

**Nordic X-Lam**  
**Nordic Structures**

**PR-L306**

Revised March 26, 2019

Products: Nordic X-Lam

Nordic Structures, 1100 Avenue des Canadiens-de-Montréal, Suite 100, Montreal, Québec,  
Canada H3B 2S2

(514) 871-8526

[www.nordic.ca](http://www.nordic.ca)

1. Basis of the product report:
  - 2018 and 2015 International Building Code (IBC): Section 2303.1.4 Structural Glued Cross-Laminated Timber
  - 2012 IBC: Section 104.11 Alternative materials
  - 2018 and 2015 International Residential Code (IRC): Sections R502.1.6, R602.1.6, and R802.1.6 Cross-Laminated Timber
  - 2012 IRC: Section R104.11 Alternative materials
  - ANSI/APA PRG 320-2018 Performance Rated Cross-Laminated Timber
  - ANSI/APA PRG 320-2017, PRG 320-2012, and PRG 320-2011 Performance Rated Cross-Laminated Timber, recognized in the 2018 IBC and IRC, 2015 IRC, and 2015 IBC, respectively
  - FPInnovations Reports 201002775, 201004981, 301010401, 301010956, and 301011903, HPVA Report T-14054R, and other qualification data
2. Product description:

Nordic X-Lam cross-laminated timber (CLT) is manufactured with spruce-pine-fir in accordance with the E1 or custom layups of ANSI/APA PRG 320 through product qualification and/or mathematical models using principles of engineering mechanics. Nordic X-Lam panels can be used in floor, roof, and wall applications, and is manufactured in a plank billet with nominal widths of 12 to 96 inches, thicknesses of 3 to 15 inches, and lengths up to 64 feet.
3. Design properties:

Nordic X-Lam CLT shall be designed with the design properties and capacities provided in Tables 1, 2, and 3, or with the allowable load table provided by the manufacturer ([www.nordic.ca/en/documentation/technical-documents](http://www.nordic.ca/en/documentation/technical-documents)). The design adjustment factors shall be based on the 2015 National Design Specification for Wood Construction (NDS), the recommendations provided by the manufacturer, the U.S. CLT Handbook ([www.rethinkwood.com/mass-timber-webform/cross-laminated-timber-clt-handbook](http://www.rethinkwood.com/mass-timber-webform/cross-laminated-timber-clt-handbook)), and approved by the engineer of record. The lateral resistance of Nordic X-Lam CLT, when used as shearwalls or diaphragms, depends on the panel-to-panel connection and anchorage designs, and shall be consulted with the CLT manufacturer and approved by the engineer of record.

Design values for the Load and Resistance Factor Design (LRFD) used in the U.S. for Nordic X-Lam CLT can be derived from the ASD values published in Tables 2 and 3 of this report in accordance with Tables 10.3.1, N1, N2, and N3 of the 2018 ANSI/AWC NDS.
4. Product installation:

Nordic X-Lam CLT shall be installed in accordance with the recommendations provided by the manufacturer (see link above) and the engineering drawing approved by the engineer of record. Permissible details shall be in accordance with the engineering drawing.

5. Fire-rated assemblies:

Fire-rated assemblies shall be constructed in accordance with the recommendations provided by the manufacturer (see link above). Procedures specified in Chapter 16 of the 2015 NDS shall be permitted for use in designing Nordic X-Lam CLT for a fire exposure up to 2 hours.

Nordic X-Lam CLT has been tested in accordance with ASTM E84 and meets the Class B rating for flame-spread index (26 – 75) and smoke-developed index (0 – 450).

6. Limitations:

- a) Nordic X-Lam CLT shall be designed in accordance with principles of mechanics using the design properties specified in this report or provided by the manufacturer.
- b) Nordic X-Lam products shall be limited to dry service conditions where the average equilibrium moisture content of solid-sawn lumber is less than 16 percent.
- c) Design properties for Nordic X-Lam CLT, when used as beams or lintels with loads applied parallel to the face-bond gluelines, other than the edgewise shear properties (see Table 3), are beyond the scope of this report.
- d) Nordic X-Lam CLT shall be manufactured in accordance with layup combinations specified in ANSI/APA PRG 320 or proprietary Nordic X-Lam CLT manufacturing specifications documented in the in-plant manufacturing standard approved by APA.
- e) Nordic X-Lam CLT is produced at the Nordic Structures, Chibougamau, Quebec facilities under a quality assurance program audited by APA.
- f) This report is subject to re-examination in one year.

7. Identification:

Nordic X-Lam CLT described in this report is identified by a label bearing the manufacturer's name (Nordic Structures) and/or trademark, the APA assigned plant number (1112), the product standard (ANSI/APA PRG 320), the APA logo, the CLT layup (E1), the report number PR-L306, and a means of identifying the date of manufacture.

Table 1. ASD Reference Design Values<sup>(a)</sup> for Lumber Laminations Used in Nordic X-Lam (For Use in the U.S.)

CLT Layup	Laminations Used in Major Strength Direction							Laminations Used in Minor Strength Direction						
	F <sub>b</sub> (psi)	E (10 <sup>6</sup> psi)	F <sub>t</sub> (psi)	F <sub>c</sub> (psi)	F <sub>c⊥</sub> (psi)	F <sub>v</sub> (psi)	F <sub>s</sub> (psi)	F <sub>b</sub> (psi)	E (10 <sup>6</sup> psi)	F <sub>t</sub> (psi)	F <sub>c</sub> (psi)	F <sub>c⊥</sub> (psi)	F <sub>v</sub> (psi)	F <sub>s</sub> (psi)
E1	1,950	1.7	1,375	1,800	425	135	45	500	1.2	250	650	425	135	45

For SI: 1 psi = 0.006895 MPa

<sup>(a)</sup> Tabulated values are allowable design values and not permitted to be increased for the lumber size adjustment factor in accordance with the NDS. The design values shall be used in conjunction with the section properties provided by the CLT manufacturer based on the actual layup used in manufacturing the CLT panel (see Table 2).

Table 2. ASD Flatwise Bending Reference Design Values<sup>(a)</sup> for Nordic X-Lam Listed in Table 1 (For Use in the U.S.)

CLT Layup <sup>(b)</sup>	Layup ID <sup>(c)</sup>	Thick-ness, t <sub>p</sub> (in.)	Lamination Thickness (in.) in CLT Layup						Major Strength Direction				Minor Strength Direction				
			=	⊥	=	⊥	=	⊥	=	(F <sub>b</sub> S) <sub>eff,1.0</sub> (lbf-ft/ft)	(EI) <sub>eff,1.0</sub> (10 <sup>6</sup> lbf-in. <sup>2</sup> /ft)	(GA) <sub>eff,1.0</sub> (10 <sup>6</sup> lbf/ft)	V <sub>s,0</sub> (lbf/ft)	(F <sub>b</sub> S) <sub>eff,1.90</sub> (lbf-ft/ft)	(EI) <sub>eff,1.90</sub> (10 <sup>6</sup> lbf-in. <sup>2</sup> /ft)	(GA) <sub>eff,1.90</sub> (10 <sup>6</sup> lbf/ft)	V <sub>s,90</sub> (lbf/ft)
E1	78-3s	3 1/8	1 1/64	1 1/16	1 1/64					2,525	48	0.34	1,110	95	1.4	0.47	380
	89-3s	3 1/2	1 3/8	3/4	1 3/8					3,350	72	0.48	1,260	45	0.51	0.39	270
	105-3s	4 1/8	1 3/8	1 3/8	1 3/8					4,525	115	0.46	1,490	160	3.1	0.61	495
	131-5s	5 1/8	1 1/64	1 1/16	1 1/64	1 1/16	1 1/64			5,800	184	0.69	1,860	790	36	0.94	1,130
	140-4s	5 1/2	1 3/8	1 3/8 x2	1 3/8					7,325	248	0.54	1,980	630	25	1.2	990
	143-5s	5 5/8	1 3/8	3/4	1 3/8	3/4	1 3/8			7,725	267	0.96	2,030	615	26	0.78	1,040
	175-5s	6 7/8	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8			10,400	440	0.92	2,480	1,370	81	1.2	1,490
	197-7s	7 3/4	1 3/8	3/4	1 3/8	3/4	1 3/8	3/4	1 3/8	13,725	654	1.4	2,800	1,410	101	1.2	1,800
	213-7l	8 3/8	1 3/8 x2	3/4	1 3/8	3/4	1 3/8 x2			18,700	963	1.6	3,025	615	26	0.93	1,040
	220-7s	8 5/8	1 3/8	1 1/16	1 3/8	1 1/16	1 3/8	1 1/16	1 3/8	15,975	853	1.4	3,125	2,190	187	1.5	2,130
	244-7s	9 5/8	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8	18,375	1,089	1.4	3,475	3,150	313	1.8	2,480
	244-7l	9 5/8	1 3/8 x2	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8 x2		23,700	1,404	1.4	3,475	1,370	81	1.3	1,490
	267-9l	10 1/2	1 3/8 x2	3/4	1 3/8	3/4	1 3/8	3/4	1 3/8 x2	28,325	1,831	2.0	3,775	1,410	101	1.3	1,800
	314-9l	12 3/8	1 3/8 x2	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8 x2	36,700	2,794	1.8	4,450	3,150	313	1.9	2,480

For SI: 1 in. = 25.4 mm; 1 ft = 304.8 mm; 1 lbf = 4.448N

<sup>(a)</sup> Tabulated values are allowable design values and not permitted to be increased for the lumber size adjustment factor in accordance with the NDS.

<sup>(b)</sup> The CLT layups are developed based on ANSI/APA PRG 320, as permitted by the standard.

<sup>(c)</sup> The layup designation refers to the panel thickness (expressed in mm), the number of layers, and the layup combination ("s" for standard perpendicular layers, and "l" for doubled outermost parallel layers).

Table 3. ASD Edgewise Bending Reference Design Values for Nordic X-Lam Listed in Table 1 (For Use in the U.S.)

CLT Layup	Layup ID	Thickness, $t_p$ (in.)	Major Strength Direction		Minor Strength Direction	
			$F_{v,e,0}$ <sup>(a)</sup> (psi)	$G_{e,0} t_p$ <sup>(d)</sup> (10 <sup>6</sup> lbf/ft)	$F_{v,e,90}$ <sup>(a)</sup> (psi)	$G_{e,90} t_p$ <sup>(d)</sup> (10 <sup>6</sup> lbf/ft)
E1	78-3s	3 1/8	155 <sup>(b)</sup>	1.36	190 <sup>(b)</sup>	1.36
	89-3s	3 1/2	155	1.52	190 <sup>(b)</sup>	1.52
	105-3s	4 1/8	155	1.79	190	1.79
	131-5s	5 1/8	185 <sup>(c)</sup>	2.23	215 <sup>(c)</sup>	2.23
	140-4s	5 1/2	145	2.39	190 <sup>(b)</sup>	2.39
	143-5s	5 5/8	185 <sup>(c)</sup>	2.44	215 <sup>(c)</sup>	2.44
	175-5s	6 7/8	185	2.99	215	2.99
	197-7s	7 3/4	155 <sup>(b)</sup>	3.37	215 <sup>(c)</sup>	3.37
	213-7l	8 3/8	185 <sup>(c)</sup>	3.64	215 <sup>(c)</sup>	3.64
	220-7s	8 5/8	185 <sup>(c)</sup>	3.75	215 <sup>(c)</sup>	3.75
	244-7s	9 5/8	185 <sup>(c)</sup>	4.18	215 <sup>(c)</sup>	4.18
	244-7l	9 5/8	185 <sup>(c)</sup>	4.18	215 <sup>(c)</sup>	4.18
	267-9l	10 1/2	155 <sup>(b)</sup>	4.56	215 <sup>(c)</sup>	4.56
	314-9l	12 3/8	185 <sup>(c)</sup>	5.38	215 <sup>(c)</sup>	5.38

For SI: 1 psi = 0.006895 MPa

- (a) Allowable edgewise in-plane shear stress, which shall be used in conjunction with the CLT thickness,  $t_p$ , to determine the in-plane shear capacities. If the net CLT thickness is less than the full CLT thickness, the in-plane shear capacities shall be calculated based on the net CLT thickness.
- (b) Based on test results from 105-3s.
- (c) Based on test results from 175-5s.
- (d) Edgewise shear rigidity is based on  $G_{e,0}$  and  $G_{e,90} = 36,200$  psi and the CLT thickness,  $t_p$ , in accordance with product performance testing.

APA – *The Engineered Wood Association* is an approved national standards developer accredited by American National Standards Institute (ANSI). APA publishes ANSI standards and Voluntary Product Standards for wood structural panels and engineered wood products. APA is an accredited certification body under ISO/IEC 17065 by Standards Council of Canada (SCC), an accredited inspection agency under ISO/IEC 17020 by International Code Council (ICC) International Accreditation Service (IAS), and an accredited testing organization under ISO/IEC 17025 by IAS. APA is also an approved Product Certification Agency, Testing Laboratory, Quality Assurance Entity, and Validation Entity by the State of Florida, and an approved testing laboratory by City of Los Angeles.

**APA – THE ENGINEERED WOOD ASSOCIATION  
 HEADQUARTERS**

7011 So. 19<sup>th</sup> St. • Tacoma, Washington 98466  
 Phone: (253) 565-6600 • Fax: (253) 565-7265 • Internet Address: [www.apawood.org](http://www.apawood.org)

**PRODUCT SUPPORT HELP DESK**  
 (253) 620-7400 • E-mail Address: [help@apawood.org](mailto:help@apawood.org)

**DISCLAIMER**

APA Product Report® is a trademark of APA – *The Engineered Wood Association*, Tacoma, Washington. The information contained herein is based on the product evaluation in accordance with the references noted in this report. Neither APA, nor its members make any warranty, expressed or implied, or assume any legal liability or responsibility for the use, application of, and/or reference to opinions, findings, conclusions, or recommendations included in this report. Consult your local jurisdiction or design professional to assure compliance with code, construction, and performance requirements. Because APA has no control over quality of workmanship or the conditions under which engineered wood products are used, it cannot accept responsibility for product performance or designs as actually constructed.