Technical Data, Nordic X-Lam

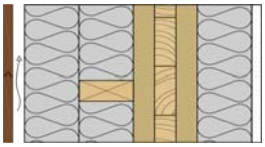
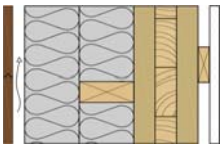
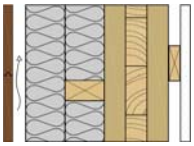
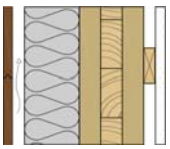
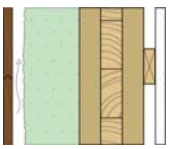
NORDIC X-LAM PRODUCTS

Construction	multi layered; 3, 5, 7, and 9 plies « E1 » stress grade
Dimensions	maximum width of 8 feet; including lapped-joints of 2-1/2 inches (64 mm) lengths up to 64 feet (19.5 meters) thicknesses from 3 to 15 in. (78 to 381 mm); standard 3-1/8 (78), 4-1/8 (105), 5-1/8 (131), 6-7/8 (175), 8-5/8 (220), 9-5/8 (244), and 12-3/8 in. (314 mm)
Joint profile	2-1/2-inch (64 mm) width lapped joint, on both sides
Appearance grade	industrial (architectural upon request)
Certification	APA Product Report PR-L306; FSC certified products available
Lumber species	Spruce-Pine-Fir (S-P-F)
Lamellas	longitudinal lamellas 1950f MSR, transversal No. 3
Adhesives	weatherproof adhesives, formaldehyde free low volatile organic compounds (VOC) limits
Density	± 32 pcf, 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 = 0.87 m^2 °C/W, R = 1.2 ft^2 h °F/BTU per inch
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 - nominal charring rate of 1.5 in./hr; see fire-resistance ratings (FRR) for typical assemblies - the flame spread and smoke developed indexes are within the limits of Class B, as defined in Section 803.1 of the IBC (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

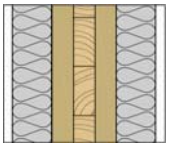
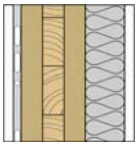
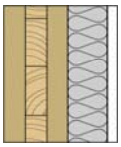
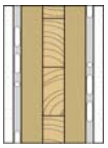
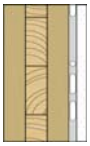
Flexible design	unrestricted designing without being bound to a grid
Simple component	simple building component construction and detailed planning
Detailed planning	minimum designing risk due to detailed planning documents
Advanced possibilities	advanced possibilities due to an efficient building material
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]
	E1.1	- wood furring, 2 rows of 3-1/2 in. at 24 in. o.c. - rock fiber insulation, 2 layers of 3-1/2 in. - cross-laminated timber 4-1/8 in. - wood furring, 3-1/2 in. at 24 in. o.c. - rock fiber insulation, 3-1/2 in. - 1 layer 5/8 in. Type X gypsum board	1 h	8,0	45
	E2	- wood furring, 2 rows of 3-1/2 in. at 24 in. o.c. - rock fiber insulation, 2 layers of 3-1/2 in. - cross-laminated timber 4-1/8 in.	n/a	5,6	32
	E2.1	- wood furring, 2 rows of 3-1/2 in. at 24 in. o.c. - rock fiber insulation, 2 layers of 3-1/2 in. - cross-laminated timber 4-1/8 in. - wood furring, 3/4 in. at 24 in. o.c. - 1 layer 5/8 in. Type X gypsum board	1 h	5,7	32
	E3	- wood furring, 2 rows of 2-1/2 in. at 24 in. o.c. - rock fiber insulation, 2 layers of 2-1/2 in. - cross-laminated timber 4-1/8 in.	n/a	4,3	24
	E3.1	- wood furring, 2 rows of 2-1/2 in. at 24 in. o.c. - rock fiber insulation, 2 layers of 2-1/2 in. - cross-laminated timber 4-1/8 in. - wood furring, 3/4 in. at 24 in. o.c. - 1 layer 5/8 in. Type X gypsum board	1 h	4,4	25
	E4	- wood furring, 3-1/2 in. at 24 in. o.c. - rock fiber insulation, 3-1/2 in. - cross-laminated timber 4-1/8 in.	n/a	3,3	19
	E4.1	- wood furring, 3-1/2 in. at 24 in. o.c. - rock fiber insulation, 3-1/2 in. - cross-laminated timber 4-1/8 in. - wood furring, 3/4 in. at 24 in. o.c. - 1 layer 5/8 in. Type X gypsum board	1 h	3,4	19
	E5	- wood furring, 3-1/2 in. at 24 in. o.c. - sprayed foam insulation, 3-1/2 in. - cross-laminated timber 4-1/8 in.	n/a	4,4	25
	E5.1	- wood furring, 3-1/2 in. at 24 in. o.c. - sprayed foam insulation, 3-1/2 in. - cross-laminated timber 4-1/8 in. - wood furring, 3/4 in. at 24 in. o.c. - 1 layer 5/8 in. Type X gypsum board	1 h	4,5	26

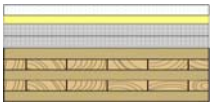
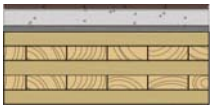
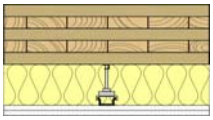
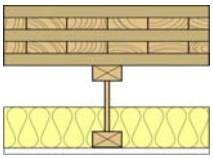
Notes:
(1) The designer shall include at least the siding, air space and air barrier in the above compositions.
(2) Fire resistance rating determined by testing according to CAN/ULC S101, *Standard methods of fire endurance tests of building construction and materials,* with restricted load use conditions and/or based on the char rate design methodology (CAN/ULC S101 reproduces the standard fire severity of the ASTM E119 standard). Higher fire resistance ratings may be possible by design.
(3) Total thermal resistance of the wall element (m^2 °C/W); to convert the RSI value to R value, divide the RSI value by 0.1761.
(4) Total thermal resistance of the wall element (R value); see minimum requirements according to the 2012 IECC on page 5.
(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, 2-1/2 in. - wood studs, 2-1/2 in. at 24 in. o.c. - cross-laminated timber 4-1/8 in. - wood studs, 2-1/2 in. at 24 in. o.c. - mineral wool, 2-1/2 in. - 1 layer 5/8 in. Type X gypsum board	1 h	58[3]
	M2	- 1 layer Type X gypsum board - resilient metal channels at 16 in. o.c. - cross-laminated timber 4-1/8 in. - air gap, 1/2 in. (optional) - wood studs, 2-1/2 in. at 24 in. o.c. - mineral wool, 2-1/2 in. - 1 layer 5/8 in. Type X gypsum board	1 h	53[4]
	M3	- cross-laminated timber 4-1/8 in.	30 min.	33[3]
	M3.1	- cross-laminated timber 4-1/8 in. - air gap, 1/2 in. (optional) - wood studs, 2-1/2 in. at 24 in. o.c. - mineral wool, 2-1/2 in. - 1 layer 5/8 in. Type X gypsum board	30 min.	50[4]
	M4	- 1 layer Type X gypsum board - resilient metal channels at 16 in. o.c. - cross-laminated timber 4-1/8 in. - resilient metal channels at 16 in. o.c. - 1 layer Type X gypsum board	1 h	37[3]
	M5	- cross-laminated timber 4-1/8 in.	30 min.	33[3]
	M5.1	- cross-laminated timber 4-1/8 in. - resilient metal channels at 16 in. o.c. - 1 layer Type X gypsum board	30 min.	n/d

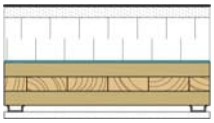
Notes :
(1) Fire resistance rating determined by testing according to CAN/ULC S101, *Standard methods of fire endurance tests of building construction and materials,* with restricted load use conditions and/or based on the char rate design methodology (CAN/ULC S101 reproduces the standard fire severity of the ASTM E119 standard). Higher fire resistance ratings may be possible by design.
(2) Walls and partitions assemblies separating dwelling units from each other or from public or service areas shall have a sound transmission class (STC) of not less than 50 (45 if field tested) for air-borne noise when tested in accordance with ASTM E 90. *(Ref. 2012 IBC, Article 1207.2)*
(3) Value based on a 4-1/8 in. 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, 1 in. - sub-floor ISOVER EP3, 0.79 in. - honeycomb acoustic infill (screed), 2x 1.18 in. - Kraft paper underlayment - cross-laminated timber 6-7/8 in.	1,5 h	62	59
	P1.1	+ 1 layer 5/8 in. Type X gypsum board	2 h	> 62	> 59
	P2	- carpet or floating flooring, about 2/5 in. - resilient underlayment (rubber mat or textured felt), 0.12 in. - at least 15.6 lb/ft^2 wet topping (concrete, gypcrete, gypsum) - resilient underlayment (2/5 in. rubber mat, 3/4 in. textured felt, or 1/2 in. low density wood fiberboard) - cross-laminated timber 6-7/8 in.	1,5 h	> 53[4]	> 55[4]
	P2.1	+ 1 layer 5/8 in. Type X gypsum board	2 h	> 53[4]	> 55[4]
	P3	- carpet or floating flooring, about 2/5 in. - resilient underlayment (rubber mat or textured felt), 0.12 in. - at least 25 kg/m^2 dry topping (20 mm Fermacell, cement fibreboard, or Fibrerock) - resilient underlayment (2/5 in. rubber mat, 3/4 in. textured felt, or 1/2 in. low density wood fiberboard) - cross-laminated timber 6-7/8 in.	1,5 h	> 48[4]	> 50[4]
	P3.1	+ 1 layer 5/8 in. Type X gypsum board	2 h	> 48[4]	> 50[4]
	P4	- cross-laminated timber 6-7/8 in.	1,5 h	39[5]	27[5]
	P4.1	- cross-laminated timber 6-7/8 in. - sound insulation clips of 4 in. high - metal hat channels, at min. 16 in. o.c. - sound insulation material, 4 in. - 2 layers 1/2 in. Type X gypsum board	2 h	64	59
	P5	- cross-laminated timber 6-7/8 in.	1,5 h	39[5]	27[5]
	P5.1	- FERMACELL 2E32 or Permabase and Sonopan - cross-laminated timber 6-7/8 in. - 7-7/8 in. wood I-joists, 24 in. o.c. - sound insulation material, 3-1/2 in. - 1 layer 5/8 in. 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 (CAN/ULC S101 reproduces the standard fire severity of the ASTM E119 standard). Higher fire resistance ratings may be possible by design.
(2) Floor/ceiling assemblies separating dwelling units from each other or from public or service areas shall have a sound transmission class (STC) of not less than 50 (45 if field tested) for air-borne noise when tested in accordance with ASTM E 90. *(Ref. 2012 IBC, Article 1207.2)*
(3) Floor/ceiling assemblies between dwelling units or between a dwelling unit and a public or service area within the structure shall have an impact insulation class (IIC) rating of not less than 50 (45 if field tested) when tested in accordance with ASTM E 492. *(Ref. 2012 IBC, Article*
(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 6-7/8 in. 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, 1 in. *(Perlite)* - rigid insulation, 4 in. - 2 ply vapor barrier - cross-laminated timber 4-1/8 in.	n/a	4,9	28
	T1.1	+ resilient metal channels at 16 in. o.c. + 1 layer 5/8 in. Type X gypsum board	1 h	4,9	28

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 (CAN/ULC S101 reproduces the standard fire severity of the ASTM E119 standard). Higher fire resistance ratings may be possible by design.
(3) Total thermal resistance of the wall element (m^2 °C/W); to convert the RSI value to R value, divide the RSI value by 0.1761.
(4) Total thermal resistance of the wall element (R value); see minimum requirements according to the 2012 ICEE below.
(5) Good thermal insulation is never arbitrary and must always be chosen according to location, zone, and climate.

Thermal envelope requirements

Thermal envelope requirements

Building type	Commercial[3]		Residential	
Building component[1]	Walls, above grade	Roofs[4]	Wood frame wall	Ceiling
Climate zone[2]	R-value	R-value	R-value[5]	R-value
Zone 1, All other and Group R	R-13+3.8ci or R-20	R-20ci	13	30
Zone 2, All other and Group R	R-13+3.8ci or R-20	R-20ci	13	38
Zone 3, All other and Group R	R-13+3.8ci or R-20	R-20ci	20 or 13+5	38
Zone 4, All other and Group R	R-13+3.8ci or R-20	R-25ci	20 or 13+5	49
Zone 5, All other	R-13+3.8ci or R-20	R-25ci	n/a	n/a
Zone 5, Group R	R-13+7.5ci or R-20+3.8ci	R-25ci	20 or 13+5	49
Zone 6, All other and Group R	R-13+7.5ci or R-20+3.8ci	R-30ci	20+5 or 13+10	49
Zone 7, All other and Group R	R-13+7.5ci or R-20+3.8ci	R-35ci	20+5 or 13+10	49
Zone 8, All other and Group R	R-13+15.6ci or R-20+10ci	R-35ci	20+5 or 13+10	49

Where ci = Continuous insulation

Notes:
(1) See appropriate references for other types of building components.
(2) The climate zones for a given location can be found in Chapter 3 of the 2012 International Energy Conservation Code.
(3) Commercial buildings or portions of commercial buildings enclosing Group R occupancies shall use the R-values from the “Group R” line of table above. Commercial buildings or portions of commercial buildings enclosing occupancies other than Group R shall use the R-values from the “All other” line of table above.
(4) Roofs insulation entirely above deck.
(5) First value is cavity insulation, second is continuous insulation or insulated siding, so “13+5” means R-13 cavity insulation plus R-5 continuous insulation or insulated siding. If structural sheathing covers 40 percent or less of the exterior, continuous insulation R-value shall be permitted to be reduced by no more than R-3 in the locations where structural sheathing is used – to maintain a consistent total sheathing thickness.