Technical Data, Nordic X-Lam

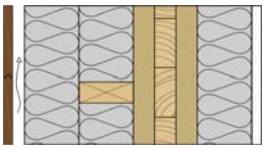
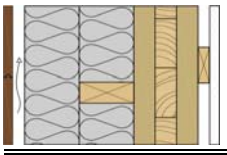
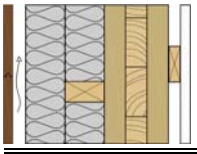
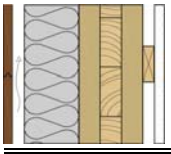
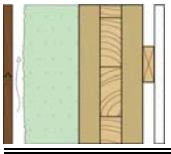
NORDIC X-LAM PRODUCTS

Construction	multi layered; 3, 5, 7, and 9 plies « E1 » stress grade
Dimensions	maximum width of 2438 mm (8 feet); including lapped-joints of 64 mm lengths up to 19.5 metres (64 feet) thicknesses from 78 to 381 mm (3 to 15 in.); standard 78 (3-1/8), 105 (4-1/8), 131 (5-1/8), 175 (6-7/8), 220 (8-5/8), 244 (9-5/8), and 314 mm (12-3/8 in.)
Joint profile	64 mm (2-1/2 in.) width lapped joint, on both sides
Appearance grade	industrial (architectural upon request)
Certification	APA Product Report PR-L306C; FSC certified products available
Lumber species	Spruce-Pine-Fir (S-P-F)
Lamellas	longitudinal lamellas 1950F_b MSR, transversal No. 3/Stud
Adhesives	weatherproof adhesives, formaldehyde free low volatile organic compounds (VOC) limits
Density	± 515 kg/m^3, Spruce-Pine-Fir
Moisture content	12 ± 2 %
Dimensional changes	longitudinal and transversal: 0,01% per % change in moisture content panel thickness: 0,20% per % change in moisture content
Thermal resistance	RSI = 0,21 m^2 °C/W, R = 4,7 ft^2 h °F/BTU per 100 mm
Acoustic resistance	wood as a material has good sound attenuation properties; sound transmission (STC) and impact insulation (IIC) classes for typical assemblies are shown below - more information available upon request
Fire safety	- the fire separating function of CLT panel assemblies can easily be met provided that the panels and joints between panels are effectively sealed to prevent air or hot gases from penetrating the assembly during fire exposure - charring rate of 0,65 mm/min.; see fire-resistance ratings (FRR) for typical assemblies - the flame spread and smoke developed classifications are 35 and 40, respectively (tests report available upon request)
Environmental performance	- available readily manufactured from wood certified as harvested from sustainably managed forests - long-term storage of the carbon absorbed by the sustainably grown trees - production of CLT resulting in far less greenhouse gas emissions than many non-wood materials - equivalent or better characteristics than functionally equivalent concrete and steel systems in other aspects of environmental performance such as thermal performance

ADVANTAGES

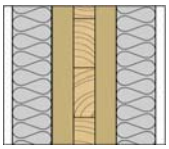
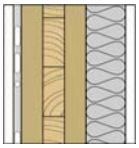
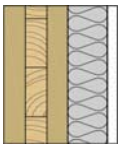
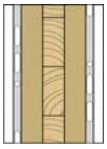
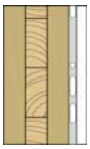
Flexible design	unrestricted designing without being bound to a grid
Simple component	simple building component construction and detailed planning
Detailed planning	minimum designing risk due to detailed planning documents
Advanced possibilities	advanced possibilities due to an efficient building material
Identical compositions	identical construction for all applications (wall/floor/roof)
Solid construction	massive timber building components, no extra bracing required
Short erection period	short construction period on site, economic assembly
Ready-to-install products	ready-to-install joined building components, delivered on time
Simple connection details	simple connection details, easy to execute
Durability	durable, solid and high quality timber construction
Sustainable material	ecological, carbon storing material (1 m^3 of wood = 1 ton of encapsulated CO_2)
Warmth	pleasant, warm in-door climate

Typical compositions, exterior walls

Exterior wall type	No	Description[1]	FRR[2]	RSI[3]	R[4]
	E1	- wood furring, 2 rows of 89 mm at 610 mm o.c. - rock fiber insulation, 2 layers of 89 mm - cross-laminated timber 105 mm - wood furring, 89 mm at 610 mm o.c. - rock fiber insulation, 89 mm - 1 layer 15,9 mm Type X gypsum board	1 h	8,0	45
	E2	- wood furring, 2 rows of 89 mm at 610 mm o.c. - rock fiber insulation, 2 layers of 89 mm - cross-laminated timber 105 mm	n/a	5,6	32
	E2.1	- wood furring, 2 rows of 89 mm at 610 mm o.c. - rock fiber insulation, 2 layers of 89 mm - cross-laminated timber 105 mm - wood furring, 19 mm at 610 mm o.c. - 1 layer 15,9 mm Type X gypsum board	1 h	5,7	32
	E3	- wood furring, 2 rows of 64 mm at 610 mm o.c. - rock fiber insulation, 2 layers of 64 mm - cross-laminated timber 105 mm	n/a	4,3	24
	E3.1	- wood furring, 2 rows of 64 mm at 610 mm o.c. - rock fiber insulation, 2 layers of 64 mm - cross-laminated timber 105 mm - wood furring, 19 mm at 610 mm o.c. - 1 layer 15,9 mm Type X gypsum board	1 h	4,4	25
	E4	- wood furring, 89 mm at 610 mm o.c. - rock fiber insulation, 89 mm - cross-laminated timber 105 mm	n/a	3,3	19
	E4.1	- wood furring, 89 mm at 610 mm o.c. - rock fiber insulation, 89 mm - cross-laminated timber 105 mm - wood furring, 19 mm at 610 mm o.c. - 1 layer 15,9 mm Type X gypsum board	1 h	3,4	19
	E5	- wood furring, 89 mm at 610 mm o.c. - sprayed foam insulation, 89 mm - cross-laminated timber 105 mm	n/a	4,4	25
	E5.1	- wood furring, 89 mm at 610 mm o.c. - sprayed foam insulation, 89 mm - cross-laminated timber 105 mm - wood furring, 19 mm at 610 mm o.c. - 1 layer 15,9 mm Type X gypsum board	1 h	4,5	26

Notes:
(1) The designer shall include at least the siding, air space and air barrier in the above compositions.
(2) Fire resistance rating determined by testing according to CAN/ULC S101, *Standard methods of fire endurance tests of building construction and materials,* with restricted load use conditions and/or based on the char rate design methodology. Higher fire resistance ratings may be possible by design.
(3) Total thermal resistance of the wall element (m^2 °C/W); see minimum requirements according to different codes on page 5.
(4) Total thermal resistance of the wall element (R value); to convert the RSI value to R value, divide the RSI value by 0.1761.
(5) Good thermal insulation is never arbitrary and must always be chosen according to location, zone, and climate.

Typical compositions, interior walls

Interior wall type	No	Description	FRR[1]	STC[2]
	M1	- 1 layer Type X gypsum board - mineral wool, 64 mm - wood studs, 64 mm at 610 mm o.c. - cross-laminated timber 105 mm - wood studs, 64 mm at 610 mm o.c. - mineral wool, 64 mm - 1 layer 15,9 mm Type X gypsum board	1 h	58[3]
	M2	- 1 layer Type X gypsum board - resilient metal channels at 406 mm o.c. - cross-laminated timber 105 mm - air gap, 10 mm (optional) - wood studs, 64 mm at 610 mm o.c. - mineral wool, 64 mm - 1 layer 15,9 mm Type X gypsum board	1 h	53[4]
	M3	- cross-laminated timber 105 mm	30 min.	33[3]
	M3.1	- cross-laminated timber 105 mm - air gap, 10 mm (optional) - wood studs, 64 mm at 610 mm o.c. - mineral wool, 64 mm - 1 layer 15,9 mm Type X gypsum board	30 min.	50[4]
	M4	- 1 layer 15,9 mm Type X gypsum board - resilient metal channels at 406 mm o.c. - cross-laminated timber 105 mm - resilient metal channels at 406 mm o.c. - 1 layer 15,9 mm Type X gypsum board	1 h	37[3]
	M5	- cross-laminated timber 105 mm	30 min.	33[3]
	M5.1	- cross-laminated timber 105 mm - resilient metal channels at 406 mm o.c. - 1 layer 15,9 mm Type X gypsum board	30 min.	n/d

Notes :

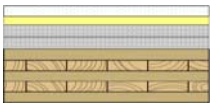
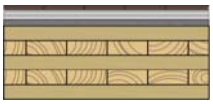
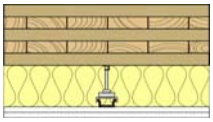
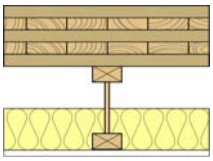
(1) Fire resistance rating determined by testing according to CAN/ULC S101, *Standard methods of fire endurance tests of building construction and materials,* with restricted load use conditions and/or based on the char rate design methodology. Higher fire resistance ratings may be possible by design.

(2) The building code requires that a dwelling unit shall be separated from every other space in a building in which noise may be generated by construction providing a sound transmission class rating not less than 50, measured in accordance with the applicable standards. *(Ref. National Building Code of Canada 2010, Articles 5.9.1.2. and 9.11.2.1)*

(3) Value based on a 105 mm wood panel. *(Ref. CLT Hanbook, Chapter 9)*

(4) Value obtained from field test results, adjusted based on STC ≈ FSTC + 3 points. *(Ref. Test report, FPInnovations)*

Typical compositions, floors

Floor type	No	Description	FRR[1]	STC[2]	IIC[3]
	P1	- gypsum fiberboard FERMACELL, 25 mm - sub-floor ISOVER EP3, 20 mm - honeycomb acoustic infill (screed), 2x 30 mm - Kraft paper underlayment - cross-laminated timber 175 mm	1,5 h	62	59
	P1.1	+ 1 layer 15,9 mm Type X gypsum board	2 h	> 62	> 59
	P2	- carpet or floating flooring, 10 mm - resilient underlayment (rubber mat or textured felt), 3 mm - at least 76 kg/m^2 wet topping (concrete, gypcrete, gypsum) - resilient underlayment (10 mm rubber mat, 18 mm textured felt, or 12 mm low density wood fiberboard) - cross-laminated timber 175 mm	1,5 h	> 53[4]	> 55[4]
	P2.1	+ 1 layer 15,9 mm Type X gypsum board	2 h	> 53[4]	> 55[4]
	P3	- carpet or floating flooring, 10 mm - resilient underlayment (rubber mat or textured felt), 3 mm - at least 25 kg/m^2 dry topping (20 mm Fermacell, cement fibreboard, or Fibrerock) - resilient underlayment (10 mm rubber mat, 18 mm textured felt, or 12 mm low density wood fiberboard) - cross-laminated timber 175 mm	1,5 h	> 48[4]	> 50[4]
	P3.1	+ 1 layer 15,9 mm Type X gypsum board	2 h	> 48[4]	> 50[4]
	P4	- cross-laminated timber 175 mm	1,5 h	39[5]	27[5]
	P4.1	- cross-laminated timber 175 mm - sound insulation clips of 100 mm high - metal hat channels, at min. 406 mm o.c. - sound insulation material, 100 mm - 2 layers 12,7 mm Type X gypsum board	2 h	64	59
	P5	- cross-laminated timber 175 mm	1,5 h	39[5]	27[5]
	P5.1	- FERMACELL 2E32 or Permabase and Sonopan - cross-laminated timber 175 mm - 200 mm wood I-joists, 610 mm o.c. - sound insulation material, 89 mm - 1 layer 15,9 mm Type X gypsum board	2 h	59	54

Notes :

(1) Fire resistance rating determined by testing according to CAN/ULC S101, *Standard methods of fire endurance tests of building construction and materials,* with restricted load use conditions and/or based on the char rate design methodology. Higher fire resistance ratings may be possible by design.

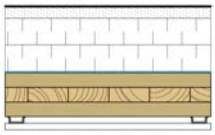
(2) The building code requires that a dwelling unit shall be separated from every other space in a building in which noise may be generated by construction providing a sound transmission class rating not less than 50, measured in accordance with the applicable standards. *(Ref. National Building Code of Canada 2005, Articles 5.9.1.2. and 9.11.2.1)*

(3) The higher the IIC, the better the attenuation of impact sound, with 50 usually considered the minimum rating for occupant satisfaction in residential buildings.

(4) Value obtained from field test results, adjusted based on FSTC ≈ FIIC + 5 points and STC ≈ FSTC + 3 points. *(Ref. Test report, FPInnovations)*

(5) Values have been adjusted for a 175 mm wood slab. *(Ref. CLT Hanbook, Chapter 9)*

Typical compositions, roofs

Roof type	No	Description[1]	FRR[2]	RSI[3]	R[4]
	**T1**	- membrane and underlayment - fiberboard, 25 mm *(Perlite)* - rigid insulation, 127 mm - 2 ply vapor barrier - cross-laminated timber 105 mm	n/a	5,8	33
	T1.1	+ resilient metal channels at 406 mm o.c. + 1 layer 15,9 mm Type X gypsum board	1 h	5,8	33

Notes:
(1) The designer shall include at least the siding, air space and air barrier to the above compositions.
(2) Fire resistance rating determined by testing according to CAN/ULC S101, *Standard methods of fire endurance tests of building construction and materials,* with restricted load use conditions and/or based on the char rate design methodology. Higher fire resistance ratings may be possible by design.
(3) Total thermal resistance of the wall element (m^2 °C/W); see minimum requirements according to different codes below.
(4) Total thermal resistance of the wall element (R value); to convert the RSI value to R value, divide the RSI value by 0.1761.
(5) Good thermal insulation is never arbitrary and must always be chosen according to location, zone, and climate.

Thermal resistances, minimum requirements

Thermal resistances, minimum requirements

Building component[1]			Exterior wall		Roof or ceiling	
Reference / Zone (degree-days under 18 °C)		*Example*	RSI	R	RSI	R
Passive house[3]			8,81	50	8,81	50
Novoclimat[4]			4,31	24	4,31	24
L.R.Q., c. B-1.1[5]	Zone A (≤ 6200)	*Malartic*	4,31	24	7,22	41
	Zone B (> 6200)	*Dolbeau*	5,11	29	9,00	51
NECB 2011[6]	Zone 5 (from 3000 to 3999)	*Toronto*	3,60	20	5,46	31
	Zone 6 (from 4000 to 4999)	*Montreal*	4,05	23	5,46	31
	Zone 7 (from 5000 to 6999)	*Québec*	4,76	27	6,17	35

Notes:
(1) See appropriate references for other types of building components.
(2) The heating degree-days for a given location can be found in Appendix C of the National Building Code.
(3) Required insulation levels are determined by modeling the building and relevant climate data. In most parts of Canada insulation levels of at least RSI = 8,81 m^2 °C/W (i.e. R-50) are required throughout the building envelope.
(4) For the Novoclimat program, the insulation of above ground walls and type III roofs must meet the minium required RSI = 4,31, and the coverage of thermal bridges as prescribed in sections 1.1.4 and 1.1.3, respectively, of the document « *Exigences techniques pour les immeubles à logements et à condominiums* ».
(5) According to the draft law amending the building code to promote energy efficiency (c. B-1.1).
(6) The prescriptive requirements of the NECB, division B, part 3, set a maximum overall thermal transmittance (U-value). These values vary only with the heating degree-day location of the building.