NORDIC ENGINEERED WOOD
RESIDENTIAL DESIGN
CONSTRUCTION GUIDE

NORDIC LAM™

NORDIC ENGINEERED WOOD

FSC-CERTIFIED PRODUCTS AVAILABLE

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The mark of responsible forestry

FSC® C011517

NORDIC
ENGINEERED WOOD

BRINGING NATURE'S RESOURCES HOME

Nordic Engineered Wood was founded in the year 2000 to develop and promote high quality wood products for use in residential and non-residential construction.

Our vision is built on the founding principles of reliable service, consistent quality, and responsible forestry practices. Chantiers Chibougamau Ltd (CCL) has achieved FSC certification, the international certification system dedicated to promoting responsible management of the forests, to ensure the long term viability of our precious natural resources.

With the addition of its third production line, CCL now boasts annual glulam production capacity in excess of 40 million board feet. Nordic Engineered Wood's goal is to provide the most consistent, high quality finished products available.

The Nordic Lam family of products illustrates our continued passion for building on tradition.

TABLE OF CONTENTS







Nordic Lam™
Building on tradition

Harvesting
The raw material used in Nordic Lam products is high density black spruce harvested on 2.0 million acres of land under the stewardship of Chantiers Chibougamau Ltd (CCL). Black spruce is known for its extreme density, fiber strength, and narrow growth rings. CCL utilizes state-of-the-art harvesting and reforestation techniques that ensure the highest quality lam stock, and guarantee that quality for generations to come.

Environmentally Friendly
CCL's state-of-the-art manufacturing facility optimizes fiber while delivering uncompromising quality. Nordic has reduced waste by developing the layup process to utilize more of the tree than ever before. Rigorous adherence to Forest Stewardship Council's forestry management practices minimizes the environmental impact and ensures the long-term viability of our forests.

Quality Control
Nordic Lam manufacturing processes are audited by APA, ensuring product quality and consistent performance. Additional in-house procedures enhance the Nordic Lam product line.

Design Flexibility
Nordic Lam products are cost effective and highly versatile in residential and light commercial applications. Nordic has a grade and dimension to fit every need, enabling architects, designers and specifiers to choose the best available design solution. The 1-3/4-inch wide beam is the perfect framing solution for stairwell openings, saving money, time and labor.

Versatility
Nordic glued laminated products are manufactured in a balanced layup, with no camber, assuring proper installation. Nordic Lam beams and headers are sized for I-joist, standard glulam, and conventional lumber depths. Nordic Lam standard column widths of 3-1/2, 5-1/2, and 7 inches are pre-sized for a seamless fit into conventional framing applications.

Workability
Nordic Lam is exceptionally strong, yet can weigh as much as 25% less than other engineered wood alternatives. Nordic Lam beams and columns can easily be cut, drilled, nailed, and installed using conventional carpentry tools. Nordic Lam black spruce products can be clad or left visible as an attractive architectural feature of the framing system.

EXCLUSIVE ENVIRO–LAM TECHNOLOGY

NORDIC LAM™

Nordic Lam beams, headers and columns feature our exclusive ENVIRO–LAM technology. Nordic's research and development team has developed this proprietary process, enabling us to utilize fiber previously deemed unviable.

ENVIRO–LAM's unique process minimizes waste and converts more of nature's raw material into useful products than ever before. ENVIRO–LAM contributes to natural resource conservation by extracting more valuable fiber from every tree.

Historically, residential and light commercial applications required the use of dimensional lumber and other engineered wood composites that rely heavily upon larger, more environmentally sensitive species. The Nordic Engineered Wood system offers an environmentally responsible choice for residential and light commercial applications. Nordic Lam's products provide price- and performance-based solutions for all your design and building requirements.

Nordic Lam™, Nordic Joist™ and rim board comprise the Nordic Engineered Wood family of products providing compatible, economical and innovative solutions for today's homebuilding systems.

ENVIRO ≡ LAM™

GLULAM BASICS

Anatomy of a Glulam

A glulam is made up of wood laminations, or "lams" that are bonded together with adhesives. The grain of all laminations runs parallel with the length of the member. Because they are engineered products, glued laminated timbers are manufactured to meet a range of design stresses. Beams are manufactured with the strongest lams on the bottom and top of the beam, where maximum tension and compression stresses occur. This concept allows the lumber resource to be used more efficiently by placing higher grade lumber in zones that have the maximum stresses, and lumber with less structural quality in lower stressed zones.

Axis Orientation

Glulam beams are typically installed with the wide face of the laminations perpendicular to the applied load (bending about X-X axis). These are commonly referred to as horizontally laminated members. If this same member is rotated 90 degrees such that the load is applied to the wide face of the laminations (bending about Y-Y axis), it is considered to be a vertically laminated member. Glulam members have different tabulated stress properties depending on whether the member is used in a horizontal or vertical orientation. Refer to Nordic Lam design stresses on page 8.

Balanced Beams

Nordic Lam balanced members are symmetrical in lumber quality about the mid-height. Balanced beams are used in applications such as cantilevers or continuous spans, in addition to simple spans, where either the top or bottom of the member may be stressed in tension due to service loads.

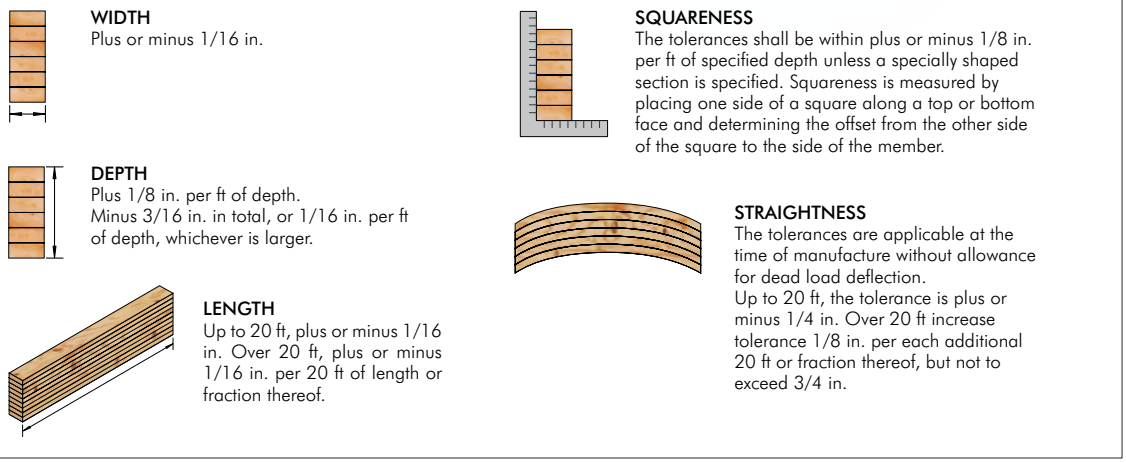
Appearance Classification

Glulam is available in a range of appearances, all looking different but having the same structural characteristics for a given strength grade. The appearance classification is not related to lumber layup requirements and thus does not affect design values of the beam. Nordic Lam appearance classifications are:

Industrial – Used for concealed applications or where appearance is not of primary importance. Stock beams are supplied with this appearance and are provided in widths designed to fit flush with 2x4 and 2x6 wall framing.

Architectural – The appearance of choice in applications where members are exposed to view, because they have a smooth, attractive finish. Available only as a custom order where finished appearance is of primary importance.

FIGURE 1
DIMENSIONAL TOLERANCES



Trademarks and Acceptances

The APA EWS trademark signifies that the products are manufactured in conformance with ANSI Standard A190.1, American National Standard for Structural Glued Laminated Timber. Typical information included in the trademark is shown on the sample trademark below. The APA EWS trademark is recognized by all major model building codes for the certification of glued laminated timber.

Checking

Glued laminated timbers may develop seasoning checks as a normal function of the moisture stabilization process. The degree of checking in individual members will be influenced by the rate at which the member moisture content changes from a moisture content level at the time of manufacture to its expected in-service level. When checks do occur, they are primary an aesthetic concern and can be filled with an elastomeric filler to improve appearance. To reduce the possibility and severity of checking, it is important to coordinate delivery schedules to minimize job site storage. Guard against direct exposure of glulam members to severe conditions.

Preservative Treatment

Although glulam does not require preservative treatment for most uses, certain applications may present environmental conditions conducive to decay, insect or marine borer attack, such as the long-term or frequent presence of moisture (generally 20 percent or greater moisture content of the wood) accompanied by temperatures ranging from 50 to 90°F. When those conditions cannot be avoided, glulam must be pressure-preservative-treated. For additional information on different treatments for specific applications, please contact Nordic Engineered Wood.

Fire Resistance

Glulam beams and columns provide architectural warmth and beauty along with structural strength and natural fire resistance. In the presence of fire, the outer portion of a glulam member becomes charred. This layer of charred wood then functions as an insulator, helping to protect the undamaged interior of the member from the heat. The rate of advancement of this insulating char layer into the remaining, undamaged portion of the member is approximately 1.5 inches per hour and forms the theoretical basis of the equations used to predict fire endurance. For further information on fire-resistance, please contact Nordic Engineered Wood.

FIGURE 2
APA GRADE STAMP

(1) Inspection Agency
(2) Structural use
BAL - Balanced member
(3) Appearance grade
IND - Industrial
ARCH - Architectural
(4) Combination
(5) Specific requirements
(6) Plant number
(7) Referenced standard (U.S.)
(8) Evaluation report (Canada)

Production lot *(not shown)*

ALLOWABLE DESIGN STRESSES

DESIGN STRESSES (1)(2)(3)

APPLICATION	BEAMS AND HEADERS	COLUMNS
APPEARANCE GRADE	INDUSTRIAL	INDUSTRIAL
STRESS GRADE	24F-1.9E	ES12
EWS LAYUP COMBINATION	24F-E/ES1M1	ES12/NPG
Bending About X-X Axis		
Bending at Extreme Fibre (F_{bx})(4,5)	2400 psi	2400 psi
Longitudinal Shear (F_{vx})(6)	250 psi	250 psi
Compression Perpendicular to Grain (F_{cpx})	600 psi	600 psi
Shear-Free Modulus of Elasticity (E_x)	1.9E+06 psi	1.9E+06 psi
Apparent Modulus of Elasticity ($E_{x,app.}$)(7)	1.8E+06 psi	1.8E+06 psi
Bending About Y-Y Axis		
Bending at Extreme Fibre (F_{by})(8)	1100 psi	2400 psi
for 3 laminations	n/a	2400 psi
Longitudinal Shear (F_{vy})(6)	175 psi	250 psi
Compression Perpendicular to Grain (F_{cpy})	300 psi	600 psi
Shear-Free Modulus of Elasticity (E_y)	1.6E+06 psi	1.9E+06 psi
Apparent Modulus of Elasticity ($E_{y,app.}$)(7)	1.5E+06 psi	1.8E+06 psi
Axially Loaded		
Compression Parallel to Grain (F_c)	1150 psi	2300 psi
for 3 laminations	n/a	1700 psi
Tension Parallel to Grain (F_t)	1050 psi	1600 psi
Modulus of Elasticity (E_a)(7)	1.6E+06 psi	1.9E+06 psi
Specific Gravity	0.41	0.46
Density (for Member Weight)	35 pcf	35 pcf

(1) The combinations in this table are applicable to members consisting of 4 or more laminations, unless otherwise noted.

(2) The tabulated design values are for dry conditions of use. For wet conditions of use, multiply the tabulated values by the wet service factors, C_M, per ANSI/AWC NDS-2012, 5.3.3.

(3) The tabulated design values are for normal duration of loading. For other durations of loading, see applicable design code (ANSI/AWC NDS-2012, 2.3.2 and Chapter 5).

(4) Nordic Lam bending members are symmetrical throughout the depth of the member (balanced layups).

(5) The tabulated design values in bending, F_{bx}, shall be multiplied by a volume factor, C_v. The volume factor formula is: $C_v = (12/d)^{1/10} \times (5.125/b)^{1/10} \times (21/L)^{1/10} \leq 1.0$, where d = beam depth (in.), b = beam width (in.), and L = beam length (ft).

(6) For non-prismatic members, notched members, members subject to impact or cyclic loading, or shear design of bending members at connections (ANSI/AWC NDS-2012, 3.4.3.3), the design value for shear (F_{vx} and F_{vy}) shall be multiplied by a factor of 0.72.

(7) The tabulated apparent E values already include a 5% shear deflection. For beam stability and column stability calculations, E_{min} shall be determined by multiplying the tabulated apparent modulus of elasticity by 0.528.

(8) The F_{by} values shall be permitted to be increased by multiplying by the size factor, $(12/d)^{1/9}$, where d is the beam depth in inches.

(9) Design of glulam members shall be in accordance to National Design Specification, 2012 Edition.

The Nordic Lam products are listed in APA Product Report PR-L294.

ALLOWABLE DESIGN PROPERTIES

24F-1.9E BEAMS AND HEADERS

WIDTH (in.)	DEPTH (in.)	MOMENT (lbf-ft)	SHEAR (lb)	M. OF INERTIA (in.^{4})	WEIGHT (lbf/ft)
1-ply 1-3/4	9-1/2	5265	2771	125	4.0
	11-7/8	8226	3464	244	5.1
	14	11,433	4083	400	6.0
	16	14,933	4667	597	6.8
	18	18,900	5250	851	7.7
2-ply 1-3/4 or 3-1/2	9-1/2	10,529	5542	250	8.1
	11-7/8	16,452	6927	488	10.1
	14	22,867	8167	800	11.9
	16	29,867	9333	1195	13.6
	18	37,800	10,500	1701	15.3
3-ply 1-3/4 or 5-1/2	9-1/2	15,794	8313	375	12.1
	11-7/8	24,678	10,391	733	15.2
	14	34,300	12,250	1201	17.9
	16	44,800	14,000	1792	20.4
	18	56,700	15,750	2552	23.0
4-ply 1-3/4 or 7	9-1/2	21,058	11,083	500	16.2
	11-7/8	32,904	13,854	977	20.2
	14	45,733	16,333	1601	23.8
	16	59,733	18,667	2389	27.2
	18	75,600	21,000	3402	30.6

NOTES:

1. Moment and shear capacities are based on dry conditions of use and normal duration of loading.
2. Moment capacities shall be multiplied by a volume effect factor, C_v.
3. Member weight is based on density of 35 pcf.
4. For 3-ply 1-3/4 or 5-1/2-inch beams, the tabulated values are based on a net width of 5-1/4 inches. For 5-1/2-inch beams, the tabulated values may be increased by 5%.

ALLOWABLE
UNIFORM LOADS (plf)

24F-1.9E BEAMS AND HEADERS — FLOOR LOADS - 100% (plf)

WIDTH (in.)	DEPTH (in.)	CRITERIA	SPAN (ft)												
			6	8	10	12	14	16	18	20	22	24	26	28	30
1-ply 1-3/4	9-1/2	L/480 LL		488	250	145	91	61	43	31	---	---	---	---	---
		L/360 LL		651	333	193	122	81	57	42	---	---	---	---	---
		L/240 TL	933	654	417	285	178	118	82	58	---	---	---	---	---
		End/Int. B.	2.7/6.7	2.6/5.9	2.1/4.7	1.7/3.8	1.5/3	1.5/3	1.5/3	1.5/3	---	---	---	---	---
	11-7/8	L/480 LL			488	283	178	119	84	61	46	35	28	---	---
		L/360 LL			651	377	237	159	112	81	61	47	37	---	---
		L/240 TL	1250	859	653	452	331	233	162	117	87	66	51	---	---
		End/Int. B.	3.6/9	3.3/8.3	3.2/7.9	2.7/6.6	2.3/5.3	1.9/4.2	1.5/3.3	1.5/3	1.5/3	1.5/3	1.5/3	---	---
	14	L/480 LL				463	292	195	137	100	75	58	46	36	30
		L/360 LL				618	389	261	183	133	100	77	61	49	40
		L/240 TL	1575	1059	797	629	461	351	269	194	144	110	85	67	53
		End/Int. B.	4.6/11.3	4.1/10.2	3.9/9.6	3.7/9.1	3.2/7.8	2.8/6.9	2.4/5.6	2/4.4	1.6/3.6	1.5/3	1.5/3	1.5/3	1.5/3
	16	L/480 LL				691	435	292	205	149	112	86	68	54	44
		L/360 LL					580	389	273	199	150	115	91	73	59
		L/240 TL	1924	1266	942	750	603	460	362	292	218	166	129	102	82
		End/Int. B.	5.6/13.8	4.9/12.2	4.6/11.3	4.4/10.9	4.1/10.2	3.6/8.9	3.2/8	2.9/7.2	2.4/5.6	2/4.6	1.7/3.9	1.5/3.3	1.5/3
	18	L/480 LL					620	415	292	213	160	123	97	77	63
		L/360 LL						554	389	284	213	164	129	103	84
		L/240 TL	2326	1492	1098	867	716	583	459	370	305	238	186	147	118
		End/Int. B.	6.7/16.7	5.8/14.3	5.3/13.2	5/12.5	4.9/12.1	4.5/11.3	4/10	3.6/9	3.3/8.2	2.9/7.1	2.4/5.7	2.1/4.8	1.8/4.2
2-ply 1-3/4 or 3-1/2	9-1/2	L/480 LL		977	500	289	182	122	86	63	47	36	---	---	---
		L/360 LL		1302	667	386	243	163	114	83	63	48	---	---	---
		L/240 TL	1865	1308	834	571	356	236	163	117	86	64	---	---	---
		End/Int. B.	2.7/6.7	2.6/5.9	2.1/4.7	1.7/3.8	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3	---	---	---
	11-7/8	L/480 LL			977	565	356	238	167	122	92	71	56	44	36
		L/360 LL			1302	754	475	318	223	163	122	94	74	59	48
		L/240 TL	2499	1717	1306	904	661	467	325	234	173	131	101	79	62
		End/Int. B.	3.6/9	3.3/8.3	3.2/7.9	2.7/6.6	2.3/5.3	1.9/4.2	1.5/3.3	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3
	14	L/480 LL				926	583	391	274	200	150	116	91	73	59
		L/360 LL				1235	778	521	366	267	200	154	121	97	79
		L/240 TL	3149	2119	1595	1258	921	703	537	388	289	220	170	134	107
		End/Int. B.	4.6/11.3	4.1/10.2	3.9/9.6	3.7/9.1	3.2/7.8	2.8/6.9	2.4/5.6	2/4.4	1.6/3.6	1.5/3	1.5/3	1.5/3	1.5/3
	16	L/480 LL				1383	871	583	410	299	224	173	136	109	88
		L/360 LL					1161	778	546	398	299	230	181	145	118
		L/240 TL	3848	2532	1885	1500	1205	920	724	584	435	332	258	204	163
		End/Int. B.	5.6/13.8	4.9/12.2	4.6/11.3	4.4/10.9	4.1/10.2	3.6/8.9	3.2/8	2.9/7.2	2.4/5.6	2/4.6	1.7/3.9	1.5/3.3	1.5/3
	18	L/480 LL					1240	831	583	425	319	246	194	155	126
		L/360 LL						1107	778	567	426	328	258	207	168
		L/240 TL	4651	2985	2195	1735	1433	1166	918	741	605	477	372	295	237
		End/Int. B.	6.7/16.7	5.8/14.3	5.3/13.2	5/12.5	4.9/12.1	4.5/11.3	4/10	3.6/9	3.3/8.2	2.9/7.1	2.4/5.7	2.1/4.8	1.8/4.2

See notes on page 11.

24F-1.9E BEAMS AND HEADERS — FLOOR LOADS - 100% (plf) (continued)

WIDTH (in.)	DEPTH (in.)	CRITERIA	SPAN (ft)												
			6	8	10	12	14	16	18	20	22	24	26	28	30
3-ply 1-3/4 or 5-1/2	9-1/2	L/480 LL		1465	750	434	273	183	129	94	70	54	43	34	---
		L/360 LL		1954	1000	579	365	244	172	125	94	72	57	46	---
		L/240 TL	2798	1962	1251	856	535	354	245	175	129	96	73	56	---
		End/Int. B.	2.7/6.7	2.6/5.9	2.1/4.7	1.7/3.8	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3	---
	11-7/8	L/480 LL			1465	848	534	358	251	183	138	106	83	67	54
		L/360 LL			1954	1131	712	477	335	244	183	141	111	89	72
		L/240 TL	3749	2576	1959	1356	992	700	487	351	260	197	152	118	93
		End/Int. B.	3.6/9	3.3/8.3	3.2/7.9	2.7/6.6	2.3/5.3	1.9/4.2	1.5/3.3	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3
	14	L/480 LL				1389	875	586	412	300	225	174	137	109	89
		L/360 LL				1853	1167	782	549	400	301	232	182	146	119
		L/240 TL	4724	3178	2392	1888	1382	1054	806	582	433	330	255	201	160
		End/Int. B.	4.6/11.3	4.1/10.2	3.9/9.6	3.7/9.1	3.2/7.8	2.8/6.9	2.4/5.6	2/4.4	1.6/3.6	1.5/3	1.5/3	1.5/3	1.5/3
	16	L/480 LL				2074	1306	875	615	448	337	259	204	163	133
		L/360 LL					1741	1167	819	597	449	346	272	218	177
		L/240 TL	5773	3798	2827	2250	1808	1374	1068	852	653	498	387	306	245
		End/Int. B.	5.6/13.8	4.9/12.2	4.6/11.3	4.4/10.9	4.1/10.2	3.6/8.9	3.2/7.8	2.8/7	2.4/5.6	2/4.6	1.7/3.9	1.5/3.3	1.5/3
	18	L/480 LL					1860	1246	875	638	479	369	290	232	189
		L/360 LL						1661	1167	851	639	492	387	310	252
		L/240 TL	6977	4477	3293	2602	2149	1721	1339	1069	871	715	558	442	355
		End/Int. B.	6.7/16.7	5.8/14.3	5.3/13.2	5/12.5	4.9/12.1	4.5/11.1	3.9/9.8	3.5/8.7	3.2/7.9	2.9/7.1	2.4/5.7	2.1/4.8	1.8/4.2
4-ply 1-3/4 or 7	9-1/2	L/480 LL		1954	1000	579	365	244	172	125	94	72	57	46	37
		L/360 LL		2605	1334	772	486	326	229	167	125	96	76	61	49
		L/240 TL	3730	2616	1669	1142	713	472	327	234	172	129	98	75	58
		End/Int. B.	2.7/6.7	2.6/5.9	2.1/4.7	1.7/3.8	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3
	11-7/8	L/480 LL			1954	1131	712	477	335	244	183	141	111	89	72
		L/360 LL			2605	1507	949	636	447	326	245	188	148	119	96
		L/240 TL	4999	3434	2612	1808	1323	934	650	468	347	262	202	158	125
		End/Int. B.	3.6/9	3.3/8.3	3.2/7.9	2.7/6.6	2.3/5.3	1.9/4.2	1.5/3.3	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3
	14	L/480 LL				1853	1167	782	549	400	301	232	182	146	119
		L/360 LL				2470	1556	1042	732	534	401	309	243	194	158
		L/240 TL	6299	4237	3189	2517	1832	1378	1071	777	577	439	340	268	213
		End/Int. B.	4.6/11.3	4.1/10.2	3.9/9.6	3.7/9.1	3.1/7.8	2.7/6.7	2.4/5.5	2/4.4	1.6/3.6	1.5/3	1.5/3	1.5/3	1.5/3
	16	L/480 LL				2765	1741	1167	819	597	449	346	272	218	177
		L/360 LL					2322	1556	1093	796	598	461	363	290	236
		L/240 TL	7697	5064	3769	3000	2364	1779	1383	1103	870	664	517	408	327
		End/Int. B.	5.6/13.8	4.9/12.2	4.6/11.3	4.4/10.9	4/10	3.5/8.7	3.1/7.6	2.7/6.8	2.4/5.6	2/4.6	1.7/3.9	1.5/3.3	1.5/3
	18	L/480 LL					2480	1661	1167	851	639	492	387	310	252
		L/360 LL						2215	1556	1134	852	656	516	413	336
		L/240 TL	9303	5969	4390	3469	2866	2229	1734	1384	1127	934	744	589	473
		End/Int. B.	6.7/16.7	5.8/14.3	5.3/13.2	5/12.5	4.9/12.1	4.4/10.8	3.8/9.5	3.4/8.5	3.1/7.6	2.8/6.9	2.4/5.7	2.1/4.8	1.8/4.2

NOTES:

1. Values shown are the maximum uniform loads, in pounds per lineal foot (plf), that can be applied to the beam in addition to its own weight.
2. Selected beam shall satisfy both live (LL) and total (TL) loads. When no value is shown in the live load row, the total load governs the design.
3. Table is based on uniform loads and the most restrictive of simple or continuous spans, and dry-use conditions. Span is measured center to center of supports. The maximum uniform loads are based on a load duration factor, C_D, of 1.00.
4. Maximum deflection = L/480 or L/360 under live load, and L/240 under total load. Other deflection limits may apply.
5. Table values assume that lateral support is provided at each support and continuously along the compression edge of the beam.
6. Multiple pieces may be used when properly connected. For 3-ply 1-3/4 or 5-1/2-inch beams, the tabulated values are based on a net width of 5-1/4 inches. For 5-1/2-inch beams, the tabulated values may be increased by 5%.
7. Sufficient bearing length shall be provided at supports. Review bearing length requirements (shown in inches) to ensure adequacy.

24F-1.9E BEAMS AND HEADERS — ROOF LOADS - 115% and 125% (plf)

WIDTH (in.)	DEPTH (in.)	CRITERIA	SPAN (ft)												
			6	8	10	12	14	16	18	20	22	24	26	28	30
1-ply 1-3/4	9-1/2	L/240 LL			500	289	182	122	86	63	47	---	---	---	---
		115%, TL	1073	753	480	332	239	159	110	79	59	---	---	---	---
		125%, TL	1167	819	522	362	239	159	110	79	59	---	---	---	---
		End/Int. B.	3.4/8.4	3.2/7.9	2.6/5.9	2.1/4.9	1.7/3.7	1.5/3	1.5/3	1.5/3	1.5/3	---	---	---	---
	11-7/8	L/240 LL				565	356	238	167	122	92	71	56	44	---
		115%, TL	1438	988	752	520	381	291	218	158	117	89	69	54	---
		125%, TL	1563	1074	818	566	415	313	218	158	117	89	69	54	---
		End/Int. B.	4.5/11.3	4.2/10.3	4/9.8	3.3/8.2	2.8/7	2.5/5.7	2/4.5	1.6/3.6	1.5/3	1.5/3	1.5/3	1.5/3	---
	14	L/240 LL						391	274	200	150	116	91	73	59
		115%, TL	1812	1219	918	725	531	405	319	257	194	148	115	91	73
		125%, TL	1970	1326	998	788	577	441	347	261	194	148	115	91	73
		End/Int. B.	5.7/14.2	5.1/12.7	4.8/12	4.6/11.4	3.9/9.8	3.5/8.6	3.1/7.6	2.6/6	2.1/4.9	1.8/4.1	1.6/3.4	1.5/3	1.5/3
	16	L/240 LL							410	299	224	173	136	109	88
		115%, TL	2214	1457	1085	863	694	530	417	337	277	224	174	138	111
		125%, TL	2407	1584	1180	939	755	577	454	367	292	224	174	138	111
		End/Int. B.	6.9/17.3	6.1/15.2	5.7/14.2	5.5/13.6	5.1/12.7	4.5/11.2	4/9.9	3.6/8.9	3.2/7.9	2.7/6.6	2.3/5.3	2/4.5	1.7/3.9
	18	L/240 LL								425	319	246	194	155	126
		115%, TL	2676	1717	1263	999	825	672	529	427	352	294	250	199	160
		125%, TL	2909	1867	1374	1086	898	731	576	465	383	320	250	199	160
		End/Int. B.	8.4/20.9	7.2/17.9	6.6/16.5	6.3/15.7	6.1/15.1	5.7/14.1	5/12.5	4.5/11.3	4.1/10.3	3.8/9.4	3.2/8	2.8/6.9	2.4/5.7
2-ply 1-3/4 or 3-1/2	9-1/2	L/240 LL			1000	579	365	244	172	125	94	72	57	46	---
		115%, TL	2146	1505	961	665	478	318	221	159	117	88	68	53	---
		125%, TL	2333	1637	1045	723	478	318	221	159	117	88	68	53	---
		End/Int. B.	3.4/8.4	3.2/7.9	2.6/5.9	2.1/4.9	1.7/3.7	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3	---
	11-7/8	L/240 LL				1131	712	477	335	244	183	141	111	89	72
		115%, TL	2876	1976	1503	1041	762	581	437	316	235	178	138	109	86
		125%, TL	3127	2149	1635	1132	829	626	437	316	235	178	138	109	86
		End/Int. B.	4.5/11.3	4.2/10.3	4/9.8	3.3/8.2	2.8/7	2.5/5.7	2/4.5	1.6/3.6	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3
	14	L/240 LL						782	549	400	301	232	182	146	119
		115%, TL	3624	2438	1836	1449	1061	810	637	514	389	297	231	183	146
		125%, TL	3940	2651	1996	1576	1155	881	694	522	389	297	231	183	146
		End/Int. B.	5.7/14.2	5.1/12.7	4.8/12	4.6/11.4	3.9/9.8	3.5/8.6	3.1/7.6	2.6/6	2.1/4.9	1.8/4.1	1.6/3.4	1.5/3	1.5/3
	16	L/240 LL							819	597	449	346	272	218	177
		115%, TL	4428	2914	2169	1727	1388	1060	834	673	554	447	349	277	222
		125%, TL	4814	3168	2359	1878	1510	1153	908	733	585	447	349	277	222
		End/Int. B.	6.9/17.3	6.1/15.2	5.7/14.2	5.5/13.6	5.1/12.7	4.5/11.2	4/9.9	3.6/8.9	3.2/7.9	2.7/6.6	2.3/5.3	2/4.5	1.7/3.9
	18	L/240 LL								851	639	492	387	310	252
		115%, TL	5351	3435	2527	1997	1650	1343	1058	854	698	579	487	398	321
		125%, TL	5818	3735	2748	2172	1795	1461	1151	930	760	631	501	398	321
		End/Int. B.	8.4/20.9	7.2/17.9	6.6/16.5	6.3/15.7	6.1/15.1	5.7/14.1	5/12.5	4.5/11.3	4.1/10.2	3.7/9.3	3.2/8	2.8/6.9	2.4/5.7

See footnotes on page 13.

24F-1.9E BEAMS AND HEADERS — ROOF LOADS - 115% and 125% (plf) (continued)

WIDTH (in.)	DEPTH (in.)	CRITERIA	SPAN (ft)												
			6	8	10	12	14	16	18	20	22	24	26	28	30
3-ply 1-3/4 or 5-1/2	9-1/2	L/240 LL			1500	868	547	366	257	188	141	109	85	68	56
		115%, TL	3219	2258	1441	997	717	476	331	238	176	133	102	79	62
		125%, TL	3500	2456	1567	1085	717	476	331	238	176	133	102	79	62
		End/Int. B.	3.4/8.4	3.2/7.9	2.6/5.9	2.1/4.9	1.7/3.7	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3
	11-7/8	L/240 LL				1696	1068	715	502	366	275	212	167	133	109
		115%, TL	4314	2964	2255	1561	1143	872	655	473	352	267	207	163	130
		125%, TL	4690	3223	2453	1699	1244	939	655	473	352	267	207	163	130
		End/Int. B.	4.5/11.3	4.2/10.3	4/9.8	3.3/8.2	2.8/7	2.5/5.7	2/4.5	1.6/3.6	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3
	14	L/240 LL						1172	823	600	451	347	273	219	178
		115%, TL	5435	3657	2753	2174	1592	1215	954	761	583	445	346	274	219
		125%, TL	5910	3977	2994	2364	1732	1322	1038	782	583	445	346	274	219
		End/Int. B.	5.7/14.2	5.1/12.7	4.8/12	4.6/11.4	3.9/9.8	3.5/8.6	3.1/7.6	2.6/6	2.1/4.9	1.8/4.1	1.6/3.4	1.5/3	1.5/3
	16	L/240 LL							1229	896	673	519	408	327	265
		115%, TL	6642	4370	3254	2590	2082	1583	1232	983	801	664	523	415	334
		125%, TL	7221	4752	3539	2817	2265	1723	1341	1071	873	671	523	415	334
		End/Int. B.	6.9/17.3	6.1/15.2	5.7/14.2	5.5/13.6	5.1/12.7	4.5/11.1	3.9/9.8	3.5/8.7	3.2/7.8	2.7/6.6	2.3/5.3	2/4.5	1.7/3.9
	18	L/240 LL								1276	958	738	581	465	378
		115%, TL	8027	5152	3790	2996	2475	1983	1543	1232	1005	833	701	596	481
		125%, TL	8727	5602	4122	3258	2693	2157	1679	1342	1094	908	751	597	481
		End/Int. B.	8.4/20.9	7.2/17.9	6.6/16.5	6.3/15.7	6.1/15.1	5.6/13.9	4.9/12.2	4.4/10.9	4/9.8	3.6/8.9	3.2/8	2.8/6.9	2.4/5.7
4-ply 1-3/4 or 7	9-1/2	L/240 LL			2001	1158	729	488	343	250	188	145	114	91	74
		115%, TL	4292	3011	1921	1329	956	635	441	317	234	177	136	105	83
		125%, TL	4667	3274	2090	1446	956	635	441	317	234	177	136	105	83
		End/Int. B.	3.4/8.4	3.2/7.9	2.6/5.9	2.1/4.9	1.7/3.7	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3
	11-7/8	L/240 LL				2261	1424	954	670	488	367	283	222	178	145
		115%, TL	5751	3953	3007	2082	1524	1159	873	631	469	357	276	217	173
		125%, TL	6253	4298	3270	2265	1659	1252	873	631	469	357	276	217	173
		End/Int. B.	4.5/11.3	4.2/10.3	4/9.8	3.3/8.2	2.8/7	2.5/5.7	2/4.5	1.6/3.6	1.5/3	1.5/3	1.5/3	1.5/3	1.5/3
	14	L/240 LL						1563	1098	800	601	463	364	292	237
		115%, TL	7247	4876	3671	2898	2110	1588	1235	985	778	594	462	365	292
		125%, TL	7879	5302	3993	3152	2295	1728	1344	1043	778	594	462	365	292
		End/Int. B.	5.7/14.2	5.1/12.7	4.8/12	4.6/11.4	3.9/9.7	3.4/8.4	3/7.4	2.6/6	2.1/4.9	1.8/4.1	1.6/3.4	1.5/3	1.5/3
	16	L/240 LL							1639	1195	898	691	544	435	354
		115%, TL	8856	5827	4339	3454	2723	2050	1595	1273	1037	859	698	553	445
		125%, TL	9628	6336	4719	3757	2962	2231	1736	1386	1130	895	698	553	445
		End/Int. B.	6.9/17.3	6.1/15.2	5.7/14.2	5.5/13.6	5/12.5	4.4/10.8	3.8/9.5	3.4/8.5	3.1/7.6	2.7/6.6	2.3/5.3	2/4.5	1.7/3.9
	18	L/240 LL								1701	1278	984	774	620	504
		115%, TL	10,703	6869	5054	3994	3300	2568	1999	1596	1301	1078	907	772	641
		125%, TL	11,636	7469	5496	4344	3590	2794	2175	1737	1417	1175	988	796	641
		End/Int. B.	8.4/20.9	7.2/17.9	6.6/16.5	6.3/15.7	6.1/15.1	5.4/13.5	4.8/11.9	4.3/10.6	3.8/9.5	3.5/8.7	3.2/7.9	2.8/6.9	2.4/5.7

NOTES:

1. Values shown are the maximum uniform loads, in pounds per lineal foot (plf), that can be applied to the beam in addition to its own weight.
2. Selected beam shall satisfy both live (LL) and total (TL) loads. When no value is shown in the live load row, the total load governs the design.
3. Table is based on uniform loads and the most restrictive of simple or continuous spans, and dry-use conditions. Span is measured center to center of supports. The maximum uniform loads are based on a load duration factor, C_D, of 1.15 (snow load) or 1.25 (construction load).
4. Maximum deflection = L/240 under live load, and L/180 under total load. Other deflection limits may apply. For deflection limit of L/360 or L/480, use the appropriate value from the Allowable Uniform Floor Loads table. The resulting live load shall not exceed the total load shown.
5. Table values assume that lateral support is provided at each support and continuously along the compression edge of the beam.
6. Multiple pieces may be used when properly connected. For 3-ply 1-3/4 or 5-1/2-inch beams, the tabulated values are based on a net width of 5-1/4 inches. For 5-1/2-inch beams, the tabulated values may be increased by 5%.
7. Sufficient bearing length shall be provided at supports. Review bearing length requirements (shown in inches) to ensure adequacy.

ALLOWABLE
AXIAL LOADS (lbs)

ES12 ALLOWABLE AXIAL LOADS (lbs)

EFFECTIVE COLUMN LENGTH (ft)	LAMINATION NET WIDTH = 3-1/2 in.								
	NET DEPTH = 3-1/2 in.			NET DEPTH = 5-1/2 in.			NET DEPTH = 7 in.		
	LOAD DURATION FACTOR			LOAD DURATION FACTOR			LOAD DURATION FACTOR		
	1.00	1.15	1.25	1.00	1.15	1.25	1.00	1.15	1.25
6	9752	10,485	10,905	16,859	17,884	18,472	21,461	22,766	23,515
7	8311	8789	9060	13,988	14,664	15,052	17,807	18,668	19,162
8	7037	7364	7550	11,666	12,138	12,410	14,851	15,453	15,798
9	5980	6216	6350	9825	10,169	10,366	12,507	12,945	13,197
10	5120	5296	5397	8361	8620	8768	10,644	10,973	11,162
11	4421	4556	4633	7187	7386	7500	9149	9403	9548
12	3847	3953	4014	6233	6390	6480	7935	8135	8249
13	3374	3458	3507	5451	5577	5648	6939	7099	7191
14	2978	3047	3086	4802	4904	4962	6113	6243	6317
15	---	---	---	---	---	---	---	---	---
16	---	---	---	---	---	---	---	---	---

See notes on page 15.

ALLOWABLE BEARING LOADS (lbs)

SPECIES OR GRADE	BEARING AREA (in.^{2})					
	12.25	19.25	24.50	30.25	38.50	49.00
	3-1/2 in. x 3-1/2 in. =	3-1/2 in. x 5-1/2 in. =	3-1/2 in. x 7 in. =	5-1/2 in. x 5-1/2 in. =	3-1/2 in. x 7 in. =	7 in. x 7 in. =
D. Fir-L	7656	12,031	15,313	18,906	24,063	30,625
Hem-Fir	4961	7796	9923	12,251	15,593	19,845
S-P-F	5206	8181	10,413	12,856	16,363	20,825
S. Pine	6921	10,876	13,843	17,091	21,753	27,685
ES11	5513	8663	11,025	13,613	17,325	22,050
24F-1.9E	7350	11,550	14,700	18,150	23,100	29,400

NOTES:

1. The tabulated allowable bearing loads are based on the compression perpendicular to grain capacity of the supporting material.
2. The allowable bearing loads shall not be increased by any load duration factor.

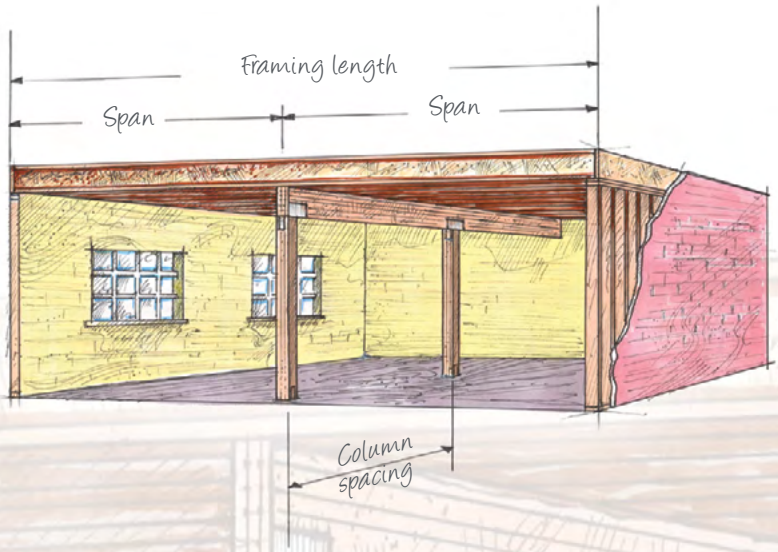
ES12 ALLOWABLE AXIAL LOADS (lbs) (continued)

EFFECTIVE COLUMN LENGTH (ft)	LAMINATION NET WIDTH = 5-1/2 in.						LAMINATION NET WIDTH = 7 in.		
	NET DEPTH = 5-1/2 in.			NET DEPTH = 7 in.			NET DEPTH = 7 in.		
	LOAD DURATION FACTOR			LOAD DURATION FACTOR			LOAD DURATION FACTOR		
	1.00	1.15	1.25	1.00	1.15	1.25	1.00	1.15	1.25
6	35,289	39,220	41,663	46,624	51,800	55,010	62,256	70,155	75,221
7	32,747	35,617	37,507	42,859	46,969	49,433	59,246	66,233	70,635
8	29,464	31,864	33,267	38,818	41,927	43,737	55,884	61,889	65,587
9	26,435	28,237	29,280	34,747	37,060	38,392	52,239	57,239	60,239
10	23,577	24,951	25,745	30,916	32,666	33,672	48,408	52,455	54,830
11	21,006	22,080	22,699	27,483	28,841	29,622	44,527	47,760	49,633
12	18,752	19,608	20,101	24,483	25,561	26,181	40,756	43,349	44,846
13	16,793	17,487	17,887	21,886	22,757	23,258	37,223	39,330	40,546
14	15,095	15,667	15,995	19,642	20,357	20,768	33,991	35,730	36,733
15	13,623	14,098	14,371	17,701	18,295	18,636	31,077	32,530	33,368
16	12,341	12,741	12,971	16,015	16,515	16,801	28,465	29,693	30,401
17	11,221	11,561	11,755	14,546	14,969	15,212	26,131	27,178	27,781
18	10,238	10,529	10,696	13,259	13,621	13,829	24,044	24,945	25,463
19	9372	9623	9767	12,127	12,439	12,618	22,177	22,958	23,406
20	8606	8824	8948	11,127	11,398	11,552	20,503	21,184	21,574
21	7925	8115	8224	10,239	10,476	10,611	18,999	19,596	19,938
22	7317	7484	7579	9448	9656	9774	17,644	18,170	18,471
23	---	---	---	---	---	---	16,419	16,886	17,152
24	---	---	---	---	---	---	15,310	15,725	15,962

NOTES:

1. Values shown are the maximum axial loads, in pounds (lbs), that can be applied to the column in addition to its own weight.
2. The tabulated allowable loads are based on simply axially loaded columns subjected to a maximum eccentricity of either 1/6 column width or 1/6 column depth, whichever is worse. For side loads, other eccentric end loads, or other combined axial and flexural loads, see NDS 2012.
3. The values are based on a load duration factor, C_D, of 1.00 (floor load), 1.15 (snow load) or 1.25 (construction load), and dry service conditions.
4. The column is assumed to be unbraced, except at the column ends, and the effective column length is equal to the actual column length.
5. These values are for preliminary design use only. Final design should include a complete analysis, including bearing capacity of the foundation supporting the column. When the column is used in a wall system, review bearing capacity requirements on page 2 to ensure adequacy.

FLOOR BEAMS



FLOOR BEAMS tables show the size of the beams needed to support various floor systems. The tables are valid for loads on one floor only, i.e., a second story floor or a story floor over a basement. Verify that floor loading of 40 psf live load and 10 psf dead load is appropriate.

Find the length of supported floor framing *(framing length)*. If floor joists are simple span, then the framing length may be taken as 80% of the sum of spans of the floor joists. When floor joists span continuously over the beam, these tables require that both spans are equal on either side of the beam.

For floor beam applications not conforming to these conditions, use a design software or contact Nordic Technical Services.

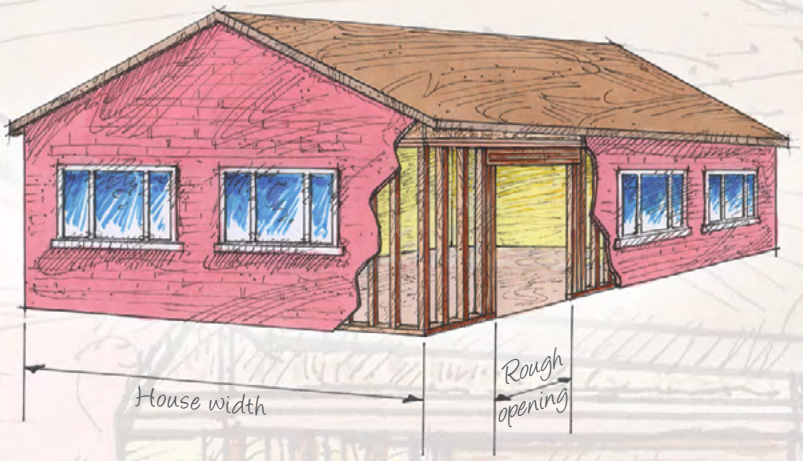
24F-1.9E BEAMS

FRAMING LENGTH (ft)	COLUMN SPACING - CENTER TO CENTER (ft)								
	6	8	10	12	14	16	18	20	22
24	3-1/2 x 9-1/2 5-1/2 x 9-1/2 7 x 9-1/2	3-1/2 x 9-1/2 5-1/2 x 9-1/2 7 x 9-1/2	3-1/2 x 9-1/2 5-1/2 x 9-1/2 7 x 9-1/2	3-1/2 x 11-7/8 5-1/2 x 11-7/8 7 x 9-1/2	3-1/2 x 14 5-1/2 x 11-7/8 7 x 11-7/8	3-1/2 x 16 5-1/2 x 14 7 x 11-7/8	3-1/2 x 16 5-1/2 x 14 7 x 14	3-1/2 x 18 5-1/2 x 16 7 x 14	--- 5-1/2 x 18 7 x 16
28	3-1/2 x 9-1/2 5-1/2 x 9-1/2 7 x 9-1/2	3-1/2 x 9-1/2 5-1/2 x 9-1/2 7 x 9-1/2	3-1/2 x 11-7/8 5-1/2 x 9-1/2 7 x 9-1/2	3-1/2 x 11-7/8 5-1/2 x 11-7/8 7 x 9-1/2	3-1/2 x 14 5-1/2 x 11-7/8 7 x 11-7/8	3-1/2 x 16 5-1/2 x 14 7 x 11-7/8	3-1/2 x 18 5-1/2 x 16 7 x 14	--- 5-1/2 x 16 7 x 16	--- 5-1/2 x 18 7 x 16
32	3-1/2 x 9-1/2 5-1/2 x 9-1/2 7 x 9-1/2	3-1/2 x 9-1/2 5-1/2 x 9-1/2 7 x 9-1/2	3-1/2 x 11-7/8 5-1/2 x 9-1/2 7 x 9-1/2	3-1/2 x 14 5-1/2 x 11-7/8 7 x 9-1/2	3-1/2 x 16 5-1/2 x 11-7/8 7 x 11-7/8	3-1/2 x 16 5-1/2 x 14 7 x 14	3-1/2 x 18 5-1/2 x 16 7 x 14	--- 5-1/2 x 18 7 x 16	--- 5-1/2 x 18 7 x 18
36	3-1/2 x 9-1/2 5-1/2 x 9-1/2 7 x 9-1/2	3-1/2 x 9-1/2 5-1/2 x 9-1/2 7 x 9-1/2	3-1/2 x 11-7/8 5-1/2 x 9-1/2 7 x 9-1/2	3-1/2 x 14 5-1/2 x 11-7/8 7 x 11-7/8	3-1/2 x 16 5-1/2 x 14 7 x 11-7/8	3-1/2 x 18 5-1/2 x 14 7 x 14	--- 5-1/2 x 16 7 x 14	--- 5-1/2 x 18 7 x 16	--- --- 7 x 18
40	3-1/2 x 9-1/2 5-1/2 x 9-1/2 7 x 9-1/2	3-1/2 x 9-1/2 5-1/2 x 9-1/2 7 x 9-1/2	3-1/2 x 11-7/8 5-1/2 x 9-1/2 7 x 9-1/2	3-1/2 x 14 5-1/2 x 11-7/8 7 x 11-7/8	3-1/2 x 16 5-1/2 x 14 7 x 11-7/8	--- 5-1/2 x 14 7 x 14	--- 5-1/2 x 16 7 x 16	--- 5-1/2 x 18 7 x 16	--- --- 7 x 18

NOTES:

1. Table is based on continuous floor joist with equal spans, and the most restrictive of simple or continuous beam with equal spans. If floor joists are not continuous, it is permissible to consider a total floor joist span that is equal to 0.8 times the total of both spans.
2. Table is based on residential floor loading of 40 psf live load and 10 psf dead load, and dry-use conditions. A live load reduction factor has been applied in accordance with IBC 2012, Section 1607.9.1. Roof framing must be supported by exterior walls only.
3. Maximum deflection = L/360 under live load, and L/240 under total load. Other deflection limits may apply.
4. Table values assume that lateral support is provided at each support and continuously along the top edge of the beam.
5. Multiple pieces may be used when properly connected. For 3-ply 1-3/4-inch beams, use the beam sizes for 5-1/2-inch width.
6. Minimum bearing length shall be 3 inches for the end bearings, and 7 inches for the intermediate bearings, except in shaded areas. In those cases, 4-1/2 and 10-1/2 inches are required for end and intermediate bearings, respectively. Bearing lengths are based on Nordic Lam's bearing stress for applicable grade. Bearing lengths may need to be increased if support member's allowable bearing stress is less.
7. For other loading conditions refer to allowable uniform load tables or use a design software.

1-STORY HEADERS



1-STORY HEADERS tables indicate the appropriate size header for various roof truss spans with 2-foot overhang. If the overhang is greater than 2 feet, additional engineering analysis is required.

Determine the roof loading and go to the appropriate section of the table. Find the width of the building that meets or exceeds that of the roof trusses. Locate the rough opening size that meets or exceeds the door or window rough opening size. Select the header size shown in the appropriate case.

For one-story header applications not conforming to these conditions, use a design software or contact Nordic Technical Services.

24F-1.9E HEADERS

HOUSE WIDTH (ft)	ROOF SNOW LOADS / ROUGH OPENINGS								
	30 psf LL + 15 psf DL			40 psf LL + 15 psf DL			50 psf LL + 15 psf DL		
	6'-0"	9'-0"	12'-0"	6'-0"	9'-0"	12'-0"	6'-0"	9'-0"	12'-0"
24	3-1/2 x 9-1/2 5-1/2 x 9-1/2	3-1/2 x 9-1/2 5-1/2 x 9-1/2	3-1/2 x 14 5-1/2 x 11-7/8	3-1/2 x 9-1/2 5-1/2 x 9-1/2	3-1/2 x 9-1/2 5-1/2 x 9-1/2	3-1/2 x 14 5-1/2 x 11-7/8	3-1/2 x 9-1/2 5-1/2 x 9-1/2	3-1/2 x 11-7/8 5-1/2 x 9-1/2	3-1/2 x 16 5-1/2 x 14
28	3-1/2 x 9-1/2 5-1/2 x 9-1/2	3-1/2 x 9-1/2 5-1/2 x 9-1/2	3-1/2 x 14 5-1/2 x 11-7/8	3-1/2 x 9-1/2 5-1/2 x 9-1/2	3-1/2 x 11-7/8 5-1/2 x 9-1/2	3-1/2 x 16 5-1/2 x 14	3-1/2 x 9-1/2 5-1/2 x 9-1/2	3-1/2 x 11-7/8 5-1/2 x 9-1/2	3-1/2 x 16 5-1/2 x 14
32	3-1/2 x 9-1/2 5-1/2 x 9-1/2	3-1/2 x 9-1/2 5-1/2 x 9-1/2	3-1/2 x 14 5-1/2 x 14	3-1/2 x 9-1/2 5-1/2 x 9-1/2	3-1/2 x 11-7/8 5-1/2 x 9-1/2	3-1/2 x 16 5-1/2 x 14	3-1/2 x 9-1/2 5-1/2 x 9-1/2	3-1/2 x 11-7/8 5-1/2 x 9-1/2	3-1/2 x 16 5-1/2 x 14
36	3-1/2 x 9-1/2 5-1/2 x 9-1/2	3-1/2 x 11-7/8 5-1/2 x 9-1/2	3-1/2 x 16 5-1/2 x 14	3-1/2 x 9-1/2 5-1/2 x 9-1/2	3-1/2 x 11-7/8 5-1/2 x 9-1/2	3-1/2 x 16 5-1/2 x 14	3-1/2 x 9-1/2 5-1/2 x 9-1/2	3-1/2 x 11-7/8 5-1/2 x 11-7/8	3-1/2 x 18 5-1/2 x 14
40	3-1/2 x 9-1/2 5-1/2 x 9-1/2	3-1/2 x 11-7/8 5-1/2 x 9-1/2	3-1/2 x 16 5-1/2 x 14	3-1/2 x 9-1/2 5-1/2 x 9-1/2	3-1/2 x 11-7/8 5-1/2 x 9-1/2	3-1/2 x 16 5-1/2 x 14	3-1/2 x 9-1/2 5-1/2 x 9-1/2	3-1/2 x 11-7/8 5-1/2 x 11-7/8	--- 5-1/2 x 16

NOTES:

1. Table is based on roof snow loads only. The header is assumed to carry 1/2 the span of the roof framing plus a 24-inch overhang.
2. Table is based on roof snow loads (as indicated) and 15 psf dead load, and dry-use conditions.
3. Maximum deflection = L/240 under live load, and the lesser of L/180 or 5/16 inch under total load. Other deflection limits may apply.
4. Table values assume that lateral support is provided at each support and continuously along the top edge of the beam.
5. Multiple pieces may be used when properly connected. For 3-ply 1-3/4-inch beams, use the beam sizes for 5-1/2-inch width.
6. Minimum bearing length shall be 3 inches for the end bearings, except in shaded areas. In those cases, 4-1/2 inches is required. Bearing across the full width of header is required. Bearing length is based on Nordic Lam's bearing stress for applicable grade. Bearing lengths may need to be increased if support member's allowable bearing stress is less.
7. For other loading conditions refer to allowable uniform load tables or use a design software.

2-STORY HEADERS

2-STORY HEADERS tables consider the combined loads from various roof truss spans with a 2-foot overhang, a wall, and a second story floor (1/4 of total floor joist length). An intermediate floor beam is assumed at mid-span. If the overhang exceeds 2 feet, additional engineering analysis is required.

Verify that floor loading of 40 psf live load and 10 psf dead load is appropriate. Determine the roof loading and go to the appropriate section of the table. Find the width of the building that meets or exceeds that of the roof trusses. Locate the rough opening size that meets or exceeds the door or window rough opening size. Select the header size shown in the appropriate case.

For two-story header applications not conforming to these conditions, use a design software or contact Nordic Technical Services.

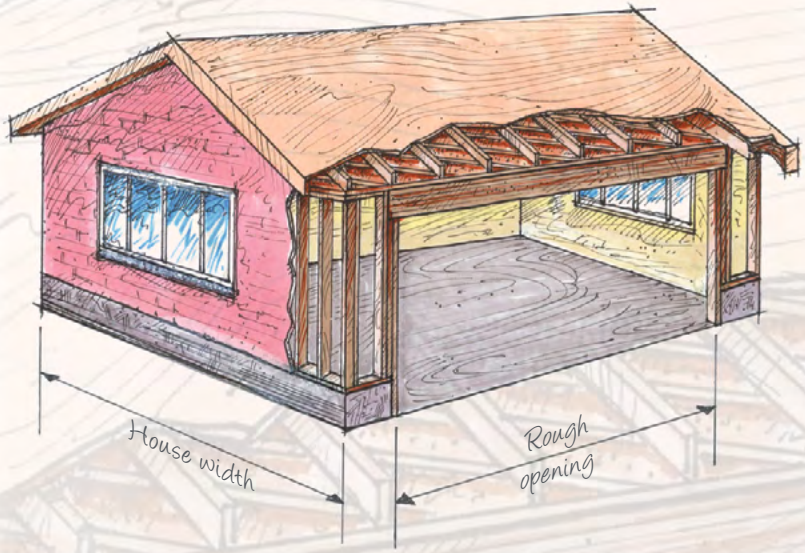
24F-1.9E HEADERS

HOUSE WIDTH (ft)	ROOF SNOW LOADS / ROUGH OPENINGS								
	30 psf LL + 15 psf DL			40 psf LL + 15 psf DL			50 psf LL + 15 psf DL		
	6'-0"	9'-0"	12'-0"	6'-0"	9'-0"	12'-0"	6'-0"	9'-0"	12'-0"
24	3-1/2 x 9-1/2	3-1/2 x 11-7/8	3-1/2 x 16	3-1/2 x 9-1/2	3-1/2 x 11-7/8	3-1/2 x 16	3-1/2 x 9-1/2	3-1/2 x 11-7/8	3-1/2 x 18
	5-1/2 x 9-1/2	5-1/2 x 9-1/2	5-1/2 x 14	5-1/2 x 9-1/2	5-1/2 x 9-1/2	5-1/2 x 14	5-1/2 x 9-1/2	5-1/2 x 11-7/8	5-1/2 x 14
28	3-1/2 x 9-1/2	3-1/2 x 11-7/8	3-1/2 x 16	3-1/2 x 9-1/2	3-1/2 x 11-7/8	3-1/2 x 18	3-1/2 x 9-1/2	3-1/2 x 11-7/8	---
	5-1/2 x 9-1/2	5-1/2 x 9-1/2	5-1/2 x 14	5-1/2 x 9-1/2	5-1/2 x 11-7/8	5-1/2 x 14	5-1/2 x 9-1/2	5-1/2 x 11-7/8	5-1/2 x 16
32	3-1/2 x 9-1/2	3-1/2 x 11-7/8	3-1/2 x 18	3-1/2 x 9-1/2	3-1/2 x 11-7/8	---	3-1/2 x 9-1/2	3-1/2 x 14	---
	5-1/2 x 9-1/2	5-1/2 x 11-7/8	5-1/2 x 14	5-1/2 x 9-1/2	5-1/2 x 11-7/8	5-1/2 x 16	5-1/2 x 9-1/2	5-1/2 x 11-7/8	5-1/2 x 16
36	3-1/2 x 9-1/2	3-1/2 x 11-7/8	---	3-1/2 x 9-1/2	3-1/2 x 11-7/8	---	3-1/2 x 9-1/2	3-1/2 x 14	---
	5-1/2 x 9-1/2	5-1/2 x 11-7/8	5-1/2 x 16	5-1/2 x 9-1/2	5-1/2 x 11-7/8	5-1/2 x 16	5-1/2 x 9-1/2	5-1/2 x 11-7/8	5-1/2 x 16
40	3-1/2 x 9-1/2	3-1/2 x 11-7/8	---	3-1/2 x 9-1/2	3-1/2 x 14	---	3-1/2 x 9-1/2	---	---
	5-1/2 x 9-1/2	5-1/2 x 11-7/8	5-1/2 x 16	5-1/2 x 9-1/2	5-1/2 x 11-7/8	5-1/2 x 16	5-1/2 x 9-1/2	5-1/2 x 11-7/8	5-1/2 x 18

NOTES:

1. Table is based on floor and roof snow loads only. The header is assumed to carry 1/2 the span of the roof framing plus a 24-inch overhang, a wall, and a second story floor (1/4 of the total floor joist length).
2. Table is based on roof snow load (as indicated) and 15 psf dead load, residential floor loading of 40 psf live load and 10 psf dead load, and dry-use conditions. A live load reduction factor has been applied in accordance with IBC 2012, Section 1607.9.1. Roof framing must be trusses supported at exterior walls only.
3. Maximum deflection = L/360 under live load, and the lesser of L/240 or 5/16 inch under total load. Other deflection limits may apply.
4. Table values assume that lateral support is provided at each support and continuously along the top edge of the beam.
5. Multiple pieces may be used when properly connected. For 3-ply 1-3/4-inch beams, use the beam sizes for 5-1/2-inch width.
6. Minimum bearing length shall be 3 inches for the end bearings, except in shaded areas. In those cases, 4-1/2 inches is required. Bearing across the full width of header is required. Bearing length is based on Nordic Lam's bearing stress for applicable grade. Bearing lengths may need to be increased if support member's allowable bearing stress is less.
7. For other loading conditions refer to allowable uniform load tables or use a design software.

GARAGE DOOR HEADERS



GARAGE DOOR HEADERS tables indicate the appropriate size header for various roof truss spans with 2-foot overhang. If the overhang is greater than 2 feet, additional engineering analysis is required.

Determine the roof loading and go to the appropriate section of the table. Find the width of the building that meets or exceeds that of the roof trusses. Locate the rough opening size that meets or exceeds the garage door rough opening size. Select the header size shown in the appropriate case.

For garage door header applications not conforming to these conditions, use a design software or contact Nordic Technical Services.

24F-1.9E HEADERS

HOUSE WIDTH (ft)	ROOF SNOW LOADS / ROUGH OPENINGS								
	30 psf LL + 15 psf DL			40 psf LL + 15 psf DL			50 psf LL + 15 psf DL		
	6'-0"	9'-0"	12'-0"	6'-0"	9'-0"	12'-0"	6'-0"	9'-0"	12'-0"
24	3-1/2 x 9-1/2	3-1/2 x 14	3-1/2 x 16	3-1/2 x 9-1/2	3-1/2 x 16	3-1/2 x 18	3-1/2 x 9-1/2	3-1/2 x 16	3-1/2 x 18
	5-1/2 x 9-1/2	5-1/2 x 11-7/8	5-1/2 x 14	5-1/2 x 9-1/2	5-1/2 x 11-7/8	5-1/2 x 14	5-1/2 x 9-1/2	5-1/2 x 14	5-1/2 x 16
28	3-1/2 x 9-1/2	3-1/2 x 14	3-1/2 x 16	3-1/2 x 9-1/2	3-1/2 x 16	3-1/2 x 18	3-1/2 x 9-1/2	---	---
	5-1/2 x 9-1/2	5-1/2 x 11-7/8	5-1/2 x 14	5-1/2 x 9-1/2	5-1/2 x 14	5-1/2 x 14	5-1/2 x 9-1/2	5-1/2 x 14	5-1/2 x 16
32	3-1/2 x 9-1/2	3-1/2 x 16	3-1/2 x 18	3-1/2 x 9-1/2	3-1/2 x 18	---	3-1/2 x 11-7/8	---	---
	5-1/2 x 9-1/2	5-1/2 x 11-7/8	5-1/2 x 14	5-1/2 x 9-1/2	5-1/2 x 14	5-1/2 x 16	5-1/2 x 9-1/2	5-1/2 x 16	5-1/2 x 18
36	3-1/2 x 9-1/2	3-1/2 x 16	3-1/2 x 18	3-1/2 x 11-7/8	---	---	3-1/2 x 11-7/8	---	---
	5-1/2 x 9-1/2	5-1/2 x 14	5-1/2 x 16	5-1/2 x 9-1/2	5-1/2 x 14	5-1/2 x 16	5-1/2 x 9-1/2	5-1/2 x 16	5-1/2 x 18
40	3-1/2 x 9-1/2	3-1/2 x 18	---	3-1/2 x 11-7/8	---	---	3-1/2 x 11-7/8	---	---
	5-1/2 x 9-1/2	5-1/2 x 14	5-1/2 x 16	5-1/2 x 9-1/2	5-1/2 x 16	5-1/2 x 18	5-1/2 x 9-1/2	5-1/2 x 16	---

NOTES:

1. Table is based on roof snow loads only. The header is assumed to carry 1/2 the span of the roof framing plus a 24-inch overhang.
2. Table is based on roof snow loads (as indicated) and 15 psf dead load, and dry-use conditions.
3. Maximum deflection = L/240 under live load, and L/180 under total load. Other deflection limits may apply.
4. Table values assume that lateral support is provided at each support and continuously along the top edge of the beam.
5. Multiple pieces may be used when properly connected. For 3-ply 1-3/4-inch beams, use the beam sizes for 5-1/2-inch width.
6. Minimum bearing length shall be 3 inches for the end bearings, except in shaded areas. In those cases, 4-1/2 inches is required. Bearing across the full width of header is required. Bearing length is based on Nordic Lam's bearing stress for applicable grade. Bearing lengths may need to be increased if support member's allowable bearing stress is less.
7. For other loading conditions refer to allowable uniform load tables or use a design software.

FLOOR
FRAMING DETAILS

Concealed or Exposed

Glulam floor beams can be installed within the floor joist cavity if a concealed application is desired. Many stocking distributors inventory glulam in I-joist-compatible depths (IJC) for use with I-joist framing systems but most standard-depth stock beams can easily be used in a concealed floor application with minimal furring. They can also be partially concealed in the floor joist cavity or left completely exposed below the floor framing, adding increased aesthetic value to the room below.

Details 3a through 3o illustrate a variety of simple floor-framing details incorporating glulam beams.

Glulam Columns

When a design calls for a column, glulam is an excellent option. Nordic Lam columns are available in standard widths of 3-1/2", 5-1/2" and 7", and can be ordered in larger dimensions.

FIGURE 3
FLOOR FRAMING DETAILS

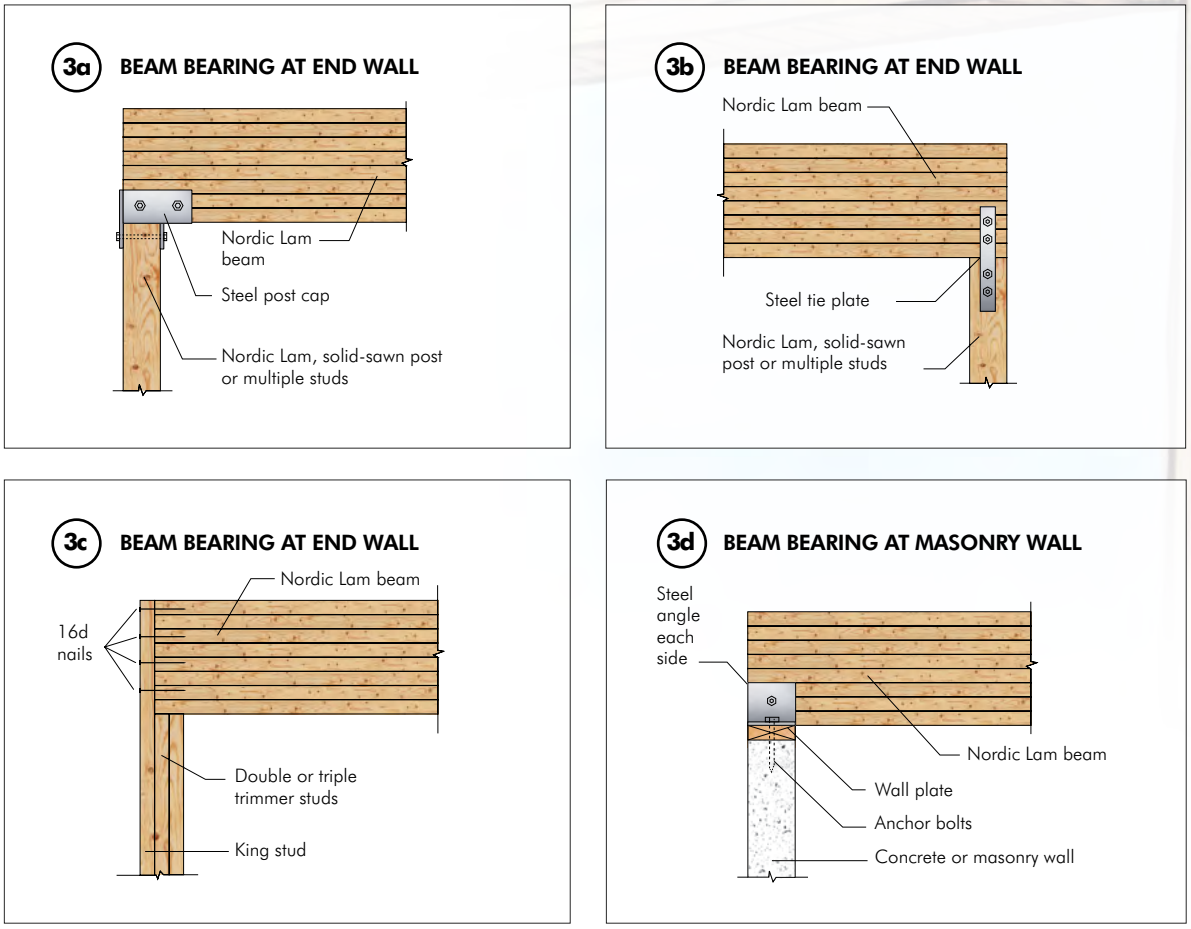
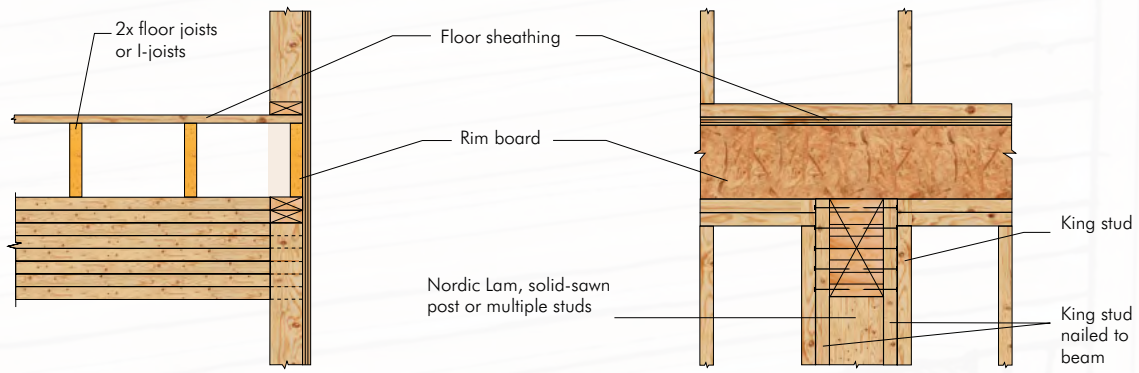
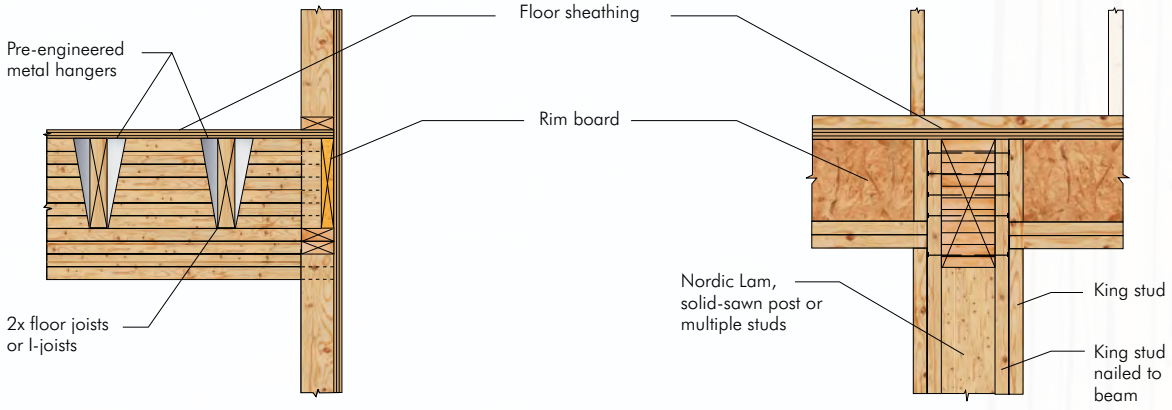


FIGURE 3 (continued)

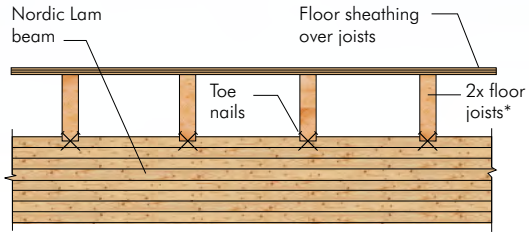
3e BEAM SUPPORT AT END WALL WITH FLOOR JOISTS OVER BEAM



3f BEAM SUPPORT AT END WALL WITH FLOOR JOISTS FLUSH WITH BEAM

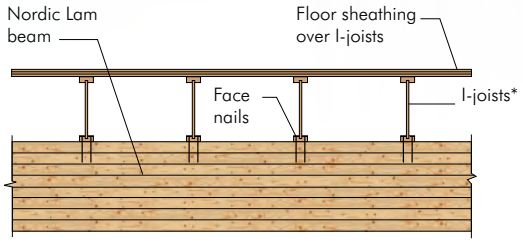


3g LUMBER JOISTS BEARING ON FLOOR BEAM



*Blocking between joists not shown for clarity

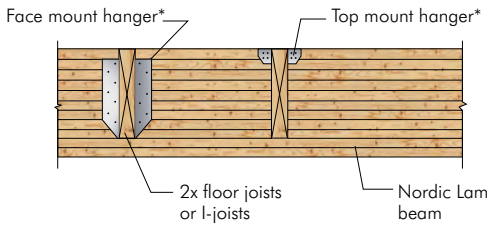
3h I-JOISTS BEARING ON FLOOR BEAM



*Blocking between joists not shown for clarity

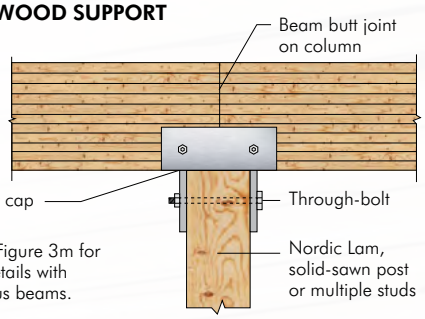
FIGURE 3 (continued)

3j JOIST MOUNTED FLUSH WITH FLOOR BEAM



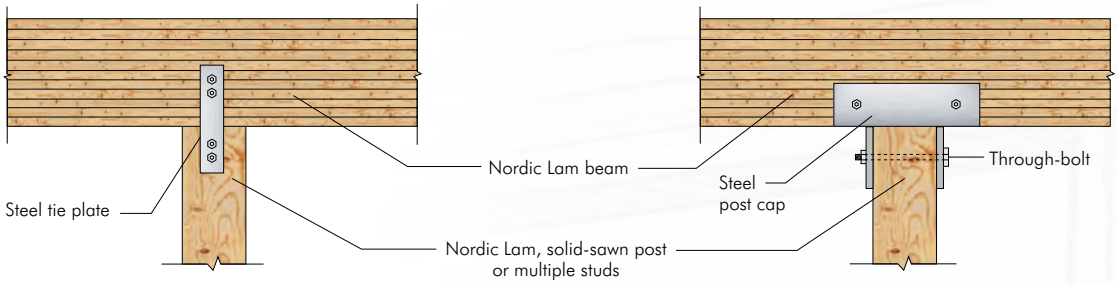
*Hangers installed per the manufacturer's recommendation; the use of mixed hanger types is for illustration purpose only.

3k BEAM BUTTING OVER INTERMEDIATE WOOD SUPPORT

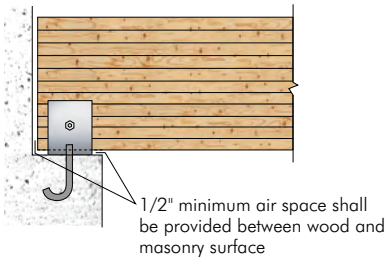


Also see Figure 3m for similar details with continuous beams.

3m CONTINUOUS FLOOR BEAM OVER INTERMEDIATE WOOD SUPPORTS



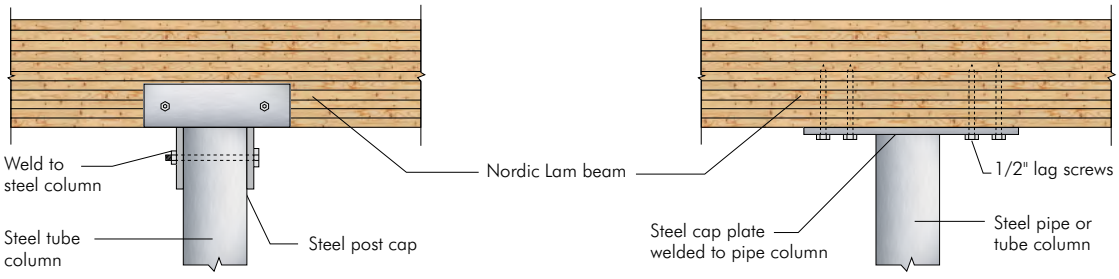
3n BEAM SITTING IN CONCRETE OR MASONRY WALL POCKET



NOTES:

1. PROVIDE ADEQUATE BEARING LENGTH AND BEARING ACROSS THE FULL WIDTH TO SUPPORT GLULAM BEAM. SEE BEARING LENGTH REQUIREMENTS ON PAGE 28, AND CONSULT LOCAL BUILDING CODE FOR SPECIFIC REQUIREMENTS.
2. HEAVY CONCENTRATED LOADS SUCH AS HEATING/ COOLING UNITS, CRANE RAILS OR MAIN FRAMING MEMBERS SUSPENDED FROM THE BOTTOM OF BEAMS INDUCE TENSION PERPENDICULAR-TO-GRAIN AND MAY CAUSE SPLITTING. EXCEPT FOR LIGHT LOADS SUCH AS HUNG CEILINGS (INCL. 2X– FRAMING), SPRINKLER SYSTEMS, LIGHTING APPLIANCES, ETC., ALWAYS SUSPEND CONCENTRATED LOADS FROM THE BEAM TOP, UNLESS DESIGNED OTHERWISE BY A QUALIFIED ENGINEER.

3o CONTINUOUS BEAM OVER INTERMEDIATE STEEL COLUMN

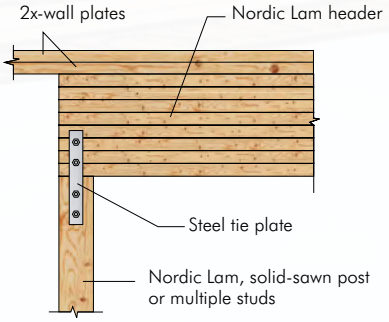


GARAGE DOOR
FRAMING DETAILS

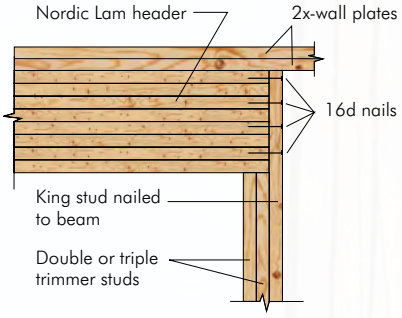
Nordic trademarked glulam beams are supplied with zero camber which makes it easy to connect glulam with other wood frame components. Details 4a to 4e illustrate some of the many simple connection details that can be used with glulam in residential garage door framing.

FIGURE 4
GARAGE DOOR HEADER FRAMING DETAILS

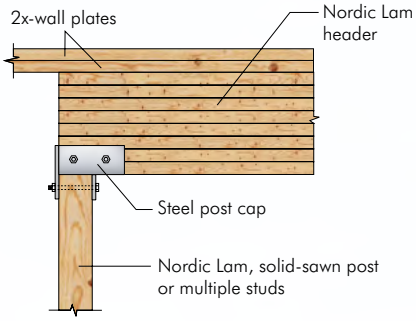
4a GARAGE DOOR HEADER TO END WALL



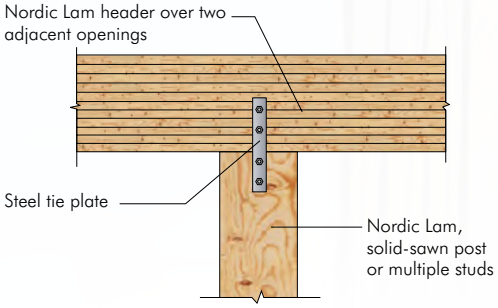
4b GARAGE DOOR HEADER TO END WALL



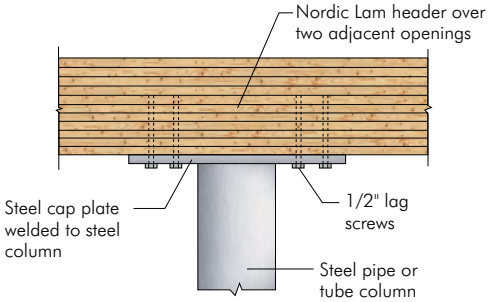
4c GARAGE DOOR HEADER TO END WALL



4d GARAGE DOOR HEADER OVER INTERMEDIATE SUPPORT



4e GARAGE DOOR HEADER OVER INTERMEDIATE SUPPORT

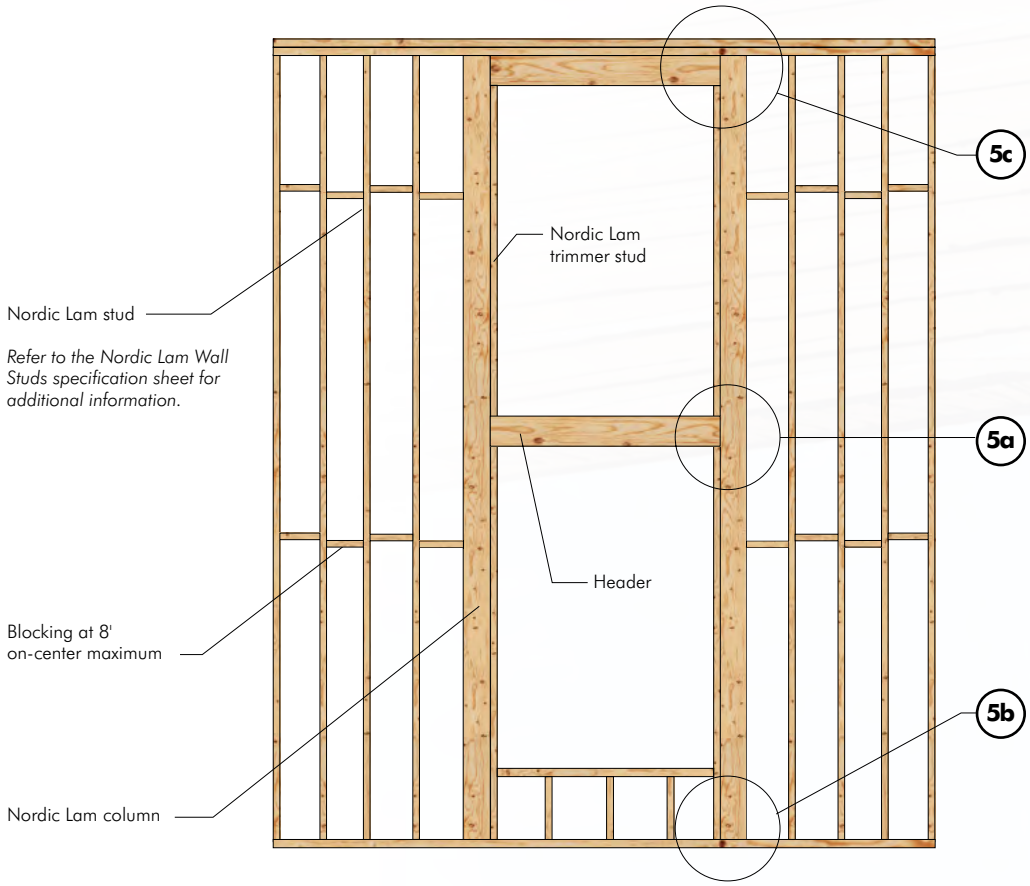


NOTES:

1. PROVIDE ADEQUATE BEARING LENGTH AND BEARING ACROSS THE FULL WIDTH TO SUPPORT GLULAM BEAM. SEE BEARING LENGTH REQUIREMENTS ON PAGE 28, AND CONSULT LOCAL BUILDING CODE FOR SPECIFIC REQUIREMENTS.
2. HEAVY CONCENTRATED LOADS SUCH AS HEATING/ COOLING UNITS, CRANE RAILS OR MAIN FRAMING MEMBERS SUSPENDED FROM THE BOTTOM OF BEAMS INDUCE TENSION PERPENDICULAR-TO-GRAIN AND MAY CAUSE SPLITTING. EXCEPT FOR LIGHT LOADS SUCH AS HUNG CEILINGS (INCL. 2X– FRAMING), SPRINKLER SYSTEMS, LIGHTING APPLIANCES, ETC., ALWAYS SUSPEND CONCENTRATED LOADS FROM THE BEAM TOP, UNLESS DESIGNED OTHERWISE BY A QUALIFIED ENGINEER.

COLUMN
FRAMING DETAILS

FIGURE 5
COLUMN FRAMING DETAILS



All additional blocking, trimmers, plates, etc. not specified should be the same as the typical stud material.

5a HEADER TO COLUMN

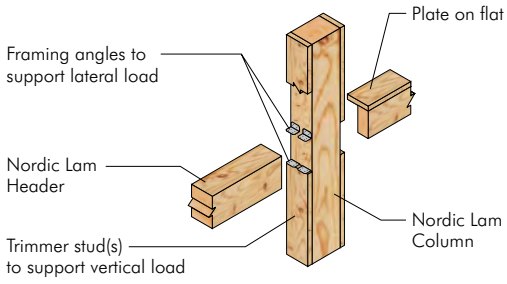


Plate width must equal wall thickness to provide lateral bracing. (Plate not required if header width equals the wall thickness.)

5b COLUMN TO BOTTOM PLATE

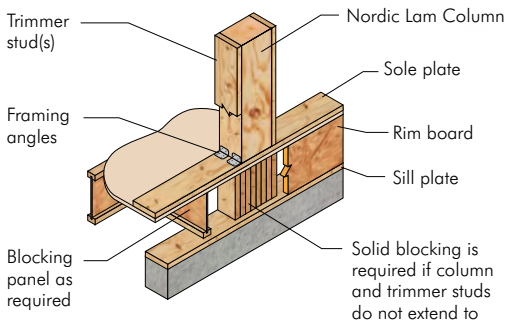
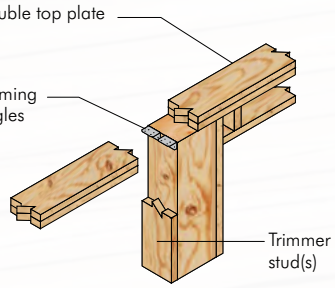
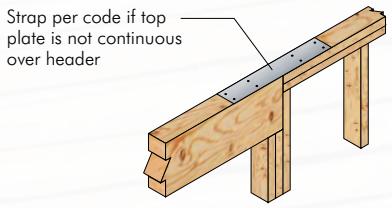


FIGURE 5 (continued)

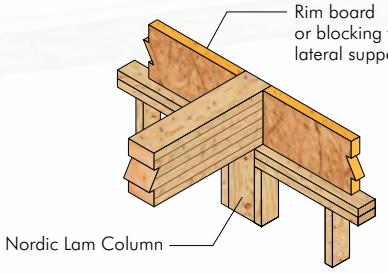
5c COLUMN TO TOP PLATE



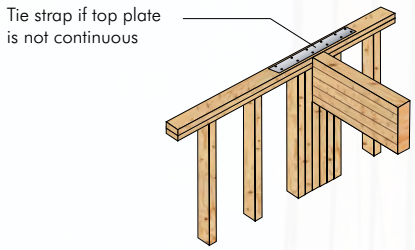
5d BEARING FOR DOOR OR WINDOW HEADER



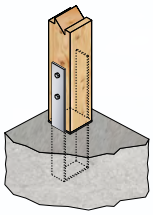
5e BEARING AT WALL



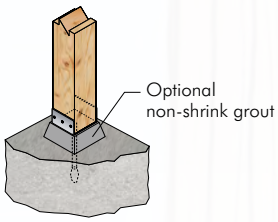
5f BEAM TO FRAME



5g COLUMN BASE

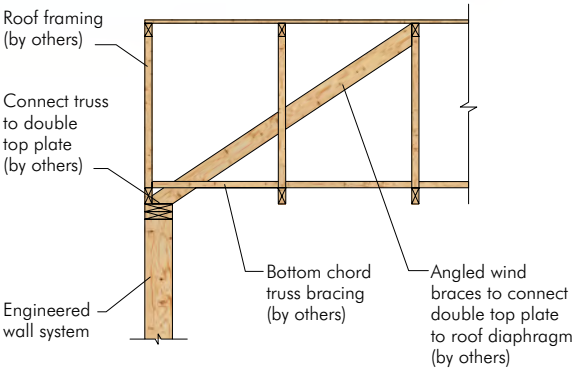


5h ELEVATED COLUMN BASE

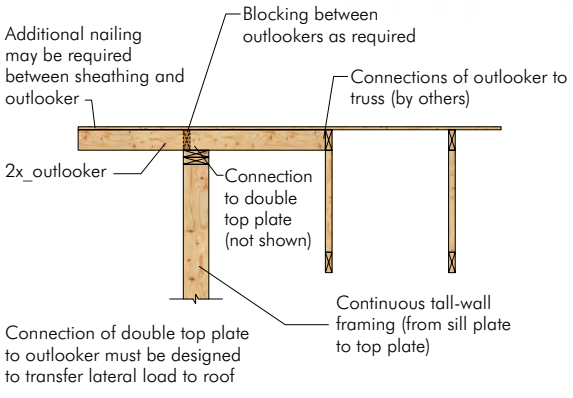


5j WIND BRACE

Wall bracing is necessary if double top plate is not attached directly to the roof/floor diaphragm.



5k ROOF OUTLOOKER



HOLES
IN GLULAM BEAMS

HORIZONTAL HOLES

Horizontal holes in glued laminated timbers are limited in size and location to maintain the structural integrity of the beam. Figure 6 shows the zones of a uniformly loaded, simply supported beam where the field drilling of holes may be considered. These non-critical zones are located in portions of the beam stressed to less than 50 percent of design bending stress and less than 50 percent of design shear stress. For beams of more complex loading or other than simple spans, similar diagrams may be developed.

Field-drilled horizontal holes should be used for access only and should not be used as attachment points for brackets or other load bearing hardware unless specifically designed as such by the engineer or designer of record.

These field drilled horizontal holes should meet the following guidelines:

1. **Hole size:** The hole diameter should not exceed 1-1/2 inches or 1/10 the beam depth, whichever is smaller.
2. **Hole location:** The hole should have a minimum clear distance, as measured from the edge of the hole to the nearest edge of the beam, of 4 hole diameters to the top or bottom face of the beam and 8 hole diameters from the end of the beam. Note that the horizontal hole should not be drilled in the moment-critical zone, as defined in Figure 4, unless approved by an engineer or architect qualified in engineered timber design.
3. **Hole spacing:** The minimum clear spacing between adjacent holes, as measured between the nearest edge of the holes, should be 8 hole diameters based on the largest diameter of any adjacent hole in the beam.
4. **Number of holes:** The maximum number of holes should not exceed 1 hole per 5 feet of beam length. In other words, the maximum number of holes should not exceed 4 for a 20-foot-long beam. The hole spacing limitation, as given above, should be satisfied separately.

For glulam members that have been oversized or glulam joists, the guidelines given above may be relaxed based on an engineering analysis. Regardless of the hole location, holes drilled horizontally through a member should be positioned and sized with the understanding that the beam will deflect over a period of time under in-service loading conditions. This deflection could cause distress to supported equipment or piping unless properly considered.

VERTICAL HOLES

Whenever possible, avoid drilling vertical holes through glulam beams. As a rule of thumb, vertical holes drilled through the depth of a glulam beam cause a reduction in the capacity at that location directly proportional to the ratio of 1-1/2 times the diameter of the hole to the width of the beam. For example, a 1-inch hole drilled in a 6-inch-wide beam would reduce the capacity of the beam at that section by approximately (1 x 1-1/2) / 6 = 25%. For this reason, when it is necessary to drill vertical holes through a glulam member, the holes should be positioned in areas of the member that are stressed to less than 50 percent of design in bending. In a simply supported, uniformly loaded beam, this area would be located from the end of the beam inward approximately 1/8 of the beam span. In all cases, the minimum clear edge distance, as measured from either side of the member to the nearest edge of the vertical hole, should be 2-1/2 times the hole diameter. Use a drill guide to minimize “wandering” of the bit as it passes through knots or material of varying density, and to ensure a true alignment of the hole through the depth of the beam.

HOLES FOR SUPPORT OF SUSPENDED EQUIPMENT

Heavy equipment or piping suspended from glulam beams should be attached such that load is applied to the top of the members to avoid introducing tension perpendicular-to-grain stresses. Any horizontal holes required for support of significant weight, such as suspended heating and cooling units or main water lines, must be located above the neutral axis of the member and in a zone stressed to less than 50 percent of the design flexural stress (see Figure 6). Fasteners supporting light loads such as light fixtures must be placed at least four laminations or 25 percent of beam depth, whichever is greater, away from the tension face of the member. The design capacity of the beam should be checked for all such loads to ensure proper performance.

PROTECTION OF FIELD-CUT NOTCHES AND HOLES

Frequently, glulam beams are provided with the ends sealed by a protective coating. This sealer is applied to the end grain of the glulam beams to retard the migration of moisture in and out of the beam ends during transit and jobsite storage. Field cutting a notch in the end of a beam can change the moisture absorption characteristics of the beam at the notch location. This can result in seasoning checks or even localized splitting developing at the root of the notch. To minimize this possibility, all notches should be sealed immediately after cutting using a water-repellent sealer. Sealing other field-cut locations as well as field-drilled holes is also recommended. These sealers can be applied with a brush, swab, roller or spray gun.

FIGURE 6
ALLOWABLE HOLES IN BEAMS

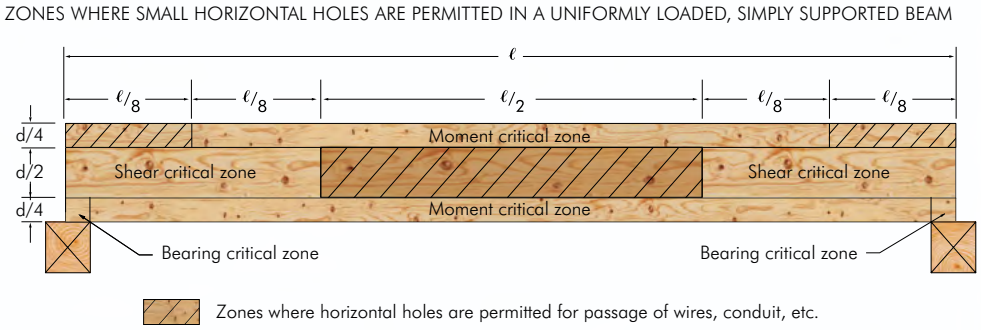
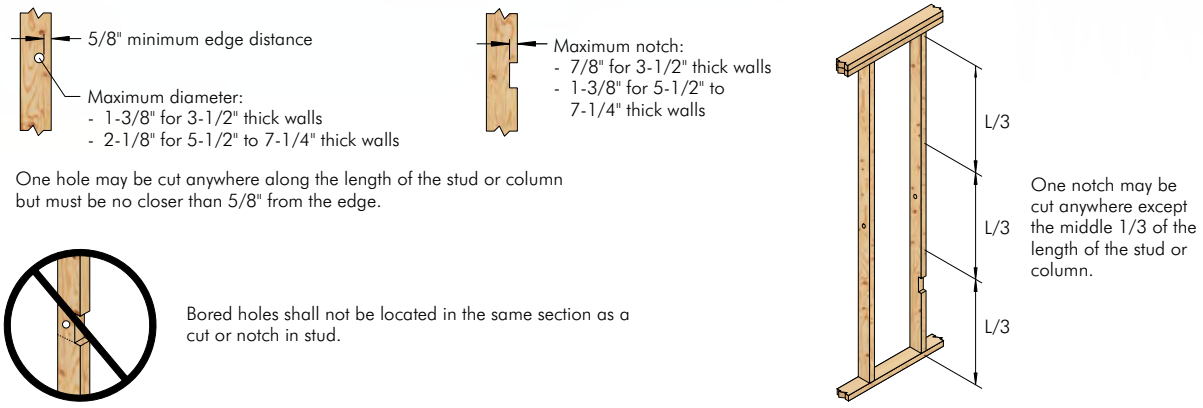


FIGURE 7
ALLOWABLE HOLES IN STUDS



BEARING LENGTH REQUIREMENTS

BEARING LENGTH REQUIREMENTS (in.)

BEAM REACTION (lb)	24F-1.9E BEAM WIDTH (in.)			
	1-ply 1-3/4	2-ply 1-3/4 or 3-1/2	3-ply 1-3/4 or 5-1/2	4-ply 1-3/4 or 7
1000	1-1/2	1-1/2	1-1/2	1-1/2
2000	2	1-1/2	1-1/2	1-1/2
3000	3	1-1/2	1-1/2	1-1/2
4000	4	2	1-1/2	1-1/2
5000	5	2-1/2	1-3/4	1-1/2
6000	5-3/4	3	2	1-1/2
7000	6-3/4	3-1/2	2-1/4	1-3/4
8000	7-3/4	4	2-3/4	2
9000	8-3/4	4-1/2	3	2-1/4
10,000	9-3/4	5	3-1/4	2-1/2
11,000	10-1/2	5-1/4	3-1/2	2-3/4
12,000		5-3/4	4	3
13,000		6-1/4	4-1/4	3-1/4
14,000		6-3/4	4-1/2	3-1/2
15,000		7-1/4	5	3-3/4
16,000		7-3/4	5-1/4	4
17,000		8-1/4	5-1/2	4-1/4
18,000		8-3/4	5-3/4	4-1/2
19,000		9-1/4	6-1/4	4-3/4
20,000		9-3/4	6-1/2	5
21,000		10	6-3/4	5
22,000		10-1/2	7	5-1/4
23,000		11	7-1/2	5-1/2
24,000			7-3/4	5-3/4
25,000			8	6
26,000			8-1/2	6-1/4
27,000			8-3/4	6-1/2
28,000			9	6-3/4
29,000			9-1/4	7
30,000			9-3/4	7-1/4

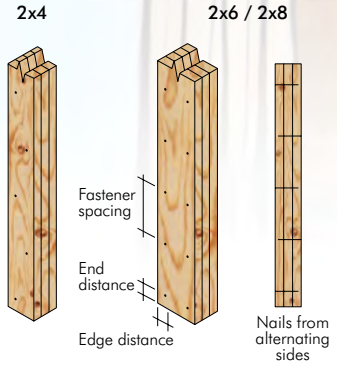
NOTES:

1. Minimum bearing lengths are 1-1/2 and 3-1/2 inches at end and intermediate supports, respectively.
2. Bearing across the full width of beam is required. Lateral support is required at all bearing points and along compression edge.
3. Bearing lengths are based on allowable bearing (compression perpendicular to grain) stress.
4. Bearing lengths may need to be increased if support member's allowable bearing stress is less.
5. For 3-ply 1-3/4 or 5-1/2-inch beams, the tabulated values are based on a net width of 5-1/4 inches. For 5-1/2-inch beams, the tabulated bearing lengths may be decreased by 5%, however, not shorter than the minimum required bearing lengths as per Note 1.

MULTIPLE VERTICAL MEMBER CONNECTIONS

ES11 NORDIC LAM BUILT-UP COLUMNS FASTENER PATTERN

COLUMN	NAILS & BOLTS			NAILS		BOLTS	
	FASTENER SIZE	MAXIMUM FASTENER SPACING	NUMBER OF ROWS	MINIMUM EDGE DISTANCE	MINIMUM END DISTANCE	MINIMUM EDGE DISTANCE	MINIMUM END DISTANCE
2-ply, 2x4 2-ply, 2x6 2-ply, 2x8	10d (0.148") Nails or 1/2" bolts	9"	1 2 2	3/4"	2-1/3"	3/4"	3-1/2"
3-ply, 2x4 3-ply, 2x6 3-ply, 2x8	30d (0.207") Nails or 1/2" bolts	9"	1 2 2	1"	3-1/8"	3/4"	3-1/2"
4-ply, 2x4 4-ply, 2x6 4-ply, 2x8	60d (0.263") Nails or 1/2" bolts	9"	1 2 2	1-1/2"	4"	3/4"	3-1/2"



NOTES:

1. Connection patterns shown are those required per NDS 2012. Capacities shall be be calculated per NDS 2012.
2. Individual studs assumed to be continuous over the full height of the built-up column and of the same grade.
3. Verify bearing capacity of the supporting member.
4. Nails are common wire nails, shall conform to ASTM F1667 and have a minimum yield strength of 90,000 psi.
5. Bolts shall conform to ASTM A307 and have a minimum yield strength of 45,000 psi. Bolt holes are recommended to be not more than 1/32 inch greater than the diameter of the bolts. Standard cut washers shall be used between head and nut of the bolt and the glulam.
6. Install one row staggered, or two rows parallel in vertical direction.
7. Nails shall be driven alternately from either face along the member's length.

MULTIPLE HORIZONTAL MEMBER CONNECTIONS

TOP-LOADED BEAMS

1-3/4" Width Pieces:

- Minimum of 2 rows 16d common wire nails (0.162 x 3-1/2 inches) at 12" o.c. for beam depths less than 14"
- Minimum of 3 rows 16d common wire nails (0.162 x 3-1/2 inches) at 12" o.c. for 14" to 18" beam depths
- Nailed connections require an additional row of nails when nail size is smaller than specified above (minimum 0.128" x 3")
- 4-Ply beams shall be attached with minimum of 2 rows 1/2-inch-diameter bolts or 1/4 x 6-inch wood screws at 24" o.c.

3-1/2" Width Pieces:

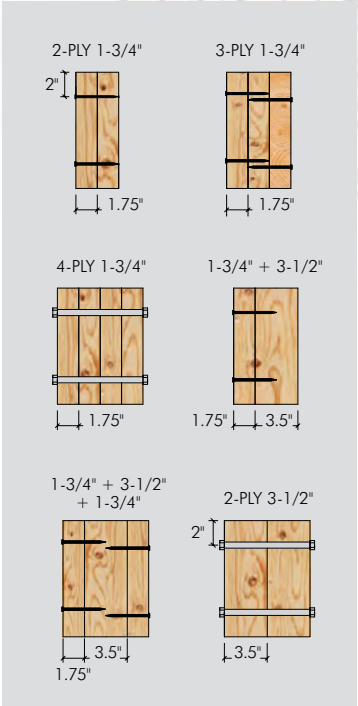
- Minimum of 2 rows 1/2-inch-diameter bolts or 1/4 x 6-inch wood screws at 24" o.c. staggered.

SIDE-LOADED BEAMS

MAXIMUM ALLOWABLE UNIFORM LOAD (plf) APPLIED TO EITHER OUTSIDE MEMBER			2-PLY 1-3/4"	3-PLY 1-3/4"	4-PLY 1-3/4"	1-3/4"+ 3-1/2"	1-3/4" + 3-1/2" + 1-3/4"	2-PLY 3-1/2"
CONNECTOR	SPACING	ROWS	NAILS OR SCREWS ONE SIDE OR THROUGH BOLTS	NAILS OR SCREWS BOTH SIDES OR THROUGH BOLTS	SCREWS ONE OR BOTH SIDES OR THROUGH BOLTS	NAILS OR SCREWS ONE SIDE OR THROUGH BOLTS	NAILS OR SCREWS BOTH SIDES OR THROUGH BOLTS	SCREWS ONE OR BOTH SIDES OR THROUGH BOLTS
16d Common Wire Nails	12" o.c.	2 Rows	465	350	N/A	350	310	N/A
		3 Rows	700	525	N/A	525	465	N/A
	6" o.c.	2 Rows	935	700	N/A	700	620	N/A
		3 Rows	1400	1050	N/A	1050	930	N/A
1/2" A307 Bolts	24" o.c.	2 Rows	375	280	250	280	250	740
	12" o.c.	2 Rows	755	565	505	565	505	1480
	6" o.c.	2 Rows	1510	1135	1005	1135	1005	2965
1/4" Simpson SDW Screws	24" o.c.	2 Rows	800	600	535	600	535	800
	16" o.c.	2 Rows	1200	900	800	900	800	1200
	12" o.c.	2 Rows	1600	1200	1065	1200	1065	1600
1/4" USP SDS Screws	24" o.c.	2 Rows	490	365	325	365	325	490
	18" o.c.	2 Rows	650	490	430	490	430	650
	12" o.c.	2 Rows	970	730	650	730	650	970

NOTES:

1. Verify adequacy of beam in uniform load tables or design software prior to using values listed above.
2. Glulam beams are assumed to be full length, have adequate lateral bracing to avoid buckling, have the same stiffness and bending capacity, and have adequate bearing at supports to carry the applied load. Concentrated loads require special consideration.
3. Capacities given are for multiple-beam connections under normal (10-yr.) load duration. Increases for other load durations are permitted.
4. Nails shall conform to ASTM F1667 and have a minimum yield strength of 90,000 psi. Nails shall be located a minimum of 2 inches from the top and bottom of the member with a minimum spacing of 2 inches between rows. The end distance shall not be less than 3 inches. Multiply tabulated connection capacities by 0.83 for 12d common wire nails (0.148 x 3-1/4 inches).
5. Bolts shall conform to ASTM A307 and have a minimum yield strength of 45,000 psi. Bolt holes are recommended to be not more than 1/32 inch greater than the diameter of the bolts and shall be located a minimum of 2 inches away from the glulam end and edges. Standard cut washers shall be used between head and nut of the bolt and the glulam.
6. Simpson SDW Screws: All screw pattern to be installed from one side only. Screws shall be installed with the head in the loaded ply. If beam loaded on screw tip side, lower tabulated values for 1-3/4" 3-ply and 3 1/2" 2-ply beams by 25%. Required screw lengths: 1-3/4" 2-ply beam = 3-3/8", 1-3/4" 3-ply beam = 5", 4-ply 1-3/4" and 2-ply 3.5" beams = 6-3/4". Min. required fastener distances: To beam end: 6"; vertically to top/bottom edges: 1-7/16"; vertically between screws: 4" (staggered).
7. USP SDS Screws: Screws to be installed from both sides always, except in case of 1-3/4" 2-ply and 1-3/4"+3.5" beams. Screws shall be installed with the screw heads in the loaded ply. Required screw lengths: 3.5" for all combinations, except for 1-3/4" 4-ply beams and 3.5" 2-ply beams, where the screw length shall be 6". Min. required fastener distances: To beam end: 4"; vertically from top/bottom edges: 1-1/2"; vertically inbetween screws: 2-1/2" (staggered).
8. 4-ply beams are recommended to be used only when loads are applied to both sides, or if the beam is not fully loaded. The lesser load should be at least 25% of the higher load on the opposite side.
9. Offset connector spacing so that protruding fasteners do not interfere with intersecting side members.
10. Stagger all fasteners installed from opposite sides.



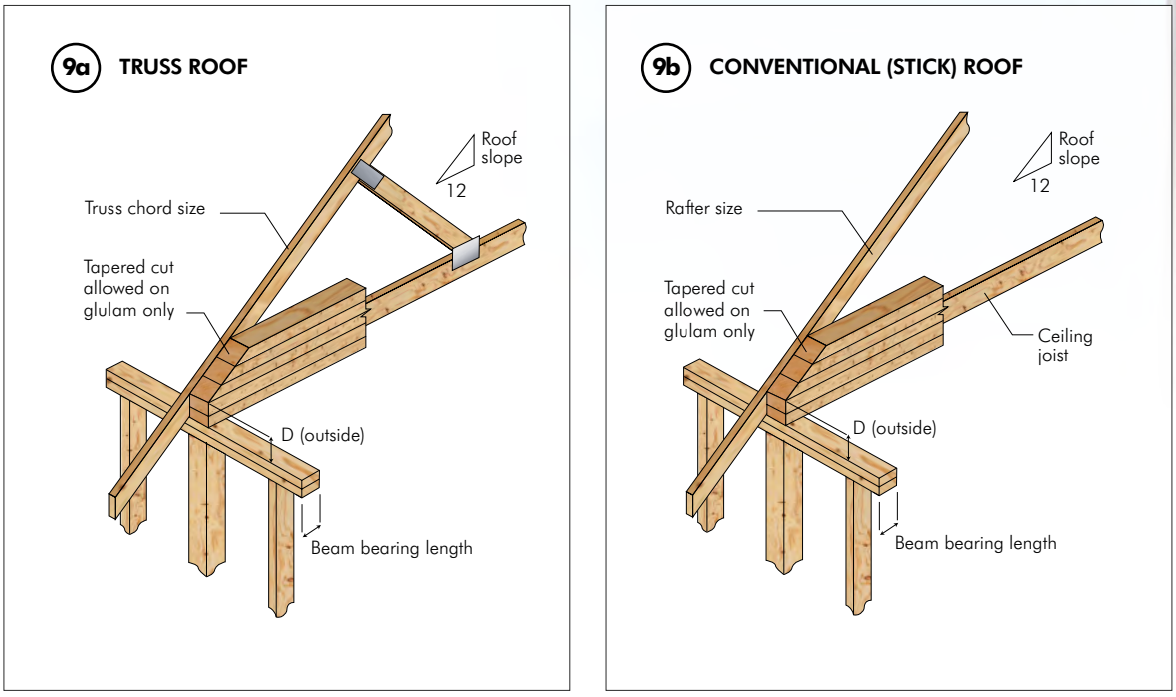
TAPERED CUT
ALLOWABLE END REACTIONS

ALLOWABLE END REACTIONS FOR 3-1/2" BEAM MEMBERS[1] – TRUSS ROOF

BEAM DEPTH (in.)	TRUSS CHORD SIZE	BEARING LENGTH (in.)	TRUSS SLOPE									
			4/12		6/12		8/12		10/12		12/12	
			D (in.)	R (lb)	D (in.)	R (lb)	D (in.)	R (lb)	D (in.)	R (lb)	D (in.)	R (lb)
9-1/2	2x4	3-1/2	3-7/8	2092	4-1/8	2431	4-3/8	3230	4-3/4	3750	5-1/8	3948
		5-1/2	3-7/8	2372	4-1/8	3080	4-3/8	3812	4-3/4	3987	5-1/8	No Effect
	2x6	3-1/2	6	2977	6-3/8	3762	6-3/4	3977	7-3/8	No Effect	8	No Effect
		5-1/2	6	3496	6-3/8	3969	6-3/4	No Effect	7-3/8	No Effect	8	No Effect
11-7/8	2x4	3-1/2	3-7/8	---	4-1/8	2431	4-3/8	2799	4-3/4	3774	5-1/8	4454
		5-1/2	3-7/8	---	4-1/8	2851	4-3/8	3804	4-3/4	4617	5-1/8	4920
	2x6	3-1/2	6	2977	6-3/8	3435	6-3/4	4440	7-3/8	4849	8	4979
		5-1/2	6	3257	6-3/8	4231	6-3/4	4856	7-3/8	4987	8	No Effect
14	2x4	3-1/2	3-7/8	---	4-1/8	---	4-3/8	---	4-3/4	3191	5-1/8	4438
		5-1/2	3-7/8	---	4-1/8	---	4-3/8	---	4-3/4	4660	5-1/8	5414
	2x6	3-1/2	6	2977	6-3/8	3370	6-3/4	4190	7-3/8	5167	8	5632
		5-1/2	6	3257	6-3/8	3790	6-3/4	5096	7-3/8	5687	8	5869
16	2x4	3-1/2	3-7/8	---	4-1/8	---	4-3/8	---	4-3/4	---	5-1/8	---
		5-1/2	3-7/8	---	4-1/8	---	4-3/8	---	4-3/4	---	5-1/8	---
	2x6	3-1/2	6	2977	6-3/8	3370	6-3/4	3809	7-3/8	5059	8	5942
		5-1/2	6	3257	6-3/8	3790	6-3/4	4822	7-3/8	5995	8	6509
18	2x4	3-1/2	3-7/8	---	4-1/8	---	4-3/8	---	4-3/4	---	5-1/8	---
		5-1/2	3-7/8	---	4-1/8	---	4-3/8	---	4-3/4	---	5-1/8	---
	2x6	3-1/2	6	---	6-3/8	3370	6-3/4	3809	7-3/8	4555	8	5957
		5-1/2	6	---	6-3/8	3790	6-3/4	4369	7-3/8	5963	8	6898

See footnotes on page 31.

FIGURE 9
ALLOWABLE END REACTIONS



ALLOWABLE END REACTIONS FOR 3-1/2" BEAM MEMBERS[1] – CONVENTIONAL ROOF

BEAM DEPTH (in.)	RAFTER SIZE	BEARING LENGTH (in.)	RAFTER SLOPE									
			4/12		6/12		8/12		10/12		12/12	
			D (in.)	R (lb)	D (in.)	R (lb)	D (in.)	R (lb)	D (in.)	R (lb)	D (in.)	R (lb)
9-1/2	2x6	3-1/2	4-5/8	2382	4-3/8	2530	4-1/4	3107	4-1/8	3554	4-1/4	3803
		5-1/2	3-7/8	2382	3-3/8	2530	2-7/8	---	2-1/2	---	2-1/4	---
	2x8	3-1/2	6-3/8	3331	6-1/4	3747	6-3/8	3929	6-1/2	3988	6-3/4	No Effect
		5-1/2	5-3/4	3331	5-1/4	3747	5	3929	4-3/4	3988	4-3/4	No Effect
	2x10	3-1/2	8-1/2	No Effect	8-1/2	No Effect	8-3/4	No Effect	9	No Effect	9-1/2	No Effect
		5-1/2	7-7/8	No Effect	7-1/2	No Effect	7-3/8	No Effect	7-3/8	No Effect	7-1/2	No Effect
	2x12	3-1/2	10-5/8	No Effect	10-3/4	No Effect	11-1/8	No Effect	11-5/8	No Effect	12-3/8	No Effect
		5-1/2	10	No Effect	9-3/4	No Effect	9-3/4	No Effect	10	No Effect	10-3/8	No Effect
11-7/8	2x6	3-1/2	4-5/8	2382	4-3/8	2530	4-1/4	2724	4-1/8	3309	4-1/4	4009
		5-1/2	3-7/8	---	3-3/8	---	2-7/8	---	2-1/2	---	2-1/4	---
	2x8	3-1/2	6-3/8	3157	6-1/4	3391	6-3/8	4195	6-1/2	4632	6-3/4	4861
		5-1/2	5-3/4	3157	5-1/4	3391	5	4195	4-3/4	4632	4-3/4	4861
	2x10	3-1/2	8-1/2	4325	8-1/2	4761	8-3/4	4943	9	No Effect	9-1/2	No Effect
		5-1/2	7-7/8	4325	7-1/2	4761	7-3/8	4943	7-3/8	No Effect	7-1/2	No Effect
	2x12	3-1/2	10-5/8	4985	10-3/4	No Effect	11-1/8	No Effect	11-5/8	No Effect	12-3/8	No Effect
		5-1/2	10	4985	9-3/4	No Effect	9-3/4	No Effect	10	No Effect	10-3/8	No Effect
14	2x6	3-1/2	4-5/8	---	4-3/8	---	4-1/4	---	4-1/8	---	4-1/4	---
		5-1/2	3-7/8	---	3-3/8	---	2-7/8	---	2-1/2	---	2-1/4	---
	2x8	3-1/2	6-3/8	3157	6-1/4	3352	6-3/8	3732	6-1/2	4691	6-3/4	5258
		5-1/2	5-3/4	3157	5-1/4	3352	5	3732	4-3/4	4691	4-3/4	---
	2x10	3-1/2	8-1/2	4043	8-1/2	4703	8-3/4	5361	9	5696	9-1/2	5845
		5-1/2	7-7/8	4043	7-1/2	4703	7-3/8	5361	7-3/8	5696	7-1/2	5845
	2x12	3-1/2	10-5/8	5328	10-3/4	5719	11-1/8	5863	11-5/8	No Effect	12-3/8	No Effect
		5-1/2	10	5328	9-3/4	5719	9-3/4	5863	10	No Effect	10-3/8	No Effect
16	2x8	3-1/2	6-3/8	3157	6-1/4	3352	6-3/8	3607	6-1/2	4299	6-3/4	5290
		5-1/2	5-3/4	3157	5-1/4	---	5	---	4-3/4	---	4-3/4	---
	2x10	3-1/2	8-1/2	4043	8-1/2	4291	8-3/4	5283	9	6014	9-1/2	6420
		5-1/2	7-7/8	4043	7-1/2	4291	7-3/8	5283	7-3/8	6014	7-1/2	6420
	2x12	3-1/2	10-5/8	4928	10-3/4	5871	11-1/8	6401	11-5/8	6644	12-3/8	6719
		5-1/2	10	4928	9-3/4	5871	9-3/4	6401	10	6644	10-3/8	6719
18	2x8	3-1/2	6-3/8	3157	6-1/4	3352	6-3/8	3607	6-1/2	3911	6-3/4	4990
		5-1/2	5-3/4	---	5-1/4	---	5	---	4-3/4	---	4-3/4	---
	2x10	3-1/2	8-1/2	4043	8-1/2	4291	8-3/4	4745	9	5994	9-1/2	6735
		5-1/2	7-7/8	4043	7-1/2	4291	7-3/8	4745	7-3/8	5994	7-1/2	6735
	2x12	3-1/2	10-5/8	4928	10-3/4	5484	11-1/8	6563	11-5/8	7139	12-3/8	7350
		5-1/2	10	4928	9-3/4	5484	9-3/4	6563	10	7139	10-3/8	7429

NOTES:

1. Values (R) shown are the allowable end reactions for 3-1/2-inch beam width. For 1-3/4, 5-1/2 and 7-inch wide beams, multiply by 0.5, 1.5 and 2.0, respectively.
2. Verify adequacy of beam in uniform load tables or design software prior to using values listed above.
3. The tabulated allowable end reactions apply only to combination 24F-1.9E glulam members.
4. Bearing across the full width of beam is required. Lateral support is required at all bearing points and along compression edge.
5. Concentrated loads are not permitted in the tapered cut region. Uplift reactions may require additional considerations.
6. Bearing lengths are based on Nordic Lam's bearing stress. Bearing lengths may need to be increased if support member's allowable bearing stress is less.
7. The values are based on a load duration factor, C_D, of 1.00 and dry service conditions.

SIMPSON STRONG-TIE CONNECTORS - ALLOWABLE LOADS (LB)

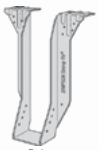
BEAM WIDTH (in.)	BEAM DEPTH (in.)	FACE MOUNT						TOP MOUNT					
		MODEL	B. DIM.	Fasteners		Uplift (160)	Download S-P-F	MODEL	B. DIM.	Fasteners		Uplift (160)	Download S-P-F
				Header	Joist					Header	Joist		
1-ply 1-3/4	9-1/2	HU9	2-1/2	24-16d	10-10d x1½	1635	2950	MIT9.5	2-1/2	8-16d	2-10d x1½	185	1665
		HUS1.81/10	3	30-16d	10-16d	2580	4705	LBV1.81/9.5	3	10-16d	6-10d x1½	770	2060
	11-7/8	HU11	2-1/2	30-16d	10-10d x1½	1635	2950	MIT11.88	2-1/2	8-16d	2-10d x1½	185	1665
		HUS1.81/10	3	30-16d	10-16d	2580	4705	BA1.81/11.88	3	16-16d	8-10d x1½	1005	2665
	14	HU14	2-1/2	36-16d	14-10d x1½	1735	3385	MIT1.81/14	2-1/2	8-16d	2-10d x1½	185	1665
		HUS1.81/10	3	30-16d	10-16d	2580	4705	LBV1.81/14	3	10-16d	6-10d x1½	770	2060
2-ply 1-3/4 or 3-1/2	9-1/2	HHUS410	3	30-16d	10-16d	3195	4835	LBV3.56/9.5	2-1/2	10-16d	6-10d x1½	770	2060
		HGUS410	4	46-16d	16-16d	3525	7825	HB3.56/9.5	3-1/2	22-16d	10-16d	2245	3820
	11-7/8	HHUS410	3	30-16d	10-16d	3195	4835	BA3.56/11.88	3	16-16d	8-10d x1½	1005	2665
		HGUS412	4	56-16d	20-16d	4335	8255	HB3.56/11.88	3-1/2	22-16d	10-16d	2245	3820
	14	HHUS410	3	30-16d	10-16d	3195	4835	BA3.56/14	3	16-16d	8-10d x1½	1005	2665
		HGUS414	4	66-16d	22-16d	4745	8650	GLTV3.514	5	10-16d	6-16d	1115	5145
	16	HHUS410	3	30-16d	10-16d	3195	4835	BA3.56/16	3	16-16d	8-10d x1½	1005	2665
		HGUS414	4	66-16d	22-16d	4745	8650	GLTV3.516	5	10-16d	6-16d	1115	5145
	18	HHUS410	3	30-16d	10-16d	3195	4835	HB3.56/18	3-1/2	22-16d	10-16d	2245	3820
		HGUS414	4	66-16d	22-16d	4745	8650	HGLTV3.518	6	18-16d	6-16d	1115	6770
3-ply 1-3/4 or 5-1/2	9-1/2	HHUS5.50/10	3	30-16d	10-16d	3195	4835	HB5.50/9.5	3-1/2	22-16d	10-16d	2245	3820
		HGUS5.50/10	4	46-16d	16-16d	3525	7825	GLTV5.59	5	10-16d	6-16d	1115	5145
	11-7/8	HHUS5.50/10	3	30-16d	10-16d	3195	4835	HB5.50/11.88	3-1/2	22-16d	10-16d	2245	3820
		HGUS5.50/12	4	56-16d	20-16d	4335	8255	HGLTV5.511	6	18-16d	6-16d	1115	6770
	14	HHUS5.50/10	3	30-16d	10-16d	3195	4835	HB5.50/14	3-1/2	22-16d	10-16d	2245	3820
		HGUS5.50/14	4	66-16d	22-16d	4745	8685	EGQ5.50-SDS3[5]	6	28-SDS¼x3	12-SDS¼x3	4940	15,600
	16	HGUS5.50/14	4	66-16d	22-16d	4745	8685	HB5.50/16	3-1/2	22-16d	10-16d	2245	3820
		HGU5.50-SDS[5]	5-1/4	36-SDS¼x2½	24-SDS¼x2½	7125	10,185	EGQ5.50-SDS3[5]	6	28-SDS¼x3	12-SDS¼x3	4940	15,600
	18	HGUS5.50/14	4	66-16d	22-16d	4745	8685	HGLTV5.518	6	18-16d	6-16d	1115	6770
		HGU5.50-SDS[5]	5-1/4	36-SDS¼x2½	24-SDS¼x2½	7125	10,185	EGQ5.50-SDS3[5]	6	28-SDS¼x3	12-SDS¼x3	4940	15,600
4-ply 1-3/4 or 7	9-1/2	HHUS7.25/10	3-5/16	30-16d	10-16d	3195	4835	HB7.12/9.5	3-1/2	22-16d	10-16d	2245	3820
		HGUS7.25/10	4	46-16d	16-16d	3525	7825	GLTV49.5-2	5	10-16d	6-16d	1115	5145
	11-7/8	HHUS7.25/10	3- 5/16	30-16d	10-16d	3195	4835	HB7.12/11.88	3-1/2	22-16d	10-16d	2245	3820
		HGUS7.25/12	4	56-16d	20-16d	4335	8255	EGQ7.25-SDS3[5]	6	28-SDS¼x3	12-SDS¼x3	4940	15,600
	14	HGUS7.25/14	4	66-16d	22-16d	4745	8685	GLTV414-2	5	10-16d	6-16d	1115	5145
		HGU7.25-SDS[5]	5-1/4	36-SDS¼x2½	24-SDS¼x2½	7125	10,185	EGQ7.25-SDS3[5]	6	28-SDS¼x3	12-SDS¼x3	4940	15,600
	16	HGUS7.25/14	4	66-16d	22-16d	4745	8685	HGLTV416-2	6	18-16d	6-16d	1115	6770
		HHGU7.25-SDS[5]	5-1/4	44-SDS¼x2½	28-SDS¼x2½	10,475	12,850	EGQ7.25-SDS3[5]	6	28-SDS¼x3	12-SDS¼x3	4940	15,600
	18	HGUS7.25/14	4	66-16d	22-16d	4745	8685	HGLTV418-2	6	18-16d	6-16d	1115	6770
		HHGU7.25-SDS[5]	5-1/4	44-SDS¼x2½	28-SDS¼x2½	10,475	12,850	EGQ7.25-SDS3[5]	6	28-SDS¼x3	12-SDS¼x3	4940	15,600

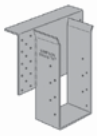
NOTES:

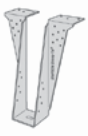
1. Verify adequacy of beam in uniform load tables or design software.
2. Leave 1/16" max. clearance between the end of the supported member and the support member or hanger.
3. Loads may not be increased for duration of load.
4. HU, LBV, and BA hangers use both round and triangular holes.
5. Glulam headers made primarily from Spruce-Pine-Fir.
6. When ordering EGQ, HGU, HHGU, B1.81X, or LBV1.81X, specify height.
7. The « B Dim. » is the depth of the hanger.

SIMPSON Strong-Tie™


B

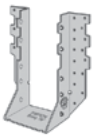

BA

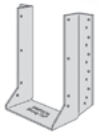

EGQ


HB


HGLTV


HGUS


HHUS


HU


HUS


LBV


MIT


SCL

USP STRUCTURAL CONNECTORS - ALLOWABLE LOADS (lb)

BEAM WIDTH (in.)	BEAM DEPTH (in.)	FACE MOUNT						TOP MOUNT					
		MODEL	B. DIM.	Fasteners		Uplift (160)	Download S-P-F	MODEL	B. DIM.	Fasteners		Uplift (160)	Download S-P-F
				Header	Joist					Header	Joist		
1-ply 1-3/4	9-1/2	HD17925	2	(18) 16d	(6) 10d x 1-1/2	895	2080	THO17950	2	(6) 10d	(2) 10d x 1-1/2	227	1060
		HUS179[7]	3	(30) 16d	(10) 16d	2690	4410	PHXU1795	3-1/4	(8) 16d	(6) 10d x 1-1/2	869	3070
	11-7/8	HD17112	2	(22) 16d	(6) 10d x 1-1/2	895	2080	THO17118	2	(6) 10d	(2) 10d x 1-1/2	227	1095
		HUS179[7]	3	(30) 16d	(10) 16d	2690	4410	PHXU17118	3-1/4	(8) 16d	(6) 10d x 1-1/2	869	3070
	14	HD1714	2	(26) 16d	(8) 10d x 1-1/2	895	2280	BPH1714	2-3/8	(10) 16d	(4) 10d x 1-1/2	525	2245
		HUS179[7]	3	(30) 16d	(10) 16d	2690	4410	PHXU1714	3-1/4	(8) 16d	(6) 10d x 1-1/2	869	3070
2-ply 1-3/4 or 3-1/2	9-1/2	THD410	3	(38) 16d	(20) 10d	3235	4600	PHXU3595	3-1/4	(8) 16d	(6) 10d	1084	3590
		THDH410[7]	4	(46) 16d	(12) 16d	3335	7120	HLBH3595	6	(15) NA16d-RS	(6) 16d	1193	8915
	11-7/8	THD412	3	(48) 16d	(20) 10d	3235	4600	PHXU35118	3-1/4	(8) 16d	(6) 10d	1084	3590
		THDH412[7]	4	(56) 16d	(14) 16d	4390	8270	HLBH35118	6	(15) NA16d-RS	(6) 16d	1193	8915
	14	THD412	3	(48) 16d	(20) 10d	3235	4600	PHXU3514	3-1/4	(8) 16d	(6) 10d	1084	3590
		THDH414[7]	4	(66) 16d	(16) 16d	5835	8270	HLBH3514	6	(15) NA16d-RS	(6) 16d	1193	8915
	16	THD412	3	(48) 16d	(20) 10d	3235	5810	PHXU3516	3-1/4	(8) 16d	(6) 10d	1084	3590
		THDH414[7]	4	(66) 16d	(16) 16d	5835	8270	HLBH3516	6	(15) NA16d-RS	(6) 16d	1193	8915
	18	THD414	3	(58) 16d	(20) 10d	3235	5810	PHXU3518	3-1/4	(8) 16d	(6) 10d	1084	3590
		THDH414[7]	4	(66) 16d	(16) 16d	5835	8270	HLBH3518	6	(15) NA16d-RS	(6) 16d	1193	8915
3-ply 1-3/4 or 5-1/2	9-1/2	THD610	3	(38) 16d	(20) 10d	2865	4900	PHXU5595	3-1/4	(8) 16d	(6) 10d	1084	3590
		THDH610[7]	4	(46) 16d	(16) 16d	3835	7520	HLBH5595	6	(15) NA16d-RS	(6) 16d	1348	8915
	11-7/8	THD610	3	(38) 16d	(20) 10d	2865	4900	PHXU55118	3-1/4	(8) 16d	(6) 10d	1084	3590
		THDH612[7]	4	(46) 16d	(16) 16d	4355	8345	HLBH55118	6	(15) NA16d-RS	(6) 16d	1348	8915
	14	THD612	3	(48) 16d	(20) 10d	2865	4900	PHXU5514	3-1/4	(8) 16d	(6) 10d	1084	3590
		THDH614[7]	4	(56) 16d	(20) 16d	4865	9780	HLBH5514	6	(15) NA16d-RS	(6) 16d	1348	8915
	16	THD612	3	(48) 16d	(20) 10d	3520	6190	PHXU5516	3-1/4	(8) 16d	(6) 10d	1084	3590
		THDH614[7]	4	(56) 16d	(20) 16d	4865	9780	HLBH5516	6	(15) NA16d-RS	(6) 16d	1348	8915
	18	THD614	3	(58) 16d	(20) 10d	3520	6190	PHXU5518	3-1/4	(8) 16d	(6) 10d	1084	3590
		THDH614[7]	4	(66) 16d	(22) 16d	4865	9780	HLBH5518	6	(15) NA16d-RS	(6) 16d	1348	8915
4-ply 1-3/4 or 7	9-1/2	THD7210	3	(38) 16d	(20) 10d	2865	4900	PHXU7195	3-1/4	(8) 16d	(6) 10d	1084	3590
		THDH7210[7]	4	(46) 16d	(12) 16d	3335	7120	HLBH7195	6	(15) NA16d-RS	(6) 16d	1348	8915
	11-7/8	THDH7212	4	(56) 16d	(14) 16d	2865	4900	PHXU71118	3-1/4	(8) 16d	(6) 10d	1084	3590
		THDH7212[7]	4	(46) 16d	(12) 16d	4390	8270	HLBH71118	6	(15) NA16d-RS	(6) 16d	1348	8915
	14	THD7210	3	(38) 16d	(20) 10d	2865	4900	PHXU7114	3-1/4	(8) 16d	(6) 10d	1084	3590
		THDH7214[7]	4	(66) 16d	(16) 16d	5835	8270	HLBH7114	6	(15) NA16d-RS	(6) 16d	1348	8915
	16	HD7120	2-1/2	(16) 16d	(6) 10d	990	1935	PHXU7116	3-1/4	(8) 16d	(6) 10d	1084	3590
		THDH7214[7]	4	(66) 16d	(16) 16d	5835	8270	HLBH7116	6	(15) NA16d-RS	(6) 16d	1348	8915
	18	HD7140	2-1/2	(20) 16d	(8) 10d	1320	2420	PHXU7118	3-1/4	(8) 16d	(6) 10d	1084	3590
		THDH7214[7]	4	(66) 16d	(16) 16d	5835	8270	HLBH7118	6	(15) NA16d-RS	(6) 16d	1348	8915

NOTES:

1. Verify adequacy of beam in uniform load tables or design software.
2. Leave 1/16" max. clearance between the end of the supported member and the support member or hanger.
3. Loads listed are based on hanger attachment to a S-P-F species glulam header. Some loads may be increased for duration of load adjustments. Refer to USP's Full Line Catalog for details.
4. Uplift loads have been increased 60% for wind and seismic loading; no further increase shall be permitted.
5. Top mount hangers require a minimum 3" header thickness for THO series hangers; 3-1/2" minimum header thickness for all other stock numbers.
6. 10d x 1-1/2 nails are 0.148" diameter x 1-1/2" long, 10d nails are 0.148" diameter x 3" long, and 16d nails are 0.162" diameter x 3-1/2" long. Minimum nail penetration shall be 1-1/2″ for 10d nails and 1-5/8″ for 16d nails. 16d sinkers are 0.148" diameter x 3-1/4″ long and may be used where 10d commons are specified.
7. Joist nails need to be toe nailed at a 30° to 45° angle to achieve listed loads for THDH and HUS models.
8. The « B Dim. » is the depth of the hanger.

USP STRUCTURAL CONNECTORS® A MiTek Company

STORAGE
AND HANDLING GUIDELINES

Glulam beams must be stored properly and handled with care to assure optimum performance. Beams may be protected with sealants, primers or paper wrap when they leave the manufacturing plant. Sealants on the ends of beams help guard against moisture penetration and checking. A coat of sealant should be applied to the ends of any beams trimmed or otherwise cut in the field. Surface sealants, which can be applied to the top, bottom, and sides of beams, resist dirt and moisture and help control checking and grain raising. Use a penetrating sealant if beams will be stained or given a natural finish.

Water-resistant wrappings are another way to protect beams from exposure to moisture, dirt and scratches during transit, storage and erection. Because sunlight can discolor beams, opaque wrappings are recommended. Beams can be wrapped individually, by the bundle or by the load. If it is necessary to remove portions of the wrapping during the erection sequence to facilitate making connections, remove all of the wrapping to avoid uneven discoloration due to exposure to the sun.

Glulam beams are commonly loaded and unloaded with a fork lift. For greater stability, the sides of the beams, rather than the bottoms, should rest on the forks. Supporting extremely long beams on their sides, however, can cause them to flex excessively, increasing the risk of damage. Use multiple forklifts to lift long glulam members. If a crane with slings is used to load or unload beams, provide adequate blocking between the cable and the member. Use wooden cleats or blocking to protect corners. Only non-marring fabric slings should be used to lift glulams. Using spreader bars can reduce the likelihood of damage when lifting especially long beams with a crane.

When transporting beams, stack them on lumber blocking or skids when loading them on rail cars or trucks. Beams can rest on their sides or bottoms. Secure the load with straps to keep it from shifting. Protect beam corners with “softeners” when strapping down the load.

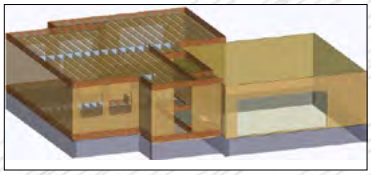
In the distribution yard and on the jobsite, a well-drained covered storage site is recommended. Keep glulam members off the ground with lumber blocking, skids or rack systems. Beams should remain wrapped to protect them from moisture, dirt, sunlight, and scratches. At the job site, use similar storage provisions when possible.

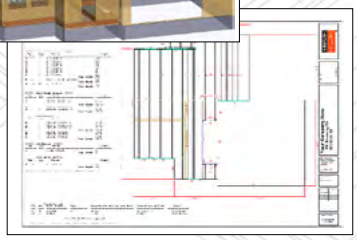
One of the advantages of the high strength to weight ratio of glulam beams is that in many residential and light commercial applications they can be installed with forklifts, front-end loaders and other commonly available construction equipment. That eliminates the time and cost required to have a crane on the jobsite.

SOFTWARE

Component Solutions EWP Edition®

ISTRUCT™



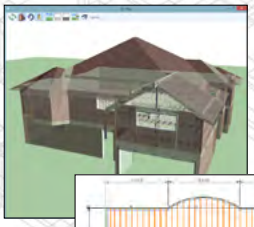


Component Solutions EWP Edition by Simpson Strong-tie and iStruct by CSD (Calculated Structured Designs) are software that integrate and automate all of the major functions that take place in specifying and engineering building components and materials for wood frame structures.

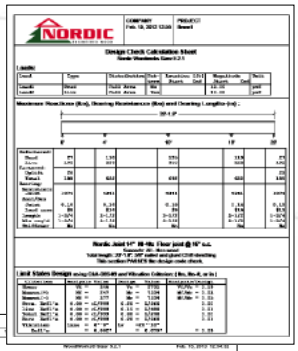
Design, analyze, engineer, calculate, plan, report, generate takeoffs, and finalize the sale all with one software solution. Generate a full house design including all engineered wood floor and roof systems, taking into account all live and gravity loads as they are transferred down through the structure, and complete with all individual component calculations.

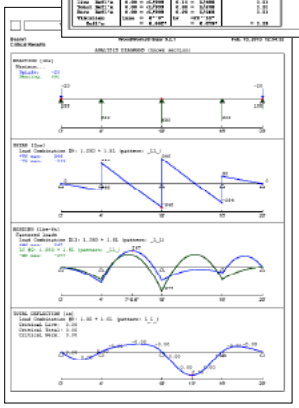
In addition, any Nordic glulam and joist may be sized separately and independent from any structure.

Component Solutions EWP Edition and iStruct are available to distributors.



Nordic Sizer





Nordic Sizer by WOODWORKS® is a software program that can be used to design individual members (joists, beams, floor/roof slabs, columns, wall panels) using the full range of Nordic's engineered wood products: glued laminated timber beams and columns, prefabricated wood I-joists, glulam decking, and cross-laminated timber (CLT).

Nordic Sizer analyzes and designs simple and multiple span members for specified dead, live, snow, and wind loads as per NDS, automatically patterns loads and checks all load combinations as per ASCE 7 and ICC/IBC. Joists and beams may be set horizontally, sloped, or axially rotated (purlins). Columns, studs, and wall panels may be analyzed under combinations of axial and bending loads, and in consideration of load excentricities.

The user may also specify deflection limits, lateral bracing, end notches, web holes, built-up members, service conditions, and floor composition. Fire design according to the char-rate method as per NDS is available for all solid timber products. Material, grade and series, width and thickness may all be specified as 'unknown' - a list of acceptable sections with all the combinations for a given span and loading situation will be generated.

Nordic Sizer is available to engineers, architects, and specifiers working with Nordic products.

LOAD DEVELOPMENT
EXAMPLES

EXAMPLE 1: FLUSH BEAM

Uniform loads: 40 psf live load, and 10 psf dead load.

1° Determine the tributary width (in feet).
In this example, the tributary width is 16/2+20/2 = 18 feet.

2° Determine the live and total load (in plf) on the beam:
Live Load (LL) = 40 psf x 18 ft = 720 plf
Total Load (TL) = (40 + 10) psf x 18 ft = 900 plf

3° Use the appropriate allowable uniform load table (pages 10-13) and match the span of the beam with the 'SPAN' column of the table. Always round the beam span up to the next even foot. In this example, use 14 feet.

4° Going from top to bottom, find a beam that supports a live load equal to or greater than 720 plf, and a total load equal to or greater than 900 plf. Both checks must be made to properly size the beam.

5° A 3-1/2x14 24F-1.9E will work (778 > 720, and 921 > 900).

Values may be interpolated if required.

EXAMPLE 2: DROPPED BEAM

Uniform loads: 40 psf live load, and 10 psf dead load.

When the beam is dropped and the I-joists are continuous over the beam, there is more load transferred to the beam. When I-joist spans are equal, this increase is 25%. If both spans are not equal, there is a potential for more than 25% increase. Complicated calculations are required to determine this increase. A simple and safe way to calculate this load is as follows:

1° Assume both spans of the I-joist to be the longest span. In the example, this should be the 17 feet span.

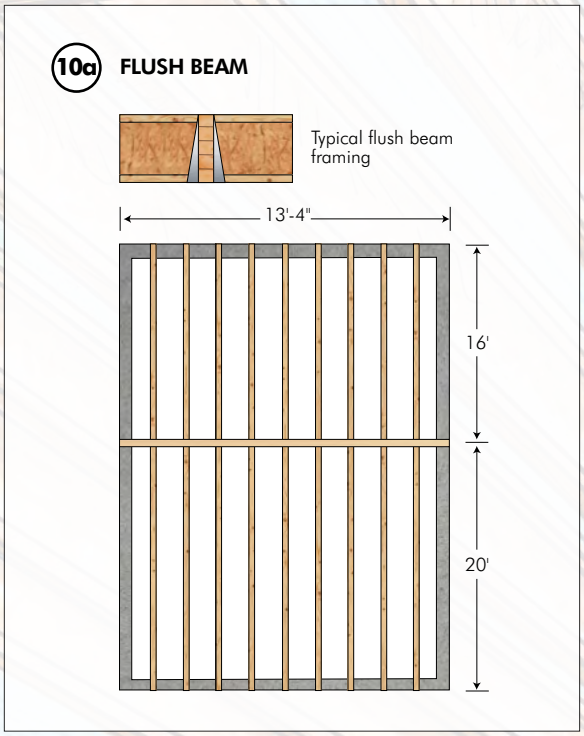
2° Calculate the load on the beam as if it were flush and increase by 25%:
Live Load (LL) = 40 psf x 17 ft x 1.25 = 850 plf
Total Load (TL) = (40 + 10) psf x 17 ft x 1.25 = 1063 plf

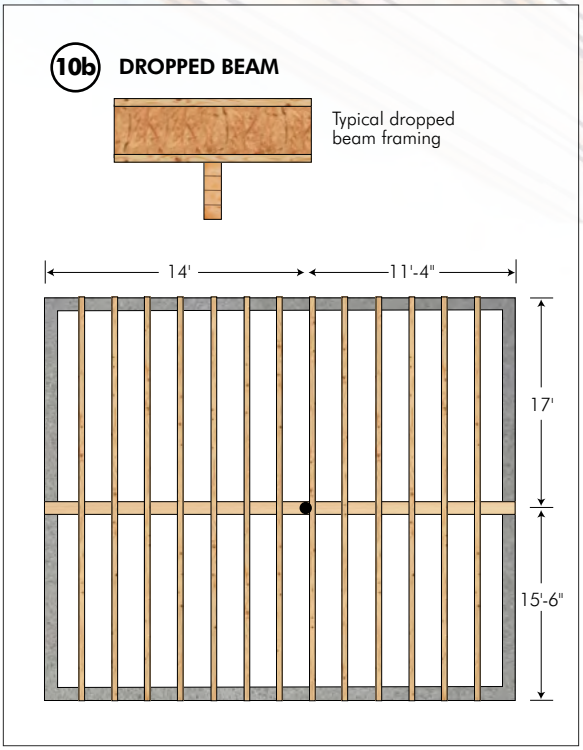
3° Use the longest span of the beam (round up to the next even foot) and use the appropriate plf table. In this example, use a span of 14 feet and verify for both live load and total load.

4° A 5-1/2x14 24F-1.9E will work (1167 > 850 and 1382 > 1063).

This method will always be safe provided the long span of the I-joist is not more than 5 times longer than the shorter span. When possible, a sizing program should be used.

FIGURE 10
LOAD DEVELOPMENT EXAMPLES





CONVERSION FACTORS

CONVERSION FACTORS

ITEM	IMPERIAL – METRIC			METRIC – IMPERIAL		
LENGTH	1 in.	=	25.4 mm	1 mm	=	0.0393701 in.
		=	0.0254 m	1 m	=	39.3701 in.
	1 ft	=	0.3048 m		=	3.28084 ft
	1 yd	=	0.9144 m		=	1.09361 yd
	1 mile	=	1.60934 km	1 km	=	0.621371 mile
LENGTH / TIME	1 ft/s	=	0.3048 m/s	1 m/s	=	3.28084 ft/s
	1 mph	=	1.60934 km/h	1 km/h	=	0.621371 mph
AREA	1 $in.^2$	=	645.16 mm^2	1 mm^2	=	0.001550 $in.^2$
	1 ft^2	=	0.0929030 m^2	1 m^2	=	10.7639 ft^2
	1 acre	=	0.404686 ha	1 ha	=	2.47105 acres
	1 mi^2	=	2.58999 km^2	1 km^2	=	0.386102 mi^2
VOLUME	1 $in.^3$	=	16387.1 mm^3	1 mm^3	=	0.0000610237 $in.^3$
	1 ft^3	=	0.0283168 m^3	1 m^3	=	35.3147 ft^3
	1 yd^3	=	0.764555 m^3		=	1.30795 yd^3
	1 fl oz (US)	=	29.5735 ml	1 ml	=	0.0338141 fl oz (US)
	1 gal (US)	=	3.78541 l	1 l	=	0.264172 gal (US)
MASS	1 oz	=	28.3495 g	1 g	=	0.0352740 oz
	1 lb	=	0.453592 kg	1 kg	=	2.20462 lb
	1 short ton (2,000 lbs)	=	0.907185 tons	1 Mg	=	1.10231 short tons
MASS / VOLUME	1 lb/ft^3	=	16.1085 kg/m^3	1 kg/m^3	=	0.062079 lb/ft^3
FORCE	1 lb	=	4.44822 N	1 N	=	0.224809 lb
STRESS	1 $lb/in.^2$ (psi)	=	0.00689476 N/mm^2 (MPa)	1 N/mm^2 (MPa)	=	145.038 $lb/in.^2$ (psi)
LOADING	1 lb/ft^2 (psf)	=	0.0478803 kN/m^2 (KPa)	1 kN/m^2 (KPa)	=	20.8854 lb/ft^2 (psf)
	1 lb/ft (plf)	=	0.0145939 kN/m	1 kN/m	=	68.5218 lb/ft (plf)
MOMENT	1 lb-ft	=	0.00135582 kN-m	1 kN-m	=	737.561 lb-ft
TEMPERATURE	1 °F	=	(°F-32) / 1.8 °C	1 °C	=	32 + 1.8 (°C) °F

NOTES:

1. 9.80665 Newton (N) = 1.0 kilogram (kg) x 9.80665 m/s^2
2. 1.0 Pascal (Pa) = 1.0 Newton per square meter (N/m^2)

PRODUCT WARRANTY

CHANTIERS CHIBOUGAMAU

PRODUCT WARRANTY

Chantiers Chibougamau guarantees that, in accordance with our specifications, Nordic products are free from manufacturing defects in material and workmanship.

Furthermore, Chantiers Chibougamau warrants that our products, when utilized in accordance with our handling and installation instructions, will meet or exceed our specifications for the lifetime of the structure.

ONE SMALL STEP FOR NORDIC ENGINEERED WOOD

ONE GIANT STEP
FOR INDUSTRY

From its inception Nordic Engineered Wood has strived to provide the most efficient wood products with the least environmental impacts. That's why Nordic Engineered Wood, in its exclusive partnership with Chantiers Chibougamau Ltd., has become a leader in demanding well-managed forestry practices.

Back in 2000, Nordic was one of the first in North America to demand that the wood used in its products meet or exceed the ISO 14001 Standard. Continuing its ongoing commitment to responsible wood solutions, Nordic Engineered Wood is proud to offer products that are certified by the Forest Stewardship Council, the international benchmark of well-managed forests.

What's in a logo?

With all the certification bodies out there, trying to do the right thing and buying responsibly produced products can be confusing. The FSC label makes it easy to make the right choice when buying wood products. This is what sets FSC apart:

Only FSC

- prohibits conversion of natural forests or other habitat around the world
- prohibits the use of highly hazardous pesticides around the world
- respects human rights with particular attention to indigenous peoples
- is the only forest ***certification system*** that is supported by all major environmental groups.
- identifies areas that need special protection (e.g. cultural or sacred sites, habitats of endangered animals or plants.

But most importantly only FSC reviews each certified operation ***at least*** once a year – and if they are found not to comply, the certificate is withdrawn.

"FSC has the highest environmental standard for forest management of any certification system in the world."

Monte Hummel
World Wildlife Fund, Canada

Protecting nature's resources is everyone's responsibility; at Nordic Engineered Wood we are doing our part.

Do yours.

FSC-Certified wood products are available. Consult your local distributor for details.

FSC
www.fsc.org

The mark of responsible forestry

FSC® C011517

www.nordicewp.com

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N-U121/ April 2014
Printed in Canada on recycled paper