NORDIC

TECHNICAL GUIDE
NORDIC X-LAM

NS-GT6

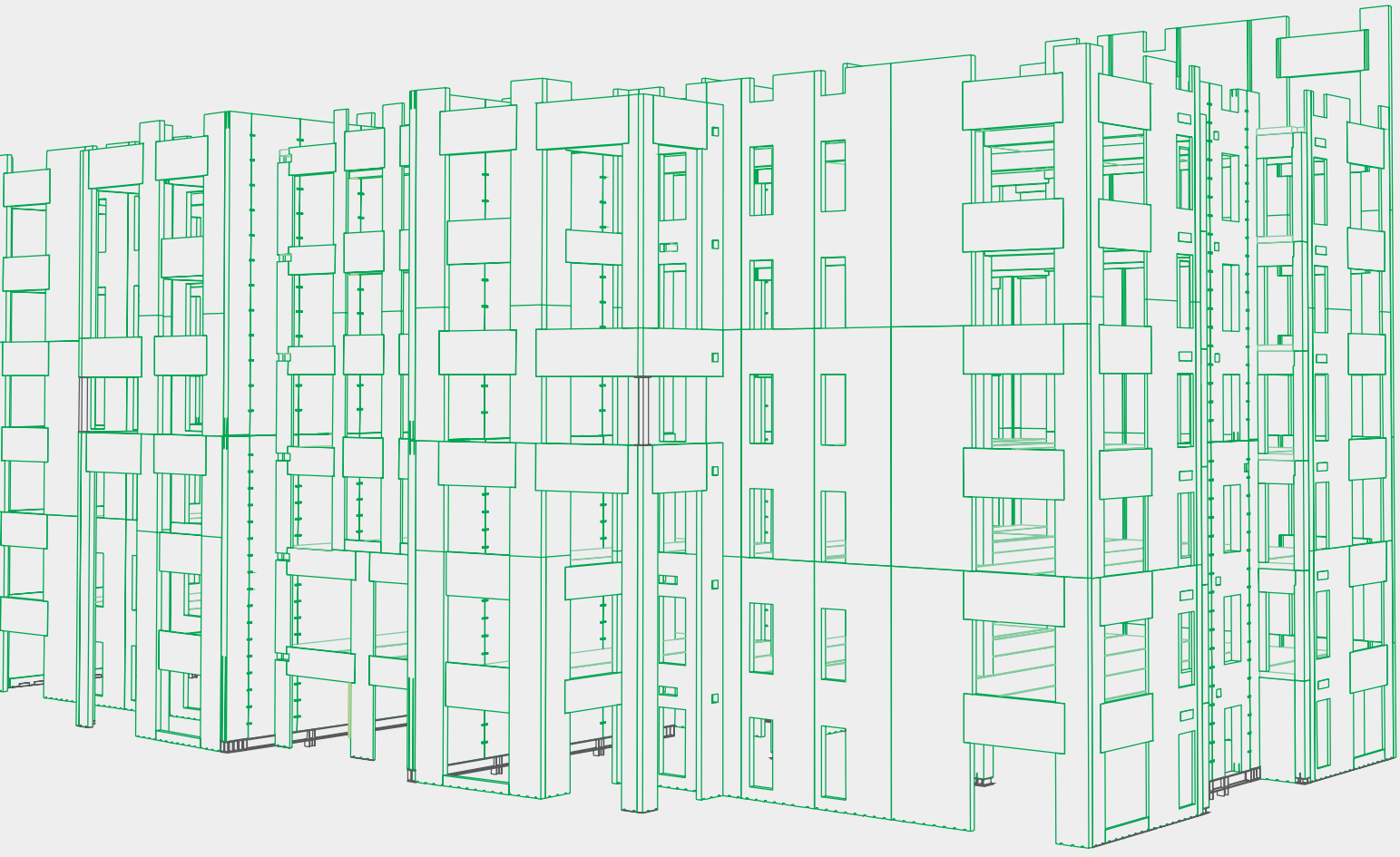
ASD

VERSION
2022-04-21

Mass Timber Construction

NORDIC X-LAM TECHNICAL GUIDE

NORDIC X-LAM



NORDIC
STRUCTURES

ABOUT NORDIC

NORDIC STRUCTURES

Nordic Structures is the leading innovator in mass timber construction. Its resource comes from responsibly managed lands within the regional boreal forest. Vertical integration, from forest to structure, bolstered by Nordic's experienced design and development team, ensures consistent quality and unparalleled level of service.

514-871-8526
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HEAD OFFICE

Nordic Structures
100-1100 Canadiens-de-Montréal Avenue
Montréal, Québec H3B 2S2
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GENERAL INFORMATION

info@nordic.ca

TECHNICAL SUPPORT

arch@nordic.ca

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ENGINEERED WOOD PRODUCTS

Standard size products available
from our distributors

NS-GT3

NORDIC JOIST

NORDIC I-JOISTS

Nordic I-joists are composed of sawn lumber flanges connected by a structural oriented strand board and bonded together with exterior-grade adhesives.

NI-40x — RESIDENTIAL SERIES

2×3 1950f MSR, 3/8 in. web
Depths
9-1/2, 11-7/8 and 14 in.

NI-60

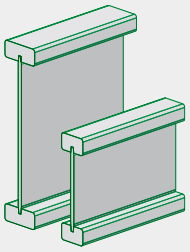
2×3 2100f MSR, 3/8 in. web
Depths
9-1/2, 11-7/8, 14 and 16 in.

NI-80

2×4 2100f MSR, 3/8 in. web
Depths
9-1/2, 11-7/8, 14 and 16 in.

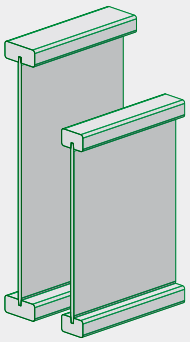
NI-90

2×4 2400f MSR, 7/16 in. web
Depths
11-7/8, 14 and 16 in.



NI-80x — COMMERCIAL SERIES

2×4 2100f MSR, 7/16 in. web
Depths
18, 20, 22 and 24 in.



NS-GT4

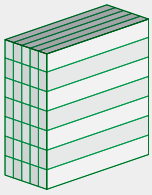
NORDIC LAM

NORDIC LAM
GLUED-LAMINATED TIMBER

Nordic Lam glued-laminated timber of industrial appearance classification consists of small wood laminations bonded together in parallel using structural adhesives.

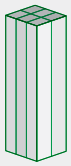
BEAMS AND HEADERS

Widths
1-3/4, 3-1/2, 5-1/2 and 7 in.
Depths
9-1/2, 11-7/8, 14, 16, 18, 20, 22 and 24 in.
Lengths*
Up to 48 ft
Stress grade
24F-1.9E



COLUMNS

Widths
3-1/2, 5-1/2 and 7 in.
Depths
3-1/2, 5-1/2 and 7 in.
Lengths*
Up to 48 ft
Stress grade
ES12



STUDS

Widths
1-1/2 and 1-3/4 in.
Depths
5-1/2 and 7-1/4 in.
Lengths*
Up to 48 ft
Stress grade
ES11

* Larger sizes available upon request

MASS TIMBER CONSTRUCTION

Products custom-manufactured
and machined for major projects

NS-GT5

NORDIC LAM+

NORDIC LAM+ GLUED-LAMINATED TIMBER

Nordic Lam+ glued-laminated timber of architectural appearance classification consists of small wood laminations bonded together in parallel using structural adhesives.

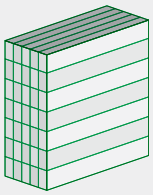
BEAMS AND COLUMNS

Widths*
38, 86, 137, 184, 215, 241, 292, 346, 395, 448, 502, 552 and 603 mm
(1-1/2, 3-3/8, 5-3/8, 7-1/4, 8-1/2, 9-1/2, 11-1/2, 13-5/8, 15-1/2, 17-5/8, 19-3/4, 21-3/4 and 23-3/4 in.)

Depths*
From 67 to 2435 mm
(2-5/8 to 95-7/8 in.)

Lengths*
Up to 24.4 m (80 ft)

Stress grade
24F-ES/NPG



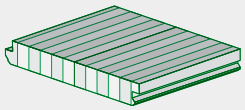
DECKING

Thicknesses*
38, 44, 54 and 89 mm
(1-1/2, 1-3/4, 2-1/8 and 3-1/2 in.)

Widths
203, 305 and 406 mm
(8, 12 and 16 in.)

Lengths
Up to 18.9 m (62 ft)

Stress grades
ES11, except 89 mm thickness in 20F-ES/CPG



* Larger sizes available upon request

NS-GT6

NORDIC X-LAM

NORDIC X-LAM CROSS-LAMINATED TIMBER

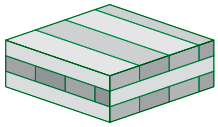
Nordic X-Lam cross-laminated timber is made of at least three orthogonal layers of graded sawn lumber that are laminated by gluing with structural adhesives.

SLABS AND PANELS

Layup combinations
89-3s, 105-3s,
143-5s, 175-5s,
197-7s, 213-7l, 245-7s, 245-7l
and 267-9l

Maximum sizes
2.70 × 19.5 m (106-1/4 in. × 64 ft)

Stress grade
E1 (L 1950Fb and T No. 3/Stud)



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NORDIC X-LAM

NORDIC X-LAM CROSS-LAMINATED TIMBER

Nordic X-Lam cross-laminated timber is made of at least three orthogonal layers of graded sawn lumber that are laminated by gluing with structural adhesives.

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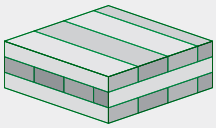
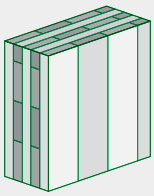
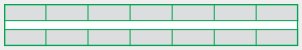




NORDIC X-LAM LAYUP COMBINATIONS

3 LAYERS

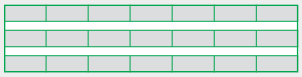
89-3s



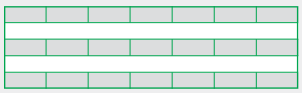
105-3s

5 LAYERS

143-5s

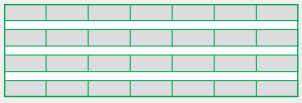


175-5s

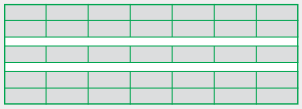


7 LAYERS

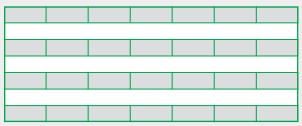
197-7s



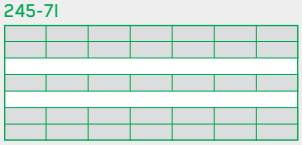
213-7l



245-7s

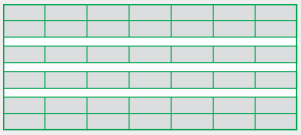


245-7l



9 LAYERS

267-9l



Nordic X-Lam – Specification Guide

Specifications

Cross-laminated timber (CLT) products shall be used in dry service conditions, such as in most covered structures, where the average equilibrium moisture content of solid wood is less than 16 percent. CLT products are intended to resist the effects of moisture on structural performance as may occur due to construction delays or other conditions of similar severity.

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REFERENCE STANDARD

.1 ANSI/APA PRG 320-[2018], Standard for Performance-Rated Cross-Laminated Timber.

ACTION AND INFORMATION SUBMITTALS

.1 Submit the product report published by a certification agency accredited by the International Accreditation Service at completion of fabrication.

MATERIALS

.1 Laminating stock: Spruce-Pine-Fir, [FSC certified]
.2 Sealer: Penetrating type, clear sealer (Sansin KP-12UVW) applied only to exposed (architectural-grade) surfaces
.3 Preservative: [Specify as required]
.4 Fire retardant: [Specify as required]

FABRICATION

.1 Stress grade: E1
.2 Service grade: Interior
.3 Appearance classification:
SPEC NOTE: Typically, only the exposed (visible) surfaces are of architectural appearance grade.
Faces: [industrial (U.N.O.)] [one industrial face – one architectural face] [architectural]
Edges: industrial
Note: Laminations are not edge-glued; Panel edges are not meant to be showcased.
.4 Fire resistance: [Specify as required]

ERECTION

.1 Erect cross-laminated timber members in accordance with erection drawings issued for construction.

For the detailed specification guide: https://www.nordic.ca/en/documentation/technical-documents

Nordic X-Lam – Appearance Classifications

The following examples of CLT appearance classifications are for reference only. These requirements are based on the appearance at the time of manufacturing. The actual CLT product appearance requirements are recommended to be agreed upon between the buyer and the seller.

Industrial Appearance

An appearance classification normally suitable for use in concealed applications where appearance is not of primary concern. Specific characteristics of this classification are as follows:

- Voids appearing on the edges of laminations need not be filled.
- Loose knots and knot holes appearing on the face layers exposed to view are not filled.
- Members are surfaced on face layers only and the appearance requirements apply only to these layers.
- Occasional misses, low laminations or wane (limited to the lumber grade) are permitted on the surface layers and are not limited in length.

Architectural Appearance

An appearance classification normally suitable for applications where appearance is an important but not overriding consideration. Specific characteristics of this classification are as follows:

- In exposed surfaces, all knot holes and voids measuring over 3/4 inch are filled with a wood-tone filler or clear wood inserts selected for similarity with the grain and color of the adjacent wood.
- The face layers exposed to view are free of loose knots and open knot holes are filled.
- Knot holes do not exceed 3/4 inch when measured in the direction of the lamination length with the exception that a void may be longer than 3/4 inch if its area is not greater than 1/2 inch^2.
- Voids greater than 1/16 inch wide created by edge joints appearing on the face layers exposed to view are filled.
- Exposed surfaces are surfaced smooth with no misses permitted.

Nordic X-Lam – Certifications

Product Certifications

Nordic X-Lam cross-laminated timber (CLT) products, certified by APA – The Engineered Wood Association (apawood.org), are manufactured in accordance with the applicable standards and associated specifications indicated below:

- ANSI/APA PRG 320, Standard for Performance-Rated Cross-Laminated Timber
- ICC-ES–APA Joint Evaluation Report ESR-4875
- APA Product Report PR-L306

APA is a not-for-profit trade association and is accredited by the International Accreditation Service (IAS), a subsidiary of ICC, as an independent Inspection Agency under ISO/IEC 17020. APA is also an accredited testing organization recognized by IAS under ISO/IEC 17025.

The ANSI/APA PRG 320 standard is recognized in the International Building Code (IBC) and is required for using the design provisions specified in the National Design Specification (NDS) for Wood Construction.

Green Certifications

Wood – efficient and ecological

Overview of environmental certifications:

- Green Verification Report APA GR-L306
- Low Formaldehyde Emissions Products APA PR-E740
- Environmental Product Declaration (EPD), Nordic X-Lam
- Health Product Declaration (HPD), Nordic X-Lam
- Declare (ILFI), Nordic X-Lam
- Home Innovation NGBS Green Certified, Certificate #00230
- USDA Certified Biobased Product, Product 100%
- Cradle to Cradle Certified, Nordic X-Lam
- FSC-certified products available

Note: For independently verified ICC 700 NGBS (National Green Building Standard) and LEED (Leadership in Energy and Environmental Design) points, refer to APA GR-L306.

See nordic.ca for details.

Nordic X-Lam – Transparency Brief

The Nordic X-Lam business-to-business environmental product declaration (EPD) is based on a cradle-to-gate life cycle analysis (LCA). The delivery of the product to the customer, its use and eventual end-of-life processing are excluded from the EPD.

Forest Operations

The assessment of the life cycle impacts of Nordic wood product begins with its origin in managed forests and the energy use and emissions caused by its extraction. Forest management and reforestation that occurs after extraction are also included.

Nordic is committed to sustainable forestry as defined in the Forest Stewardship Council (FSC) forest management certification. Nordic's wood fiber sources fall into the following category:

- Certified sources of wood fiber come from FSC certified forests

CLT Production

The cross-laminated timber (CLT) production phase begins with the transportation of logs to the finished product. These processes consume fossil fuel (65.7%), electricity drawn from regional grids (22.5%), internally generated biomass (9.4%) and nuclear (2.4%).

Environmental Impacts

Atmosphere		
	Global warming potential	121.89 kg CO_2 eq.
	Ozone depletion potential	1.79E-06 kg CFC-11 eq.
	Photochemical ozone creation potential	35.53 kg O_3 eq.
Water		
	Acidification potential	1.19 kg SO_2 eq.
	Eutrophication potential	0.11 kg N eq.
Earth		
	Depletion of abiotic resources (elements)	38.84 kg
	Depletion of abiotic resources (fossil fuels)	1831.88 MJ

Material Content

Component – for 1 m^3 of Nordic X-Lam	**Mass (kg)**	**Mass (%)**
Wood (on oven dry basis); renewable	406 kg	98.9 %
Resins (polyurethane and isocyanate)	4.46 kg	1.1 %
Total	410.46 kg	100 %

Carbon Balance

Impact Category – for 1 m^3 of Nordic X-Lam	**Carbon (kg of CO_2 eq.)**
Forest carbon uptake	-741.36 kg of CO_2 eq.
Life cycle greenhouse gas emissions	121.89 kg of CO_2 eq.
Unaccounted biogenic carbon emissions	28.50 kg of CO_2 eq.
Net global warming potential	-590.97 kg of CO_2 eq.

See nordic.ca for details.

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TECHNICAL GUIDE
NORDIC X-LAM

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STRUCTURE 2

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STRUCTURES

Nordic X-Lam – Design Properties

Characteristics

Nordic X-Lam cross-laminated timber (CLT) is certified according to E1 CLT stress grade, using 1950f-1.7E Spruce-Pine-Fir (S-P-F) MSR lumber in longitudinal layers and No. 3 S-P-F lumber in the transverse layers. Nordic X-Lam products are certified by APA (Product Report PR-L306) per the ANSI/APA PRG 320 Standard and shall be used in dry service conditions.

Material Design Properties

CLT stress grade	E1	
	Layers	
Orientation	Longitudinal	Transversal
Species combination	S-P-F	S-P-F
Stress class	1950f-1.7E MSR	No. 3
Bending at extreme fiber, F_b (psi)	1,950	500
Shear parallel to grain, F_v (psi)	135	135
Rolling shear, F_s (psi)	45	45
Compression parallel to grain, F_c (psi)	1,800	650
Compression perpendicular to grain, F_{cp} (psi)	425	425
Tension parallel to grain, F_t (psi)	1,375	250
Modulus of elasticity, E (psi)	1,700,000	1,200,000
Shear modulus, G (psi)	106,250	75,000
Rolling shear modulus, G_s (psi)	10,625	7,500

Note:

1. Appearance grades as defined in ANSI/APA PRG 320 do not affect the structural performance of CLT panels.

Panel Layups

Layup [(a)]	Thickness and orientation of layers [(b)]	Number of layers	Thickness		Weight		
			(mm)	(in.)	(kg/m²)	(kN/m²)	(psf)
89-3s	35L - 19T - 35L	3	89	3-1/2	45.8	0.45	9.38
105-3s	35L - 35T - 35L	3	105	4-1/8	54.0	0.53	11.1
143-5s	35L - 19T - 35L - 19T - 35L	5	143	5-5/8	73.6	0.72	15.1
175-5s	35L - 35T - 35L - 35T - 35L	5	175	6-7/8	89.9	0.88	18.4
197-7s	35L - 19T - 35L - 19T - 35L - 19T - 35L	7	197	7-3/4	101	0.99	20.8
213-7l	35L - 35L - 19T - 35L - 19T - 35L - 35L	7	213	8-3/8	110	1.07	22.4
245-7s	35L - 35T - 35L - 35T - 35L - 35T - 35L	7	245	9-5/8	126	1.24	25.9
245-7l	35L - 35L - 35T - 35L - 35T - 35L - 35L	7	245	9-5/8	126	1.24	25.9
267-9l	35L - 35L - 19T - 35L - 19T - 35L - 19T - 35L - 35L	9	267	10-1/2	137	1.35	28.1

a) The layup designation refers to the panel thickness (in mm), the number of layers, and the layer orientations ("s" for standard perpendicular layers, and "l" for doubled outermost parallel layers).

b) L = longitudinal, T = transversal, 35 = 1-3/8 in. = 34.925 mm, 19 = 3/4 in. = 19.05 mm

Floor/Roof Slabs – Design Properties

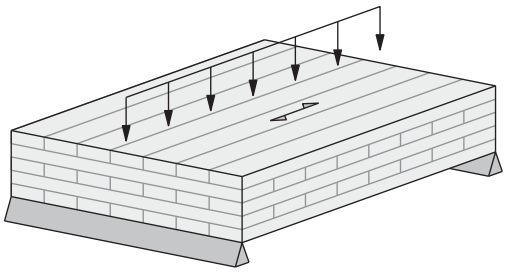
Floor/Roof Slabs – Design Properties

CLT stress grade	E1 (L = S-P-F 1950f MSR and T = S-P-F No. 3)								
Layup	89-3s	105-3s	143-5s	175-5s	197-7s	213-7l	245-7s	245-7l	267-9l
Bending in the major strength direction									
Effective flatwise bending moment capacity, $M_{eff,f,0}$ (lbf-ft/ft) [(a)]	3,350	4,525	7,725	10,400	13,725	18,700	18,375	23,700	28,325
Flatwise shear capacity, $V_{s,0}$ (lbf/ft)	1,260	1,490	2,030	2,480	2,800	3,025	3,475	3,475	3,775
Effective flatwise bending stiffness, $(EI)_{eff,f,0}$ (10^6 lbf-in.^{2}/ft)	72	115	267	440	654	963	1,089	1,404	1,831
Effective shear stiffness in flatwise bending, $(GA)_{eff,f,0}$ (10^6 lbf/ft)	0.48	0.46	0.96	0.92	1.4	1.6	1.4	1.4	2.0
Bending in the minor strength direction									
Effective flatwise bending moment capacity, $M_{eff,f,90}$ (lbf-ft/ft) [(a)]	45	160	615	1,370	1,410	615	3,150	1,370	1,410
Flatwise shear capacity, $V_{s,90}$ (lbf/ft)	270	495	1,040	1,490	1,800	1,040	2,480	1,490	1,800
Effective flatwise bending stiffness, $(EI)_{eff,f,90}$ (10^6 lbf-in.^{2}/ft)	0.51	3.1	26	81	101	26	313	81	101
Effective shear stiffness in flatwise bending, $(GA)_{eff,f,90}$ (10^6 lbf/ft)	0.39	0.61	0.78	1.2	1.2	0.93	1.8	1.3	1.3

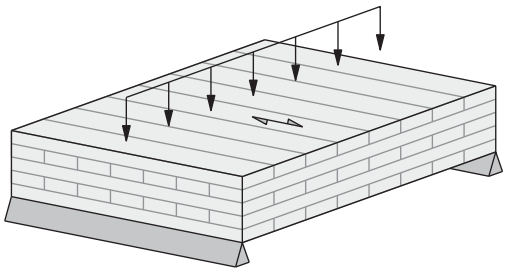
a) The effective flatwise bending moment capacity values in the major strength direction, $M_{eff,f,0}$, include the adjustment factor of 0.85 from ANSI/APA PRG 320.

Notes:

1. The tabulated design values are for dry service conditions and normal duration of loading.
2. The compressive capacity perpendicular to grain values shall be based on S-P-F No. 3 lumber (f_{cp} = 425 psi).
3. The specific gravity for dowel-type fastener design is 0.42.
4. The density for member weight is 32 pcf for a moisture content of 12%.
5. Design of CLT members shall be in accordance with the NDS.



Bending in the major strength direction



Bending in the minor strength direction

Floor Slabs – Sizing

Live load = 40 psf – Simple Span

Layup selection

Dead load [a] (psf)	L (ft) [b, c]														
	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
20	89-3s	89-3s	89-3s	89-3s	105-3s	105-3s	143-5s	143-5s	143-5s	143-5s	175-5s	175-5s	197-7s	197-7s	213-7l
30				105-3s	105-3s	143-5s				175-5s		197-7s			
40				105-3s	143-5s				175-5s		197-7s			213-7l	245-7s
50			105-3s	105-3s				175-5s	175-5s	197-7s		213-7l	213-7l		
60			105-3s	143-5s										245-7l	
70		105-3s	105-3s				175-5s		197-7s		213-7l		245-7s	245-7l	267-9l
80		105-3s	143-5s					175-5s							

Live load = 40 psf – Double Span

Layup selection

Dead load [a] (psf)	L (ft) [b, d]														
	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
20	89-3s	89-3s	89-3s	89-3s	89-3s	89-3s	105-3s	105-3s	143-5s	143-5s	143-5s	175-5s	175-5s	197-7s	197-7s
30						89-3s									
40					89-3s	105-3s					143-5s				
50				89-3s			143-5s	143-5s		143-5s	175-5s	175-5s			
60					105-3s										
70			89-3s			143-5s			143-5s	175-5s			197-7s		
80				105-3s											

a) The panel self weight is considered in the calculation and shall not be included in the dead load.
b) Span is measured center to center of supports.
c) The maximum spans for vibration control, l_v, are increased by 10% as recommended by Nordic Structures.
d) The maximum spans for vibration control, l_v, are increased by 20% for non-structural elements that are considered to provide enhanced vibration effect.

Notes:

1. For preliminary design use only. Final design shall include a complete analysis including the verification of the bearing capacity.
2. Tables are based on uniform loads and dry service conditions, for bending in the major strength direction of the panel.
3. Tabulated values take into account the bending moment and shear capacities, a live load deflection limit of L/360, a total load deflection limit of L/240, and include a consideration for floor vibration. The maximum spans for vibration control, l_v, are based on Clause A.8.5.3 of the Update No. 1 of CSA O86-14.
4. Fire-resistance rating takes into account the bending moment and shear capacities of the reduced cross-section.
5. Fire-resistance rating:

30 min	60 min	90 min	120 min

Live load = 50 psf – Simple Span

Layup selection

Dead load [a] (psf)	L (ft) [b, c]														
	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
20	89-3s	89-3s	89-3s	89-3s	105-3s	143-5s	143-5s	143-5s	143-5s	175-5s	175-5s	175-5s	197-7s	197-7s	213-7l
30				105-3s	143-5s				175-5s		175-5s	197-7s		213-7l	
40			105-3s	105-3s				175-5s		175-5s	197-7s		213-7l		
50			105-3s	143-5s					175-5s	197-7s				245-7s	245-7l
60			105-3s				175-5s				213-7l	213-7l			
70		105-3s	143-5s			175-5s		175-5s	197-7s				245-7s	245-7l	
80															267-9l

Live load = 50 psf – Double Span

Layup selection

Dead load [a] (psf)	L (ft) [b, d]														
	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
20	89-3s	89-3s	89-3s	89-3s	89-3s	89-3s	105-3s	105-3s	143-5s	143-5s	143-5s	175-5s	175-5s	197-7s	197-7s
30				89-3s	89-3s	105-3s		143-5s			143-5s				
40			89-3s				143-5s			143-5s					
50				89-3s	105-3s	143-5s			143-5s	175-5s	175-5s		197-7s		213-7l
60			89-3s												
70				105-3s											
80															

a) The panel self weight is considered in the calculation and shall not be included in the dead load.
b) Span is measured center to center of supports.
c) The maximum spans for vibration control, l_v, are increased by 10% as recommended by Nordic Structures.
d) The maximum spans for vibration control, l_v, are increased by 20% for non-structural elements that are considered to provide enhanced vibration effect.

Notes:

1. For preliminary design use only. Final design shall include a complete analysis including the verification of the bearing capacity and of a concentrated live load as defined in IBC 1607.4 (if applicable).
2. Tables are based on uniform loads and dry service conditions, for bending in the major strength direction of the panel.
3. Tabulated values take into account the bending moment and shear capacities, a live load deflection limit of L/360, a total load deflection limit of L/240, and include a consideration for floor vibration. The maximum spans for vibration control, l_v, are based on Clause A.8.5.3 of the Update No. 1 of CSA O86-14.
4. Fire-resistance rating takes into account the bending moment and shear capacities of the reduced cross-section.
5. Fire-resistance rating:

30 min	60 min	90 min	120 min

Live load = 100 psf – Simple Span

Layup selection

Dead load [a] (psf)	L (ft) [b, c]														
	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
20	89-3s	89-3s	105-3s	105-3s	143-5s	143-5s	143-5s	175-5s	175-5s	197-7s	197-7s	197-7s	213-7l	213-7l	245-7s
30				143-5s					197-7s			213-7l			245-7l
40		105-3s	143-5s				175-5s	197-7s			213-7l		245-7s	245-7l	267-9l
50						175-5s				213-7l		245-7s	245-7l	267-9l	
60												245-7l			
70															
80	105-3s	143-5s													

Live load = 100 psf – Double Span

Layup selection

Dead load [a] (psf)	L (ft) [b, d]														
	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
20	89-3s	89-3s	89-3s	105-3s	105-3s	143-5s	143-5s	143-5s	143-5s	143-5s	175-5s	175-5s	175-5s	197-7s	197-7s
30															
40		89-3s						143-5s		175-5s		197-7s	197-7s		213-7l
50					143-5s				175-5s		197-7s			213-7l	
60			105-3s	105-3s		143-5s	143-5s	175-5s					197-7s		
70															
80	89-3s														

a) The panel self weight is considered in the calculation and shall not be included in the dead load.
b) Span is measured center to center of supports.
c) The maximum spans for vibration control, l_v, are increased by 10% as recommended by Nordic Structures.
d) The maximum spans for vibration control, l_v, are increased by 20% for non-structural elements that are considered to provide enhanced vibration effect.

Notes:

1. For preliminary design use only. Final design shall include a complete analysis including the verification of the bearing capacity and of a concentrated live load as defined in IBC 1607.4 (if applicable).
2. Tables are based on uniform loads and dry service conditions, for bending in the major strength direction of the panel.
3. Tabulated values take into account the bending moment and shear capacities, a live load deflection limit of L/360, a total load deflection limit of L/240, and include a consideration for floor vibration. The maximum spans for vibration control, l_v, are based on Clause A.8.5.3 of the Update No. 1 of CSA O86-14.
4. Fire-resistance rating takes into account the bending moment and shear capacities of the reduced cross-section.
5. Fire-resistance rating:

30 min	60 min	90 min	120 min

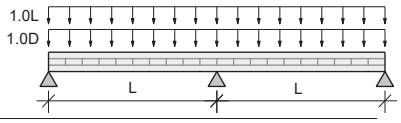
Floor Slabs – Selection Tables

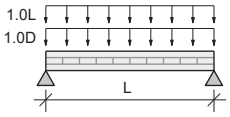
Bending Moment and Shear Capacities

Allowable uniform total load (psf)

L [(a)] (ft)	Layup								
	89-3s	105-3s	143-5s	175-5s	197-7s	213-7l	245-7s	245-7l	267-9l
10.0	211	252							
10.5	201	240							
11.0	191	228							
11.5	183	218							
12.0	175	208	289						
12.5	168	199	276						
13.0	159	191	265						
13.5	147	184	255						
14.0	137	177	245						
14.5	127	171	236	292					
15.0	119	161	228	282					
15.5	112	151	220	272					
16.0	105	141	213	263	299				
16.5	98	133	206	255	290				
17.0	93	125	200	247	281				
17.5	88	118	194	239	272	295			
18.0	83	112	188	232	264	287			
18.5	78	106	181	226	256	278			
19.0	74	100	171	219	249	271			
19.5	70	95	163	214	243	263			
20.0	67	91	155	208	236	256	297	297	
20.5	64	86	147	198	230	250	289	289	
21.0	61	82	140	189	224	243	282	282	
21.5	58	78	134	180	219	237	275	275	
22.0	55	75	128	172	214	232	268	268	293
22.5	53	72	122	164	209	226	262	262	286
23.0	51	68	117	157	204	221	256	256	280
23.5		66	112	151	199	216	250	250	273
24.0		63	107	144	191	212	245	245	267
24.5		60	103	139	183	207	239	239	261
25.0		58	99	133	176	203	234	234	256
25.5		56	95	128	169	198	226	230	251

Bending moment and shear capacities
- $M_0 \geq M$ and $V_0 \geq V$





a) Span is measured center to center of supports.

Notes:

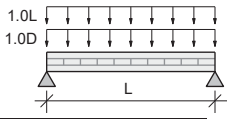
1. For preliminary design use only. Final design shall include a complete analysis including the verification of the bending moment, shear, and bearing capacities and a consideration for live load and total load deflections. If applicable, the final design shall include a consideration for floor vibration, the verification of a concentrated live load as defined in IBC 1607.4, and fire-resistance requirements.
2. The tabulated values are based on dry service conditions, normal duration of loading, and the most restrictive of simple span or double span, for bending in the major strength direction of the panel.

L/240 Deflection Limit – Simple Span

Allowable uniform total load (psf)

L [(a)] (ft)	Layup								
	89-3s	105-3s	143-5s	175-5s	197-7s	213-7l	245-7s	245-7l	267-9l
10.0	95	142	324						
10.5	83	125	284						
11.0	73	110	251	372					
11.5	64	97	223	332					
12.0	57	87	198	298					
12.5	51	77	177	268	400				
13.0		69	159	242	361				
13.5		62	143	219	327				
14.0		56	129	199	297				
14.5		51	117	181	270	381			
15.0			107	165	246	348	374		
15.5			97	151	225	319	344		
16.0			89	138	206	293	317	387	
16.5			81	127	190	270	292	358	
17.0			75	117	175	249	270	331	
17.5			69	108	161	230	250	308	
18.0			63	100	149	213	232	286	379
18.5			59	93	138	198	216	266	353
19.0			54	86	128	184	201	248	329
19.5				80	119	171	187	232	307
20.0				74	111	159	175	217	287
20.5				69	103	149	163	203	268
21.0				65	96	139	153	190	251
21.5				61	90	130	143	178	236
22.0				57	84	122	134	168	221
22.5				53	79	114	126	158	208
23.0					74	107	119	148	196
23.5					70	101	112	140	185
24.0					66	95	105	132	174
24.5					62	90	99	125	164
25.0					59	85	94	118	155
25.5					55	80	89	112	147

Deflection limit
- $K_{cr}\,\Delta_{LT} + \Delta_{ST} \leq L/240$



a) Span is measured center to center of supports.

Notes:

1. For preliminary design use only. Final design shall include a complete analysis including the verification of the bending moment, shear, and bearing capacities and a consideration for live load and total load deflections. If applicable, the final design shall include a consideration for floor vibration, the verification of a concentrated live load as defined in IBC 1607.4, and fire-resistance requirements.
2. The tabulated values are based on dry service conditions, for bending in the major strength direction of the panel.
3. The above values apply to slabs with a dead load less or equal to the live load. If the dead load is greater than the live load, multiply the allowable uniform total load by the corresponding adjustment factor:

Adjustment factor based on dead load / live load ratio (D/L)

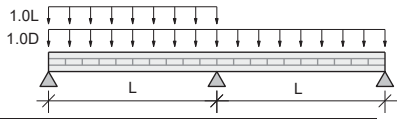
D/L	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00
Factor	1.000	0.964	0.938	0.917	0.900	0.886	0.875	0.865	0.857

L/240 Deflection Limit – Double Span

Allowable uniform total load (psf)

L [(a)] (ft)	Layup								
	89-3s	105-3s	143-5s	175-5s	197-7s	213-7l	245-7s	245-7l	267-9l
10.0	170	241							
10.5	149	214							
11.0	132	190							
11.5	117	170	385						
12.0	104	152	346						
12.5	93	137	311						
13.0	84	124	281						
13.5	75	112	255	369					
14.0	68	102	232	338					
14.5	62	93	211	310					
15.0	56	84	193	285					
15.5	51	77	177	262	392				
16.0		71	162	242	362				
16.5		65	149	224	334				
17.0		60	137	207	309				
17.5		55	127	192	287	400			
18.0		51	117	178	266	373	395		
18.5			109	166	248	347	370		
19.0			101	155	231	324	346		
19.5			94	144	215	303	324	390	
20.0			88	135	201	284	304	367	
20.5			82	126	188	266	285	346	
21.0			76	118	176	249	268	326	
21.5			71	111	165	234	253	307	
22.0			67	104	155	220	238	290	386
22.5			63	98	146	207	224	274	365
23.0			59	92	137	196	212	259	345
23.5			55	87	129	184	200	245	326
24.0			52	82	122	174	189	232	309
24.5				77	115	165	179	220	293
25.0				73	109	156	170	209	278
25.5				69	103	148	161	199	263

Deflection limit
- $K_{cr}\,\Delta_{LT} + \Delta_{ST} \le L/240$



a) Span is measured center to center of supports.

Notes:

1. For preliminary design use only. Final design shall include a complete analysis including the verification of the bending moment, shear, and bearing capacities and a consideration for live load and total load deflections. If applicable, the final design shall include a consideration for floor vibration, the verification of a concentrated live load as defined in IBC 1607.4, and fire-resistance requirements.
2. The tabulated values are based on dry service conditions, for bending in the major strength direction of the panel.
3. The above values apply to slabs with a dead load less or equal to the live load. If the dead load is greater than the live load, multiply the allowable uniform total load by the corresponding adjustment factor:

Adjustment factor based on dead load / live load ratio (D/L)

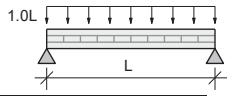
D/L	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00
Factor	1.000	0.964	0.938	0.917	0.900	0.886	0.875	0.865	0.857

L/360 Deflection Limit – Simple Span

Allowable uniform live load (psf)

L [(a)] (ft)	Layup								
	89-3s	105-3s	143-5s	175-5s	197-7s	213-7l	245-7s	245-7l	267-9l
10.0	95	142							
10.5	83	125							
11.0	73	110							
11.5	64	97							
12.0	57	87							
12.5	51	77	177						
13.0	45	69	159						
13.5	41	62	143						
14.0		56	129						
14.5		51	117						
15.0		46	107	165					
15.5		42	97	151					
16.0			89	138					
16.5			81	127					
17.0			75	117	175				
17.5			69	108	161				
18.0			63	100	149				
18.5			59	93	138				
19.0			54	86	128				
19.5			50	80	119	171			
20.0			47	74	111	159	175		
20.5			44	69	103	149	163		
21.0			41	65	96	139	153		
21.5				61	90	130	143	178	
22.0				57	84	122	134	168	
22.5				53	79	114	126	158	
23.0				50	74	107	119	148	
23.5				47	70	101	112	140	
24.0				44	66	95	105	132	174
24.5				42	62	90	99	125	164
25.0					59	85	94	118	155
25.5					55	80	89	112	147

Deflection limit
- $\Delta_L \leq L/360$



a) Span is measured center to center of supports.

Notes:

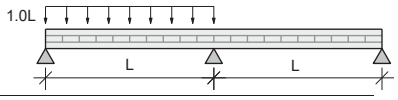
1. For preliminary design use only. Final design shall include a complete analysis including the verification of the bending moment, shear, and bearing capacities and a consideration for live load and total load deflections. If applicable, the final design shall include a consideration for floor vibration, the verification of a concentrated live load as defined in IBC 1607.4, and fire-resistance requirements.
2. The tabulated values are based on dry service conditions, for bending in the major strength direction of the panel.

L/360 Deflection Limit – Double Span

Allowable uniform live load (psf)

L [(a)] (ft)	Layup								
	89-3s	105-3s	143-5s	175-5s	197-7s	213-7l	245-7s	245-7l	267-9l
10.0	130								
10.5	114	167							
11.0	100	148							
11.5	88	131							
12.0	79	117							
12.5	70	105							
13.0	63	94							
13.5	56	85							
14.0	51	77	177						
14.5	46	70	161						
15.0	42	64	146						
15.5		58	134						
16.0		53	122						
16.5		49	112	172					
17.0		45	103	159					
17.5		41	95	147					
18.0			88	136					
18.5			81	126					
19.0			75	118	175				
19.5			70	109	163				
20.0			65	102	152				
20.5			61	95	142				
21.0			57	89	133				
21.5			53	84	124	178			
22.0			50	78	117	167			
22.5			47	74	110	157	172		
23.0			44	69	103	148	162		
23.5			41	65	97	139	153		
24.0				61	91	131	144	179	
24.5				58	86	124	136	169	
25.0				55	81	117	129	160	
25.5				52	77	111	122	152	

Deflection limit
- $\Delta_L \leq L/360$



a) Span is measured center to center of supports.

Notes:

1. For preliminary design use only. Final design shall include a complete analysis including the verification of the bending moment, shear, and bearing capacities and a consideration for live load and total load deflections. If applicable, the final design shall include a consideration for floor vibration, the verification of a concentrated live load as defined in IBC 1607.4, and fire-resistance requirements.
2. The tabulated values are based on dry service conditions, for bending in the major strength direction of the panel.

Vibration, Simple Span

Maximum span, l_v (ft)

Span	Layup								
	89-3s	105-3s	143-5s	175-5s	197-7s	213-7l	245-7s	245-7l	267-9l
Simple	12'-4"	13'-10"	17'-0"	19'-2"	21'-3"	23'-6"	24'-0"	25'-10"	27'-7"

Notes:

1. The maximum spans for vibration control, l_v, are increased by 10% as recommended by Nordic Structures.
2. The tabulated values apply to simply supported floor slabs.

Vibration, Double Span

Maximum span, l_v (ft)

Span	Layup								
	89-3s	105-3s	143-5s	175-5s	197-7s	213-7l	245-7s	245-7l	267-9l
Double	13'-5"	15'-1"	18'-7"	20'-11"	23'-2"	25'-8"	26'-2"	26'-3"	27'-7"

Notes:

1. The maximum spans for vibration control, l_v, are increased by 20% for non-structural elements that are considered to provide enhanced vibration effect.
2. If applicable, the concrete topping area density shall not be greater than twice the bare CLT floor area density.
3. The tabulated values apply to simply supported floor slabs.

Note:

1. The maximum spans for vibration control, l_v, are based on Clause A.8.5.3 of CSA O86:19.

Roof Slabs – Sizing

Snow load = 20 psf – Simple Span

Layup selection

Dead load [a] (psf)	L (ft) [b]														
	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
10	89-3s	89-3s	89-3s	89-3s	89-3s	89-3s	89-3s	89-3s	105-3s	105-3s	143-5s	143-5s	143-5s	143-5s	143-5s
20							105-3s	105-3s	143-5s	143-5s				175-5s	175-5s
30						105-3s	105-3s	143-5s			175-5s	175-5s	175-5s	175-5s	197-7s
40					105-3s	105-3s	143-5s			175-5s		175-5s	175-5s	197-7s	
50					105-3s	143-5s					175-5s	197-7s	197-7s		213-7l
60				105-3s	105-3s				175-5s	175-5s				213-7l	
70				105-3s	143-5s										

Snow load = 20 psf – Double Span

Layup selection

Dead load [a] (psf)	L (ft) [b]														
	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
10	89-3s	89-3s	89-3s	89-3s	89-3s	89-3s	89-3s	89-3s	89-3s	89-3s	89-3s	89-3s	105-3s	105-3s	105-3s
20									89-3s	89-3s	105-3s	105-3s		143-5s	143-5s
30								89-3s		105-3s			143-5s		
40							89-3s		105-3s		143-5s	143-5s		143-5s	143-5s
50						89-3s		105-3s		143-5s			143-5s		
60					89-3s		105-3s		143-5s		143-5s	143-5s		175-5s	175-5s
70				89-3s											

a) The panel self weight is considered and shall not be included in the dead load.

b) Span is measured center to center of supports.

Notes:

1. For preliminary design use only. Final design shall include a complete analysis including the verification of the bearing capacity. If applicable, the final design shall include a consideration for vibration control and the verification of a concentrated live load as defined in IBC 1607.4.
2. Tables are based on uniform loads, dry service conditions, and a load duration factor, C_D, of 1.15, for bending in the major strength direction of the panel.
3. Tabulated values take into account the bending moment and shear capacities, a live load deflection limit of L/240, a total load deflection limit of L/180.
4. Fire resistance-rating takes into account the bending moment and shear capacities of the reduced cross-section.
5. Fire resistance-rating:

30 min	60 min	90 min	120 min

Snow load = 40 psf – Simple Span

Layup selection

Dead load [a] (psf)	L (ft) [b]														
	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
10	89-3s	89-3s	89-3s	89-3s	89-3s	89-3s	105-3s	105-3s	143-5s	143-5s	143-5s	143-5s	143-5s	175-5s	175-5s
20						105-3s						175-5s	175-5s		197-7s
30					105-3s		143-5s	143-5s			175-5s	175-5s		197-7s	
40					105-3s	143-5s				175-5s	175-5s		197-7s		
50				105-3s						175-5s		197-7s			213-7l
60					143-5s				175-5s					213-7l	
70			105-3s								197-7s		213-7l		

Snow load = 40 psf – Double Span

Layup selection

Dead load [a] (psf)	L (ft) [b]														
	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
10	89-3s	89-3s	89-3s	89-3s	89-3s	89-3s	89-3s	89-3s	89-3s	89-3s	105-3s	105-3s	143-5s	143-5s	143-5s
20							89-3s		105-3s	105-3s		143-5s		143-5s	143-5s
30					89-3s	89-3s		105-3s		143-5s	143-5s		143-5s		175-5s
40				89-3s			105-3s		143-5s		143-5s	143-5s		175-5s	
50										143-5s			175-5s		
60					89-3s	105-3s		143-5s							
70			89-3s												

a) The panel self weight is considered and shall not be included in the dead load.

b) Span is measured center to center of supports.

Notes:

1. For preliminary design use only. Final design shall include a complete analysis including the verification of the bearing capacity. If applicable, the final design shall include a consideration for vibration control and the verification of a concentrated live load as defined in IBC 1607.4.
2. Tables are based on uniform loads, dry service conditions, and a load duration factor, C_D, of 1.15, for bending in the major strength direction of the panel.
3. Tabulated values take into account the bending moment and shear capacities, a live load deflection limit of L/240, a total load deflection limit of L/180.
4. Fire resistance-rating takes into account the bending moment and shear capacities of the reduced cross-section.
5. Fire resistance-rating:

30 min	60 min	90 min	120 min

Snow load = 60 psf – Simple Span

Layup selection

Dead load [a] (psf)	L (ft) [b]														
	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
10	89-3s	89-3s	89-3s	89-3s	89-3s	105-3s	105-3s	143-5s	143-5s	143-5s	143-5s	175-5s	175-5s	175-5s	197-7s
20				89-3s	105-3s						175-5s			197-7s	
30				105-3s		143-5s	143-5s			175-5s		197-7s	197-7s		213-7l
40			89-3s		143-5s				175-5s		197-7s		213-7l	213-7l	
50			105-3s	143-5s				175-5s		197-7s					245-7s
60															
70															

Snow load = 60 psf – Double Span

Layup selection

Dead load [a] (psf)	L (ft) [b]														
	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
10	89-3s	89-3s	89-3s	89-3s	89-3s	89-3s	89-3s	89-3s	105-3s	105-3s	105-3s	143-5s	143-5s	143-5s	143-5s
20				89-3s	89-3s			105-3s		143-5s	143-5s	143-5s			175-5s
30				89-3s			89-3s		143-5s	143-5s	143-5s			175-5s	
40			89-3s			89-3s	105-3s		143-5s				143-5s		
50			89-3s			105-3s		143-5s	143-5s			175-5s	175-5s		197-7s
60															
70															

a) The panel self weight is considered and shall not be included in the dead load.

b) Span is measured center to center of supports.

Notes:

1. For preliminary design use only. Final design shall include a complete analysis including the verification of the bearing capacity. If applicable, the final design shall include a consideration for vibration control and the verification of a concentrated live load as defined in IBC 1607.4.
2. Tables are based on uniform loads, dry service conditions, and a load duration factor, C_D, of 1.15, for bending in the major strength direction of the panel.
3. Tabulated values take into account the bending moment and shear capacities, a live load deflection limit of L/240, a total load deflection limit of L/180.
4. Fire-resistance rating takes into account the bending moment and shear capacities of the reduced cross-section.
5. Fire-resistance rating:

30 min	60 min	90 min	120 min

Roof Slabs – Selection Tables

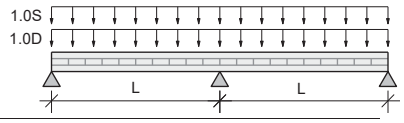
Bending Moment and Shear Capacities

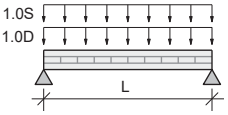
Allowable uniform total load (psf)

L [(a)] (ft)	Layup								
	89-3s	105-3s	143-5s	175-5s	197-7s	213-7l	245-7s	245-7l	267-9l
10.0	211	252							
10.5	201	240							
11.0	191	228							
11.5	183	218							
12.0	175	208	289						
12.5	168	199	276						
13.0	161	191	265						
13.5	155	184	255						
14.0	149	177	245						
14.5	144	171	236	292					
15.0	137	165	228	282					
15.5	128	159	220	272					
16.0	120	154	213	263	299				
16.5	113	149	206	255	290				
17.0	107	144	200	247	281				
17.5	101	136	194	239	272	295			
18.0	95	128	188	232	264	287			
18.5	90	122	183	226	256	278			
19.0	85	115	178	219	249	271			
19.5	81	109	173	214	243	263			
20.0	77	104	169	208	236	256	297	297	
20.5	73	99	164	203	230	250	289	289	
21.0	70	94	160	198	224	243	282	282	
21.5	67	90	154	193	219	237	275	275	
22.0	64	86	147	188	214	232	268	268	293
22.5	61	82	140	184	209	226	262	262	286
23.0	58	79	134	180	204	221	256	256	280
23.5	56	75	129	173	199	216	250	250	273
24.0	54	72	123	166	195	212	245	245	267
24.5	51	69	118	159	191	207	239	239	261
25.0		67	114	153	187	203	234	234	256
25.5		64	109	147	183	198	230	230	251

Bending moment and shear capacities

- $M_0 \geq M$ and $V_0 \geq V$





a) Span is measured center to center of supports.

Notes:

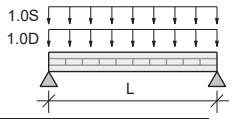
1. For preliminary design use only. Final design shall include a complete analysis including the verification of the bending moment, shear, and bearing capacities and a consideration for snow load and total load deflections. If applicable, the final design shall include a consideration for vibration control, the verification of a concentrated live load as defined in IBC 1607.4, and fire-resistance requirements.
2. Tables are based on dry service conditions, a load duration factor, C_D, of 1.15, and the most restrictive of simple span or double span, for bending in the major strength direction of the panel.

L/180 Deflection Limit – Simple Span

Allowable uniform total load (psf)

L [(a)] (ft)	Layup								
	89-3s	105-3s	143-5s	175-5s	197-7s	213-7l	245-7s	245-7l	267-9l
10.0	127	189							
10.5	111	166	379						
11.0	97	146	335						
11.5	86	130	297						
12.0	76	115	264	397					
12.5	68	103	236	357					
13.0	60	92	212	323					
13.5	54	83	191	292					
14.0		75	173	265	395				
14.5		68	156	241	360				
15.0		62	142	220	328				
15.5		56	130	201	300				
16.0		51	118	185	275	391			
16.5			109	170	253	360	390		
17.0			100	156	233	332	360		
17.5			92	144	215	307	334		
18.0			85	133	199	284	309	381	
18.5			78	123	184	263	287	355	
19.0			72	115	171	245	268	331	
19.5			67	106	159	228	249	309	
20.0			62	99	148	212	233	289	382
20.5			58	92	138	198	217	270	358
21.0			54	86	129	185	204	253	335
21.5			51	81	120	173	191	238	314
22.0				76	113	162	179	223	295
22.5				71	106	152	168	210	277
23.0				67	99	143	158	198	261
23.5				63	93	135	149	187	246
24.0				59	88	127	140	176	232
24.5				56	83	120	133	166	219
25.0				52	78	113	125	157	207
25.5					74	107	118	149	196

Deflection limit
- $K_{cr}\,\Delta_{LT} + \Delta_{ST} \leq L/180$



a) Span is measured center to center of supports.

Notes:

1. For preliminary design use only. Final design shall include a complete analysis including the verification of the bending moment, shear, and bearing capacities and a consideration for snow load and total load deflections. If applicable, the final design shall include a consideration for vibration control, the verification of a concentrated live load as defined in IBC 1607.4, and fire-resistance requirements.
2. Tables are based on dry service conditions, for bending in the major strength direction of the panel.
3. The above values apply to slabs with a dead load less or equal to the snow load. If the dead load is greater than the snow load, multiply the allowable uniform total load by the corresponding adjustment factor:

Adjustment factor based on dead load / snow load ratio (D/S)

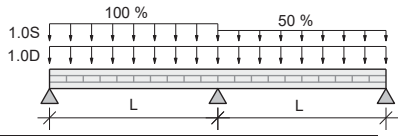
D/S	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00
Factor	1.000	0.964	0.938	0.917	0.900	0.886	0.875	0.865	0.857

L/180 Deflection Limit – Double Span

Allowable uniform total load (psf)

L [(a)] (ft)	Layup								
	89-3s	105-3s	143-5s	175-5s	197-7s	213-7l	245-7s	245-7l	267-9l
10.0	245	344							
10.5	216	306							
11.0	191	273							
11.5	169	244							
12.0	151	219							
12.5	135	198							
13.0	122	179							
13.5	110	162	368						
14.0	99	147	335						
14.5	90	134	305						
15.0	82	122	279						
15.5	75	112	256	377					
16.0	68	103	235	348					
16.5	63	95	216	322					
17.0	58	87	199	298					
17.5	53	80	184	277					
18.0		74	171	257	385				
18.5		69	158	240	358				
19.0		64	147	224	334				
19.5		60	137	209	312				
20.0		55	127	195	291				
20.5		52	119	183	273	384			
21.0			111	171	256	360	386		
21.5			104	161	240	339	364		
22.0			98	151	225	319	343		
22.5			92	142	212	300	324	394	
23.0			86	134	200	283	306	373	
23.5			81	126	188	267	289	353	
24.0			76	119	178	253	274	335	
24.5			72	113	168	239	259	317	
25.0			68	106	159	226	246	301	
25.5			64	101	150	214	233	286	380

Deflection limit
- $K_{cr}\,\Delta_{LT} + \Delta_{ST} \leq L/180$



a) Span is measured center to center of supports.

Notes:

1. For preliminary design use only. Final design shall include a complete analysis including the verification of the bending moment, shear, and bearing capacities and a consideration for snow load and total load deflections. If applicable, the final design shall include a consideration for vibration control, the verification of a concentrated live load as defined in IBC 1607.4, and fire-resistance requirements.
2. Tables are based on dry service conditions, for bending in the major strength direction of the panel.
3. The above values apply to slabs with a dead load less or equal to the snow load. If the dead load is greater than the snow load, multiply the allowable uniform total load by the corresponding adjustment factor:

Adjustment factor based on dead load / snow load ratio (D/S)

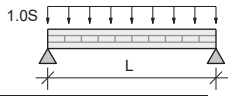
D/S	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00
Factor	1.000	0.964	0.938	0.917	0.900	0.886	0.875	0.865	0.857

L/240 Deflection Limit – Simple Span

Allowable uniform snow load (psf)

L [(a)] (ft)	Layup								
	89-3s	105-3s	143-5s	175-5s	197-7s	213-7l	245-7s	245-7l	267-9l
10.0	143	213							
10.5	125	187							
11.0	109	165							
11.5	96	146	334						
12.0	85	130	297						
12.5	76	116	266						
13.0	68	104	239						
13.5	61	94	215	328					
14.0	55	85	194	298					
14.5	50	77	176	271					
15.0	45	70	160	248					
15.5	41	63	146	226	338				
16.0		58	133	208	310				
16.5		53	122	191	284				
17.0		49	112	176	262				
17.5		45	103	162	242	345			
18.0		41	95	150	223	319	348		
18.5			88	139	207	296	323		
19.0			81	129	192	275	301		
19.5			76	120	178	256	280	347	
20.0			70	112	166	239	262	325	
20.5			65	104	155	223	245	304	
21.0			61	97	145	208	229	285	
21.5			57	91	135	195	215	268	
22.0			53	85	127	183	201	251	332
22.5			50	80	119	172	189	236	312
23.0			47	75	112	161	178	223	294
23.5			44	70	105	152	168	210	277
24.0			41	66	99	143	158	198	261
24.5				63	93	135	149	187	247
25.0				59	88	127	141	177	233
25.5				56	83	120	133	167	221

Deflection limit
- $\Delta_S \leq L/240$



a) Span is measured center to center of supports.

Notes:

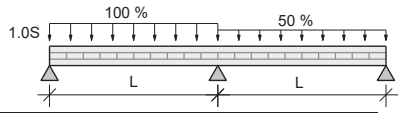
1. For preliminary design use only. Final design shall include a complete analysis including the verification of the bending moment, shear, and bearing capacities and a consideration for snow load and total load deflections. If applicable, the final design shall include a consideration for vibration control, the verification of a concentrated live load as defined in IBC 1607.4, and fire-resistance requirements.
2. Tables are based on dry service conditions, for bending in the major strength direction of the panel.

L/240 Deflection Limit – Double Span

Allowable uniform snow load (psf)

L [(a)]	Layup								
(ft)	89-3s	105-3s	143-5s	175-5s	197-7s	213-7l	245-7s	245-7l	267-9l
10.0	237	338							
10.5	208	299							
11.0	183	266							
11.5	163	238							
12.0	145	213							
12.5	129	191							
13.0	116	172							
13.5	104	156							
14.0	94	141	323						
14.5	85	129	294						
15.0	78	117	268						
15.5	71	107	245						
16.0	65	98	225	338					
16.5	59	90	207	312					
17.0	54	83	191	289					
17.5	50	77	176	268					
18.0	46	71	163	249					
18.5	43	66	151	231	345				
19.0		61	140	215	321				
19.5		57	130	201	299				
20.0		53	121	187	279				
20.5		49	113	175	261				
21.0		46	105	164	245	347			
21.5		43	99	154	229	326			
22.0			92	144	215	306	332		
22.5			87	136	202	288	313		
23.0			81	128	190	272	295		
23.5			77	120	179	256	279	343	
24.0			72	113	169	242	263	324	
24.5			68	107	160	228	249	307	
25.0			64	101	151	216	236	292	
25.5			61	96	143	205	224	277	

Deflection limit
- $\Delta_S \leq L/240$



a) Span is measured center to center of supports.

Notes:

1. For preliminary design use only. Final design shall include a complete analysis including the verification of the bending moment, shear, and bearing capacities and a consideration for snow load and total load deflections. If applicable, the final design shall include a consideration for vibration control, the verification of a concentrated live load as defined in IBC 1607.4, and fire-resistance requirements.
2. Tables are based on dry service conditions, for bending in the major strength direction of the panel.

Walls – Design Properties

Walls – Design Properties

CLT stress grade	E1 (L = S-P-F 1950f MSR and T = S-P-F No. 3)								
Layup	89-3s	105-3s	143-5s	175-5s	197-7s	213-7l	245-7s	245-7l	267-9l
Loading parallel to outermost layers									
Compression in the major strength direction									
Compressive capacity, P_0 (10^3 lbf/ft) [a]	59	59	89	89	119	149	119	149	178
Effective cross-sectional area, $A_{eff,0}$ (in.^{2}/ft)	33	33	50	50	66	83	66	83	99
Effective out-of-plane moment of inertia, $I_{eff,0}$ (in.^{4}/ft)	42	68	157	257	383	566	634	824	1,075
Effective out-of-plane radius of gyration, $r_{eff,0}$ (in./ft) [b]	1.1	1.4	1.8	2.3	2.4	2.6	3.1	3.2	3.3
Bending in the major strength direction									
Effective flatwise bending moment capacity, $M_{eff,f,0}$ (lbf-ft/ft) [c]	3,350	4,525	7,725	10,400	13,725	18,700	18,375	23,700	28,325
Flatwise shear capacity, $V_{s,0}$ (lbf/ft)	1,260	1,490	2,030	2,480	2,800	3,025	3,475	3,475	3,775
Effective flatwise bending stiffness, $(EI)_{eff,f,0}$ (10^6 lbf-in.^{2}/ft)	72	115	267	440	654	963	1,089	1,404	1,831
Effective shear stiffness in flatwise bending, $(GA)_{eff,f,0}$ (10^6 lbf/ft)	0.48	0.46	0.96	0.92	1.4	1.6	1.4	1.4	2.0
Loading perpendicular to outermost layers									
Compression in the minor strength direction									
Compressive capacity, P_{90} (10^3 lbf/ft) [a]	5.9	11	12	21	18	12	32	21	18
Effective cross-sectional area, $A_{eff,90}$ (in.^{2}/ft)	9.0	17	18	33	27	18	50	33	27
Effective out-of-plane moment of inertia, $I_{eff,90}$ (in.^{4}/ft)	0.42	2.6	21	68	83	21	257	68	83
Effective out-of-plane radius of gyration, $r_{eff,90}$ (in./ft) [b]	0.22	0.40	1.1	1.4	1.7	1.1	2.3	1.4	1.7
Bending in the minor strength direction									
Effective flatwise bending moment capacity, $M_{eff,f,90}$ (lbf-ft/ft) [c]	45	160	615	1,370	1,410	615	3,150	1,370	1,410
Flatwise shear capacity, $V_{s,90}$ (lbf/ft)	270	495	1,040	1,490	1,800	1,040	2,480	1,490	1,800
Effective flatwise bending stiffness, $(EI)_{eff,f,90}$ (10^6 lbf-in.^{2}/ft)	0.51	3.1	26	81	101	26	313	81	101
Effective shear stiffness in flatwise bending, $(GA)_{eff,f,90}$ (10^6 lbf/ft)	0.39	0.61	0.78	1.2	1.2	0.93	1.8	1.3	1.3

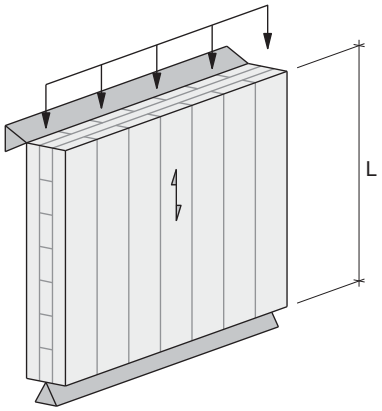
a) The compressive capacity under axial load, P_0 and P_{90}, shall be adjusted by the column stability factor, C_P, as defined in the NDS. The effective flatwise bending stiffness, $(EI)_{eff,f}$, values shall be based on S-P-F 1950f MSR lumber (E = 1,700,000 psi) and on $I_{eff,0}$ for loading parallel to outermost layers, or on S-P-F No. 3 lumber (E = 1,200,000 psi) and on $I_{eff,90}$ for loading perpendicular to outermost layers. The critical buckling design value, F_{cE}, shall be calculated as follows: $F_{cE} = \pi^2 (EI)'_{app\text{-}min} / (\ell_e^2 A_{eff})$.

b) As per NDS 3.7.1.4, the slenderness ratio for walls, $\ell_e / (\sqrt{12}\, r_{eff})$, shall not exceed 50, except that during construction $\ell_e / (\sqrt{12}\, r_{eff})$ shall not exceed 75.

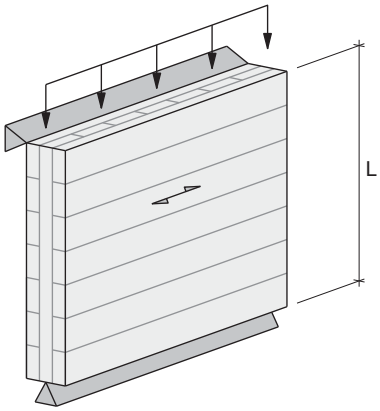
c) The effective flatwise bending moment capacity values in the major strength direction, $M_{eff,f,0}$, include the adjustment factor of 0.85 from ANSI/APA PRG 320.

Notes:

1. The tabulated design values are for dry service conditions and normal duration of loading.
2. The compressive capacity perpendicular to grain values shall be based on S-P-F No. 3 lumber (f_{cp} = 425 psi).
3. The specific gravity for dowel-type fastener design is 0.42.
4. The density for member weight is 32 pcf for a moisture content of 12%.
5. Design of CLT members shall be in accordance with the NDS.



Loading parallel to outermost layers



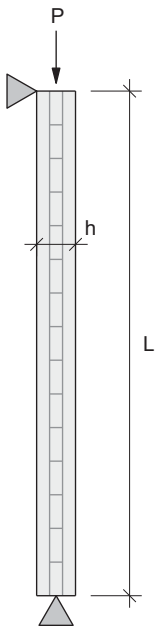
Loading perpendicular to outermost layers

Walls – Selection Tables

Concentric End Loads

Allowable uniform load, P (plf)

L	Fire-resistance rating	Layup								
(ft)	(min)	89-3s	105-3s	143-5s	175-5s	197-7s	213-7l	245-7s	245-7l	267-9l
8	0	30,300	39,900	73,600	79,850	108,550	136,850	111,900	138,700	168,400
	30	11,650	16,350	53,850	67,100	108,550	136,850	111,900	138,700	168,400
	60	3,050	2,800	35,450	45,000	95,300	107,450	110,250	118,050	168,400
	90			11,800	39,750	44,600	56,900	101,200	61,500	113,250
	120			2,450	10,400	26,400	44,050	42,050	61,700	93,500
9	0	25,450	35,000	68,300	77,350	105,800	134,150	110,600	137,000	166,700
	30	9,900	14,250	47,500	61,300	105,800	134,150	110,600	137,000	166,700
	60	2,500	2,350	30,950	40,300	86,900	99,800	104,050	112,300	166,700
	90			10,350	35,750	40,600	52,050	95,400	57,400	107,150
	120			2,050	9,400	23,700	40,350	39,450	57,600	88,300
10	0	21,450	30,500	62,300	74,100	102,350	130,700	109,000	134,950	164,650
	30	8,500	12,450	42,000	55,800	102,350	130,700	109,000	134,950	164,650
	60	2,100	2,000	27,100	36,050	78,800	92,150	97,500	106,250	161,000
	90			9,150	32,150	36,900	47,500	89,350	53,350	100,800
	120			1,750	8,500	21,250	36,850	36,800	53,500	83,000
11	0	18,250	26,500	56,050	70,250	98,000	126,500	107,050	132,450	162,200
	30	7,350	10,950	37,250	50,650	93,950	126,500	107,050	132,450	162,200
	60	1,800	1,650	23,850	32,300	71,350	84,850	90,850	100,050	152,350
	90			8,050	28,950	33,500	43,300	83,300	49,500	94,400
	120			1,500	7,650	19,050	33,650	34,300	49,600	77,700
12	0	15,700	23,150	50,050	65,750	92,850	121,350	104,650	129,450	159,200
	30	6,400	9,650	33,150	46,000	85,500	121,350	104,650	129,450	159,200
	60	1,500	1,450	21,100	29,050	64,600	77,950	84,300	93,850	143,450
	90			7,150	26,100	30,450	39,500	77,350	45,800	88,100
	120			1,250	6,900	17,150	30,750	31,850	45,900	72,550
13	0	13,600	20,300	44,600	60,950	87,050	115,400	101,800	125,950	155,650
	30	5,600	8,600	29,650	41,800	77,850	115,400	101,800	125,950	155,650
	60	1,300	1,200	18,750	26,150	58,550	71,650	78,000	87,800	134,600
	90			6,350	23,600	27,750	36,050	71,700	42,400	82,050
	120			1,100	6,250	15,500	28,150	29,600	42,500	67,600
14	0	11,850	17,900	39,800	56,100	80,900	108,750	98,450	121,800	151,450
	30	4,950	7,650	26,600	38,100	70,950	108,750	95,350	121,800	151,450
	60	1,100	1,050	16,800	23,650	53,200	65,850	72,150	82,000	125,950
	90			5,700	21,400	25,300	33,000	66,450	39,250	76,400
	120			950	5,650	14,000	25,800	27,450	39,350	63,000



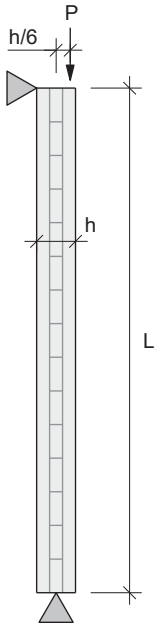
Notes:

1. For preliminary design use only. Final design shall include a complete analysis including the verification of the bearing capacity and a consideration for live load and total load deflections.
2. The tabulated values are based on dry service conditions, normal duration of loading, and on simply axially loaded walls subjected to concentric end loads parallel to outermost layers.
3. For L ≤ 8 ft, use P for L = 8 ft.
4. L = unsupported length.
5. Provided that surfaces are protected from fire exposure by fire-rated Type X gypsum board, the assigned fire-resistance duration can be increased as per CLT Handbook – U.S. Edition (FPInnovations, 2013).

Eccentricity of 1/6

Allowable uniform load, P (plf)

L	Fire-resistance rating	Layup								
(ft)	(min)	89-3s	105-3s	143-5s	175-5s	197-7s	213-7l	245-7s	245-7l	267-9l
8	0	18,050	23,550	40,200	46,400	60,450	77,000	66,150	82,250	97,350
	30	9,650	13,050	38,400	45,800	60,450	77,000	66,150	82,250	97,350
	60	2,700	2,500	27,300	33,750	60,450	72,500	66,150	79,150	97,350
	90			9,600	30,250	32,350	41,100	66,150	44,050	76,750
	120			2,150	8,200	20,350	32,450	29,750	44,150	64,300
9	0	15,750	21,100	37,250	44,300	58,100	74,450	64,600	80,400	95,350
	30	8,350	11,600	34,850	42,800	58,100	74,450	64,600	80,400	95,350
	60	2,250	2,100	24,400	30,900	58,100	68,650	64,600	76,250	95,350
	90			8,600	27,750	30,150	38,450	64,600	41,850	73,650
	120			1,850	7,550	18,650	30,350	28,350	41,950	61,650
10	0	13,800	18,850	34,350	42,050	55,550	71,700	62,900	78,300	93,150
	30	7,300	10,350	31,600	39,850	55,550	71,700	62,900	78,300	93,150
	60	1,900	1,800	21,800	28,200	55,550	64,700	62,900	73,150	93,150
	90			7,700	25,450	27,950	35,800	62,900	39,600	70,400
	120			1,550	6,950	17,050	28,300	26,950	39,650	58,900
11	0	12,100	16,850	31,500	39,700	52,800	68,700	61,000	76,050	90,750
	30	6,400	9,250	28,650	37,000	52,800	68,700	61,000	76,050	90,750
	60	1,650	1,550	19,550	25,750	52,300	60,750	61,000	69,900	90,750
	90			6,900	23,300	25,900	33,300	59,650	37,350	67,050
	120			1,350	6,350	15,600	26,300	25,500	37,400	56,050
12	0	10,700	15,100	28,800	37,250	49,950	65,550	59,000	73,650	88,150
	30	5,650	8,250	26,000	34,300	49,950	65,550	59,000	73,650	88,150
	60	1,400	1,300	17,600	23,550	48,350	56,950	59,000	66,600	88,150
	90			6,200	21,300	23,950	30,900	56,350	35,150	63,650
	120			1,150	5,800	14,250	24,400	24,100	35,200	53,200
13	0	9,500	13,600	26,350	34,850	47,100	62,300	56,900	71,050	85,400
	30	5,000	7,450	23,650	31,750	47,100	62,300	56,900	71,050	85,400
	60	1,200	1,150	15,850	21,500	44,650	53,250	56,900	63,300	85,400
	90			5,600	19,550	22,150	28,650	53,050	33,000	60,250
	120			1,000	5,350	13,000	22,650	22,750	33,100	50,400
14	0	8,500	12,250	24,100	32,500	44,250	59,050	54,650	68,400	82,450
	30	4,450	6,700	21,600	29,400	44,250	59,050	54,650	68,400	82,450
	60	1,050	1,000	14,350	19,700	41,250	49,800	53,750	60,050	82,450
	90			5,050	17,950	20,500	26,600	49,950	31,000	57,000
	120			850	4,900	11,900	21,050	21,450	31,050	47,700



Notes:

1. For preliminary design use only. Final design shall include a complete analysis including the verification of the bearing capacity and a consideration for live load and total load deflections.
2. The tabulated values are based on dry service conditions, normal duration of loading, loading parallel to outermost layers, and on simply axially loaded walls subjected to an eccentricity of 1/6 wall thickness.
3. For L ≤ 8 ft, use P for L = 8 ft.
4. L = unsupported length.
5. Provided that surfaces are protected from fire exposure by fire-rated Type X gypsum board, the assigned fire-resistance duration can be increased as per CLT Handbook – U.S. Edition (FPInnovations, 2013).

Shear Walls, Lintels, and Diaphragms – Design Properties

Shear Walls, Lintels, and Diaphragms – Design Properties

CLT stress grade	E1 (L = S-P-F 1950f MSR and T = S-P-F No. 3)								
Layup	89-3s	105-3s	143-5s	175-5s	197-7s	213-7l	245-7s	245-7l	267-9l
Loading parallel to outermost layers									
Edgewise bending in the minor strength direction									
Effective width in edgewise bending, $b_{eff,e,90}$ (in.) [(a)]	0.75	1.38	1.50	2.75	2.25	1.50	4.13	2.75	2.25
Reference edgewise shear design value, $F_{v,e,90}$ (psi) [(b)]	190	190	215	215	215	215	215	215	215
Edgewise shear rigidity, $G_{e,90}t_p$ (10^6 lbf/ft) [(c)]	1.52	1.79	2.44	2.99	3.37	3.64	4.18	4.18	4.56
Loading perpendicular to outermost layers									
Edgewise bending in the major strength direction									
Effective width in edgewise bending, $b_{eff,e,0}$ (in.) [(a)]	2.75	2.75	4.13	4.13	5.50	6.88	5.50	6.88	8.25
Reference edgewise shear design value, $F_{v,e,0}$ (psi) [(b)]	155	155	185	185	155	185	185	185	155
Edgewise shear rigidity, $G_{e,0}t_p$ (10^6 lbf/ft) [(c)]	1.52	1.79	2.44	2.99	3.37	3.64	4.18	4.18	4.56

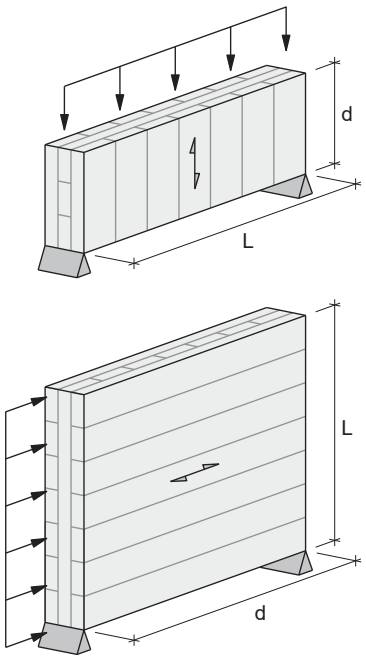
a) The edgewise bending moment capacity, M_e, and the effective edgewise bending stiffness, $(EI)_{eff,e}$, values shall be based on the effective width in edgewise bending and depth of the panel, $b_{eff,e}$ and d (see table above and figures below), respectively. Calculations shall be based on S-P-F No. 3 lumber (F_b = 500 psi, E = 1,200,000 psi) for loading parallel to outermost layer, or on S-P-F 1950f MSR lumber (F_b = 1,950 psi, E = 1,700,000 psi) for loading perpendicular to outermost layer.

b) The edgewise shear capacity values, $V_{,e}$, shall be based on the gross cross-sectional area of the panel.

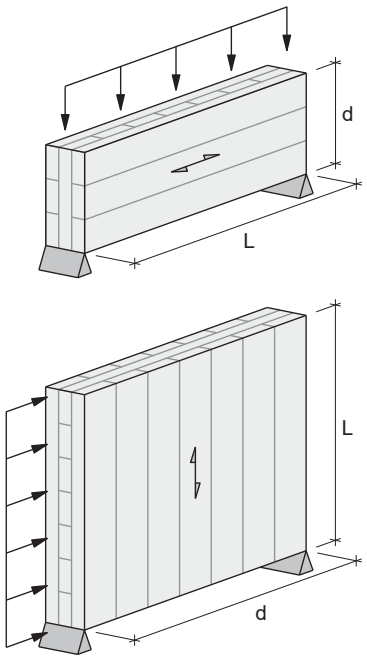
c) $G_{e,0}$ and $G_{e,90}$ = 36,200 psi based on product performance testing. Edgewise shear rigidity, $(GA)_{eff,e}$, shall be calculated by multiplying $G_e t_p$ by the member depth, d, in feet (see figures below).

Notes:

1. The tabulated design values are for dry service conditions and normal duration of loading.
2. The compressive capacity perpendicular to grain values shall be based on S-P-F No. 3 lumber (f_{cp} = 425 psi).
3. The specific gravity for dowel-type fastener design is 0.42.
4. The density for member weight is 32 pcf for a moisture content of 12%.
5. Design of CLT members shall be in accordance with the NDS.



Loading parallel to outermost layers



Loading perpendicular to outermost layers

NORDIC

TECHNICAL GUIDE
NORDIC X-LAM

NS-GT6

ASD

VERSION
2022-04-21

STRUCTURAL DETAILS 3

NORDIC STRUCTURES

GENERAL NOTES

1.0 General

1.1 This document supersedes all previous versions. For the latest version, consult nordic.ca or contact Nordic Structures.

1.2 The information contained in this document is provided for information purposes only. This information should not be used for any application without examination and verification of its accuracy, suitability and applicability by a licensed engineer, architect or other professional. Nordic Structures does not guarantee that the information is suitable for any general or particular use, and assumes no responsibility for the use, application of and/or reference to the information.

1.3 All dimensions are in inches (in.), unless otherwise noted.

1.4 For more information, consult nordic.ca or contact Nordic Structures.

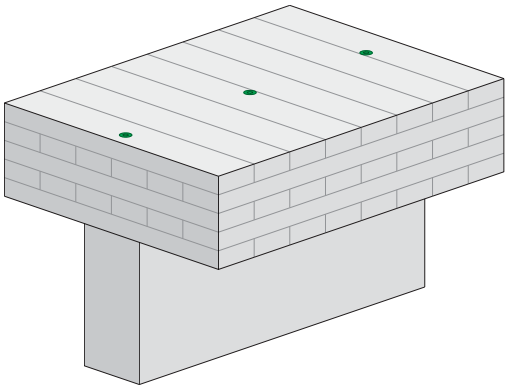
2.0 Design of connections

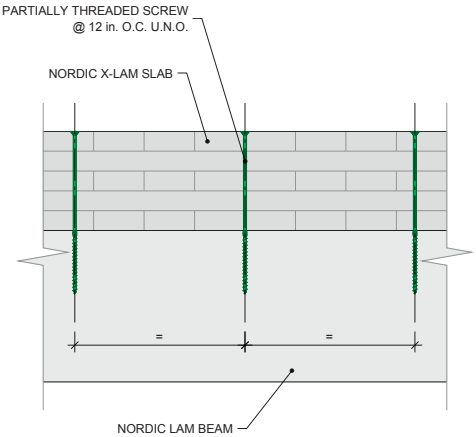
2.1 The design of connections, including fire resistance if required, shall be in accordance with the National Design Specification (NDS) for Wood Construction 2015.

2.2 The design of connections should include considerations for structural and service performance, such as resistance, minimum distances, dimensional changes, durability, erection and fire safety, among others, as well as taking into account architectural requirements.

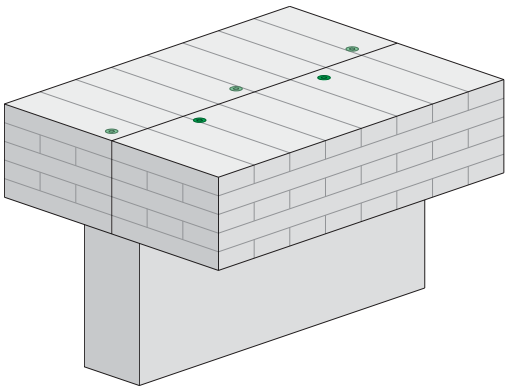
2.3 The connections shown in this document are provided for information purposes only, and conceptually. Note that many possibilities and variants are possible.

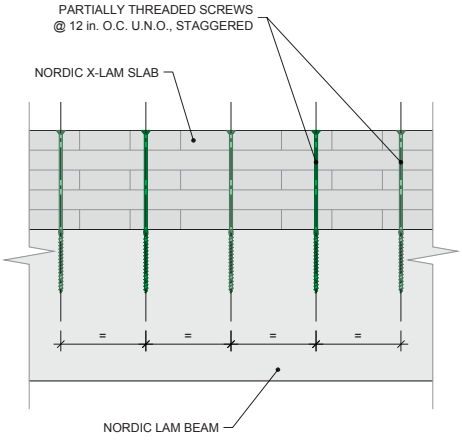
Structure, GL-CLT | Continuous Floor Slab on Beam | NS-DS2001



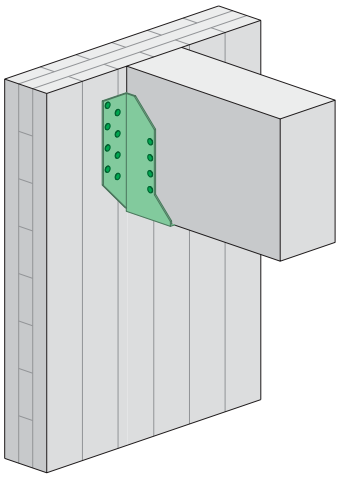


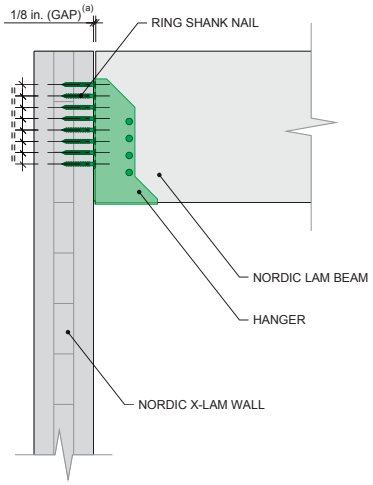
Structure, GL-CLT | Single Floor Slab on Beam | NS-DS2002





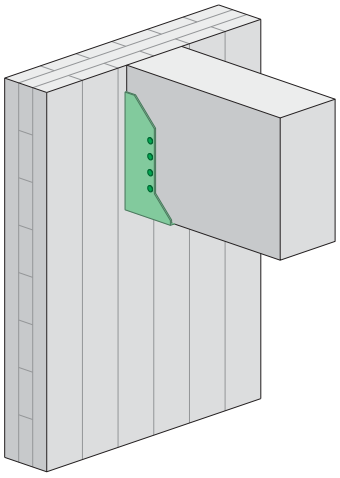
Structure, GL-CLT | Face-mount Hanger | NS-DS2003

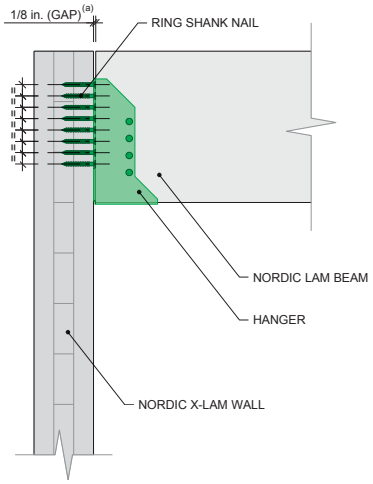




a) The 1/8 in. gap may not be required depending on the detail on the other side of the beam.

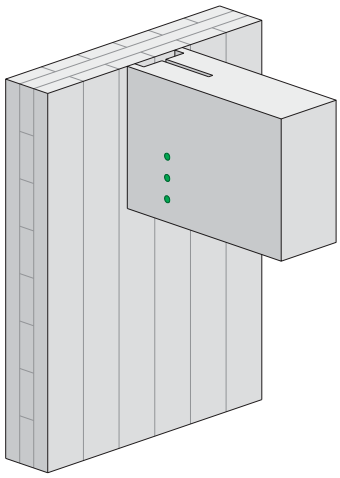
Structure, GL-CLT | Face-mount Hanger with Concealed Flanges | NS-DS2067

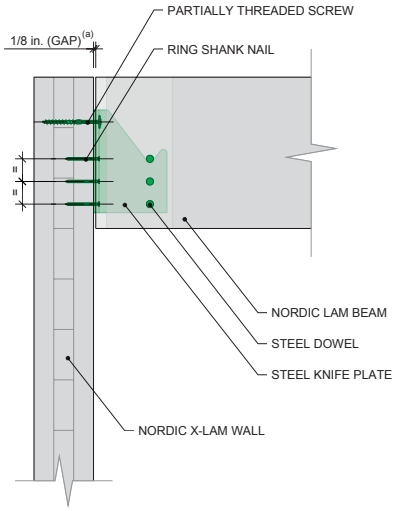




a) The 1/8 in. gap may not be required depending on the detail on the other side of the beam.

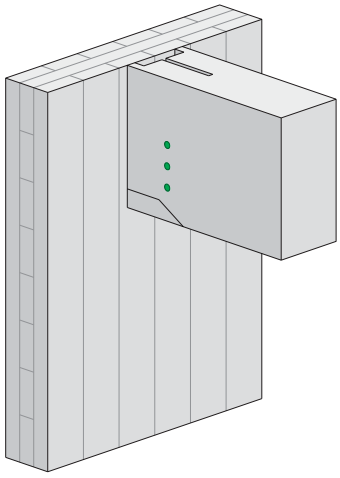
Structure, GL-CLT | Knife Plate | NS-DS2004

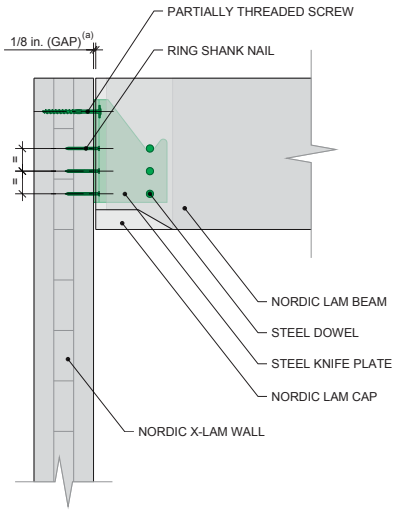




a) The 1/8 in. gap may not be required depending on the detail on the other side of the beam.

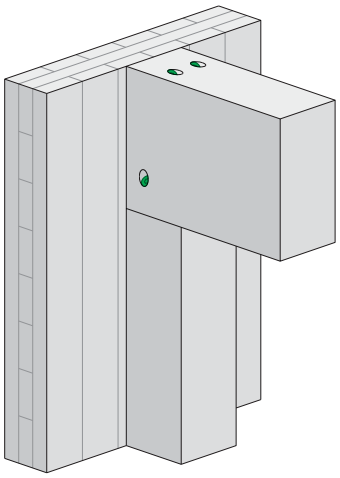
Structure, GL-CLT | Knife Plate with Cap | NS-DS2005

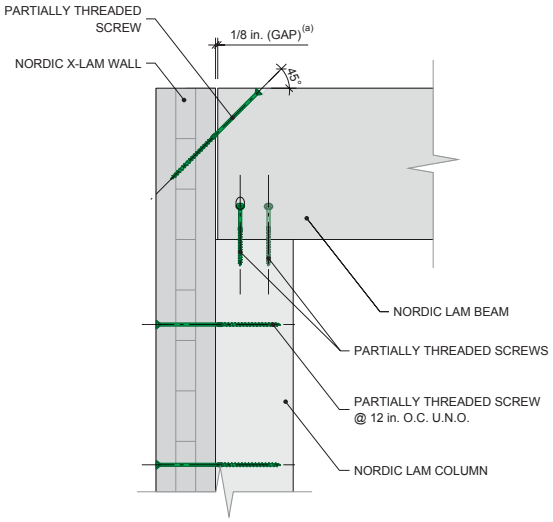




a) The 1/8 in. gap may not be required depending on the detail on the other side of the beam.

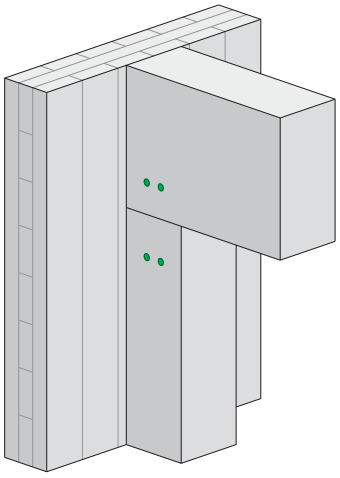
Structure, GL-CLT | Screwed Beam to Column | NS-DS2006

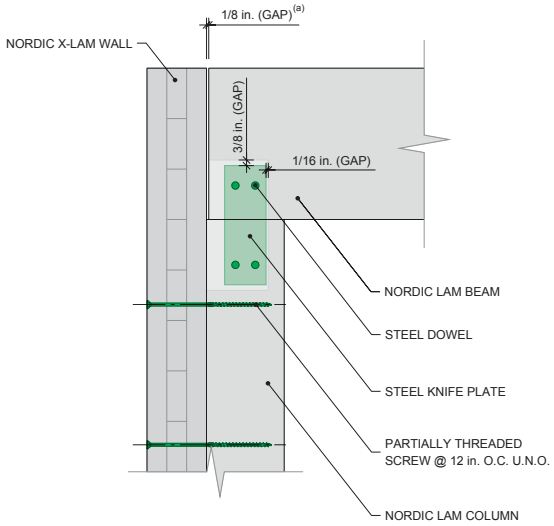




a) The 1/8 in. gap may not be required depending on the detail on the other side of the beam.

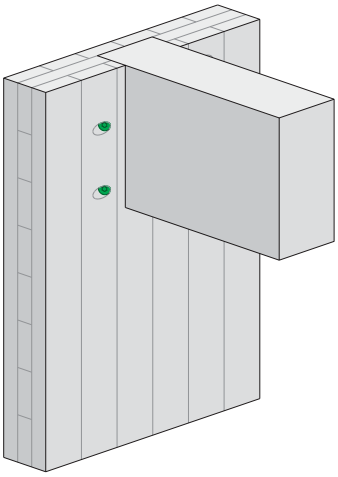
Structure, GL-CLT | Beam to Column with Knife Plate | NS-DS2007

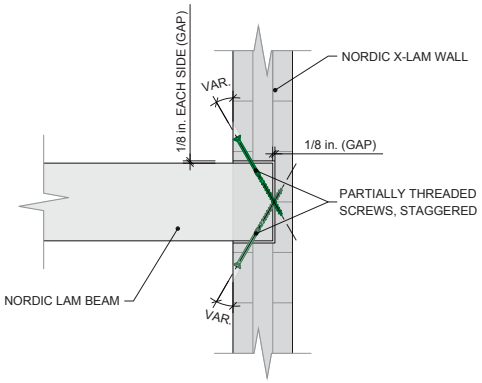




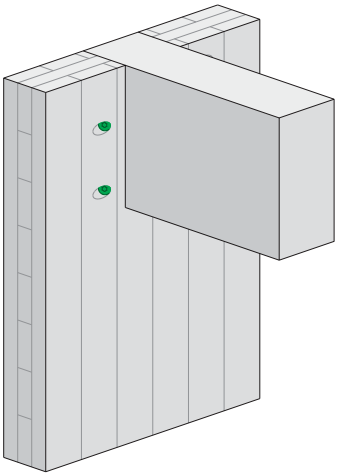
a) The 1/8 in. gap may not be required depending on the detail on the other side of the beam.

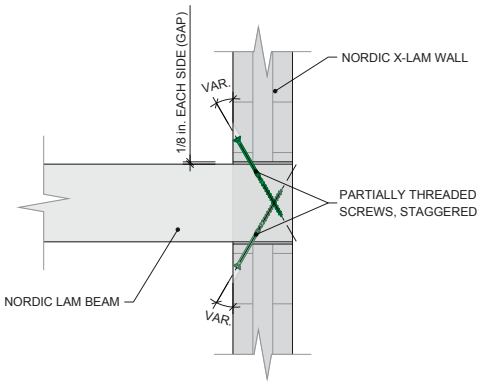
Structure, GL-CLT | Pocket for Beam | NS-DS2008



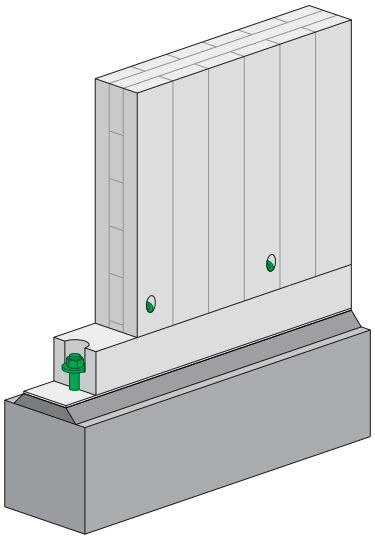


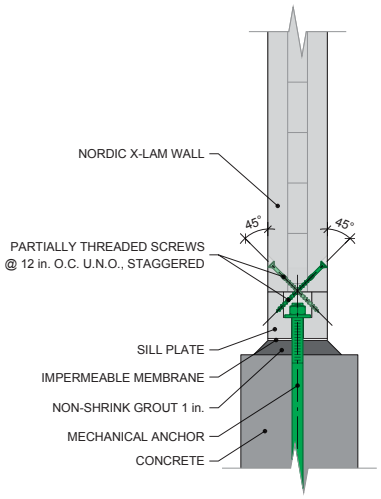
Structure, GL-CLT | Through Pocket for Beam | NS-DS2009



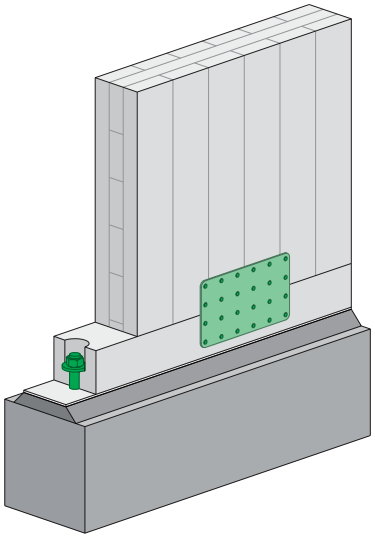


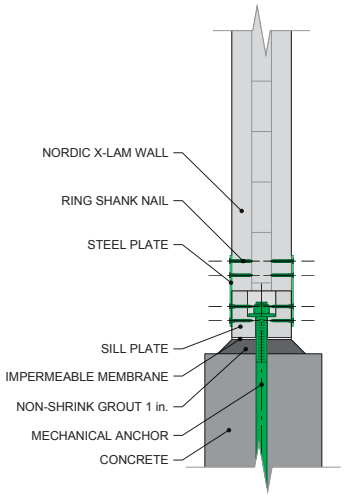
Structure, Wall-Foundation | Wall to Sill Plate, Screws | NS-DS2010



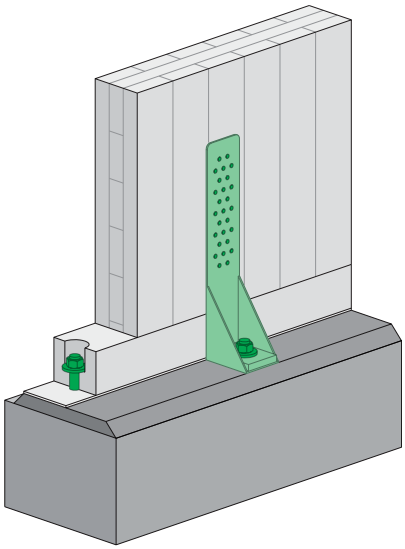


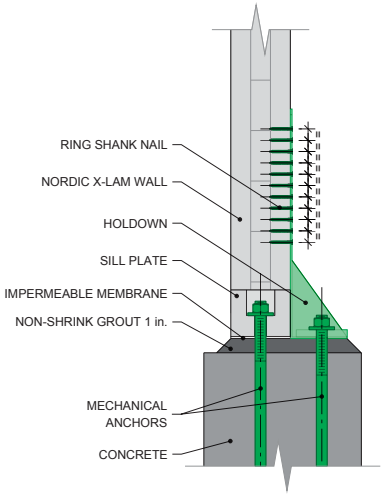
Structure, Wall-Foundation | Wall to Sill Plate, Nailed Steel Plate | NS-DS2011



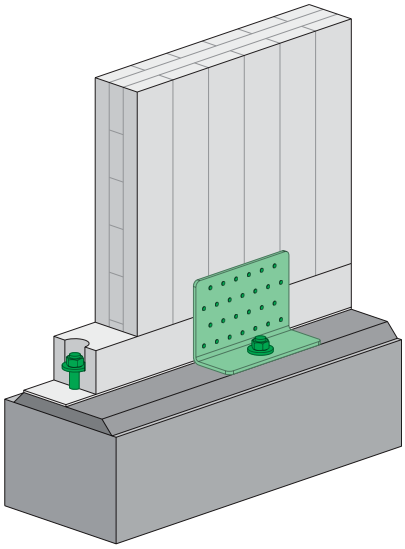


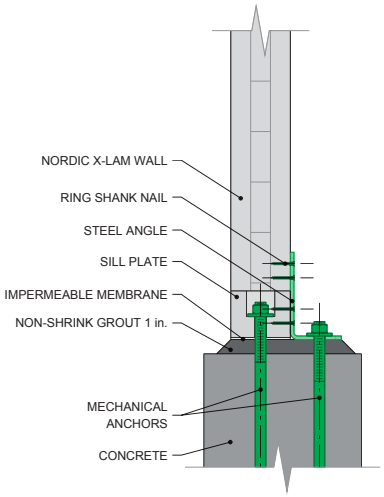
Structure, Wall–Foundation | Wall to Sill Plate, Holdown | NS-DS2012



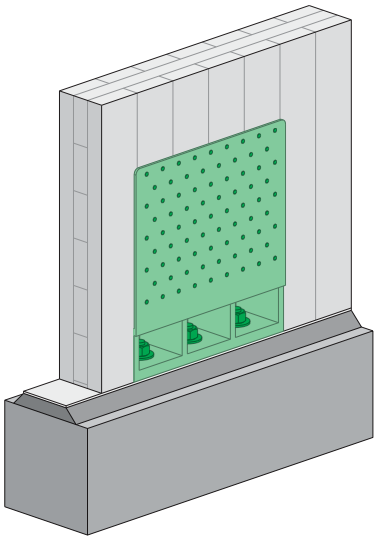


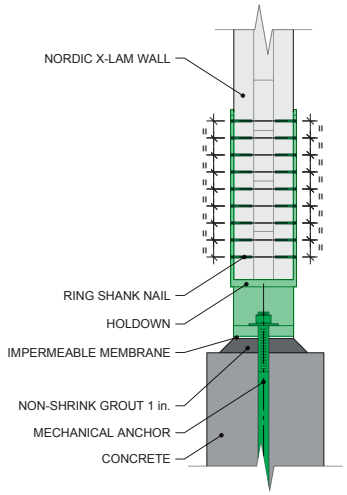
Structure, Wall–Foundation | Wall to Sill Plate, Steel Angle | NS-DS2013



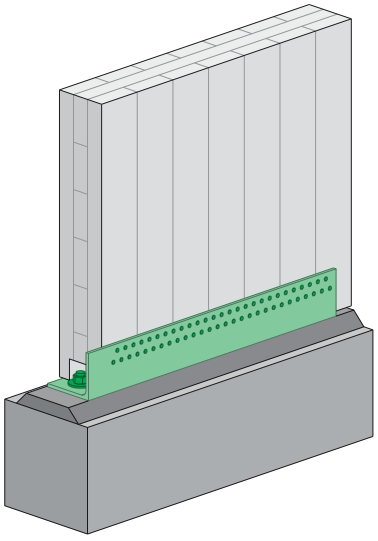


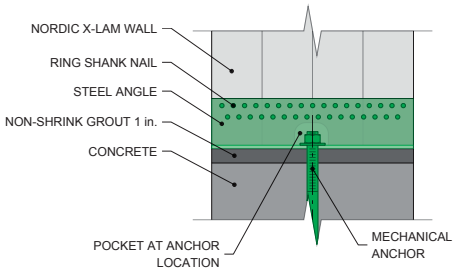
Structure, Wall-Foundation | Wall to Foundation, Holdown | NS-DS2014

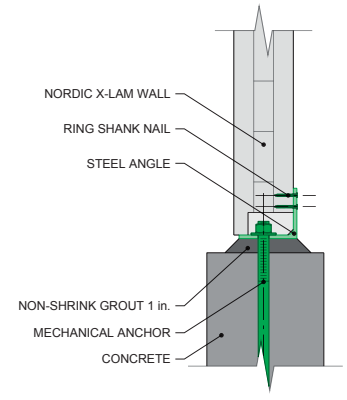




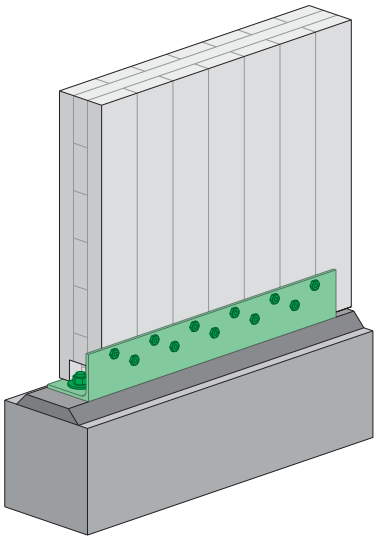
Structure, Wall-Foundation | Wall to Foundation, Nailed Steel Angle | NS-DS2015

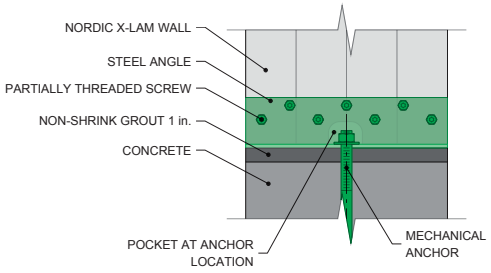


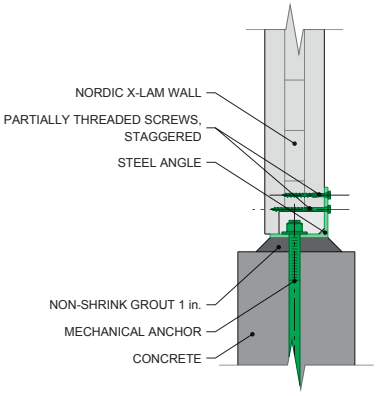




Structure, Wall-Foundation | Wall to Foundation, Screwed Steel Angle | NS-DS2016

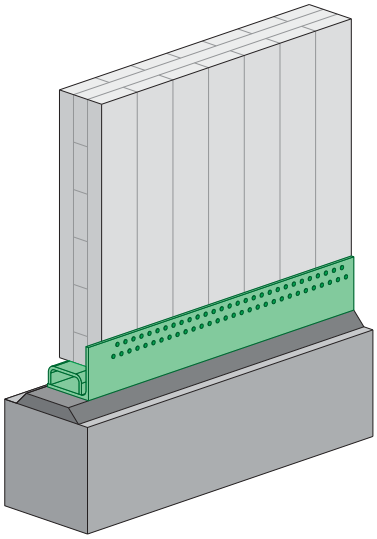


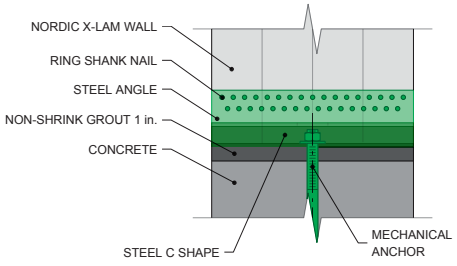


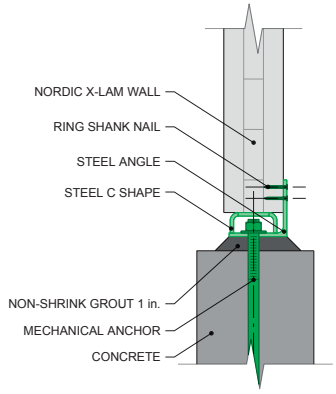


Note:
1. This assembly detail offers a resistance to forces acting perpendicularlry to the foundation wall.

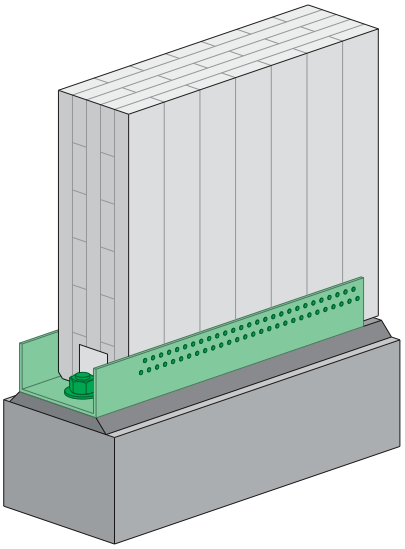
Structure, Wall-Foundation | Wall to Foundation, Nailed Steel Angle and Steel C Shape | NS-DS2068

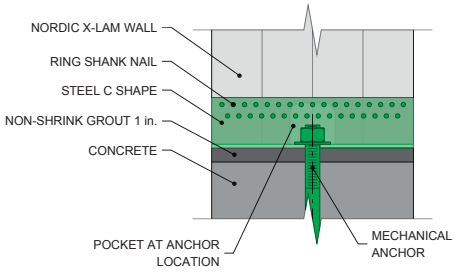


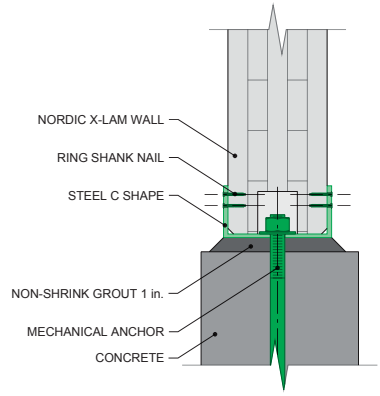




Structure, Wall-Foundation | Wall to Foundation, Nailed C Shape | NS-DS2017

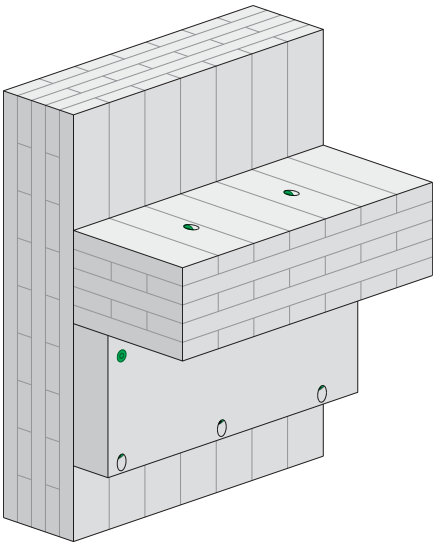


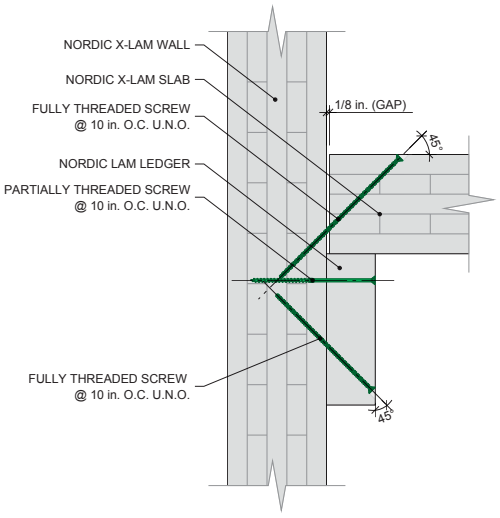




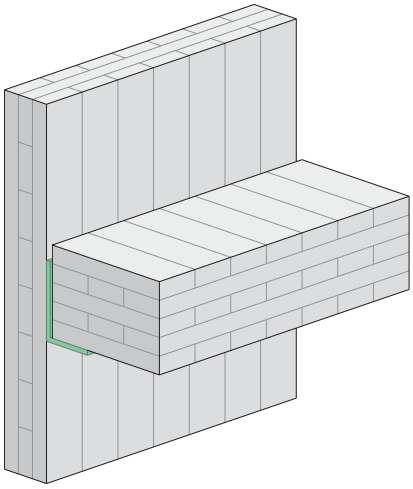
Note:
1. For an exterior wall on foundation, careful consideration should be given to waterproofing and drainage at the junction between wall and steel C shape.

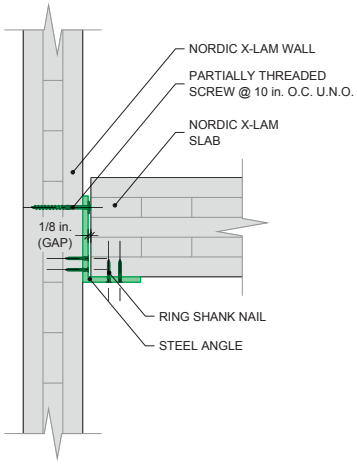
Structure, Floor/Roof-Wall | Ledger | NS-DS2018



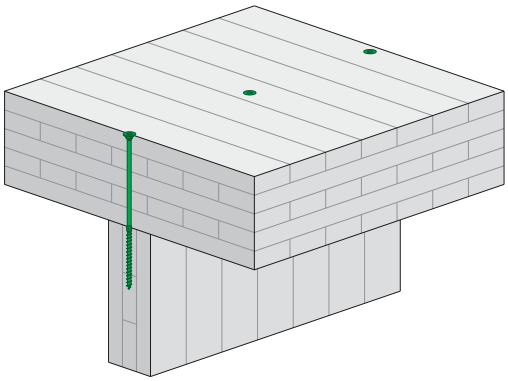


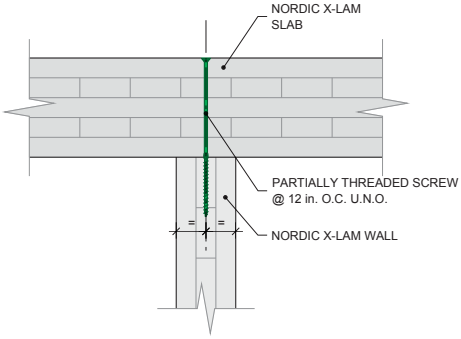
Structure, Floor/Roof-Wall | Steel Angle | NS-DS2019



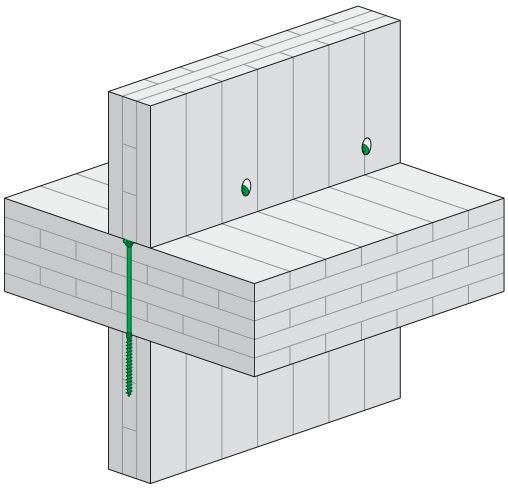


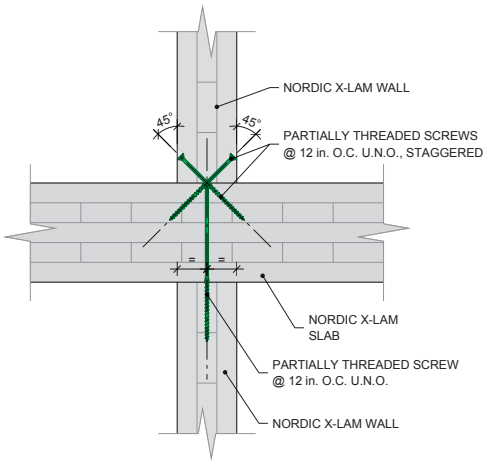
Structure, Floor/Roof-Wall | Screwed Floor/Roof Slab to Wall | NS-DS2020



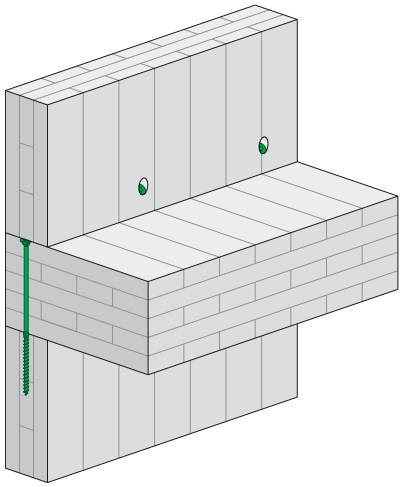


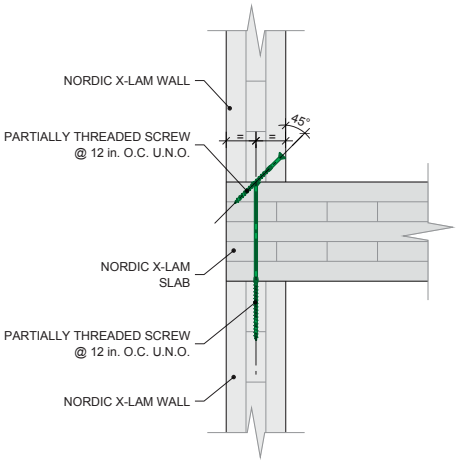
Structure, Floor/Roof-Wall | Screwed Wall to Continuous Floor Slab to Wall | NS-DS2021



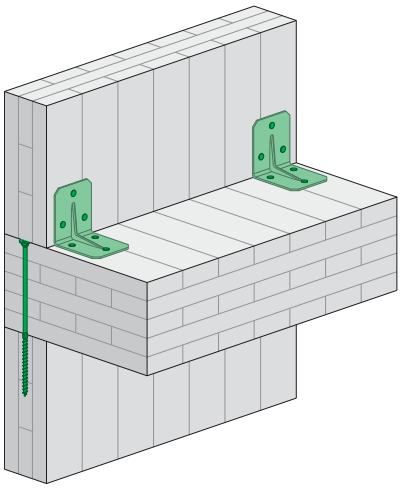


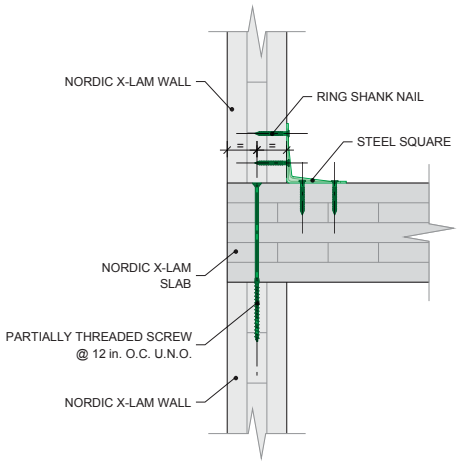
Structure, Floor/Roof-Wall | Screwed Wall to Single Floor Slab to Wall | NS-DS2022



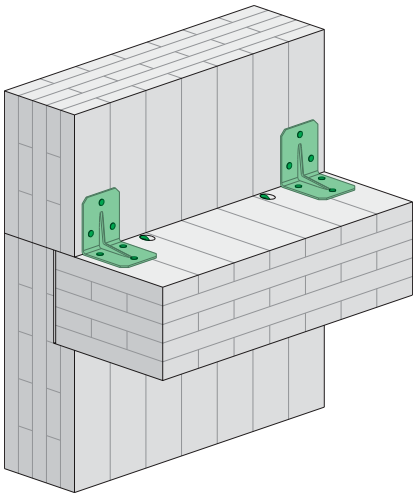


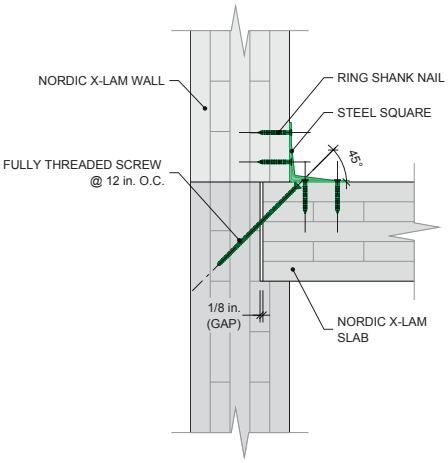
Structure, Floor/Roof-Wall | Wall to Floor Slab with Steel Square to Wall | NS-DS2023



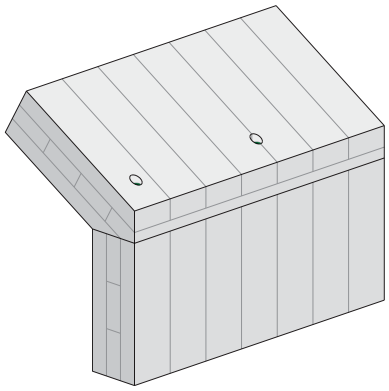


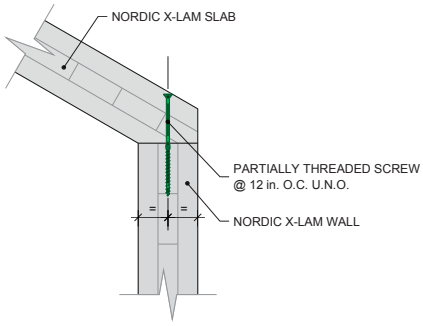
Structure, Floor/Roof-Wall | Wall to Floor Slab with Steel Square to Notched Wall | NS-DS2024



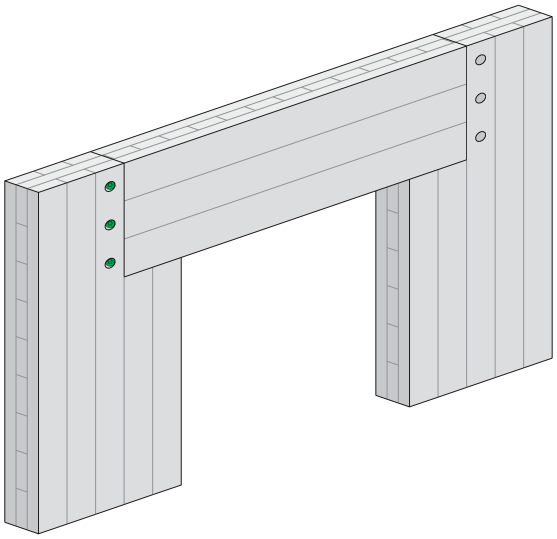


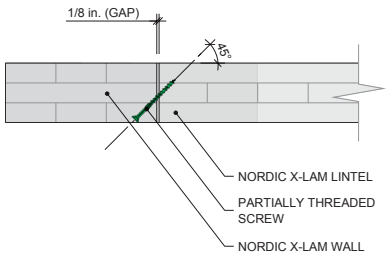
Structure, Floor/Roof-Wall | Sloped Roof Slab to Wall | NS-DS2025



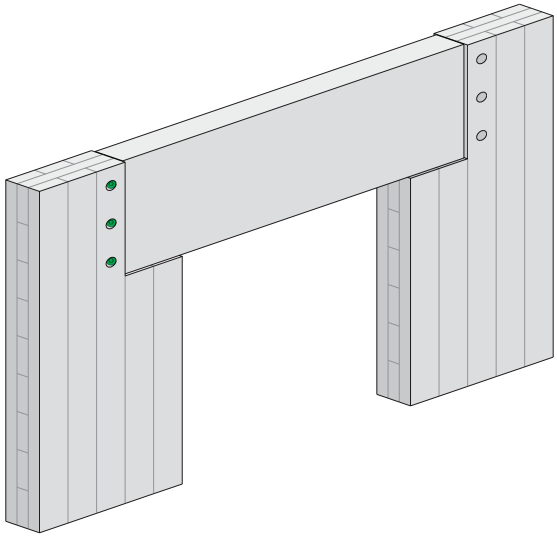


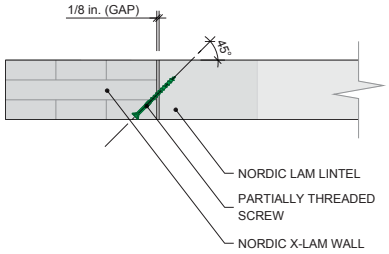
Structure, Lintel | CLT Lintel | NS-DS2026



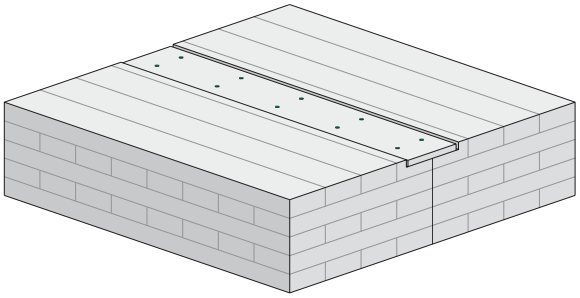


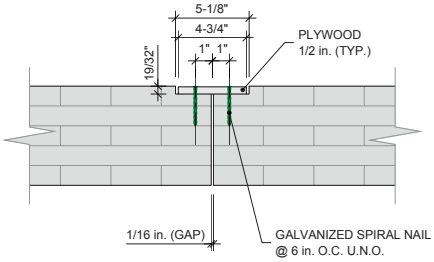
Structure, Lintel | Glulam Lintel | NS-DS2027



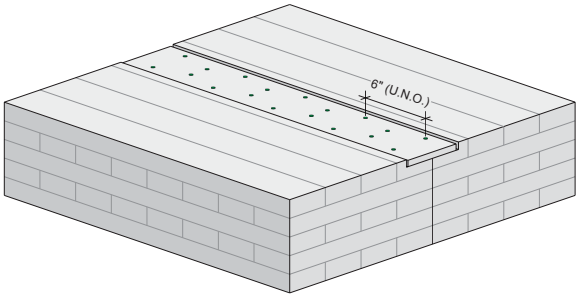


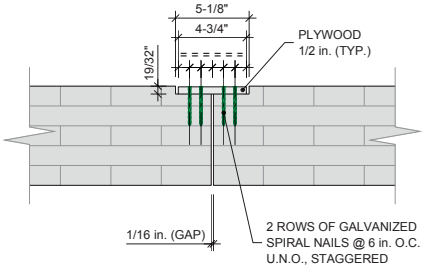
Structure, Panel-Panel | Butt Joint, One Row of Nails | NS-DS2029



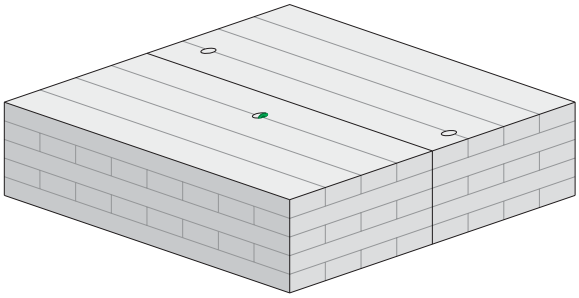


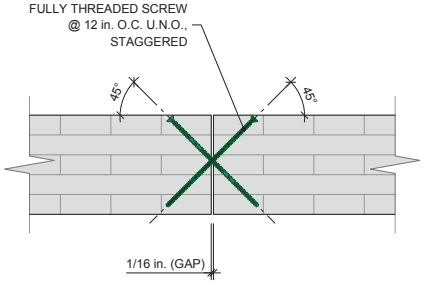
Structure, Panel-Panel | Butt Joint, Two Rows of Nails | NS-DS2030



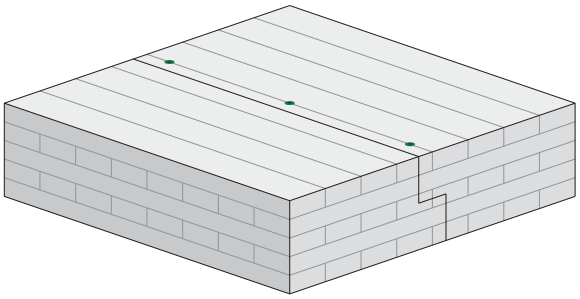


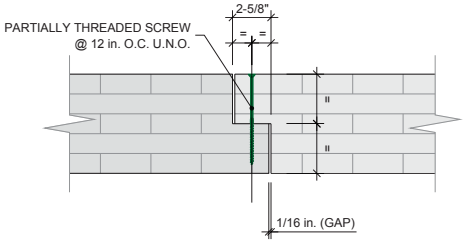
Structure, Panel-Panel | Butt Joint, 45° Screws | NS-DS2069



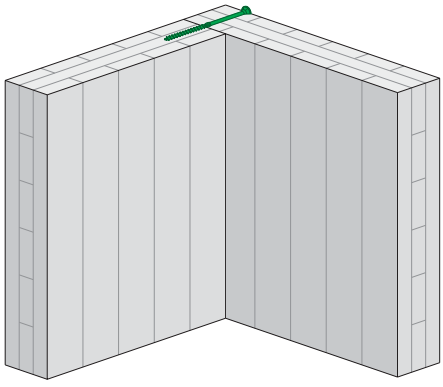


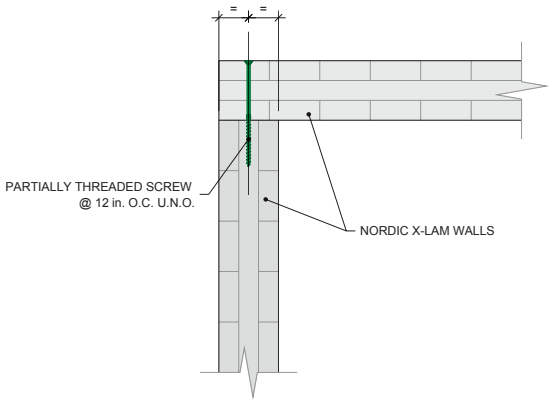
Structure, Panel-Panel | Half-lap Joint | NS-DS2031



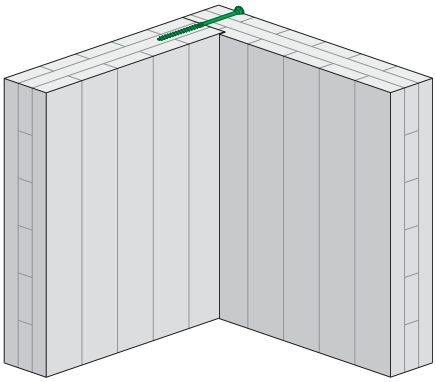


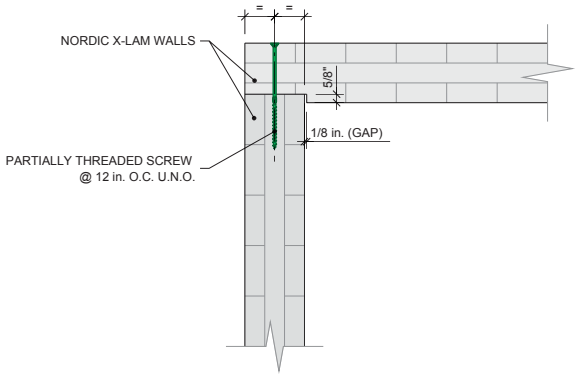
Structure, Wall-Wall | Corner Joint with 90° Screws | NS-DS2032



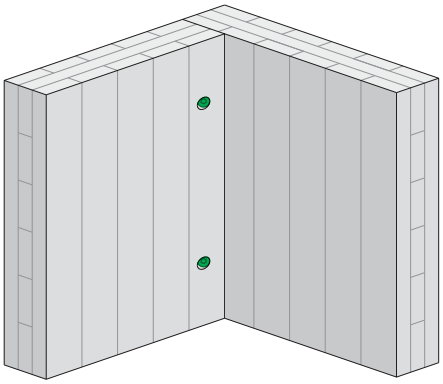


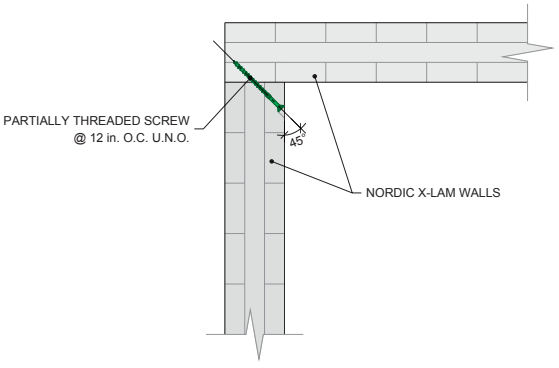
Structure, Wall-Wall | Notched Corner Joint with 90° Screws | NS-DS2033



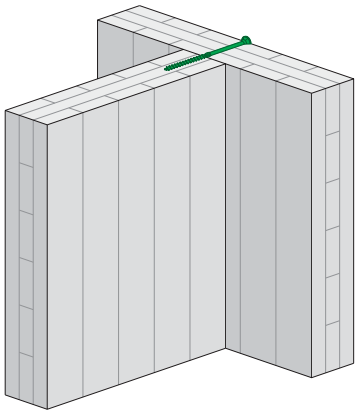


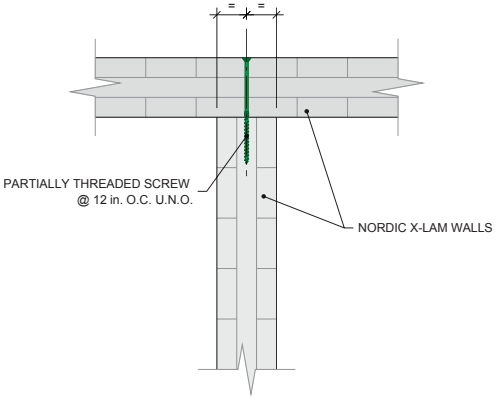
Structure, Wall-Wall | Corner Joint with 45° Screws | NS-DS2034



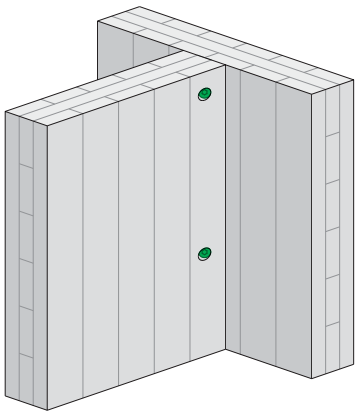


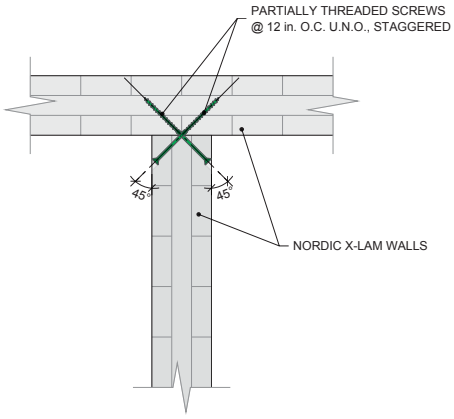
Structure, Wall-Wall | T-joint with 90° Screws | NS-DS2035



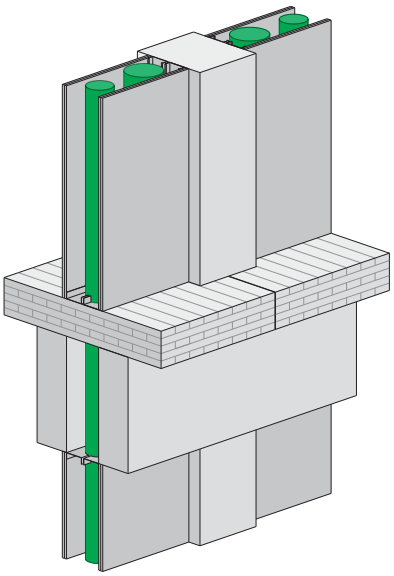


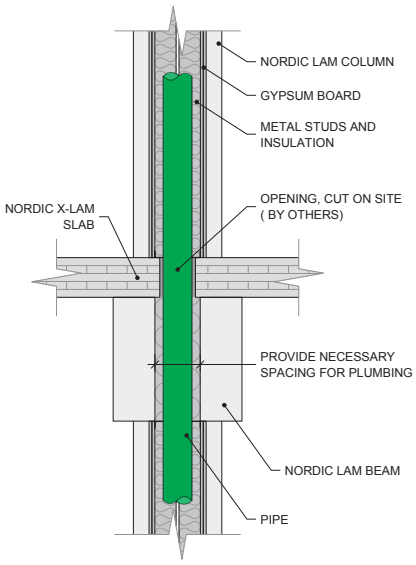
Structure, Wall-Wall | T-joint with 45° Screws | NS-DS2036



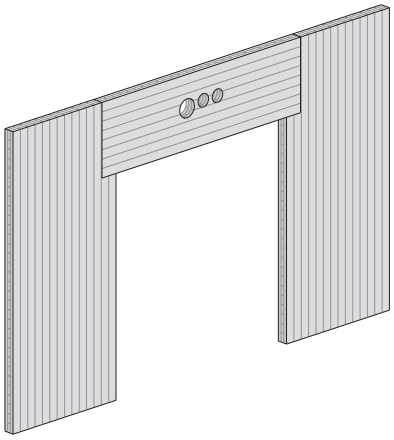


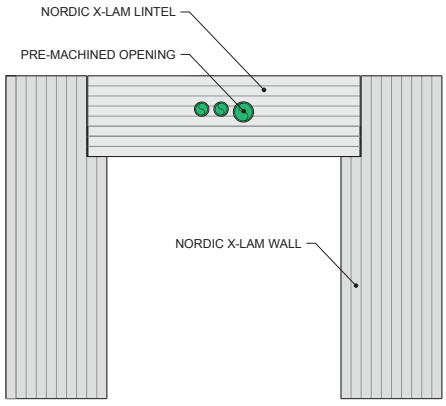
Mechanical, Electrical, and Plumbing | Vertical, Double-member Beam | NS-DS2501



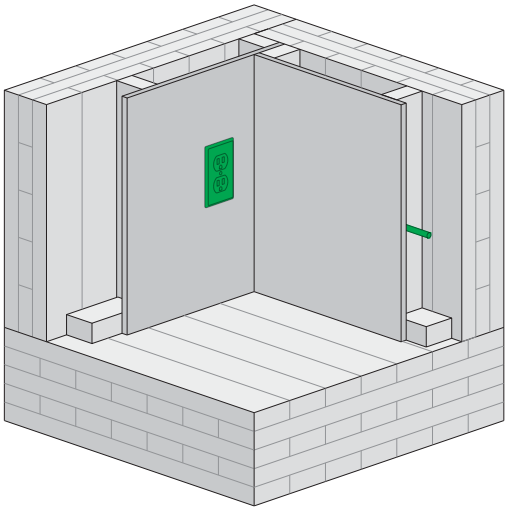


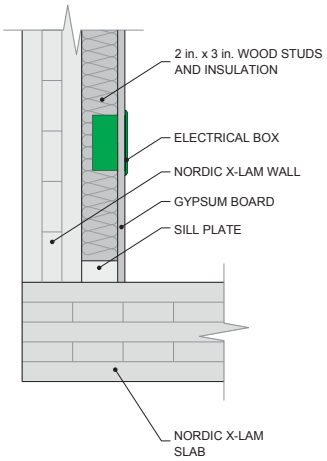
Mechanical, Electrical, and Plumbing | Horizontal, Pre-machined Opening | NS-DS2502



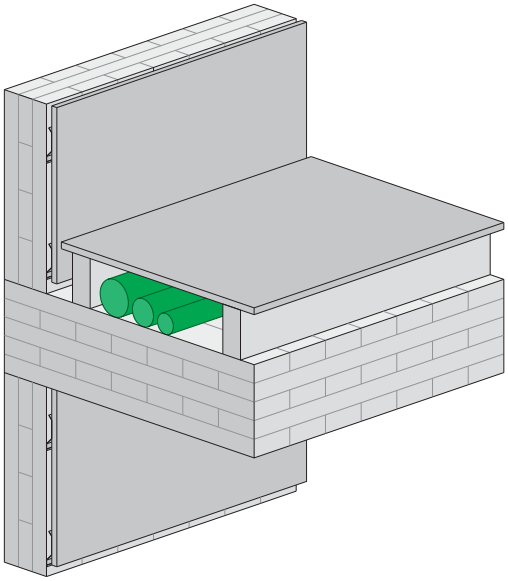


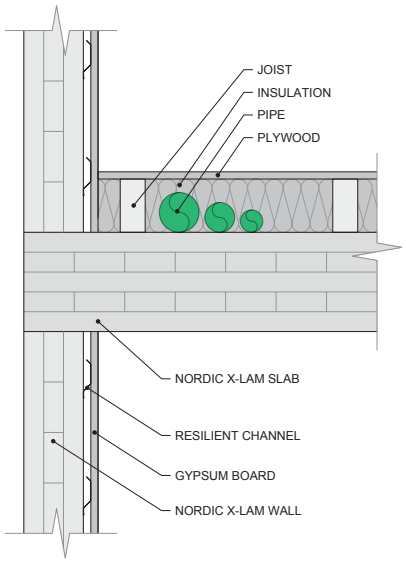
Mechanical, Electrical, and Plumbing | Horizontal, Electrical Box with 38 mm x 64 mm Wood Studs | NS-DS2503



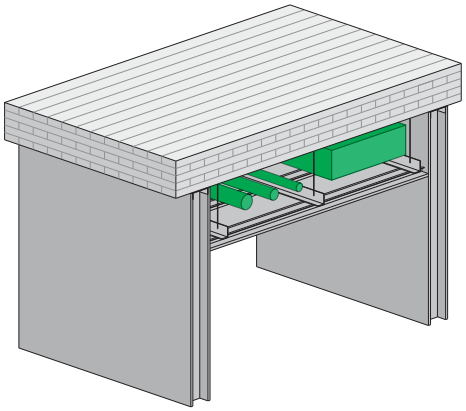


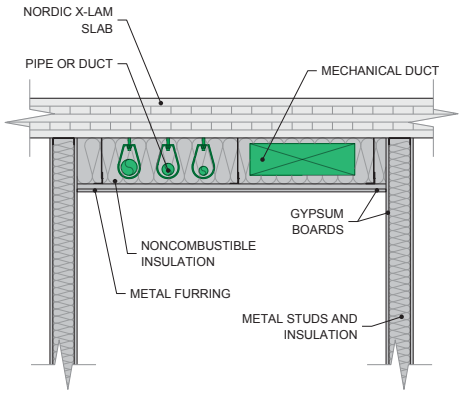
Mechanical, Electrical, and Plumbing | Horizontal, Raised Floor | NS-DS2504



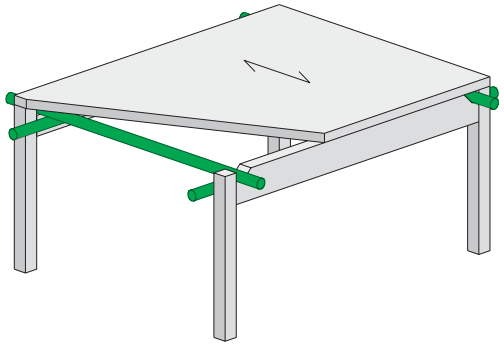


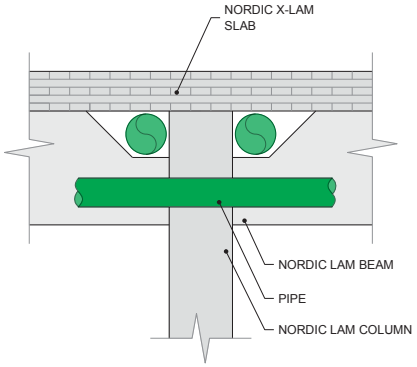
Mechanical, Electrical, and Plumbing | Horizontal, Suspended Ceiling | NS-DS2505



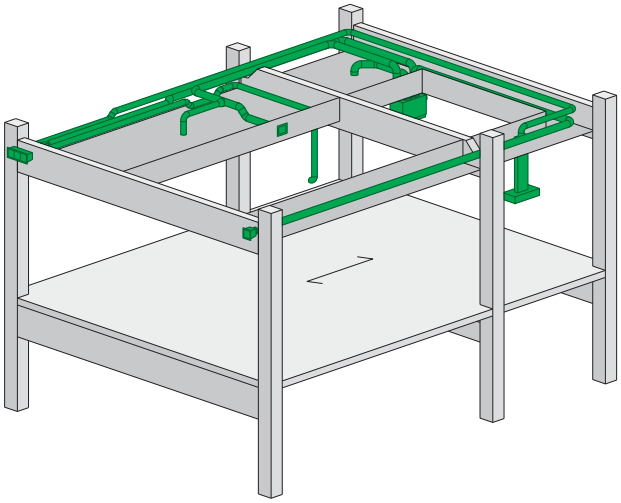


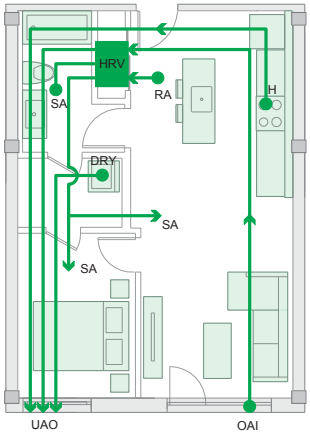
Mechanical, Electrical, and Plumbing | Horizontal, Bevelled Beam | NS-DS2507





Mechanical, Electrical, and Plumbing | Multi-residential Unit Diagram – Option 1 | NS-DS2508

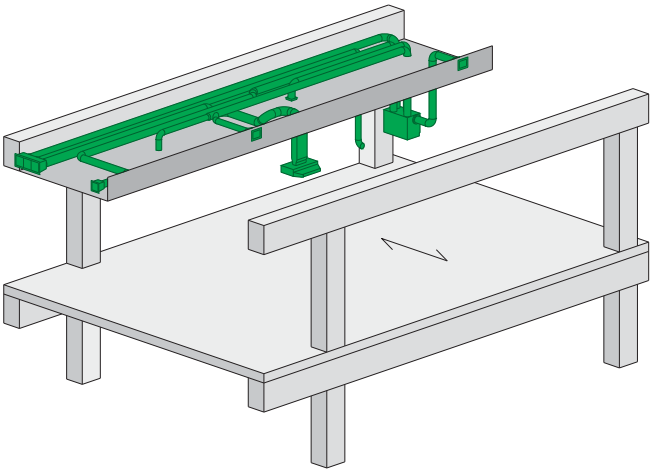


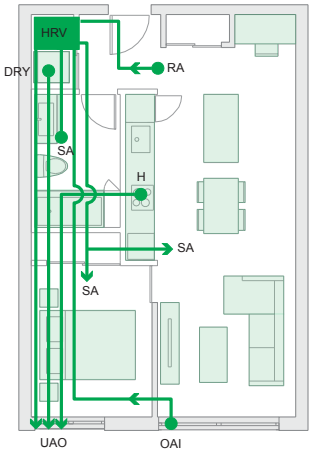


Legend

SA	Supply Air
H	Hood
OAI	Outdoor Air Intake
RA	Return Air
UAO	Used Air Outlet
SEC	Dryer
HRV	Heat Recovery Ventilator

Mechanical, Electrical, and Plumbing | Multi-residential Unit Diagram – Option 2 | NS-DS2509





Legend

SA	Supply Air
H	Hood
OAI	Outdoor Air Intake
RA	Return Air
UAO	Used Air Outlet
SEC	Dryer
HRV	Heat Recovery Ventilator

NORDIC

TECHNICAL GUIDE
NORDIC X-LAM

NS-GT6

ASD

VERSION
2022-04-21

ARCHITECTURAL DETAILS 4

NORDIC
STRUCTURES

GENERAL NOTES

1.0 General

1.1 This document supersedes all previous versions. For the latest version, consult nordic.ca or contact Nordic Structures.

1.2 The information contained in this document is provided for information purposes only. This information should not be used for any application without examination and verification of its accuracy, suitability and applicability by a licensed engineer, architect or other professional. Nordic Structures does not guarantee that the information is suitable for any general or particular use, and assumes no responsibility for the use, application of and/or reference to the information.

1.3 Certain commercial products are identified in this document in order to properly represent the test procedure. In no case does such identification imply recommendations or endorsement by Nordic Structures, nor does it imply that the product or material identified is the best available for the purpose.

1.4 For more information, consult nordic.ca or contact Nordic Structures.

2.0 Fire Safety

2.1 The fire resistance rating (FRR) is determined using the design methodology specified in the National Design Specification (NDS) for Wood Construction 2015. The fire resistance rating may also be determined on the basis of the results of tests conducted in conformance with ASTM E119, Standard Test Methods for Fire Tests of Building Construction and Materials.

2.2 To determine the fire resistance of an element or assembly according to other assumptions than those specified in this document, consult the Nordic X-Lam technical guide or use Nordic Sizer software.

2.3 The fire performance criteria for evaluating the separating function of building elements shall be considered when required by the applicable building code.

2.4 For this purpose, among other requirements, many firestop systems suitable for mass timber are available. For more details, consult the product suppliers.

2.5 Additional references: Fire-Resistance-Tested Mass Timber Assemblies and Penetrations.

3.0 Envelope

3.1 Good thermal insulation is never arbitrary and must always be chosen according to location, area and climate.

3.2 The total thermal resistance of an assembly is calculated according to the values of thermal conductivity, λ, and thermal resistance, R, indicated in the following table.

3.3 To convert the thermal resistance of the International System (RSI) [m²K/W] to the R-value [ft²Fh/BTU], divide the RSI value by 0.1761.

3.4 As stated in technical note NS-NT602-US, Nordic X-Lam cross-laminated timber acts as a vapor barrier.

3.5 The use of closed cell spray polyurethane is not recommended for exterior wall assemblies made of cross-laminated timber because of its low permeability.

3.6 The study of the building envelope, including the control of condensation, the transfers of heat, air, moisture and sound, as well as the details of joining and fixing of the coverings, shall be carried out in accordance with the applicable building code.

GENERAL NOTES (CONTINUED)

Thermal Resistance of Materials

Product	t (in.)	λ (BTU/ftFh)	R (ft²Fh/BTU)
Nordic Lam	1	0.0751	1.11
Nordic X-Lam	1	0.0751	1.11
Sawn lumber	1	0.0693	1.20
Spray polyurethane (BASF)	2	0.0116	14.2
Stone wool (Rockwool ComfortBatt R24)	5-1/2	0.0191	24.0
Gypsum board	1/2	0.0919	0.45
Polyisocyanurate (SOPRA-ISO)	-	0.0144	-
Air cavity – Wall	1/2 to 3/4	-	0.91
Air cavity – Ceiling	1/2 to 1-5/8	-	0.85
	1-5/8 to 3-1/2	-	0.91
Interior air film – Wall	-	-	0.68
Interior air film – Ceiling	-	-	0.62
Exterior air film	-	-	0.17

References: Test Report AT-00205 (AIR-INS inc.), Wood Handbook (FPL, 2010), Evaluation Listing CCMC 13588-L (2011), Technical Data Sheet (Rockwool, 2017), Technical Data Sheet 190304SCANE (Soprema, 2019) and Table A-9.36.2.4.1.1)-D of NBC 2015.

4.0 Acoustics

4.1 The Sound Transmission Class (STC) rating describes the performance of the separating wall or floor/ceiling assembly, whereas the Field Sound Transmission Class (FSTC) takes into consideration the performance of the separating element as well as the flanking transmission paths. Also, building professionals should ensure that floors are designed to minimize impact transmission. For more details, see the IBC 2018, Section 1206.

4.2 The following pages present separating assemblies that may comply with the applicable building code. However, selecting an appropriate separating assembly is only one part of the solution for reducing airborne sound transmission between adjoining spaces: to fully address the sound performance of the whole system, flanking assemblies must be connected to the separating assembly. For more details, see the Nordic X-Lam Technical Guide.

4.3 Unless otherwise noted, concrete topping and prefabricated concrete topping used in assemblies have a density of 2,710 kg/m^3.

4.4 The use of prefabricated concrete topping in floor assemblies is only required by the acoustical testing procedure.

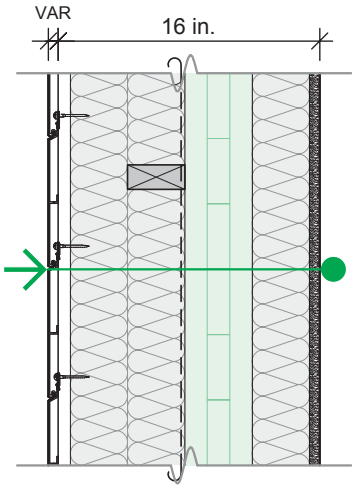
4.5 The use of an acoustic membrane under a floor covering is recommended, especially when it is a hard surface coating (e.g. ceramic).

4.6 Unless otherwise noted, the acoustic performance values are derived from test results from a certified laboratory. Test reports are available upon request.

4.7 Additional references:

- WoodWorks – Acoustics and Mass Timber: Room-to-Room Noise Control
- WoodWorks – Acoustically-Tested Mass Timber Assemblies
- University of Oregon – Acoustic Lab Testing of Typical Multi-Family Residential Wall and Floor Assemblies

Architecture, Assembly | Exterior Wall | NS-DA2000



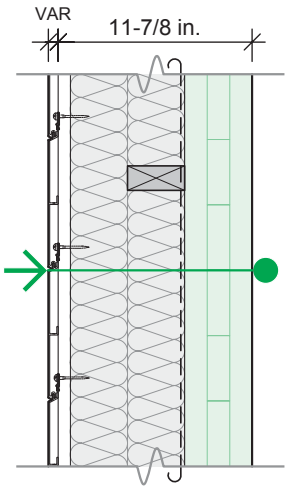
E1

Fire-resistance rating	FRR [a]	1 h	
Thermal resistance	RSI / R	6.7	/ 38
Acoustic ratings	STC / FSTC	n.a.	/ n.a.
	IIC / FIIC	n.a.	/ n.a.

a) The fire-resistance rating is based on an effective length of 10 feet and on a concentric uniform load of 12,450 plf.

- CLADDING (UP TO THE DESIGNER)
- AIR GAP 3/4 in.
- WOOD STUDS 2 in. X 4 in. @ 24 in. O.C.
- WOOD FURRING 2 in. X 4 in. @ 24 in. O.C.
- 2 ROWS OF STONE WOOL INSULATION 3-1/2 in. EA.
- AIR BARRIER MEMBRANE
- NORDIC X-LAM 4-1/8 in.
- WOOD STUDS 2 in. X 4 in. @ 24 in. O.C.
- 1 ROW OF STONE WOOL INSULATION 3-1/2 in.
- 1 TYPE X GYPSUM BOARD 5/8 in.

Architecture, Assembly | Exterior Wall | NS-DA2001



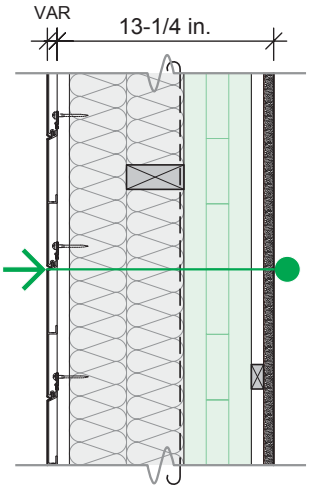
E2

Fire-resistance rating	FRR [a]	30 min	
Thermal resistance	RSI / R	4.8	/ 27
Acoustic ratings	STC / FSTC	n.a.	/ n.a.
	IIC / FIIC	n.a.	/ n.a.

a) The fire-resistance rating is based on an effective length of 10 feet and on a concentric uniform load of 12,450 plf.

- CLADDING (UP TO THE DESIGNER)
- AIR GAP 3/4 in.
- WOOD STUDS 2 in. X 4 in. @ 24 in. O.C.
- WOOD FURRING 2 in. X 4 in. @ 24 in. O.C.
- 2 ROWS OF STONE WOOL INSULATION 3-1/2 in. EA.
- AIR BARRIER MEMBRANE
- NORDIC X-LAM 4-1/8 in.

Architecture, Assembly | Exterior Wall | NS-DA2002



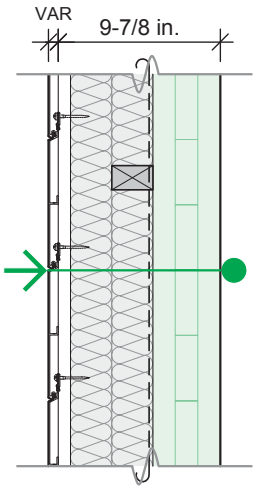
E3

Fire-resistance rating	FRR [a]	1 h	
Thermal resistance	RSI / R	5.0	/ 28
Acoustic ratings	STC / FSTC	n.a.	/ n.a.
	IIC / FIIC	n.a.	/ n.a.

a) The fire-resistance rating is based on an effective length of 10 feet and on a concentric uniform load of 12,450 plf.

- CLADDING (UP TO THE DESIGNER)
- AIR GAP 3/4 in.
- WOOD STUDS 2 in. X 4 in. @ 24 in. O.C.
- WOOD FURRING 2 in. X 4 in. @ 24 in. O.C.
- 2 ROWS OF STONE WOOL INSULATION 3-1/2 in. EA.
- AIR BARRIER MEMBRANE
- NORDIC X-LAM 4-1/8 in.
- WOOD FURRING 3/4 in. @ 24 in. O.C.
- 1 TYPE X GYPSUM BOARD 5/8 in.

Architecture, Assembly | Exterior Wall | NS-DA2003



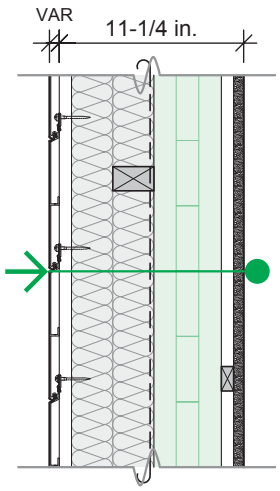
E4

Fire-resistance rating	FRR [a]	30 min	
Thermal resistance	RSI / R	3.7	/ 21
Acoustic ratings	STC / FSTC	n.a.	/ n.a.
	IIC / FIIC	n.a.	/ n.a.

a) The fire-resistance rating is based on an effective length of 10 feet and on a concentric uniform load of 12,450 plf.

- CLADDING (UP TO THE DESIGNER)
- AIR GAP 3/4 in.
- WOOD STUDS 2 in. X 3 in. @ 24 in. O.C.
- WOOD FURRING 2 in. X 3 in. @ 24 in. O.C.
- 2 ROWS OF STONE WOOL INSULATION 2-1/2 in. EA.
- AIR BARRIER MEMBRANE
- NORDIC X-LAM 4-1/8 in.

Architecture, Assembly | Exterior Wall | NS-DA2004



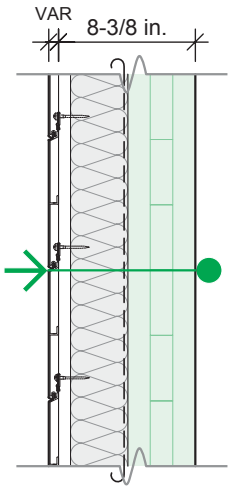
E5

Fire-resistance rating	FRR [a]	1 h	
Thermal resistance	RSI / R	4.0	/ 22
Acoustic ratings	STC / FSTC	n.a.	/ n.a.
	IIC / FIIC	n.a.	/ n.a.

a) The fire-resistance rating is based on an effective length of 10 feet and on a concentric uniform load of 12,450 plf.

- CLADDING (UP TO THE DESIGNER)
- AIR GAP 3/4 in.
- WOOD STUDS 2 in. X 3 in. @ 24 in. O.C.
- WOOD FURRING 2 in. X 3 in. @ 24 in. O.C.
- 2 ROWS OF STONE WOOL INSULATION 2-1/2 in. EA.
- AIR BARRIER MEMBRANE
- NORDIC X-LAM 4-1/8 in.
- WOOD FURRING 3/4 in. @ 24 in. O.C.
- 1 TYPE X GYPSUM BOARD 5/8 in.

Architecture, Assembly | Exterior Wall | NS-DA2005



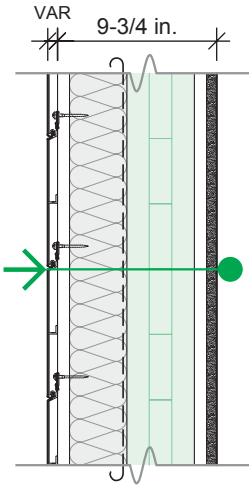
E6

Fire-resistance rating	FRR [a]	30 min	
Thermal resistance	RSI / R	2.9	/ 16
Acoustic ratings	STC / FSTC	n.a.	/ n.a.
	IIC / FIIC	n.a.	/ n.a.

a) The fire-resistance rating is based on an effective length of 10 feet and on a concentric uniform load of 12,450 plf.

- CLADDING (UP TO THE DESIGNER)
- AIR GAP 3/4 in.
- WOOD STUDS 2 in. X 4 in. @ 24 in. O.C.
- 1 ROW OF STONE WOOL INSULATION 3-1/2 in.
- AIR BARRIER MEMBRANE
- NORDIC X-LAM 4-1/8 in.

Architecture, Assembly | Exterior Wall | NS-DA2006



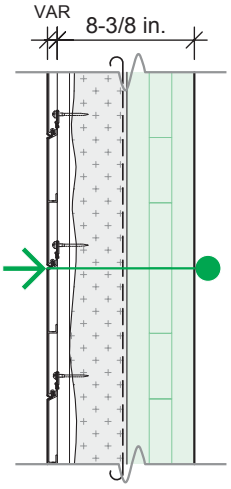
E7

Fire-resistance rating	FRR [a]	1 h	
Thermal resistance	RSI / R	3.1	/ 18
Acoustic ratings	STC / FSTC	n.a.	/ n.a.
	IIC / FIIC	n.a.	/ n.a.

a) The fire-resistance rating is based on an effective length of 10 feet and on a concentric uniform load of 12,450 plf.

- CLADDING (UP TO THE DESIGNER)
- AIR GAP 3/4 in.
- WOOD STUDS 2 in. X 4 in. @ 24 in. O.C.
- 1 ROW OF STONE WOOL INSULATION 3-1/2 in.
- AIR BARRIER MEMBRANE
- NORDIC X-LAM 4-1/8 in.
- WOOD FURRING 3/4 in. @ 24 in. O.C.
- 1 TYPE X GYPSUM BOARD 5/8 in.

Architecture, Assembly | Exterior Wall | NS-DA2007



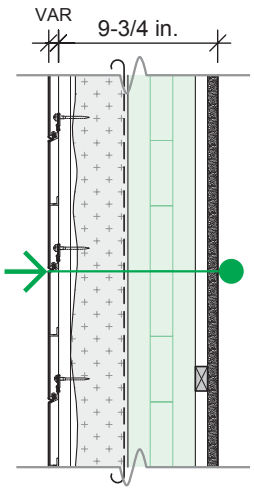
E8

Fire-resistance rating	FRR [a]	30 min	
Thermal resistance	RSI / R	3.4	/ 20
Acoustic ratings	STC / FSTC	n.a.	/ n.a.
	IIC / FIIC	n.a.	/ n.a.

a) The fire-resistance rating is based on an effective length of 10 feet and on a concentric uniform load of 12,450 plf.

- CLADDING (UP TO THE DESIGNER)
- AIR GAP 3/4 in.
- WOOD STUDS 2 in. X 4 in. @ 24 in. O.C.
- SPRAYED POLYURETHANE FOAM 3-1/2 in.
- AIR BARRIER MEMBRANE
- NORDIC X-LAM 4-1/8 in.

Architecture, Assembly | Exterior Wall | NS-DA2008



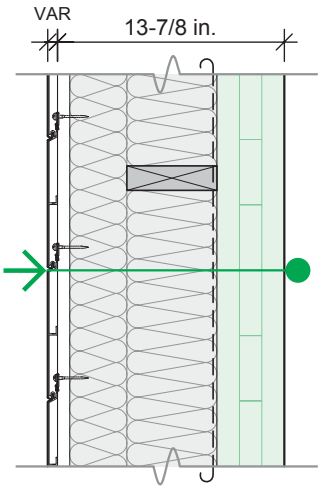
E9

Fire-resistance rating	FRR [a]	1 h
Thermal resistance	RSI / R	3.7 / 21
Acoustic ratings	STC / FSTC	n.a. / n.a.
	IIC / FIIC	n.a. / n.a.

a) The fire-resistance rating is based on an effective length of 10 feet and on a concentric uniform load of 12,450 plf.

- CLADDING (UP TO THE DESIGNER)
- AIR GAP 3/4 in.
- WOOD STUDS 2 in. X 4 in. @ 24 in. O.C.
- SPRAYED POLYURETHANE FOAM 3-1/2 in.
- AIR BARRIER MEMBRANE
- NORDIC X-LAM 4-1/8 in.
- WOOD FURRING 3/4 in. @ 24 in. O.C.
- 1 TYPE X GYPSUM BOARD 5/8 in.

Architecture, Assembly | Exterior Wall | NS-DA2009



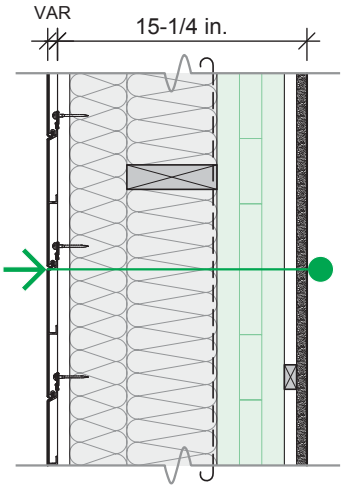
E10

Fire-resistance rating	FRR [a]	30 min
Thermal resistance	RSI / R	5.8 / 33
Acoustic ratings	STC / FSTC	n.a. / n.a.
	IIC / FIIC	n.a. / n.a.

a) The fire-resistance rating is based on an effective length of 10 feet and on a concentric uniform load of 12,450 plf.

- CLADDING (UP TO THE DESIGNER)
- AIR GAP 3/4 in.
- WOOD STUDS 2 in. X 4 in. @ 24 in. O.C.
- WOOD FURRING 2 in. X 6 in. @ 24 in. O.C.
- 1 ROW OF STONE WOOL INSULATION 3-1/2 in.
- 1 ROW OF STONE WOOL INSULATION 5-1/2 in.
- AIR BARRIER MEMBRANE
- NORDIC X-LAM 4-1/8 in.

Architecture, Assembly | Exterior Wall | NS-DA2010



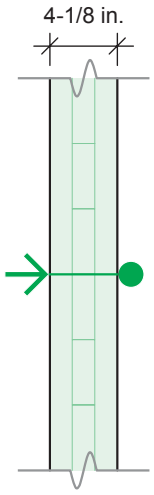
E11

Fire-resistance rating	FRR [a]	1 h	
Thermal resistance	RSI / R	6.1	/ 35
Acoustic ratings	STC / FSTC	n.a.	/ n.a.
	IIC / FIIC	n.a.	/ n.a.

a) The fire-resistance rating is based on an effective length of 10 feet and on a concentric uniform load of 12,450 plf.

- CLADDING (UP TO THE DESIGNER)
- AIR GAP 3/4 in.
- WOOD STUDS 2 in. X 4 in. @ 24 in. O.C.
- WOOD FURRING 2 in. X 6 in. @ 24 in. O.C.
- 1 ROW OF STONE WOOL INSULATION 3-1/2 in.
- 1 ROW OF STONE WOOL INSULATION 5-1/2 in.
- AIR BARRIER MEMBRANE
- NORDIC X-LAM 4-1/8 in.
- WOOD FURRING 3/4 in. @ 24 in. O.C.
- 1 TYPE X GYPSUM BOARD 5/8 in.

Architecture, Assembly | Partition | NS-DA2100



P1

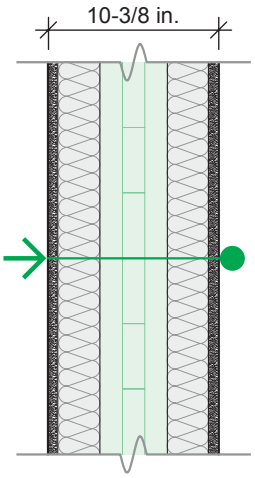
Fire-resistance rating	FRR [a]	30 min	/ 30 min
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC [b] / FSTC	33	/ n.a.
	IIC / FIIC	n.a.	/ n.a.

a) The fire-resistance ratings on each side of the partition are based on an effective length of 10 feet and on a concentric uniform load of 12,450 plf.

b) Composition and acoustic performance taken from the CLT Handbook – Canadian Edition (FPInnovations, 2011). Acoustic performance based on a CLT thickness of 95-115 mm (3-3/4 in. to 4-1/2 in.).

- NORDIC X-LAM 4-1/8 in.

Architecture, Assembly | Partition | NS-DA2101



P2

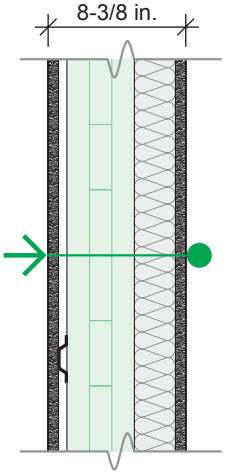
Fire-resistance rating	FRR [a]	1 h	/	1 h
Thermal resistance	RSI / R	n.a.	/	n.a.
Acoustic ratings	STC [b] / FSTC	58	/	n.a.
	IIC / FIIC	n.a.	/	n.a.

a) The fire-resistance ratings on each side of the partition are based on an effective length of 10 feet and on a concentric uniform load of 12,450 plf.

b) Composition and acoustic performance taken from the CLT Handbook – Canadian Edition (FPInnovations, 2011). Acoustic performance based on a CLT thickness of 95-115 mm (3-3/4 in. to 4-1/2 in.).

– 1 TYPE X GYPSUM BOARD 5/8 in.
– 1 ROW OF MINERAL WOOL INSULATION 2-1/2 in.
– WOOD STUDS 2 in. X 3 in. @ 24 in. O.C.
– NORDIC X-LAM 4-1/8 in.
– WOOD STUDS 2 in. X 3 in. @ 24 in. O.C. OFF-CENTERED FROM THE OTHER ROW OF WOOD STUDS
– 1 ROW OF MINERAL WOOL INSULATION 2-1/2 in.
– 1 TYPE X GYPSUM BOARD 5/8 in.

Architecture, Assembly | Partition | NS-DA2102



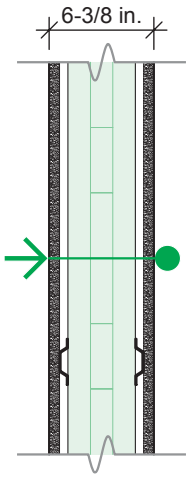
P3

Fire-resistance rating	FRR [a]	1 h	/	1 h
Thermal resistance	RSI / R	n.a.	/	n.a.
Acoustic ratings	STC / FSTC	53	/	n.a.
	IIC / FIIC	n.a.	/	n.a.

a) The fire-resistance ratings on each side of the partition are based on an effective length of 10 feet and on a concentric uniform load of 12,450 plf.

– 1 TYPE X GYPSUM BOARD 5/8 in.
– RESILIENT CHANNELS 1/2 in. @ 16 in. O.C. INSTALLED HORIZONTALLY
– NORDIC X-LAM 4-1/8 in.
– WOOD STUDS 2 in. X 3 in. @ 24 in. O.C.
– 1 ROW OF MINERAL WOOL INSULATION 2-1/2 in.
– 1 TYPE X GYPSUM BOARD 5/8 in.

Architecture, Assembly | Partition | NS-DA2103



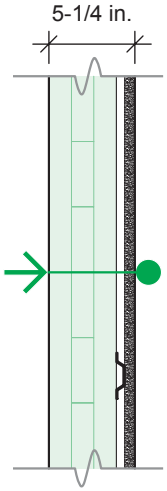
P4

Fire-resistance rating	FRR [a]	1 h	/	1 h
Thermal resistance	RSI / R	n.a.	/	n.a.
	STC [b] / FSTC	37	/	n.a.
Acoustic ratings	IIC / FIIC	n.a.	/	n.a.

a) The fire-resistance ratings on each side of the partition are based on an effective length of 10 feet and on a concentric uniform load of 12,450 plf.
b) Composition and acoustic performance taken from the CLT Handbook – Canadian Edition (FPInnovations, 2011). Acoustic performance based on a CLT thickness of 95-115 mm (3-3/4 in. to 4-1/2 in.).

– 1 TYPE X GYPSUM BOARD 5/8 in.
– RESILIENT CHANNELS 1/2 in. @ 16 in. O.C. INSTALLED HORIZONTALLY
– NORDIC X-LAM 4-1/8 in.
– RESILIENT CHANNELS 1/2 in. @ 16 in. O.C. INSTALLED HORIZONTALLY
– 1 TYPE X GYPSUM BOARD 5/8 in.

Architecture, Assembly | Partition | NS-DA2104



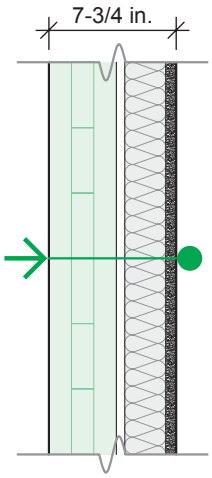
P5

Fire-resistance rating	FRR [a]	30 min	/	1 h
Thermal resistance	RSI / R	n.a.	/	n.a.
	STC [b] / FSTC	37	/	n.a.
Acoustic ratings	IIC / FIIC	n.a.	/	n.a.

a) The fire-resistance ratings on each side of the partition are based on an effective length of 10 feet and on a concentric uniform load of 12,450 plf.
b) Composition and acoustic performance taken from the CLT Handbook – Canadian Edition (FPInnovations, 2011). Acoustic performance based on a CLT thickness of 95-115 mm (3-3/4 in. to 4-1/2 in.).

– NORDIC X-LAM 4-1/8 in.
– RESILIENT CHANNELS 1/2 in. @ 16 in. O.C. INSTALLED HORIZONTALLY
– 1 TYPE X GYPSUM BOARD 5/8 in.

Architecture, Assembly | Partition | NS-DA2105



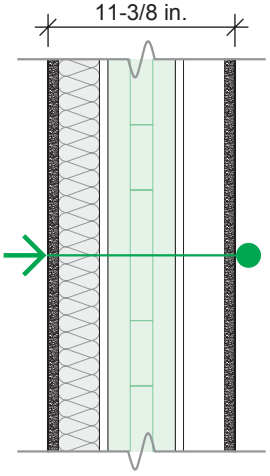
P6

Fire-resistance rating	FRR [a]	30 min	/ 1 h
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC / FSTC	n.a.	/ 47
	IIC / FIIC	n.a.	/ n.a.

a) The fire-resistance ratings on each side of the partition are based on an effective length of 10 feet and on a concentric uniform load of 12,450 plf.

- NORDIC X-LAM 4-1/8 in.
- AIR GAP 1/2 in.
- WOOD STUDS 2 in. X 3 in. @ 16 in. O.C.
- 1 ROW OF MINERAL WOOL INSULATION 2-1/2 in.
- 1 TYPE X GYPSUM BOARD 5/8 in.

Architecture, Assembly | Partition | NS-DA2106



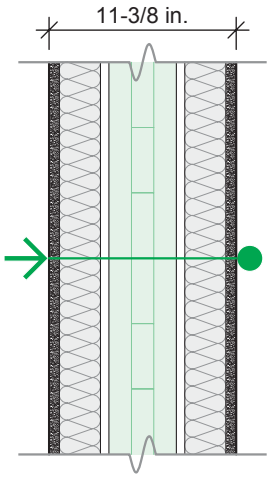
P7

Fire-resistance rating	FRR [a]	1 h	/ 1 h
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC / FSTC	n.a.	/ 50
	IIC / FIIC	n.a.	/ n.a.

a) The fire-resistance ratings on each side of the partition are based on an effective length of 10 feet and on a concentric uniform load of 12,450 plf.

- 1 TYPE X GYPSUM BOARD 5/8 in.
- 1 ROW OF MINERAL WOOL INSULATION 2-1/2 in.
- WOOD STUDS 2 in. X 3 in. @ 16 in. O.C.
- AIR GAP 1/2 in.
- NORDIC X-LAM 4-1/8 in.
- AIR GAP 1/2 in.
- WOOD STUDS 2 in. X 3 in. @ 16 in. O.C.
- 1 TYPE X GYPSUM BOARD 5/8 in.

Architecture, Assembly | Partition | NS-DA2107



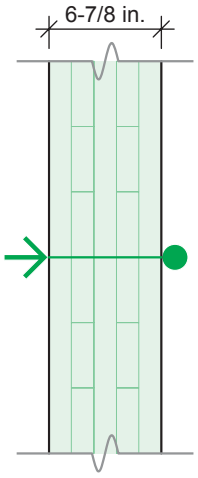
P8

Fire-resistance rating	FRR [a]	1 h	/	1 h
Thermal resistance	RSI / R	n.a.	/	n.a.
Acoustic ratings	STC / FSTC	n.a.	/	54
	IIC / FIIC	n.a.	/	n.a.

a) The fire-resistance ratings on each side of the partition are based on an effective length of 10 feet and on a concentric uniform load of 12,450 plf.

- 1 TYPE X GYPSUM BOARD 5/8 in.
- 1 ROW OF MINERAL WOOL INSULATION 2-1/2 in.
- WOOD STUDS 2 in. X 3 in. @ 16 in. O.C.
- AIR GAP 1/2 in.
- NORDIC X-LAM 4-1/8 in.
- AIR GAP 1/2 in.
- WOOD STUDS 2 in. X 3 in. @ 16 in. O.C.
- 1 ROW OF MINERAL WOOL INSULATION 2-1/2 in.
- 1 TYPE X GYPSUM BOARD 5/8 in.

Architecture, Assembly | Partition | NS-DA2108



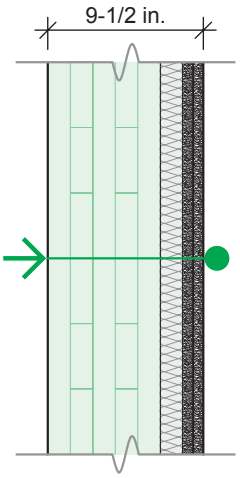
P9

Fire-resistance rating	FRR [a]	1.5 h	/	1.5 h
Thermal resistance	RSI / R	n.a.	/	n.a.
Acoustic ratings	STC / FSTC	37	/	n.a.
	IIC / FIIC	n.a.	/	n.a.

a) The fire-resistance ratings on each side of the partition are based on an effective length of 10 feet and on a concentric uniform load of 32,150 plf.

- NORDIC X-LAM 6-7/8 in.

Architecture, Assembly | Partition | NS-DA2109



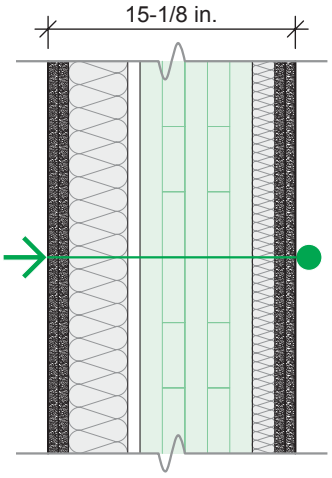
P10

Fire-resistance rating	FRR [a]	1.5 h	/ 2.5 h
Thermal resistance	RSI / R	n.a.	/ n.a.
	STC / FSTC	53	/ n.a.
Acoustic ratings	IIC / FIIC	n.a.	/ n.a.

a) The fire-resistance ratings on each side of the partition are based on an effective length of 10 feet and on a concentric uniform load of 32,150 plf.

- NORDIC X-LAM 6-7/8 in.
- Z-CHANNELS (26 GAUGE) 1-3/8 in. @ 16 in. O.C. INSTALLED VERTICALLY
- 1 ROW OF FIBERGLASS INSULATION OF TYPE "ROSE FIBERGLAS ECOTOUCH" 1-1/2 in.
- 2 TYPE X GYPSUM BOARDS 5/8 in. EA.

Architecture, Assembly | Partition | NS-DA2110



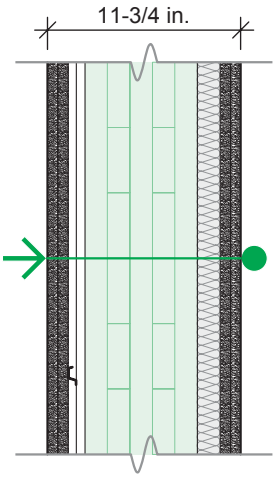
P11

Fire-resistance rating	FRR [a]	2.5 h	/ 2.5 h
Thermal resistance	RSI / R	n.a.	/ n.a.
	STC / FSTC	71	/ n.a.
Acoustic ratings	IIC / FIIC	n.a.	/ n.a.

a) The fire-resistance ratings on each side of the partition are based on an effective length of 10 feet and on a concentric uniform load of 32,150 plf.

- 2 TYPE X GYPSUM BOARDS 5/8 in. EA.
- METAL STUDS (26 GAUGE) 1-1/4 in. X 3-5/8 in. @ 16 in. O.C.
- 1 ROW OF FIBERGLASS INSULATION OF TYPE "ROSE FIBERGLAS ECOTOUCH" 3-5/8 in.
- AIR GAP 3/4 in.
- NORDIC X-LAM 6-7/8 in.
- Z-CHANNELS (26 GAUGE) 1-3/8 in. @ 16 in. O.C. INSTALLED VERTICALLY
- 1 ROW OF FIBERGLASS INSULATION OF TYPE "ROSE FIBERGLAS ECOTOUCH" 1-1/2 in.
- 2 TYPE X GYPSUM BOARDS 5/8 in. EA.

Architecture, Assembly | Partition | NS-DA2111



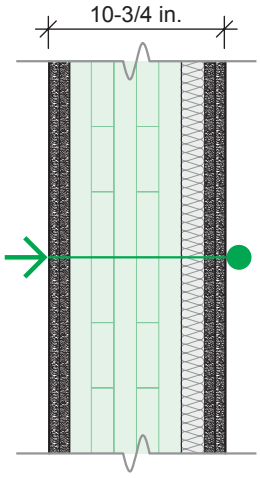
P12

Fire-resistance rating	FRR [a]	2.5 h	/ 2.5 h
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC / FSTC	53	/ n.a.
	IIC / FIIC	n.a.	/ n.a.

a) The fire-resistance ratings on each side of the partition are based on an effective length of 10 feet and on a concentric uniform load of 32,150 plf.

- 2 TYPE X GYPSUM BOARDS 5/8 in. EA.
- RESILIENT CHANNELS 1/2 in. @ 16 in. O.C. INSTALLED HORIZONTALLY
- PLYWOOD STRIPS 1/2 in. @ 16 in. O.C.
- NORDIC X-LAM 6-7/8 in.
- Z-CHANNELS (26 GAUGE) 1-3/8 in. @ 16 in. O.C. INSTALLED VERTICALLY
- 1 ROW OF FIBERGLASS INSULATION OF TYPE "ROSE FIBERGLAS ECOTOUCH" 1-1/2 in.
- 2 TYPE X GYPSUM BOARDS 5/8 in. EA.

Architecture, Assembly | Partition | NS-DA2112



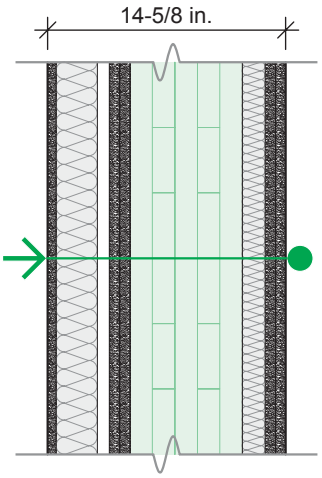
P13

Fire-resistance rating	FRR [a]	2.5 h	/ 2.5 h
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC / FSTC	53	/ n.a.
	IIC / FIIC	n.a.	/ n.a.

a) The fire-resistance ratings on each side of the partition are based on an effective length of 10 feet and on a concentric uniform load of 32,150 plf.

- 2 TYPE X GYPSUM BOARDS 5/8 in. EA.
- NORDIC X-LAM 6-7/8 in.
- Z-CHANNELS (26 GAUGE) 1-3/8 in. @ 16 in. O.C. INSTALLED VERTICALLY
- 1 ROW OF FIBERGLASS INSULATION OF TYPE "ROSE FIBERGLAS ECOTOUCH" 1-1/2 in.
- 2 TYPE X GYPSUM BOARDS 5/8 in. EA.

Architecture, Assembly | Partition | NS-DA2113



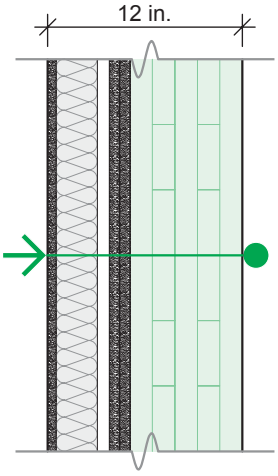
P14

Fire-resistance rating	FRR [a]	2.5 h	/ 2.5 h
Thermal resistance	RSI / R	n.a.	/ n.a.
	STC / FSTC	65	/ n.a.
Acoustic ratings	IIC / FIIC	n.a.	/ n.a.

a) The fire-resistance ratings on each side of the partition are based on an effective length of 10 feet and on a concentric uniform load of 32,150 plf.

- 1 TYPE C GYPSUM BOARD 1/2 in.
- METAL STUDS (26 GAUGE) 1-1/4 in. X 2-1/2 in. @ 16 in. O.C.
- 1 ROW OF STONE WOOL INSULATION OF TYPE “ROXUL AFB” 2-1/2 in.
- AIR GAP 3/4 in.
- 2 TYPE X GYPSUM BOARDS 5/8 in. EA.
- NORDIC X-LAM 6-7/8 in.
- Z-CHANNELS (26 GAUGE) 1-3/8 in. @ 16 in. O.C. INSTALLED VERTICALLY
- 1 ROW OF FIBERGLASS INSULATION OF TYPE “ROSE FIBERGLAS ECOTOUCH” 1-1/2 in.
- 2 TYPE X GYPSUM BOARDS 5/8 in. EA.

Architecture, Assembly | Partition | NS-DA2114



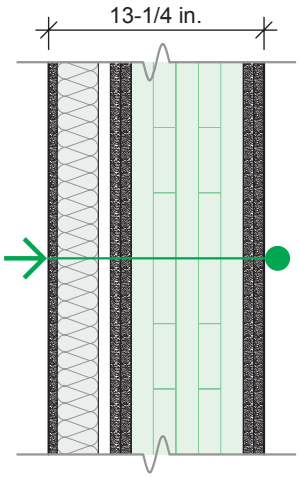
P15

Fire-resistance rating	FRR [a]	2.5 h	/ 1.5 h
Thermal resistance	RSI / R	n.a.	/ n.a.
	STC / FSTC	62	/ n.a.
Acoustic ratings	IIC / FIIC	n.a.	/ n.a.

a) The fire-resistance ratings on each side of the partition are based on an effective length of 10 feet and on a concentric uniform load of 32,150 plf.

- 1 TYPE C GYPSUM BOARD 1/2 in.
- METAL STUDS (26 GAUGE) 1-1/4 in. X 2-1/2 in. @ 16 in. O.C.
- 1 ROW OF STONE WOOL INSULATION OF TYPE “ROXUL AFB” 2-1/2 in.
- AIR GAP 3/4 in.
- 2 TYPE X GYPSUM BOARDS 5/8 in. EA.
- NORDIC X-LAM 6-7/8 in.

Architecture, Assembly | Partition | NS-DA2115



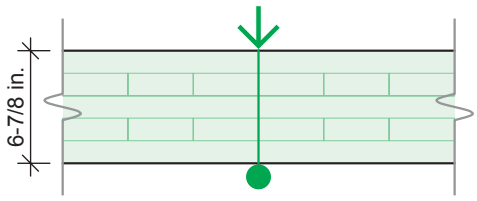
P16

Fire-resistance rating	FRR [a]	2.5 h	/ 2.5 h
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC / FSTC	61	/ n.a.
	IIC / FIIC	n.a.	/ n.a.

a) The fire-resistance ratings on each side of the partition are based on an effective length of 10 feet and on a concentric uniform load of 32,150 plf.

- 1 TYPE C GYPSUM BOARD 1/2 in.
- METAL STUDS (26 GAUGE) 1-1/4 in. X 2-1/2 in. @ 16 in. O.C.
- 1 ROW OF STONE WOOL INSULATION OF TYPE “ROXUL AFB” 2-1/2 in.
- AIR GAP 3/4 in.
- 2 TYPE X GYPSUM BOARDS 5/8 in. EA.
- NORDIC X-LAM 6-7/8 in.
- 2 TYPE X GYPSUM BOARDS 5/8 in. EA.

Architecture, Assembly | Floor | NS-DA2200



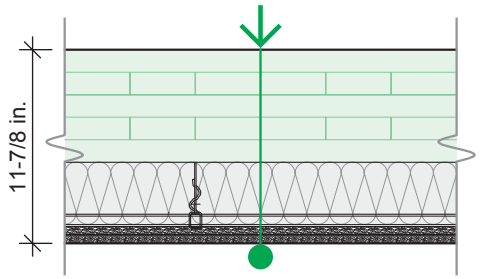
F1

Fire-resistance rating	FRR [a]	1.5 h	
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC / FSTC	39	/ n.a.
	IIC / FIIC	27	/ n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

- NORDIC X-LAM 6-7/8 in.

Architecture, Assembly | Floor | NS-DA2201



F2

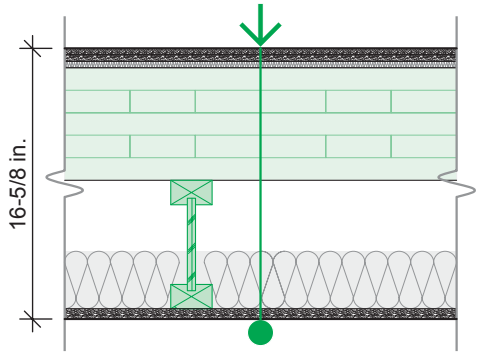
Fire-resistance rating	FRR [a]	2 h	
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC [b] / FSTC	64	/ n.a.
	IIC [b] / FIIC	59	/ n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

b) Composition and acoustic performance taken from the CLT Handbook – Canadian Edition (FPInnovations, 2011). Acoustic performance based on a CLT thickness of 146 mm (5-3/4 in.).

- NORDIC X-LAM 6-7/8 in.
- SUSPENDED CEILING:
  - RESILIENT METALLIC HANGERS 4 in.
  - METAL TRACKS @ 16 in. O.C. MIN
  - SOUNDPROOFING MATERIAL 4 in.
- 2 TYPE X GYPSUM BOARDS 1/2 in. EA.

Architecture, Assembly | Floor | NS-DA2202



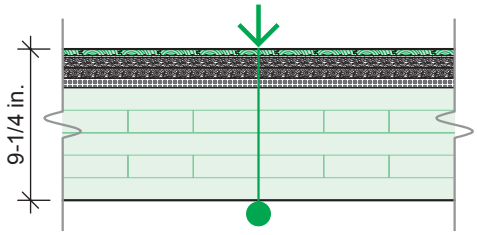
F3

Fire-resistance rating	FRR [a]	2 h	
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC / FSTC	n.a.	/ n.a.
	IIC / FIIC	n.a.	/ n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

- UNDERLAY OF TYPE “FERMACELL 2E32” 1-1/4 in. OR “PERMABASE” WITH “SONOPAN”
- NORDIC X-LAM 6-7/8 in.
- NORDIC JOIST 7-7/8 in. @ 24 in. O.C.
- SOUNDPROOFING MATERIAL 3-1/2 in.
- 1 TYPE X GYPSUM BOARD 5/8 in.

Architecture, Assembly | Floor | NS-DA2203



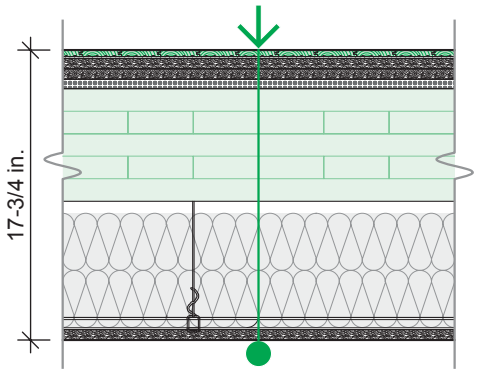
F4

Fire-resistance rating	FRR [a]	1.5 h	
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC / FSTC	n.a.	/ 47
	IIC / FIIC	n.a.	/ 46

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

- FLOATING FLOOR 3/8 in.
- UNDERLAY OF TYPE “INSONOBOIS” 1/8 in.
- 2 UNDERLAYS OF TYPE “FIBEROCK” 5/8 in. EA.
- UNDERLAY OF TYPE “INSONOMAT” 5/8 in.
- NORDIC X-LAM 6-7/8 in.

Architecture, Assembly | Floor | NS-DA2204



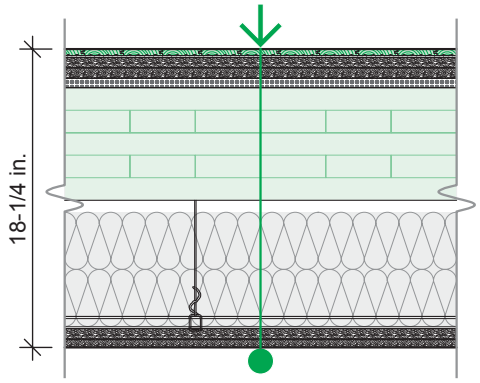
F5

Fire-resistance rating	FRR [a]	2 h	
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC / FSTC	n.a.	/ 59
	IIC / FIIC	n.a.	/ 61

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

- FLOATING FLOOR 3/8 in.
- UNDERLAY OF TYPE “INSONOBOIS” 1/8 in.
- 2 FLOOR BACKERBOARDS OF TYPE “FIBEROCK” 5/8 in. EA.
- UNDERLAY OF TYPE “INSONOMAT” 5/8 in.
- NORDIC X-LAM 6-7/8 in.
- SUSPENDED CEILING:
  - RESILIENT METALLIC HANGERS 7-7/8 in. @ 48 in. O.C.
  - METAL TRACKS @ 24 in. O.C.
  - 2 ROWS OF STONE WOOL INSULATION OF TYPE “ROXUL” (2.5 pcf) 3-1/2 in. EA.
- 1 TYPE X GYPSUM BOARD 5/8 in.

Architecture, Assembly | Floor | NS-DA2205



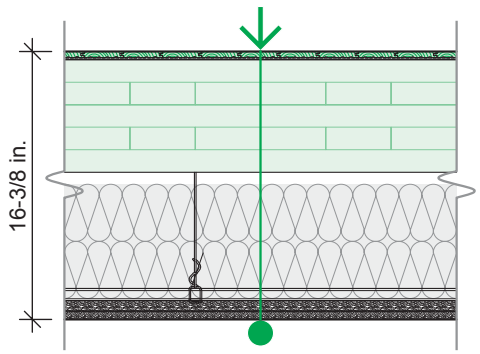
F6

Fire-resistance rating	FRR [a]	2 h
Thermal resistance	RSI / R	n.a. / n.a.
Acoustic ratings	STC / FSTC	n.a. / 58
	IIC / FIIC	n.a. / 60

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

- FLOATING FLOOR 3/8 in.
- UNDERLAY OF TYPE “INSONOBOIS” 1/8 in.
- 2 FLOOR BACKERBOARDS OF TYPE “FIBEROCK” 5/8 in. EA.
- UNDERLAY OF TYPE “INSONOMAT” 5/8 in.
- NORDIC X-LAM 6-7/8 in.
- SUSPENDED CEILING:
  - RESILIENT METALLIC HANGERS 7-7/8 in. @ 48 in. O.C.
  - METAL TRACKS @ 24 in. O.C.
  - 2 ROWS OF STONE WOOL INSULATION OF TYPE “ROXUL” (2.5 pcf) 3-1/2 in. EA.
- 1 TYPE X GYPSUM BOARD 5/8 in.
- 1 REGULAR GYPSUM BOARD 1/2 in.

Architecture, Assembly | Floor | NS-DA2206



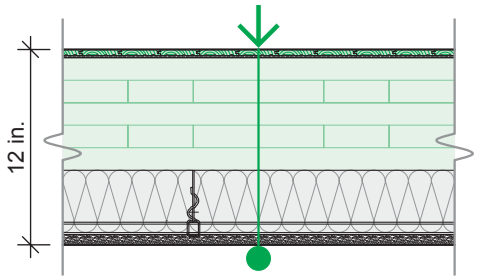
F7

Fire-resistance rating	FRR [a]	2 h
Thermal resistance	RSI / R	n.a. / n.a.
Acoustic ratings	STC / FSTC	n.a. / 54
	IIC / FIIC	n.a. / 56

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

- FLOATING FLOOR 3/8 in.
- UNDERLAY OF TYPE “INSONOBOIS” 1/8 in.
- NORDIC X-LAM 6-7/8 in.
- SUSPENDED CEILING:
  - RESILIENT METALLIC HANGERS 7-7/8 in. @ 48 in. O.C.
  - METAL TRACKS @ 24 in. O.C.
  - 2 ROWS OF STONE WOOL INSULATION OF TYPE “ROXUL” (2.5 pcf) 3-1/2 in. EA.
- 1 TYPE X GYPSUM BOARD 5/8 in.
- 1 REGULAR GYPSUM BOARD 1/2 in.

Architecture, Assembly | Floor | NS-DA2207



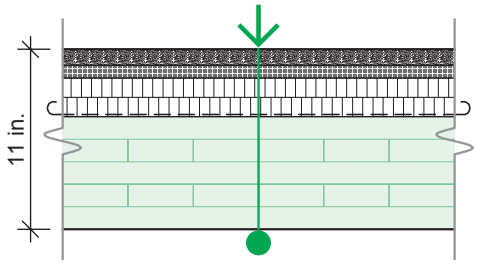
F8

Fire-resistance rating	FRR [a]	2 h	
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC / FSTC	n.a.	/ 53
	IIC / FIIC	n.a.	/ 52

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

- FLOATING FLOOR 3/8 in.
- UNDERLAY OF TYPE “INSONOBOIS” 1/8 in.
- NORDIC X-LAM 6-7/8 in.
- SUSPENDED CEILING:
  - RESILIENT METALLIC HANGERS 4 in. @ 48 in. O.C.
  - METAL TRACKS @ 24 in. O.C.
  - 1 ROW OF STONE WOOL INSULATION OF TYPE “ROXUL” (2.5 pcf) 3-1/2 in. EA.
- 1 TYPE X GYPSUM BOARD 5/8 in.

Architecture, Assembly | Floor | NS-DA2208



F9

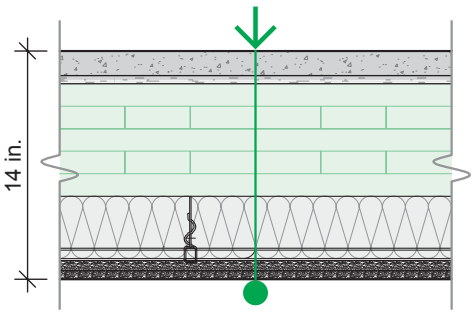
Fire-resistance rating	FRR [a]	1.5 h	
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC [b] / FSTC	62	/ n.a.
	IIC [b] / FIIC	59	/ n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

b) Composition and acoustic performance taken from the CLT Handbook – U.S. Edition (FPInnovations, 2013). Acoustic performance based on a CLT thickness of 135 mm (5-5/16 in.).

- GYPSUM FIBERBOARD OF TYPE “FERMACELL” 1 in.
- UNDERLAY OF TYPE “ISOVER EP3” 3/4 in.
- 2 LAYERS OF PELLETS AND HONEYCOMB CORE OF TYPE “FERMACELL” 1-1/4 in. EA.
- KRAFT PAPER UNDERLAY
- NORDIC X-LAM 6-7/8 in.

Architecture, Assembly | Floor | NS-DA2209



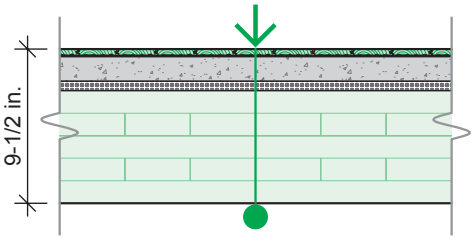
F10

Fire-resistance rating	FRR [a]	2 h
Thermal resistance	RSI / R	n.a. / n.a.
Acoustic ratings	STC / FSTC	n.a. / 61
	IIC / FIIC	n.a. / 50

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

- CONCRETE TOPPING (125 pcf) 1-1/2 in.
- WOOD FIBER ACOUSTIC PANEL OF TYPE "BP ECO-LOGICAL" 1/2 in.
- NORDIC X-LAM 6-7/8 in.
- SUSPENDED CEILING:
  - RESILIENT METALLIC HANGERS 4 in. @ 48 in. O.C.
  - METAL TRACKS @ 24 in. O.C.
  - 1 ROW OF STONE WOOL INSULATION OF TYPE "ROXUL" (2.5 pcf) 3-1/2 in.
- 1 TYPE X GYPSUM BOARD 5/8 in.
- 1 REGULAR GYPSUM BOARD 1/2 in.

Architecture, Assembly | Floor | NS-DA2210



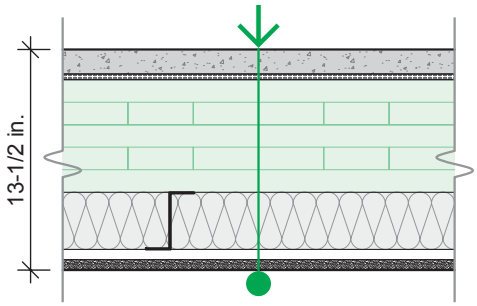
F11

Fire-resistance rating	FRR [a]	1.5 h
Thermal resistance	RSI / R	n.a. / n.a.
Acoustic ratings	STC / FSTC	55 / n.a.
	IIC / FIIC	51 / n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

- ENGINEERED WOOD FLOOR 3/8 in.
- UNDERLAY OF TYPE "ROBERTS SOFT STRIDE" 1/8 in.
- CONCRETE TOPPING 1-1/2 in.
- UNDERLAY OF TYPE "INSONOMAT" 5/8 in.
- NORDIC X-LAM 6-7/8 in.

Architecture, Assembly | Floor | NS-DA2211



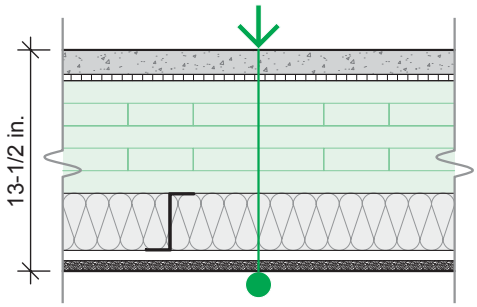
F12

Fire-resistance rating	FRR [a]	2 h	
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC / FSTC	70	/ n.a.
	IIC / FIIC	56	/ n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

- CONCRETE TOPPING 1-1/2 in.
- UNDERLAY OF TYPE “OWENS CORNING QUIÉTUDE” 3/8 in.
- NORDIC X-LAM 6-7/8 in.
- Z-CHANNELS (26 GAUGE) 3-1/2 in. @ 24 in. O.C.
- 1 ROW OF FIBERGLASS INSULATION OF TYPE “ROSE FIBERGLAS ECOTOUCH” 3-5/8 in.
- FURRING CHANNELS 5/8 in. @ 16 in. O.C.
- 1 TYPE X GYPSUM BOARD 5/8 in.

Architecture, Assembly | Floor | NS-DA2212



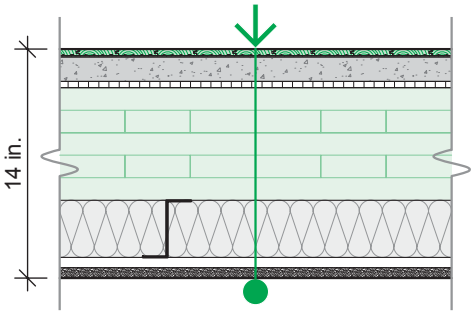
F13

Fire-resistance rating	FRR [a]	2 h	
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC / FSTC	69	/ n.a.
	IIC / FIIC	54	/ n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

- CONCRETE TOPPING 1-1/2 in.
- TAR FIBERBOARD 3/8 in.
- NORDIC X-LAM 6-7/8 in.
- Z-CHANNELS (26 GAUGE) 3-1/2 in. @ 24 in. O.C.
- 1 ROW OF FIBERGLASS INSULATION OF TYPE “ROSE FIBERGLASS ECOTOUCH” 3-5/8 in.
- FURRING CHANNELS 5/8 in. @ 16 in. O.C.
- 1 TYPE X GYPSUM BOARD 5/8 in.

Architecture, Assembly | Floor | NS-DA2213



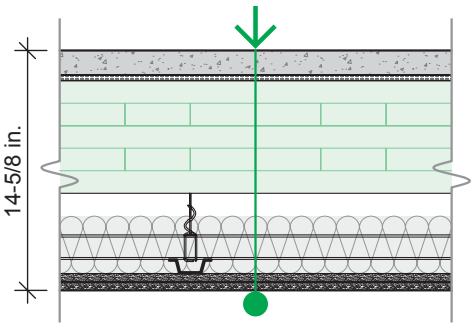
F14

Fire-resistance rating	FRR [a]	2 h
Thermal resistance	RSI / R	n.a. / n.a.
Acoustic ratings	STC / FSTC	69 / n.a.
	IIC / FIIC	58 / n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

- ENGINEERED WOOD FLOOR 3/8 in.
- UNDERLAY OF TYPE “ROBERTS SOFT STRIDE” 1/8 in.
- CONCRETE TOPPING 1-1/2 in.
- TAR FIBERBOARD 3/8 in.
- NORDIC X-LAM 6-78 in.
- Z-CHANNELS (26 GAUGE) 3-1/2 in. @ 24 in. O.C.
- 1 ROW OF FIBERGLASS INSULATION OF TYPE “ROSE FIBERGLAS ECOTOUCH” 3-5/8 in.
- FURRING CHANNELS 5/8 in. @ 16 in. O.C.
- 1 TYPE X GYPSUM BOARD 5/8 in.

Architecture, Assembly | Floor | NS-DA2214



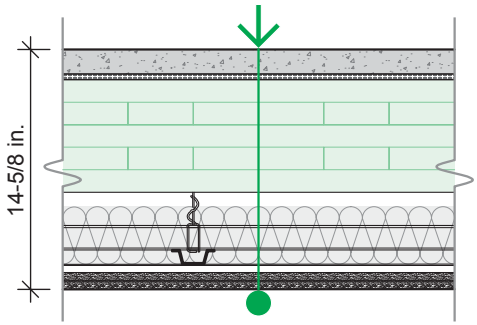
F15

Fire-resistance rating	FRR [a]	1.5 h
Thermal resistance	RSI / R	n.a. / n.a.
Acoustic ratings	STC / FSTC	72 / n.a.
	IIC / FIIC	65 / n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

- CONCRETE TOPPING 1-1/2 in.
- UNDERLAY OF TYPE “OWENS CORNING QUIÉTUDE” 3/8 in.
- NORDIC X-LAM 6-7/8 in.
- SUSPENDED CEILING:
  - METALLIC HANGERS 2-1/2 in.
  - CHANNEL IRONS 1-1/2 in. @ 48 in. O.C.
  - FURRING CHANNELS 7/8 in. @ 16 in. O.C.
  - 1 ROW OF FIBERGLASS INSULATION OF TYPE “ROSE FIBERGLAS ECOTOUCH” 3-5/8 in.
- 2 TYPE C GYPSUM BOARDS 1/2 in. EA.

Architecture, Assembly | Floor | NS-DA2215



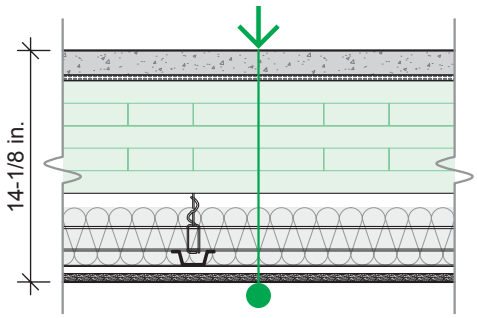
F16

Fire-resistance rating	FRR [(a)]	1.5 h	
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC / FSTC	73	/ n.a.
	IIC / FIIC	66	/ n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

- CONCRETE TOPPING 1-1/2 in.
- UNDERLAY OF TYPE “OWENS CORNING QUIÉTUDE” 3/8 in.
- NORDIC X-LAM 6-7/8 in.
- SUSPENDED CEILING:
  - METALLIC HANGERS 2 in.
  - CHANNEL IRONS 1-1/2 in. @ 48 in. O.C.
  - FURRING CHANNELS 7/8 in. @ 16 in. O.C.
  - 1 ROW OF FIBERGLASS INSULATION OF TYPE “ROSE FIBERGLAS ECOTOUCH” 3-5/8 in.
- RESILIENT CHANNELS 1/2 in. @ 24 in. O.C.
- 2 TYPE C GYPSUM BOARDS 1/2 in. EA.

Architecture, Assembly | Floor | NS-DA2216



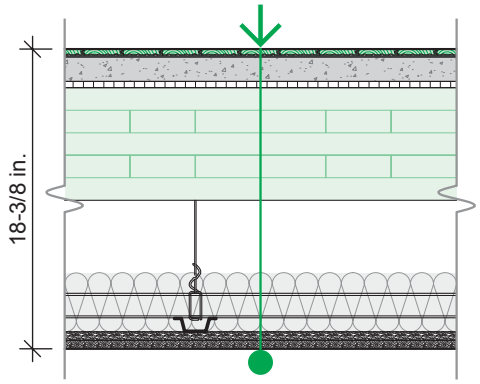
F17

Fire-resistance rating	FRR [(a)]	1.5 h	
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC / FSTC	72	/ n.a.
	IIC / FIIC	62	/ n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

- CONCRETE TOPPING 1-1/2 in.
- UNDERLAY OF TYPE “OWENS CORNING QUIÉTUDE” 3/8 in.
- NORDIC X-LAM 6-7/8 in.
- SUSPENDED CEILING:
  - METALLIC HANGERS 2 in.
  - CHANNEL IRONS 1-1/2 in. @ 48 in. O.C.
  - FURRING CHANNELS 7/8 in. @ 16 in. O.C.
  - 1 ROW OF FIBERGLASS INSULATION OF TYPE “ROSE FIBERGLAS ECOTOUCH” 3-5/8 in.
- RESILIENT CHANNELS 1/2 in. @ 24 in. O.C.
- 1 TYPE C GYPSUM BOARD 1/2 in.

Architecture, Assembly | Floor | NS-DA2217



F18

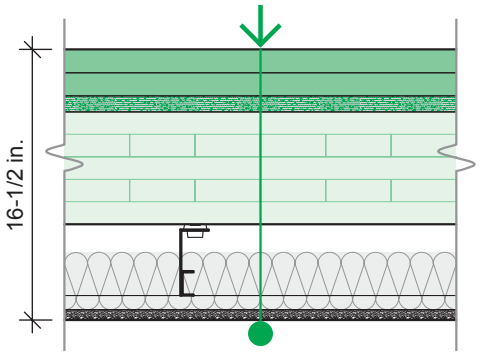
Fire-resistance rating	FRR [a]	1.5 h	
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC [b] / FSTC	75	/ n.a.
	IIC [b] / FIIC	66	/ n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

b) Acoustic performance based on a CLT thickness of 131 mm (5-1/8 in.).

- FLOATING FLOOR 3/8 in.
- UNDERLAY OF TYPE “ACOUSTITECH PREMIUM” 1/8 in.
- PREFABRICATED CONCRETE TOPPING 1-1/2 in.
- TAR FIBERBOARD 3/8 in.
- NORDIC X-LAM 6-7/8 in.
- SUSPENDED CEILING:
  - METALLIC HANGERS 5-3/4 in.
  - CHANNEL IRONS 1-1/2 in. @ 48 in. O.C.
  - FURRING CHANNELS 7/8 in. @ 16 in. O.C.
  - 1 ROW OF FIBERGLASS INSULATION OF TYPE “ROSE FIBERGLAS ECOTOUCH” 3-5/8 in.
- 2 TYPE C GYPSUM BOARDS 1/2 in. EA.

Architecture, Assembly | Floor | NS-DA2219



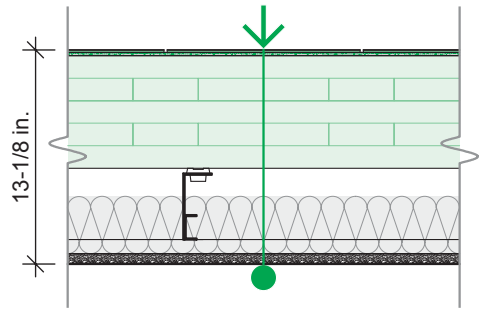
F20

Fire-resistance rating	FRR [a]	2 h	
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC / FSTC	61	/ n.a.
	IIC / FIIC	55	/ n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

- 2 ROWS OF PANELS OF TYPE “HUBER ENGINEERED WOOD ADVANTECH” 1-3/8 in. EA.
- UNDERLAY OF TYPE “GENIEMAT FF” 1 in.
- NORDIC X-LAM 6-7/8 in.
- SUSPENDED CEILING:
  - BRACKETS OF TYPE “GENIECLIP LB” 4-3/8 in.
  - CHANNEL IRONS 1-1/2 in. @ 48 in. O.C. FIXED AT THE BOTTOM OF THE BRACKETS
  - FURRING CHANNELS 7/8 in. @ 24 in. O.C.
  - 1 ROW OF FIBERGLASS INSULATION OF TYPE “JOHNS MANVILLE UNFACED BATTS R13” 3-1/2 in.
- 1 TYPE X GYPSUM BOARD 5/8 in.

Architecture, Assembly | Floor | NS-DA2220



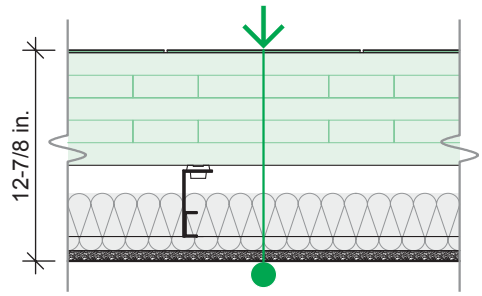
F21

Fire-resistance rating	FRR [a]	2 h	
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC / FSTC	58	/ n.a.
	IIC / FIIC	58	/ n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

- VINYL TILES FLOORING 1/8 in.
- UNDERLAY OF TYPE “GENIEMAT RST05” 1/4 in.
- NORDIC X-LAM 6-78 in.
- SUSPENDED CEILING:
  - BRACKETS OF TYPE “GENIECLIP LB” 4-3/8 in.
  - CHANNEL IRONS 1-1/2 in. @ 48 in. O.C. FIXED AT THE BOTTOM OF THE BRACKETS
  - FURRING CHANNELS 7/8 in. @ 24 in. O.C.
  - 1 ROW OF FIBERGLASS INSULATION OF TYPE “JOHNS MANVILLE UNFACED BATTS R13” 3-1/2 in.
- 1 TYPE X GYPSUM BOARD 5/8 in.

Architecture, Assembly | Floor | NS-DA2221



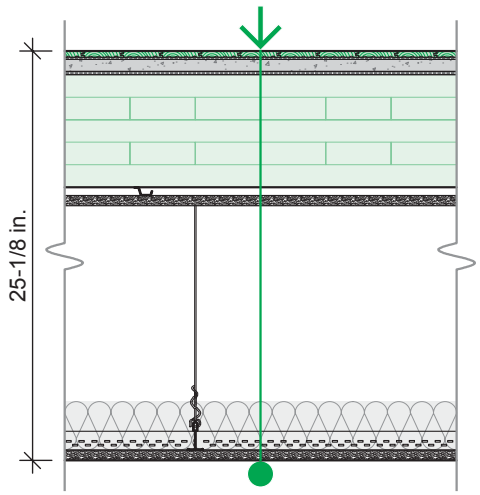
F22

Fire-resistance rating	FRR [a]	2 h	
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC / FSTC	57	/ n.a.
	IIC / FIIC	54	/ n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

- VINYL TILES FLOORING 1/8 in.
- NORDIC X-LAM 6-7/8 in.
- SUSPENDED CEILING:
  - BRACKETS OF TYPE “GENIECLIP LB” 4-3/8 in.
  - CHANNEL IRONS 1-1/2 in. @ 48 in. O.C. FIXED AT THE BOTTOM OF THE BRACKETS
  - FURRING CHANNELS 7/8 in. @ 24 in. O.C.
  - 1 ROW OF FIBERGLASS INSULATION OF TYPE “JOHNS MANVILLE UNFACED BATTS R13” 3-1/2 in.
- 1 TYPE X GYPSUM BOARD 5/8 in.

Architecture, Assembly | Floor | NS-DA2222



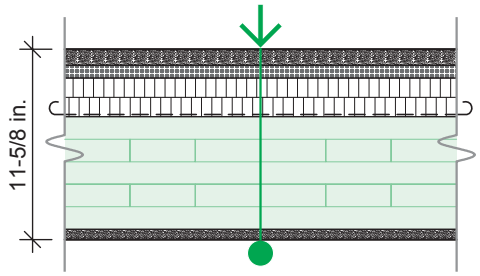
F23

Fire-resistance rating	FRR [a]	2.5 h
Thermal resistance	RSI / R	n.a. / n.a.
Acoustic ratings	STC / FSTC	n.a. / 54
	IIC / FIIC	n.a. / 53

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

- FLOATING FLOOR 3/8 in.
- UNDERLAY OF TYPE “INSONOBOIS” 1/8 in.
- TOPPING OF TYPE “MAXXON GYP-CRETE” (128 pcf) 3/4 in.
- ENTANGLED FILAMENT MAT OF TYPE “MAXXON ACOUSTI-MAT 1” 1/4 in.
- NORDIC X-LAM 6-7/8 in.
- RESILIENT CHANNELS 1/2 in. @ 24 in. O.C.
- 1 TYPE X GYPSUM BOARD OF TYPE “QUIETROCK” 5/8 in.
- SUSPENDED DRYWALL GRID SYSTEM OF TYPE “ARMSTRONG”:
  - METALLIC HANGERS 15 in.
  - T-CHANNELS 1-5/8 in. @ 48 in. O.C.
  - 1 ROW OF STONE WOOL INSULATION OF TYPE “ROXUL” (2.5 pcf) 3 in.
- 1 TYPE X GYPSUM BOARD 5/8 in.

Architecture, Assembly | Floor | NS-DA2223



F24

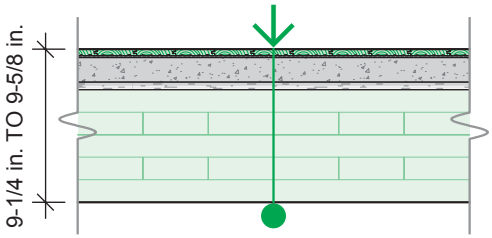
Fire-resistance rating	FRR [a]	2 h
Thermal resistance	RSI / R	n.a. / n.a.
Acoustic ratings	STC [b] / FSTC	62 / n.a.
	IIC [b] / FIIC	59 / n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

b) Composition and acoustic performance taken from the CLT Handbook – U.S. Edition (FPInnovations, 2013). Acoustic performance based on a CLT thickness of 135 mm (5-5/16 in.).

- GYPSUM FIBERBOARD OF TYPE “FERMACELL” 1 in.
- UNDERLAY OF TYPE “ISOVER EP3” 3/4 in.
- 2 LAYERS OF PELLETS AND HONEYCOMB CORE OF TYPE “FERMACELL” 1-1/4 in. EA.
- KRAFT PAPER UNDERLAY
- NORDIC X-LAM 6-7/8 in.
- 1 TYPE X GYPSUM BOARD 5/8 in.

Architecture, Assembly | Floor | NS-DA2224



F25

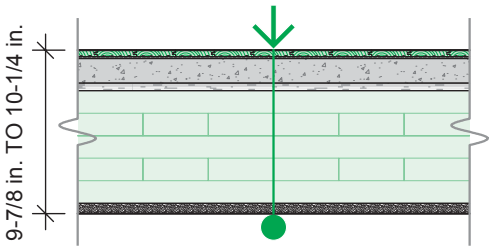
Fire-resistance rating	FRR [a]	1.5 h	
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC / FSTC [b]	n.a.	/ > 50
	IIC / FIIC [b]	n.a.	/ > 50

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

b) Composition and acoustic performance taken from the CLT Handbook – U.S. Edition (FPInnovations, 2013). Acoustic performance based on a CLT thickness of 135 mm (5-5/16 in.).

– CARPET OR FLOATING FLOOR 3/8 in.
– RESILIENT UNDERLAY (RUBBER OR FELT) 1/8 in.
– TOPPING, AT LEAST 15.6 psf (I.E. CONCRETE OR OF TYPE “MAXXON GYP-CRETE”)
– RESILIENT UNDERLAY (RUBBER 3/8 in., FELT 3/4 in., OR WOOD FIBERBOARD 1/2 in.)
– NORDIC X-LAM 6-7/8 in.

Architecture, Assembly | Floor | NS-DA2225



F26

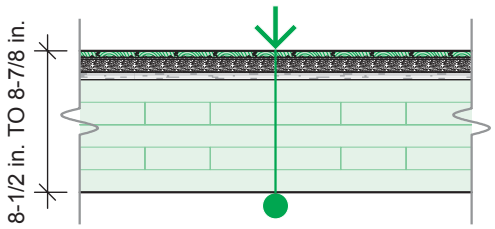
Fire-resistance rating	FRR [a]	2 h	
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC / FSTC [b]	n.a.	/ > 50
	IIC / FIIC [b]	n.a.	/ > 50

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

b) Composition and acoustic performance taken from the CLT Handbook – U.S. Edition (FPInnovations, 2013). Acoustic performance based on a CLT thickness of 135 mm (5-5/16 in.).

– CARPET OR FLOATING FLOOR 3/8 in.
– RESILIENT UNDERLAY (RUBBER OR FELT) 1/8 in.
– TOPPING, AT LEAST 15.6 psf (I.E. CONCRETE OR OF TYPE “MAXXON GYP-CRETE”)
– RESILIENT UNDERLAY (RUBBER 3/8 in., FELT 3/4 in., OR WOOD FIBERBOARD 1/2 in.)
– NORDIC X-LAM 6-7/8 in.
– 1 TYPE X GYPSUM BOARD 5/8 in.

Architecture, Assembly | Floor | NS-DA2226



F27

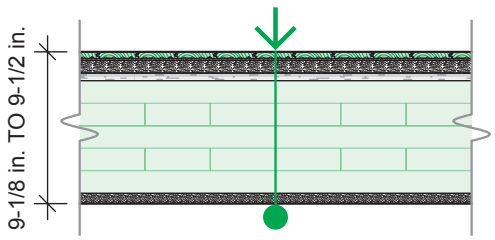
Fire-resistance rating	FRR [a]	1.5 h
Thermal resistance	RSI / R	n.a. / n.a.
Acoustic ratings	STC / FSTC [b]	n.a. / > 45
	IIC / FIIC [b]	n.a. / > 45

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

b) Composition and acoustic performance taken from the CLT Handbook – U.S. Edition (FPInnovations, 2013). Acoustic performance based on a CLT thickness of 135 mm (5-5/16 in.).

– CARPET OR FLOATING FLOOR 3/8 in.
– RESILIENT UNDERLAY (RUBBER OR FELT) 1/8 in.
– PREFABRICATED TOPPING, AT LEAST 5.1 psf (3/4 in. OF TYPE "FERMACELL" OR OF TYPE "FIBREROCK")
– RESILIENT UNDERLAY (RUBBER 3/8 in., FELT 3/4 in., OR WOOD FIBERBOARD 1/2 in.)
– NORDIC X-LAM 6-7/8 in.

Architecture, Assembly | Floor | NS-DA2227



F28

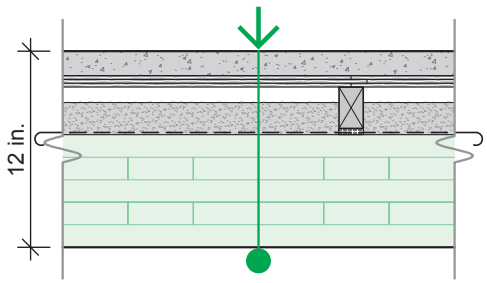
Fire-resistance rating	FRR [a]	2 h
Thermal resistance	RSI / R	n.a. / n.a.
Acoustic ratings	STC / FSTC [b]	n.a. / > 45
	IIC / FIIC [b]	n.a. / > 45

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

b) Composition and acoustic performance taken from the CLT Handbook – U.S. Edition (FPInnovations, 2013). Acoustic performance based on a CLT thickness of 135 mm (5-5/16 in.).

– CARPET OR FLOATING FLOOR 3/8 in.
– RESILIENT UNDERLAY (RUBBER OR FELT) 1/8 in.
– PREFABRICATED TOPPING, AT LEAST 5.1 psf (3/4 in. OF TYPE "FERMACELL" OR OF TYPE "FIBREROCK")
– RESILIENT UNDERLAY (RUBBER 3/8 in., FELT 3/4 in., OR WOOD FIBERBOARD 1/2 in.)
– NORDIC X-LAM 6-7/8 in.
– 1 TYPE X GYPSUM BOARD 5/8 in.

Architecture, Assembly | Floor | NS-DA2228



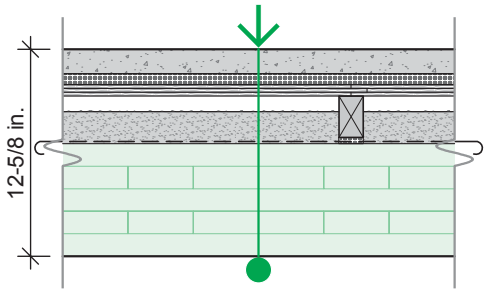
F29

Fire-resistance rating	FRR [a]	1.5 h	
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC [b] / FSTC	64	/ n.a.
	IIC [b] / FIIC	53	/ n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.
b) Acoustic performance based on a CLT thickness of 131 mm (5-1/8 in.).

- PREFABRICATED CONCRETE TOPPING 1-1/2 in.
- TONGUE AND GROOVE OSB SHEATHING 3/4 in.
- WOOD RAFTERS 2 in. X 3 in. @ 24 in. O.C.
- SILICA SAND (#71) 2 in.
- RUBBER MEMBRANE BANDS 3/8 in. UNDER RAFTERS
- POLYETHYLENE SHEETING 6 mil
- NORDIC X-LAM 6-7/8 in.

Architecture, Assembly | Floor | NS-DA2229



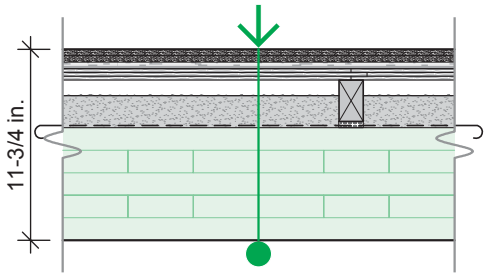
F30

Fire-resistance rating	FRR [a]	1.5 h	
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC [b] / FSTC	66	/ n.a.
	IIC [b] / FIIC	60	/ n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.
b) Acoustic performance based on a CLT thickness of 131 mm (5-1/8 in.).

- PREFABRICATED CONCRETE TOPPING 1-1/2 in.
- UNDERLAY OF TYPE “REGUPOL SONUS WAVE” 5/8 in.
- TONGUE AND GROOVE OSB SHEATHING 3/4 in.
- WOOD RAFTERS 2 in. X 3 in. @ 24 in. O.C.
- SILICA SAND (#71) 2 in.
- RUBBER MEMBRANE BANDS 3/8 in. UNDER RAFTERS
- POLYETHYLENE SHEETING 6 mil
- NORDIC X-LAM 6-7/8 in.

Architecture, Assembly | Floor | NS-DA2230



F31

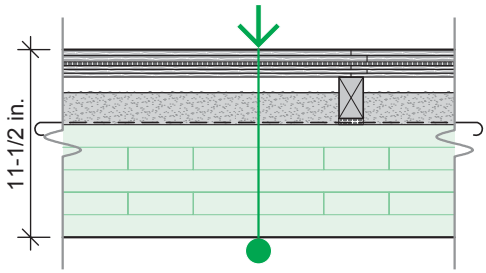
Fire-resistance rating	FRR [a]	1.5 h	
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC [b] / FSTC	59	/ n.a.
	IIC [b] / FIIC	53	/ n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

b) Acoustic performance based on a CLT thickness of 131 mm (5-1/8 in.).

- UNDERLAY OF TYPE “FERMACELL 2E31” 1-1/4 in.
- TONGUE AND GROOVE OSB SHEATHING 3/4 in.
- WOOD RAFTERS 2 in. X 3 in. @ 24 in. O.C.
- SILICA SAND (#71) 2 in.
- RUBBER MEMBRANE BANDS 3/8 in. UNDER RAFTERS
- POLYETHYLENE SHEETING 6 mil
- NORDIC X-LAM 6-7/8 in.

Architecture, Assembly | Floor | NS-DA2231



F32

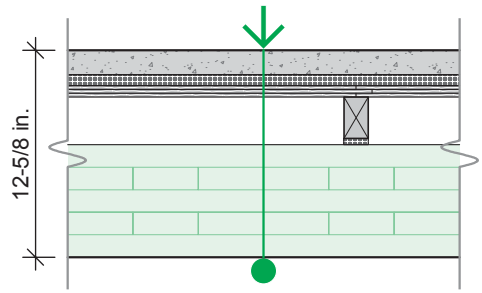
Fire-resistance rating	FRR [a]	1.5 h	
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC [b] / FSTC	56	/ n.a.
	IIC [b] / FIIC	50	/ n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

b) Acoustic performance based on a CLT thickness of 131 mm (5-1/8 in.).

- UNDERLAY OF TYPE “SONODECK INSULFLOOR” 1 in.
- TONGUE AND GROOVE OSB SHEATHING 3/4 in.
- WOOD RAFTERS 2 in. X 3 in. @ 24 in. O.C.
- SILICA SAND (#71) 2 in.
- RUBBER MEMBRANE BANDS 3/8 in. UNDER RAFTERS
- POLYETHYLENE SHEETING 6 mil
- NORDIC X-LAM 6-7/8 in.

Architecture, Assembly | Floor | NS-DA2232



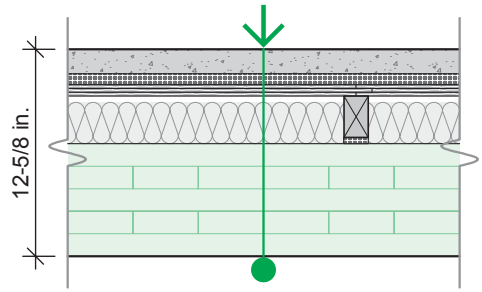
F33

Fire-resistance rating	FRR [a]	1.5 h	
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC [b] / FSTC	59	/ n.a.
	IIC [b] / FIIC	54	/ n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.
b) Acoustic performance based on a CLT thickness of 131 mm (5-1/8 in.).

– PREFABRICATED CONCRETE TOPPING 1-1/2 in.
– UNDERLAY OF TYPE “REGUPOL SONUS WAVE” 5/8 in.
– TONGUE AND GROOVE OSB SHEATHING 3/4 in.
– WOOD RAFTERS 2 in. X 3 in. @ 24 in. O.C.
– RUBBER MEMBRANE BANDS 3/8 in. UNDER RAFTERS
– NORDIC X-LAM 6-7/8 in.

Architecture, Assembly | Floor | NS-DA2233



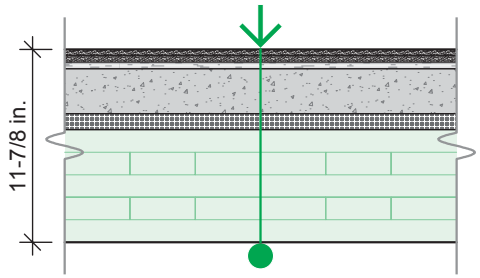
F34

Fire-resistance rating	FRR [a]	1.5 h	
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC [b] / FSTC	60	/ n.a.
	IIC [b] / FIIC	54	/ n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.
b) Acoustic performance based on a CLT thickness of 131 mm (5-1/8 in.).

– PREFABRICATED CONCRETE TOPPING 1-1/2 in.
– UNDERLAY OF TYPE “REGUPOL SONUS WAVE” 5/8 in.
– TONGUE AND GROOVE OSB SHEATHING 3/4 in.
– WOOD RAFTERS 2 in. X 3 in. @ 24 in. O.C.
– 1 ROW OF FIBERGLASS INSULATION 2-1/2 in.
– RUBBER MEMBRANE BANDS 3/8 in. UNDER RAFTERS
– NORDIC X-LAM 6-7/8 in.

Architecture, Assembly | Floor | NS-DA2235



F36

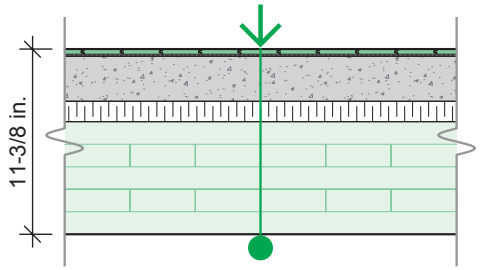
Fire-resistance rating	FRR [a]	1.5 h	
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC [b] / FSTC	56	/ n.a.
	IIC [b] / FIIC	52	/ n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

b) Acoustic performance based on a CLT thickness of 131 mm (5-1/8 in.).

– UNDERLAY OF TYPE “FERMACELL 2E31” 1-1/4 in.
– PREFABRICATED CONCRETE TOPPING (147 pcf) 2-3/4 in.
– UNDERLAY OF TYPE “REGUPOL SONUS WAVE” 1 in.
– NORDIC X-LAM 6-7/8 in.

Architecture, Assembly | Floor | NS-DA2236



F37

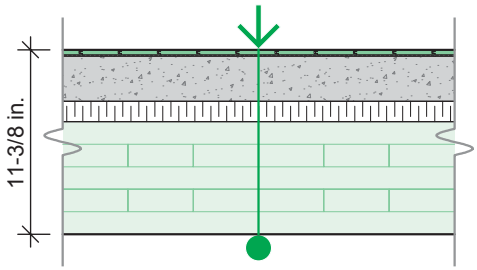
Fire-resistance rating	FRR [a]	1.5 h	
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC [b] / FSTC	57	/ n.a.
	IIC [b] / FIIC	51	/ n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

b) Acoustic performance based on a CLT thickness of 131 mm (5-1/8 in.).

– LAMINATED FLOORING 3/8 in.
– UNDERLAY OF TYPE “ACOUSTITECH PREMIUM” 1/8 in.
– PREFABRICATED CONCRETE TOPPING (147 pcf) 2-3/4 in.
– RIGID SHEATHING BOARD OF TYPE “ROXUL COMFORTBOARD IS” 1-1/4 in.
– NORDIC X-LAM 6-7/8 in.

Architecture, Assembly | Floor | NS-DA2237



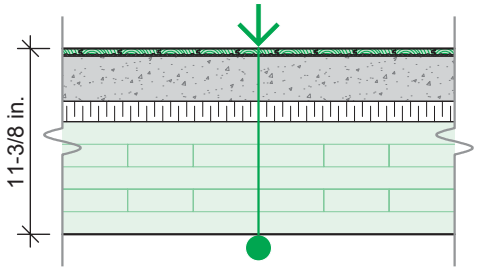
F38

Fire-resistance rating	FRR [a]	1.5 h	
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC [b] / FSTC	57	/ n.a.
	IIC [b] / FIIC	51	/ n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.
b) Acoustic performance based on a CLT thickness of 131 mm (5-1/8 in.).

– LAMINATED FLOORING 3/8 in.
– UNDERLAY OF TYPE “ROBERTS SOFT STRIDE” 1/8 in.
– PREFABRICATED CONCRETE TOPPING (147 pcf) 2-3/4 in.
– RIGID SHEATHING BOARD OF TYPE “ROXUL COMFORTBOARD IS” 1-1/4 in.
– NORDIC X-LAM 6-7/8 in.

Architecture, Assembly | Floor | NS-DA2238



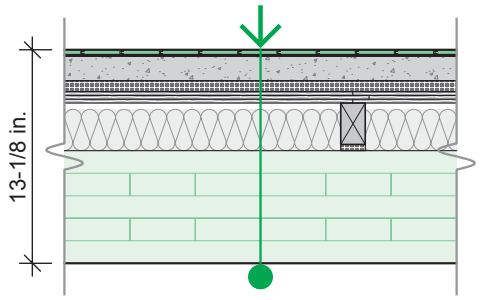
F39

Fire-resistance rating	FRR [a]	1.5 h	
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC [b] / FSTC	57	/ n.a.
	IIC [b] / FIIC	51	/ n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.
b) Acoustic performance based on a CLT thickness of 131 mm (5-1/8 in.).

– HARDWOOD FLOORING OF TYPE “TORLYS EVEREST PREMIER” 3/8 in.
– UNDERLAY OF TYPE “ROBERTS SOFT STRIDE” 1/8 in.
– PREFABRICATED CONCRETE TOPPING (147 pcf) 2-3/4 in.
– RIGID SHEATHING BOARD OF TYPE “ROXUL COMFORTBOARD IS” 1-1/4 in.
– NORDIC X-LAM 6-7/8 in.

Architecture, Assembly | Floor | NS-DA2239



F40

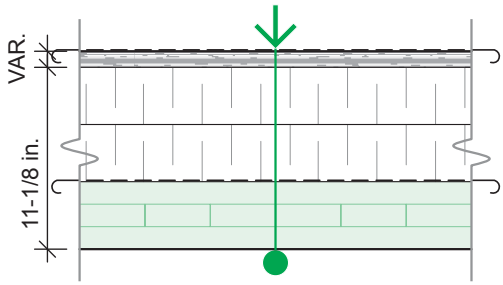
Fire-resistance rating	FRR [a]	1.5 h	
Thermal resistance	RSI / R	n.a.	/ n.a.
Acoustic ratings	STC [b] / FSTC	60	/ n.a.
	IIC [b] / FIIC	58	/ n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

b) Acoustic performance based on a CLT thickness of 131 mm (5-1/8 in.).

- LAMINATED FLOORING 3/8 in.
- UNDERLAY OF TYPE “ROBERTS SOFT STRIDE” 1/8 in.
- PREFABRICATED CONCRETE TOPPING 1-1/2 in.
- UNDERLAY OF TYPE “REGUPOL SONUS WAVE” 5/8 in.
- TONGUE AND GROOVE OSB SHEATHING 3/4 in.
- WOOD RAFTERS 2 in. X 3 in. @ 24 in. O.C.
- 1 ROW OF FIBERGLASS INSULATION 2-1/2 in.
- RUBBER MEMBRANE BANDS 3/8 in. UNDER RAFTERS
- NORDIC X-LAM 6-7/8 in.

Architecture, Assembly | Roof | NS-DA2300



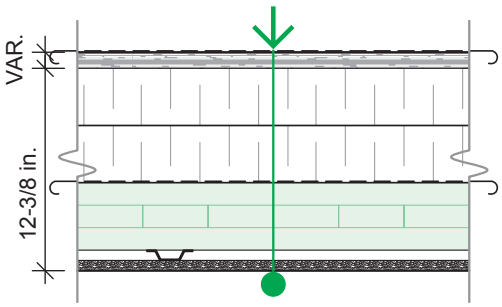
R1

Fire-resistance rating	FRR [a]	1 h	
Thermal resistance	RSI / R	7.9	/ 45
Acoustic ratings	STC / FSTC	n.a.	/ n.a.
	IIC / FIIC	n.a.	/ n.a.

a) The fire-resistance rating is based on a span of 12 feet and on a uniform load of 80 psf.

- TWO-LAYER ELASTOMERIC MEMBRANE ROOFING
- ROOFING UNDERLAY (UP TO THE DESIGNER)
- 2 ROWS OF POLYISOCYANURATE INSULATION 3-1/2 in. EA.
- VAPOR BARRIER MEMBRANE
- NORDIC X-LAM 4-1/8 in.

Architecture, Assembly | Roof | NS-DA2301



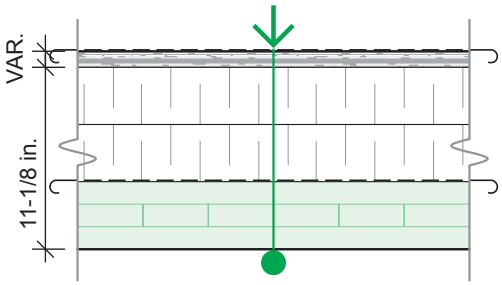
R2

Fire-resistance rating	FRR [(a)]	1.5 h	
Thermal resistance	RSI / R	8.2	/ 47
Acoustic ratings	STC / FSTC	n.a.	/ n.a.
	IIC / FIIC	n.a.	/ n.a.

a) The fire-resistance rating is based on a span of 12 feet and on a uniform load of 80 psf.

- TWO-LAYER ELASTOMERIC MEMBRANE ROOFING
- ROOFING UNDERLAY (UP TO THE DESIGNER)
- 2 ROWS OF POLYISOCYANURATE INSULATION 3-1/2 in. EA.
- VAPOR BARRIER MEMBRANE
- NORDIC X-LAM 4-1/8 in.
- FURRING CHANNELS 5/8 in. @ 16 in. O.C.
- 1 TYPE X GYPSUM BOARD 5/8 in.

Architecture, Assembly | Roof | NS-DA2302



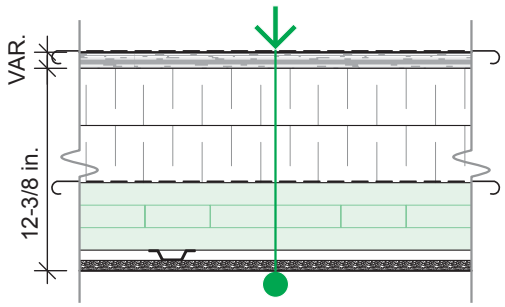
R3

Fire-resistance rating	FRR [(a)]	1 h	
Thermal resistance	RSI / R	7.9	/ 45
Acoustic ratings	STC / FSTC	n.a.	/ n.a.
	IIC / FIIC	n.a.	/ n.a.

a) The fire-resistance rating is based on a span of 12 feet and on a uniform load of 80 psf.

- THERMOPLASTIC POLYOLEFIN (TPO) MEMBRANE ROOFING
- ROOFING UNDERLAY (UP TO THE DESIGNER)
- 2 ROWS OF POLYISOCYANURATE INSULATION 3-1/2 in. EA.
- VAPOR BARRIER MEMBRANE
- NORDIC X-LAM 4-1/8 in.

Architecture, Assembly | Roof | NS-DA2303



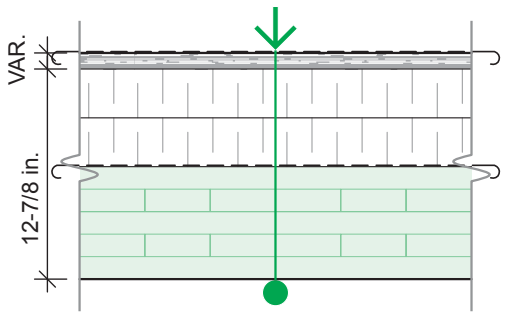
R4

Fire-resistance rating	FRR [a]	1.5 h	
Thermal resistance	RSI / R	8.2	/ 47
Acoustic ratings	STC / FSTC	n.a.	/ n.a.
	IIC / FIIC	n.a.	/ n.a.

a) The fire-resistance rating is based on a span of 12 feet and on a uniform load of 80 psf.

- THERMOPLASTIC POLYOLEFIN (TPO) MEMBRANE ROOFING
- ROOFING UNDERLAY (UP TO THE DESIGNER)
- 2 ROWS OF POLYISOCYANURATE INSULATION 3-1/2 in. EA.
- VAPOR BARRIER MEMBRANE
- NORDIC X-LAM 4-1/8 in.
- FURRING CHANNELS 5/8 in. @ 16 in. O.C.
- 1 TYPE X GYPSUM BOARD 5/8 in.

Architecture, Assembly | Roof | NS-DA2304



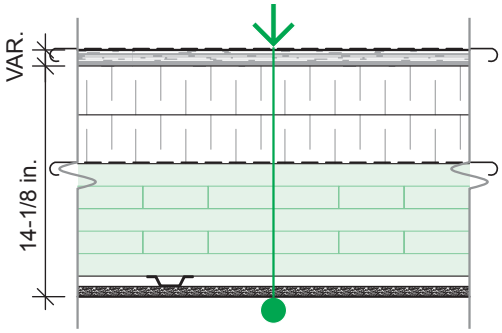
R5

Fire-resistance rating	FRR [a]	1.5 h	
Thermal resistance	RSI / R	7.5	/ 43
Acoustic ratings	STC / FSTC	n.a.	/ n.a.
	IIC / FIIC	n.a.	/ n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

- TWO-LAYER ELASTOMERIC MEMBRANE ROOFING
- ROOFING UNDERLAY (UP TO THE DESIGNER)
- 2 ROWS OF POLYISOCYANURATE INSULATION 3 in. EA.
- VAPOR BARRIER MEMBRANE
- NORDIC X-LAM 6-7/8 in.

Architecture, Assembly | Roof | NS-DA2305



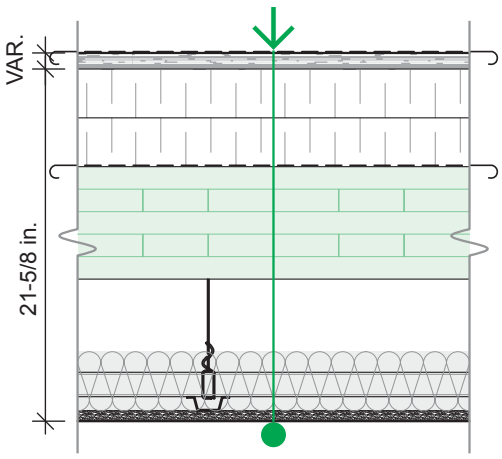
R6

Fire-resistance rating	FRR [(a)]	2 h	
Thermal resistance	RSI / R	7.7	/ 44
Acoustic ratings	STC / FSTC	n.a.	/ n.a.
	IIC / FIIC	n.a.	/ n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

- TWO-LAYER ELASTOMERIC MEMBRANE ROOFING
- ROOFING UNDERLAY (UP TO THE DESIGNER)
- 2 ROWS OF POLYISOCYANURATE INSULATION 3 in. EA.
- VAPOR BARRIER MEMBRANE
- NORDIC X-LAM 6-7/8 in.
- FURRING CHANNELS 5/8 in. @ 16 in. O.C.
- 1 TYPE X GYPSUM BOARD 5/8 in.

Architecture, Assembly | Roof | NS-DA2306



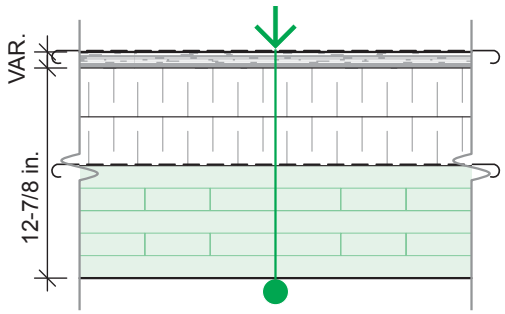
R7

Fire-resistance rating	FRR [(a)]	2 h	
Thermal resistance	RSI / R	7.7	/ 44
Acoustic ratings	STC / FSTC	n.a.	/ n.a.
	IIC / FIIC	n.a.	/ n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

- TWO-LAYER ELASTOMERIC MEMBRANE ROOFING
- ROOFING UNDERLAY (UP TO THE DESIGNER)
- 2 ROWS OF POLYISOCYANURATE INSULATION 3 in. EA.
- VAPOR BARRIER MEMBRANE
- NORDIC X-LAM 6-7/8 in.
- SUSPENDED CEILING:
  - METALLIC HANGERS 5-3/4 in.
  - CHANNEL IRONS 1-1/2 in. @ 48 in. O.C.
  - FURRING CHANNELS 7/8 in. @ 16 in. O.C.
  - SOUNDPROOFING MATERIAL 3-5/8 in.
- 1 TYPE X GYPSUM BOARD 5/8 in.

Architecture, Assembly | Roof | NS-DA2307



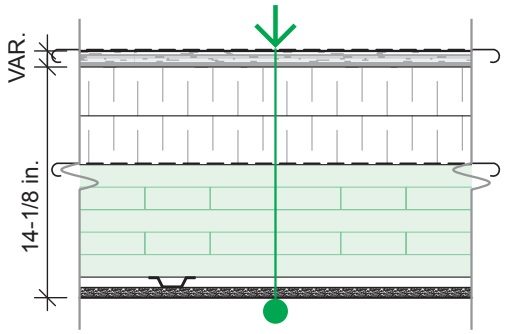
R8

Fire-resistance rating	FRR [a]	1.5 h	
Thermal resistance	RSI / R	7.5	/ 43
Acoustic ratings	STC / FSTC	n.a.	/ n.a.
	IIC / FIIC	n.a.	/ n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

- THERMOPLASTIC POLYOLEFIN (TPO) MEMBRANE ROOFING
- ROOFING UNDERLAY (UP TO THE DESIGNER)
- 2 ROWS OF POLYISOCYANURATE INSULATION 3 in. EA.
- VAPOR BARRIER MEMBRANE
- NORDIC X-LAM 6-7/8 in.

Architecture, Assembly | Roof | NS-DA2308



R9

Fire-resistance rating	FRR [a]	2 h	
Thermal resistance	RSI / R	7.7	/ 44
Acoustic ratings	STC / FSTC	n.a.	/ n.a.
	IIC / FIIC	n.a.	/ n.a.

a) The fire-resistance rating is based on a span of 18 feet and on a uniform load of 90 psf.

- THERMOPLASTIC POLYOLEFIN (TPO) MEMBRANE ROOFING
- ROOFING UNDERLAY (UP TO THE DESIGNER)
- 2 ROWS OF POLYISOCYANURATE INSULATION 3 in. EA.
- VAPOR BARRIER MEMBRANE
- NORDIC X-LAM 6-7/8 in.
- FURRING CHANNELS 5/8 in. @ 16 in. O.C.
- 1 TYPE X GYPSUM BOARD 5/8 in.

NORDIC

TECHNICAL GUIDE
NORDIC X-LAM

NS-GT6

ASD

VERSION
2022-04-21

ADDITIONAL INFORMATION 5

NORDIC
STRUCTURES

Software

Nordic Sizer

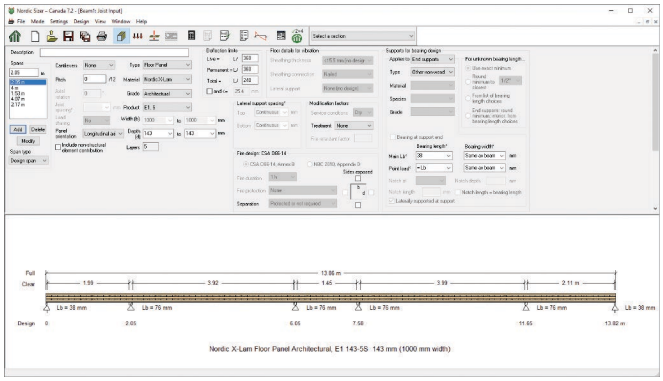
Nordic Sizer is a software program built to design individual structural elements (joists, beams, columns, studs, slabs, and panels) using the full range of Nordic engineered wood products.

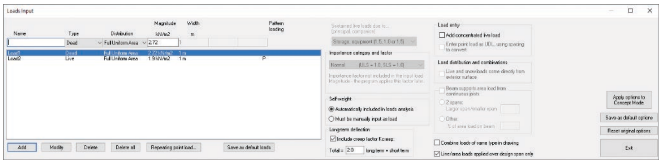
Nordic Sizer software application analyzes and designs members for specified loads in accordance with CSA O86 (Canada) or NDS (United States) standard, and automatically checks load cases and load combinations in accordance with NBC (Canada) or IBC (United States). Features include floor vibration checks and fire resistance calculations.

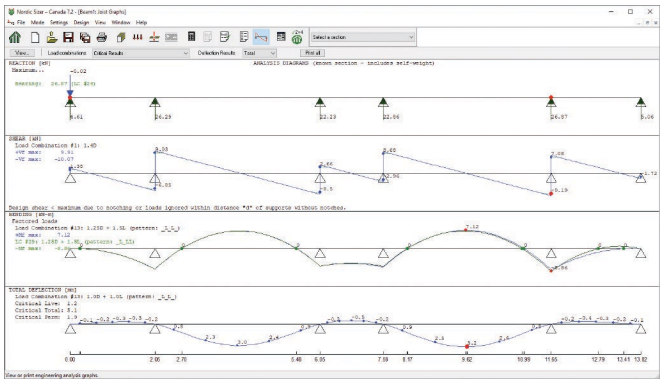
For more information: http://woodworks-software.com

DOWNLOAD & INSTALL
Fill in the form (contact.nordic.ca/en/nordic-sizer-software-request/) to receive instructions by email within the next business day.
For assistance, please contact the technical support at 514-871-8526, ext. 2 or tech@nordic.ca.

WOODWORKS SOFTWARE TUTORIALS
US Training Videos and User Guide
woodworks-software.com/support/support-us-edition/







NORDIC STRUCTURES

COMPANY	PROJECT
Aug. 12, 2020 15:47	Beam1

Design Check Calculation Sheet
Nordic Sizer – Canada 7.2

Loads:

Load	Type	Distribution	Pat-tern	Location [m] Start	End	Magnitude Start	End	Unit
Load1	Dead	Full Area	No			2.72(1.00m)		kN/m2
Load2	Live	Full Area	Yes			1.90(1.00m)		kN/m2
Self-weight	Dead	Full UDL	No			0.72		kN/m

Maximum Reactions (kN), Bearing Resistances (kN) and Bearing Lengths (mm) :

13.86 m
0 2.05 6.05 7.58 11.65 13.82 m

Unfactored:								
Dead	1.54	12.59		9.22	9.56		12.87	1.79
Live	1.79	7.04		7.14	7.28		7.19	1.88
Factored:								
Uplift	0.02							
Total	4.61	26.29		22.23	22.86		26.87	5.06
Bearing:								
Capacity								
Beam	161.54	282.46		305.35	304.13		282.38	161.54
Des ratio								
Beam	0.03	0.08		0.06	0.07		0.08	0.03
Load case	#24	#14		#25	#16		#29	#24
Length	38*	76		76	76		76	38*
Min req'd	38*	76*		76*	76*		76*	38*
KB	1.00	1.00		1.00	1.00		1.00	1.00
KB min	1.00	1.00		1.00	1.00		1.00	1.00
KD	1.00	0.87		0.94	0.94		0.87	1.00

*Minimum bearing length for panels is 38 mm for exterior supports and 76 mm for intermediate supports

Nordic X-Lam Floor Panel Architectural, E1 143-5S 143 mm (1000 mm width)
Supports: All - Non-wood
Total length: 13.858 m; Clear span: 2, 3.9, 1.5, 4, 2.1 m; Volume = 1.982 m^3; Panel orientation: Longitudinal axis
This section PASSES the design code check.

Limit States Design using CSA O86-14:

Criterion	Analysis Value	Design Value	Unit	Analysis/Design
Shear	Vf @d = 9.19	Vr = 27.95	kN	Vf/Vr = 0.33
Moment(+)	Mf = 7.12	Mr = 58.05	kN-m	Mf/Mr = 0.12
Moment(-)	Mf = 8.86	Mr = 56.95	kN-m	Mf/Mr = 0.16
Perm. Defl'n	1.9 = < L/999	11.3 = L/360	mm	0.17
Live Defl'n	1.2 = < L/999	11.3 = L/360	mm	0.11
Total Defl'n	5.1 = L/798	17.0 = L/240	mm	0.30
Vibration	Lmax = 4.070	Lv = 5.186	m	Lmax/Lv = 0.78

+ architectural details →**DA2**

+ structural details →**DS2**

+ installation guide →**GI2**

+ maintenance guide →**GE2**

+ product warranty →**N-X601**

nordic.ca