

## Nordic Lam Beams

### CHECKLIST: Nordic Lam Beams

To verify that the tabulated resistances and  $E_3I$  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 durations of load, 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:

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

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

$$K_{SE} = 0.90 \text{ for } E_3I$$

3. Is the material free of strength-reducing chemicals ( $K_T$ )?

$K_T$  is a treatment factor. The tabulated resistances are based on beams and purlins that are untreated ( $K_T = 1.0$ ). 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.

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, then 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 for  $M'_r$  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;

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 members are notched on the tension side at supports, multiply the tabulated  $V_r$  and  $W_r L^{0.18}$  values by:

$$K_N = [1 - d_n/d]^2$$

If members are notched on the compression side, multiply the tabulated  $V_r$  and  $W_r L^{0.18}$  values by:

$$\text{(if } e > d) \quad K_N = 1 - d_n/d$$

$$\text{(if } e < d) \quad K_N = 1 - d_n e / [d(d-d_n)]$$

where:

d = depth of beam (mm);

$d_n$  = depth of notch (mm), which must not exceed 0.25d;

e = length of notch (mm), from inner edge of closest support to farthest edge of notch.

7. For  $W_e L^{0.18}$  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, therefore  $C_v = 3.69$ . If the beam is not simply supported or the loading is not uniformly distributed, select the appropriate CV value from Clause 6.5.7.3 of CSA O86-09 and multiply the tabulated  $W_e L^{0.18}$  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.

Note that in certain cases the National Building Code permits a reduction in the loads due to use and occupancy depending upon the size of the tributary area (refer to Article 4.1.6.9 of the 2005 NBC).

## Beam Selection Tables

**Nordic Lam 24F-1.9E**
**86 mm**
**137 mm**

Depth mm	24F-1.9E Stress Grade				$E_{SI}$ $10^2 \text{ N-mm}^{-2}$	$M'_r$ kN-m	$V_r$ kN	$W_r L^{U,10}$ kN-m <sup>U,10</sup>	$E_{SI}$ $10^2 \text{ N-mm}^{-2}$
	$M'_r$ kN-m	$V_r$ kN	$W_r L^{U,10}$ kN-m <sup>U,10</sup>	$E_{SI}$ $10^2 \text{ N-mm}^{-2}$					
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	
1499					1418	271	958	476 833	
1568					1551	284	994	545 757	
1613					1641	292	1017	594 106	
1664									
1708									

## Notes:

1.  $V_r$  may only be used as a simplified check of shear capacity if the beam volume is  $< 2.0 \text{ m}^3$ .
2.  $W_r L^{U,10}$  may be used for all beam volumes to check shear capacity.
3. The dimensions showed in black are the optimum dimensions for straight beams (maximum length of 18.9 m).
4. Beams of dimensions in light grey are fabricated using manual techniques (maximum length of 24.4 m).
5. Other dimensions are available on request; please contact Nordic.

## Beam Selection Tables

**Nordic Lam 24F-1.9E**
**184 mm**
**228 mm**

Depth mm	24F-1.9E Stress Grade				$E_S I$ $10^7 \text{ N-mm}^2$	$M'_r$ kN-m	$V_r$ kN	$W_r L^{U,10}$ kN-m	$E_S I$ $10^7 \text{ N-mm}^2$
	$M'_r$ kN-m	$V_r$ kN	$W_r L^{U,10}$ kN-m	$E_S I$ $10^7 \text{ N-mm}^2$					
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	
1499	1904	364	1220	640 417	2359	451	1454	793 561	
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-1.9E**
**279 mm**
**327 mm**

Depth mm	24F-1.9E Stress Grade				$E_{SI}$	$M'_r$ kN-m	$V_r$ kN	$W_r L^{U,10}$ kN-m <sup>U,10</sup>	$E_{SI}$
	$M'_r$ kN-m	$V_r$ kN	$W_r L^{U,10}$ kN-m <sup>U,10</sup>	$10^2$ N-mm <sup>2</sup>					
318	130	117	481	9 271					
362	168	133	535	13 676	197	156	610	16 029	
406	212	150	588	19 294	248	175	670	22 613	
457	268	168	648	27 517	314	197	738	32 251	
502	324	185	700	36 472	379	217	797	42 746	
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	
1499	2887	552	1716	971 068	3384	647	1954	1 138 133	
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.