795	262	931	155 143
921	719	224	818	148 538	891	277	975	184 058
965	789	234	850	170 860	978	290	1013	211 718
1010	864	245	882	195 895	1071	304	1052	242 739
1054	941	256	914	222 628	1166	317	1089	275 865
1105	1035	268	950	256 534	1282	333	1132	317 879
1149	1119	279	981	288 415	1386	346	1169	357 384
1194	1208	290	1012	323 647	1497	359	1207	401 041
1245	1313	302	1047	366 916	1627	375	1249	454 656
1289	1408	313	1078	407 209	1744	388	1285	504 585
1334	1508	324	1108	451 363	1868	401	1321	559 297
1384	1623	336	1142	504 042	2011	417	1362	624 574
1429	1730	347	1173	554 824	2144	430	1398	687 499
1473	1838	358	1202	607 668	2278	443	1433	752 980
1524	1968	370	1236	672 997	2439	459	1474	833 931
1568	2083	381	1266	732 987	2581	472	1509	908 267
1613	2205	392	1295	797 924	2732	485	1544	988 732
1664	2346	404	1329	876 028	2907	501	1584	1 085 514
1708	2472	415	1357	947 375	3063	514	1618	1 173 921
1753	2604	426	1387	1 024 245	3226	528	1653	1 269 174
1797	2736	436	1415	1 103 323	3390	541	1687	1 367 161
1848	2894	449	1448	1 199 953	3586	556	1726	1 486 898
1892	3033	460	1476	1 287 721	3758	569	1760	1 595 654
1937	3179	470	1505	1 381 806	3939	583	1794	1 712 238
1981	3325	481	1533	1 478 127	4120	596	1828	1 831 592
2032	3499	494	1565	1 595 252	4335	612	1866	1 976 726
2076	3652	504	1593	1 701 141	4525	625	1899	2 107 936
2121	3812	515	1621	1 814 180	4723	638	1933	2 248 005
2172	3997	528	1653	1 948 219	4953	654	1971	2 414 097
2216					5156	667	2004	2 563 802
2261					5367	680	2037	2 723 184

See notes on page 2.

Beam Selection Tables

Nordic Lam 24F-ES/NPG

Depth mm	279 mm				327 mm			
	M <sub>r</sub> kN-m	V <sub>r</sub> kN	W <sub>r</sub> L <sup>0,18</sup> kN-m <sup>0,18</sup>	E <sub>s</sub> I 10 <sup>9</sup> N-mm <sup>2</sup>	M <sub>r</sub> kN-m	V <sub>r</sub> kN	W <sub>r</sub> L <sup>0,18</sup> kN-m <sup>0,18</sup>	E <sub>s</sub> I 10 <sup>9</sup> N-mm <sup>2</sup>
318	130	117	481	9 271	197	156	610	16 029
362	168	133	535	13 676	248	175	670	22 613
406	212	150	588	19 294	314	197	738	32 251
457	268	168	648	27 517	379	217	797	42 746
502	324	185	700	36 472				
546	383	201	750	46 927	449	236	854	55 000
597	458	220	807	61 343	537	258	919	71 897
641	528	236	855	75 931	619	277	974	88 994
686	605	253	904	93 072	709	296	1030	109 084
737	698	271	959	115 411	818	318	1092	135 267
781	784	288	1005	137 340	919	337	1145	160 969
826	877	304	1053	162 474	1027	357	1199	190 427
870	972	320	1098	189 846	1140	376	1251	222 508
921	1090	339	1151	225 229	1277	398	1311	263 978
965	1196	355	1196	259 076	1402	417	1362	303 648
1010	1311	372	1241	297 036	1536	436	1414	348 139
1054	1427	388	1285	337 572	1673	455	1464	395 649
1105	1569	407	1336	388 984	1839	477	1522	455 906
1149	1696	423	1380	437 325	1988	496	1572	512 564
1194	1832	440	1424	490 747	2147	515	1622	575 177
1245	1991	459	1474	556 356	2334	537	1678	652 073
1289	2135	475	1516	617 452	2502	556	1727	723 681
1334	2286	491	1559	684 403	2680	576	1776	802 150
1384	2461	510	1607	764 281	2884	597	1831	895 770
1429	2624	526	1650	841 281	3075	617	1879	986 018
1473	2788	542	1691	921 410	3267	636	1927	1 079 932
1524	2984	561	1739	1 020 468	3497	658	1981	1 196 033
1568	3159	577	1780	1 111 432	3702	677	2028	1 302 646
1613	3343	594	1822	1 209 895	3918	696	2075	1 418 049
1664	3557	613	1869	1 328 326	4170	718	2129	1 556 855
1708	3748	629	1910	1 436 509	4393	737	2175	1 683 650
1753	3948	646	1951	1 553 068	4627	757	2222	1 820 262
1797	4149	662	1991	1 672 973	4863	776	2268	1 960 796
1848	4388	681	2037	1 819 494	5143	798	2320	2 132 525
1892	4599	697	2077	1 952 576	5390	817	2366	2 288 504
1937	4821	713	2117	2 095 239	5650	836	2412	2 455 710
1981	5042	730	2157	2 241 290	5909	855	2456	2 626 888
2032	5305	748	2202	2 418 888	6218	877	2508	2 835 041
2076	5537	765	2241	2 579 447	6490	896	2553	3 023 223
2172	6061	800	2326	2 954 093	7104	938	2649	3 462 324
2216	6309	816	2364	3 137 285	7395	957	2693	3 677 032
2261	6568	833	2404	3 332 317	7698	976	2738	3 905 619
2311	6862	851	2447	3 558 316	8042	998	2787	4 170 499
2356	7132	868	2486	3 770 253	8358	1017	2832	4 418 899
2400	7400	884	2524	3 985 459	8674	1036	2875	4 671 130

See notes on page 2.