NORDIC

TECHNICAL GUIDE
NORDIC LAM+

NS-GT5

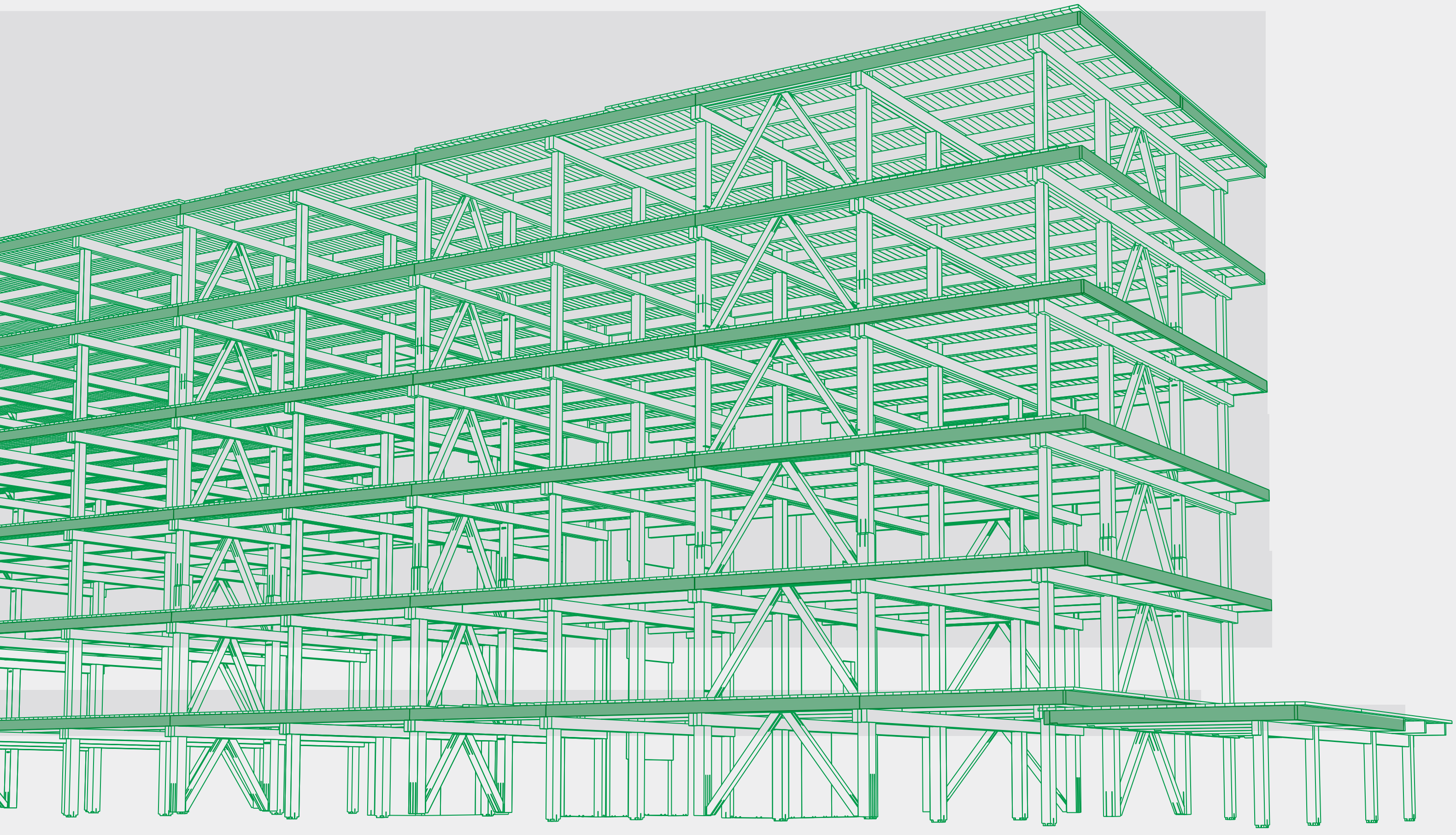
ENGLISH

VERSION
2026-02-01

Mass Timber Construction

NORDIC LAM+ TECHNICAL GUIDE

NORDIC 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
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GENERAL INFORMATION

info@nordic.ca

TECHNICAL SUPPORT

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ENGINEERED WOOD PRODUCTS

Standard size products available
from our distributors

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NORDIC JOIST

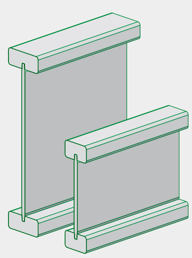
NORDIC I-JOISTS

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

RESIDENTIAL SERIES

NI-20
2×3 S-P-F No. 2, 3/8 in. web
Depths
9-1/2 and 11-7/8 in.

NI-40x
2×3 1950f MSR, 3/8 in. web
Depths
9-1/2, 11-7/8 and 14 in.



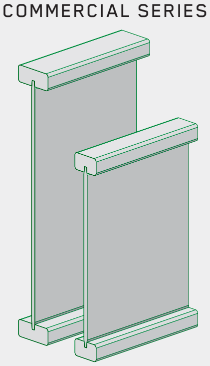
NI-60
2×3 2100f MSR, 3/8 in. web
Depths
9-1/2, 11-7/8, 14 and 16 in.

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.

COMMERCIAL SERIES

NI-80x
2×4 2100f MSR, 7/16 in. web
Depths
18, 20, 22 and 24 in.



RIM BOARDS

1-1/8 in. width
I-joist compatible depths

NS-GT4

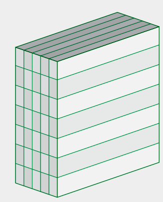
NORDIC LAM

NORDIC LAM GLUED-LAMINATED TIMBER

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

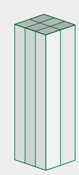
BEAMS AND HEADERS

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



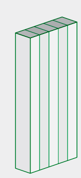
COLUMNS

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

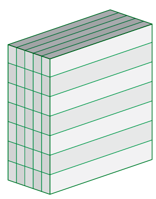
NORDIC LAM+ GLUED-LAMINATED TIMBER

Nordic Lam+ glued-laminated timber of architectural appearance grade 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.)



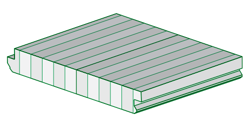
Lengths*
Up to 24.4 m (80 ft)

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

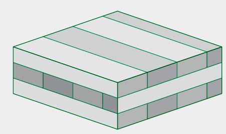
NORDIC X-LAM CROSS-LAMINATED TIMBER

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
2.565 × 19.5 m (101 in. × 64 ft)



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

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STRUCTURES

GLULAM

NORDIC LAM+

NORDIC LAM+ GLUED-LAMINATED TIMBER

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

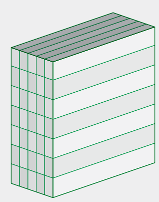
BEAMS AND COLUMNS

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



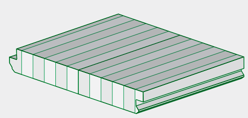
DECKING

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

Nordic Lam+ – Specification Guide

Specifications

Glued-laminated timber (glulam) products may be used in dry service conditions, such as in most covered structures, where the average equilibrium moisture content of solid wood over a year is 15% or less and does not exceed 19%, as well as wet service conditions when accounted for in the design.

Additional considerations for wet use include, but are not limited to, service condition factors for the resistance, dimensional changes, architectural details, wood protection and maintenance.

Master format 06 18 00

REFERENCE STANDARD

.1 CSA O122-[16], Structural Glued Laminated Timber.
.2 CSA O177-[06 (R2015)], Qualification Code for Manufacturers of Structural Glued-Laminated Timber.

ACTION AND INFORMATION SUBMITTALS

.1 Submit the product report published by a certification agency accredited by the Standards Council of Canada at completion of fabrication.

MATERIALS

.1 Laminating stock: Spruce-Pine-Fir, [FSC certified]
.2 Sealer: Penetrating type, clear, non-yellowing liquid (Sansin KP-12UVW)
.3 Preservative: [Specify as required]
.4 Fire retardant: [Specify as required]

FABRICATION

.1 Stress grade: [bending, compression and/or tension members 24F-ES/NPG (beams, columns, and ties)] [and/or] [ES11 or 20F-ES/CPG (decking)]
.2 Service grade: [Interior] [Exterior]
.3 Appearance grade: [Architectural]
.4 Fire resistance: [Specify as required]

ERECTION

.1 Erect glued-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 Lam+ – Appearance Grades

The following example of glued laminated timber appearance grade is for reference only. These requirements are based on the appearance at the time of manufacturing. The actual glulam product appearance requirements are recommended to be agreed upon between the buyer and the seller.

Architectural Appearance

A high quality appearance suitable for applications where appearance is an important but not overriding consideration. This grade corresponds to CSA O122 quality appearance grade and its specific characteristics are:

- **Lamination Characteristics** – The wide face of laminations exposed to view are free of loose knots. Otherwise, laminations are permitted to possess the natural growth characteristics of the lumber grade.
- **Void Repair** – In exposed surfaces, voids measuring over 3/4 in. (19 mm) long are filled with a wood-tone colored filler that reasonably blends with the final product or with wood inserts selected for similarity to the grain and color of the adjacent wood. Exception: A void (not repaired) is permitted to be longer than 3/4 in. (19 mm) if its area does not exceed 1/2 in.^{2} (3.23 cm^2). Open knot holes on the wide face of laminations exposed to view are filled.
  - **Pencil Wane** – All occurrences of pencil wane are repaired, regardless of length. Pencil wane is permitted to be repaired using filler up to a maximum length of 8 in. (203 mm). For pencil wane longer than 8 in. (203 mm), wood inserts are used for repairs.
  - **Edge Joints** – Voids greater than 1/16 in. (2 mm) wide in edge joints appearing on the wide face of laminations exposed to view are filled with wood-tone colored filler that reasonably blends with the final product.
- **Surfacing** – Exposed faces are surfaced smooth. Misses, wane, and low laminations are not permitted. Occasional repaired pencil wane is permitted subject to the restrictions above (see Pencil Wane).
- **Eased Corners** – The corners of the member exposed to view in the final structure are eased with a minimum radius of 1/8 in. (3 mm) or equivalent chamfer.

Industrial Appearance

An appearance grade normally suitable for use in concealed applications where appearance is not of primary concern. For more details on industrial grade Nordic Lam products, see the technical guide GT4.

Nordic Lam+ – Certifications

Product Certifications

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

- CSA O122, *Structural Glued Laminated Timber.*
- CSA O177, *Qualification Code for Manufacturers of Structural Glued-Laminated Timber.*
- APA Product Report PR-L294C

APA is a not-for-profit trade association and is accredited by the Standards Council of Canada (SCC) as a Product Certification Body under ISO Guide 65. APA is also an accredited testing organization recognized by SCC under ISO/IEC 17025.

The CSA O122 standard is recognized in the National Building Code (NBC) and is required for using the design provisions specified in CSA O86, Engineering design in wood.

Green Certifications

Wood – efficient and ecological

Overview of environmental certifications:

- Green Verification Report APA GR-L294
- Low Formaldehyde Emissions Products APA PR-E740
- Environmental Product Declaration (EPD), Nordic Lam
- Health Product Declaration (HPD), Nordic Lam
- Declare (ILFI), Nordic Lam
- USDA Certified Biobased Product, Product 92%
- Cradle to Cradle Certified, Nordic Lam
- FSC-certified products available

Note: For independently verified LEED (Leadership in Energy and Environmental Design) points, refer to APA GR-L294.

See nordic.ca for details.

Nordic Lam+ – Transparency Brief

The Nordic 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.

Glulam Production

The glued-laminated timber (glulam) production phase begins with the transportation of logs to the finished product. These processes consume fossil fuel (63.0%), electricity drawn from regional grids (25.3%), internally generated biomass (10.7%) and nuclear (1.1%).

Environmental Impacts

Atmosphere		
	Global warming potential	100.38 kg CO_2 eq.
	Ozone depletion potential	1.39E-06 kg CFC-11 eq.
	Photochemical ozone creation potential	30.99 kg O_3 eq.
Water		
	Acidification potential	1.01 kg SO_2 eq.
	Eutrophication potential	0.08 kg N eq.
Earth		
	Depletion of abiotic resources (elements)	5.16 kg
	Depletion of abiotic resources (fossil fuels)	1423.32 MJ

Material Content

Component – for 1 m^3 of Nordic Lam	**Mass (kg)**	**Mass (%)**
Wood (on oven dry basis); renewable	406 kg	99.9 %
Resins (polyurethane and isocyanate)	0.43 kg	0.1 %
Total	406.43 kg	100 %

Carbon Balance

Impact Category – for 1 m^3 of Nordic Lam	**Carbon (kg of CO_2 eq.)**
Forest carbon uptake	-741.36 kg of CO_2 eq.
Life cycle greenhouse gas emissions	100.38 kg of CO_2 eq.
Unaccounted biogenic carbon emissions	26.70 kg of CO_2 eq.
Net global warming potential	-614.27 kg of CO_2 eq.

See nordic.ca for details.

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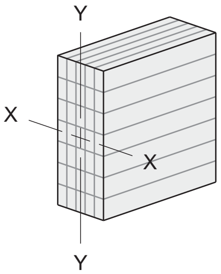
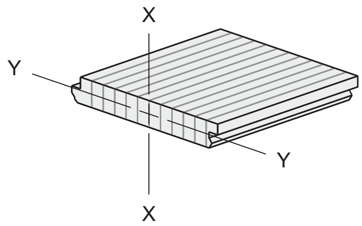
STRUCTURE 2

NORDIC
STRUCTURES

Nordic Lam+ – Design Properties

Nordic Lam+ – Design Properties

Application	Beams and columns		Decking	
Axonometry				
Appearance grade [(a)]	Architectural		Architectural	
Stress grade	24F-ES/NPG		ES11/NPG	20F-ES/CPG
Available thicknesses	-		38, 44 and 54 mm	89 mm
Bending about X-X axis				
Bending moment, f_{bx} [(b)]	30.7	MPa	17.2 MPa	25.6 MPa
Longitudinal shear, f_{vx} [(c)]	2.5	MPa	2.2 MPa	2.2 MPa
Compression perpendicular to grain, f_{cpx} [(d)]	7.5	MPa	5.8 MPa	5.8 MPa
Shear-free modulus of elasticity, E_x	13 100	MPa	11 000 MPa	13 100 MPa
Apparent modulus of elasticity, $E_{x,app}$ [(e)]	12 400	MPa	10 300 MPa	12 400 MPa
Bending about Y-Y axis				
Bending moment, f_{by} [(b)]	30.7	MPa	22.4 MPa	25.6 MPa
Longitudinal shear, f_{vy} [(c)]	2.5	MPa	1.5 MPa	2.2 MPa
Compression perpendicular to grain, f_{cpy} [(d)]	7.5	MPa	5.8 MPa	5.8 MPa
Shear-free modulus of elasticity, E_y	13 100	MPa	11 000 MPa	13 100 MPa
Apparent modulus of elasticity, $E_{y,app}$ [(e)]	12 400	MPa	10 300 MPa	12 400 MPa
Axially loaded				
Compression parallel to grain, f_c	33.0	MPa	22.3 MPa	14.4 MPa
Tension parallel to grain, f_t	20.4	MPa	12.5 MPa	10.2 MPa
Tension perpendicular to grain, f_{tp}	0.51	MPa	0.51 MPa	0.51 MPa
Modulus of elasticity, E_a	13 100	MPa	11 000 MPa	13 100 MPa
Connection design				
Mean relative density, G [(f)]	0.47	-	0.42 -	0.42 -
Characteristic density, ρ_k [(g)]	430	kg/m³	n.a. kg/m³	385 kg/m³
Density (for member weight), ρ [(h)]	560	kg/m³	560 kg/m³	560 kg/m³

a) Architectural appearance grade corresponds to CSA O122 quality appearance grade.
b) The size factor for bending, K_{Zbg}, shall be calculated as per Clause 7.5.6.5.1 of CSA O86:19, where the beam width, b, is taken as the full member width.
c) The specified fracture shear strength at a notch, f_f, shall be calculated as per Clause 7.5.7.5.2 of CSA O86:19, where the effective lamination width, b_{eff}, is taken as the full member width.
d) The size factor for bearing, K_{Zcp}, shall be calculated as per Clause 6.5.6.4 of CSA O86:19, where the width and the depth are respectively the full member width and the thickness of lamination.
e) The apparent modulus of elasticity values include a 5% shear deflection. For column stability calculations, E_{05} shall be determined by multiplying the tabulated apparent modulus of elasticity by 0.87.
f) Mean relative density values, G, for dowel-type fastener design in accordance with CSA O86.
g) Characteristic density values, ρ_k, for dowel-type fastener design in accordance with EN 1995-1-1.
h) Density values, ρ, for a moisture content of 12%.

Notes:
1. The tabulated values are for dry service conditions and standard-term duration of load.
2. Nordic Lam+ members are symmetrical throughout the depth and the width of the member (homogeneous layups). It should be noted that Clause 7.5.3 of CSA O86:19 is not applicable.
3. Design of glulam members shall be in accordance with CSA O86:19.

Beams and Columns – Standard Dimensions

Beams and Columns – Standard Dimensions

Width (mm)												
38	86	137	184	215	241	292	346	395	448	502	552	603
Depths (mm)												
67	140	137										
92	191	191	184									
117	241	241	241	215	241							
143	292	292	292	292	292	292						
171	343	343	343	343	343	343	346					
197	394	394	394	394	394	394	394	395				
222	445	445	445	445	445	445	445	445	448			
248	495	495	495	495	495	495	495	495	495	502		
273	546	546	546	546	546	546	546	546	546	546	552	
298	597	597	597	597	597	597	597	597	597	597	597	603
327	648	648	648	648	648	648	648	648	648	648	648	648
352	699	699	699	699	699	699	699	699	699	699	699	699
378	749	749	749	749	749	749	749	749	749	749	749	749
403	803	803	803	803	803	803	803	803	803	803	803	803
429	854	854	854	854	854	854	854	854	854	854	854	854
454	905	905	905	905	905	905	905	905	905	905	905	905
	956	956	956	956	956	956	956	956	956	956	956	956
	1 006	1 006	1 006	1 006	1 006	1 006	1 006	1 006	1 006	1 006	1 006	1 006
		1 057	1 057	1 057	1 057	1 057	1 057	1 057	1 057	1 057	1 057	1 057
		1 108	1 108	1 108	1 108	1 108	1 108	1 108	1 108	1 108	1 108	1 108
		1 159	1 159	1 159	1 159	1 159	1 159	1 159	1 159	1 159	1 159	1 159
		1 210	1 210	1 210	1 210	1 210	1 210	1 210	1 210	1 210	1 210	1 210
		1 260	1 260	1 260	1 260	1 260	1 260	1 260	1 260	1 260	1 260	1 260
		1 311	1 311	1 311	1 311	1 311	1 311	1 311	1 311	1 311	1 311	1 311
		1 362	1 362	1 362	1 362	1 362	1 362	1 362	1 362	1 362	1 362	1 362
		1 413	1 413	1 413	1 413	1 413	1 413	1 413	1 413	1 413	1 413	1 413
		1 464	1 464	1 464	1 464	1 464	1 464	1 464	1 464	1 464	1 464	1 464
		1 514	1 514	1 514	1 514	1 514	1 514	1 514	1 514	1 514	1 514	1 514
		1 565	1 565	1 565	1 565	1 565	1 565	1 565	1 565	1 565	1 565	1 565
		1 619	1 619	1 619	1 619	1 619	1 619	1 619	1 619	1 619	1 619	1 619
			1 670	1 670	1 670	1 670	1 670	1 670	1 670	1 670	1 670	1 670
			1 721	1 721	1 721	1 721	1 721	1 721	1 721	1 721	1 721	1 721
			1 772	1 772	1 772	1 772	1 772	1 772	1 772	1 772	1 772	1 772
			1 822	1 822	1 822	1 822	1 822	1 822	1 822	1 822	1 822	1 822
			1 873	1 873	1 873	1 873	1 873	1 873	1 873	1 873	1 873	1 873
			1 924	1 924	1 924	1 924	1 924	1 924	1 924	1 924	1 924	1 924
			1 975	1 975	1 975	1 975	1 975	1 975	1 975	1 975	1 975	1 975
			2 026	2 026	2 026	2 026	2 026	2 026	2 026	2 026	2 026	2 026
			2 076	2 076	2 076	2 076	2 076	2 076	2 076	2 076	2 076	2 076
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			2 178	2 178	2 178	2 178	2 178	2 178	2 178	2 178	2 178	2 178
				2 229	2 229	2 229	2 229	2 229	2 229	2 229	2 229	2 229
				2 280	2 280	2 280	2 280	2 280	2 280	2 280	2 280	2 280
				2 330	2 330	2 330	2 330	2 330	2 330	2 330	2 330	2 330
				2 384	2 384	2 384	2 384	2 384	2 384	2 384	2 384	2 384
				2 435	2 435	2 435	2 435	2 435	2 435	2 435	2 435	2 435

Notes:

1. Members of dimensions in black are cold pressed for lengths up to 18.9 m (optimum dimensions for straight members) and hot pressed for lengths between 18.9 and 24.4 m (maximum length).
2. Members of dimensions in grey are cold pressed (maximum length of 24.4 m).
3. Members of shaded dimensions are cold pressed using manual techniques (maximum length of 24.4 m).
4. Depth-to-width ratio shall be limited to 12:1.
5. Other dimensions are available upon request; please contact Nordic Structures.

Beams – Design Properties

Beams – Design Properties

Depth (mm)	Width (mm)							
	86				137			
	M_r [a] (kN-m)	V_r (kN)	$W_rL^{0.18}$ [b] (kN-m$^{0.18}$)	E_sI (10^9 N-mm²)	M_r [a] (kN-m)	V_r (kN)	$W_rL^{0.18}$ [b] (kN-m$^{0.18}$)	E_sI (10^9 N-mm²)
140	8	18	106	244				
191	14	25	137	619	23	39	201	986
241	23	31	166	1 244	37	50	243	1 982
292	34	38	194	2 213	54	60	285	3 525
343	47	44	222	3 586	74	71	325	5 713
394	62	51	248	5 435	98	81	364	8 659
445	78	57	274	7 831	125	91	402	12 475
495	97	64	299	10 778	155	102	439	17 170
546	118	70	325	14 465	188	112	475	23 043
597	141	77	349	18 909	225	123	512	30 122
648	166	84	373	24 180	265	133	547	38 520
699	194	90	397	30 351	308	144	582	48 350
749	222	97	421	37 341	354	154	616	59 485
803	255	104	445	46 014	407	165	652	73 301
854	289	110	468	55 349	460	175	686	88 173
905	324	117	491	65 870	517	186	719	104 932
956	362	123	514	77 645	577	196	753	123 690
1 006	401	130	536	90 476	638	207	785	144 130
1 057					705	217	817	167 181
1 108					775	228	849	192 566
1 159					847	238	881	220 400
1 210					924	249	913	250 794
1 260					1 002	259	944	283 187
1 311					1 084	269	975	318 984
1 362					1 170	280	1 006	357 678
1 413					1 260	290	1 037	399 381
1 464					1 352	301	1 067	444 206
1 514					1 446	311	1 097	491 291
1 565					1 545	322	1 127	542 630
1 619					1 654	333	1 159	600 761
1 670								
1 721								
1 772								
1 822								
1 873								
1 924								
1 975								
2 026								
2 076								
2 127								
2 178								
2 229								
2 280								
2 330								
2 384								
2 435								

a) The factored bending moment resistance values, M_r, shall be adjusted by the lesser of size factor or lateral stability factor, K_{Zbg} or K_L, respectively, as defined in Clause 7.5.6.5.1 of CSA O86:19.

b) Tabulated $W_rL^{0,18}$ values are based on a simply supported beam with a uniformly distributed load (C_v = 3.69). For other conditions, determine the appropriate C_v value as per Clause 7.5.7.6 of CSA O86:19 and multiply the tabulated $W_rL^{0,18}$ value by C_v / 3.69.

Notes:

1. Final design shall include a complete analysis including the verification of the factored bearing resistance and fire-resistance requirements.
2. The tabulated values are based on dry service conditions, standard-term duration of load, and on beams that are not notched.

Beams – Design Properties (continued)

Depth (mm)	184: M_r (a) (kN-m)	184: V_r (kN)	184: $W_rL^{0.18}$ (b) (kN-m$^{0.18}$)	184: E_sI (10^9 N-mm²)	215: M_r (a) (kN-m)	215: V_r (kN)	215: $W_rL^{0.18}$ (b) (kN-m$^{0.18}$)	215: E_sI (10^9 N-mm²)
140								
191								
241	49	67	310	2 661				
292	72	81	362	4 734	84	94	412	5 531
343	100	95	414	7 673	116	111	470	8 965
394	132	109	463	11 629	154	127	526	13 588
445	168	123	512	16 755	196	144	582	19 578
495	208	137	559	23 061	243	160	635	26 946
546	253	151	605	30 948	295	176	688	36 162
597	302	165	651	40 456	353	193	740	47 272
648	356	179	697	51 735	416	209	792	60 451
699	414	193	741	64 937	484	225	842	75 877
749	475	207	785	79 892	555	242	892	93 352
803	546	222	831	98 448	638	259	944	115 034
854	618	236	874	118 422	722	275	993	138 373
905	694	250	916	140 930	811	292	1 041	164 674
956	774	264	958	166 124	905	308	1 089	194 112
1 006	858	278	999	193 576	1 002	324	1 135	226 190
1 057	947	292	1 041	224 535	1 106	341	1 182	262 364
1 108	1 040	306	1 082	258 629	1 215	357	1 229	302 203
1 159	1 138	320	1 122	296 011	1 330	374	1 275	345 883
1 210	1 241	334	1 163	336 833	1 450	390	1 321	393 582
1 260	1 345	348	1 202	380 338	1 572	406	1 366	444 417
1 311	1 456	362	1 242	428 417	1 702	423	1 411	500 596
1 362	1 572	376	1 281	480 385	1 837	439	1 456	561 320
1 413	1 692	390	1 320	536 395	1 977	456	1 500	626 766
1 464	1 816	404	1 359	596 598	2 122	472	1 545	697 111
1 514	1 942	418	1 397	659 836	2 269	488	1 588	771 004
1 565	2 075	432	1 436	728 788	2 425	505	1 631	851 573
1 619	2 221	447	1 476	806 861	2 595	522	1 677	942 800
1 670	2 363	461	1 514	885 539	2 761	539	1 721	1 034 733
1 721	2 510	475	1 552	969 172	2 932	555	1 764	1 132 456
1 772	2 661	489	1 590	1 057 912	3 109	571	1 806	1 236 147
1 822	2 813	503	1 626	1 150 015	3 287	588	1 848	1 343 767
1 873	2 973	517	1 664	1 249 314	3 473	604	1 890	1 459 796
1 924	3 137	531	1 701	1 354 171	3 665	620	1 932	1 582 319
1 975	3 305	545	1 738	1 464 737	3 862	637	1 974	1 711 513
2 026	3 478	559	1 774	1 581 163	4 064	653	2 016	1 847 554
2 076	3 652	573	1 810	1 701 141	4 267	670	2 057	1 987 746
2 127	3 833	587	1 847	1 829 619	4 479	686	2 098	2 137 870
2 178	4 019	601	1 883	1 964 409	4 697	702	2 139	2 295 369
2 229					4 919	719	2 180	2 460 419
2 280					5 147	735	2 221	2 633 198
2 330					5 375	751	2 261	2 810 261
2 384					5 627	769	2 304	3 010 216
2 435					5 870	785	2 344	3 207 567

a) The factored bending moment resistance values, M_r, shall be adjusted by the lesser of size factor or lateral stability factor, K_{Zbg} or K_L, respectively, as defined in Clause 7.5.6.5.1 of CSA O86:19.

b) Tabulated $W_rL^{0,18}$ values are based on a simply supported beam with a uniformly distributed load (C_v = 3.69). For other conditions, determine the appropriate C_v value as per Clause 7.5.7.6 of CSA O86:19 and multiply the tabulated $W_rL^{0,18}$ value by C_v / 3.69.

Notes:

1. Final design shall include a complete analysis including the verification of the factored bearing resistance and fire-resistance requirements.
2. The tabulated values are based on dry service conditions, standard-term duration of load, and on beams that are not notched.

Beams – Design Properties (continued)

Depth (mm)	Width (mm) 241				292			
	M_r [(a)] (kN-m)	V_r (kN)	$W_rL^{0.18}$ [(b)] (kN-m$^{0.18}$)	E_sI (10^9 N-mm²)	M_r [(a)] (kN-m)	V_r (kN)	$W_rL^{0.18}$ [(b)] (kN-m$^{0.18}$)	E_sI (10^9 N-mm²)
140								
191								
241	65	87	386	3 486				
292	95	106	452	6 200	115	128	529	7 512
343	131	124	516	10 049	158	150	604	12 176
394	172	142	578	15 232	209	173	677	18 455
445	220	161	639	21 945	266	195	748	26 589
495	272	179	697	30 205	329	217	816	36 596
546	331	197	755	40 535	401	239	884	49 114
597	396	216	813	52 988	479	261	951	64 202
648	466	234	869	67 761	565	284	1 018	82 101
699	542	253	925	85 053	657	306	1 083	103 052
749	623	271	979	104 641	754	328	1 146	126 785
803	716	290	1 037	128 945	867	352	1 213	156 232
854	809	309	1 090	155 107	981	374	1 276	187 930
905	909	327	1 143	184 588	1 101	396	1 338	223 650
956	1 014	346	1 196	217 586	1 229	419	1 400	263 631
1 006	1 123	364	1 247	253 543	1 361	441	1 459	307 197
1 057	1 240	382	1 299	294 091	1 502	463	1 520	356 327
1 108	1 362	401	1 350	338 748	1 651	485	1 580	410 433
1 159	1 491	419	1 400	387 711	1 806	508	1 639	469 757
1 210	1 625	437	1 451	441 178	1 969	530	1 698	534 539
1 260	1 762	455	1 500	498 160	2 135	552	1 755	603 580
1 311	1 907	474	1 549	561 133	2 311	574	1 813	679 879
1 362	2 059	492	1 599	629 200	2 494	597	1 871	762 350
1 413	2 216	511	1 647	702 561	2 685	619	1 928	851 236
1 464	2 379	529	1 696	781 413	2 882	641	1 985	946 774
1 514	2 544	547	1 743	864 241	3 082	663	2 041	1 047 131
1 565	2 718	566	1 791	954 554	3 293	685	2 097	1 156 555
1 619	2 909	585	1 842	1 056 813	3 525	709	2 156	1 280 454
1 670	3 095	604	1 889	1 159 864	3 750	731	2 212	1 405 312
1 721	3 287	622	1 937	1 269 405	3 983	754	2 267	1 538 034
1 772	3 485	641	1 984	1 385 634	4 222	776	2 322	1 678 860
1 822	3 684	659	2 029	1 506 269	4 464	798	2 375	1 825 023
1 873	3 893	677	2 076	1 636 330	4 717	820	2 430	1 982 607
1 924	4 108	696	2 122	1 773 669	4 978	843	2 484	2 149 010
1 975	4 329	714	2 168	1 918 487	5 245	865	2 538	2 324 473
2 026	4 555	732	2 214	2 070 980	5 519	887	2 591	2 509 237
2 076	4 783	750	2 259	2 228 125	5 795	909	2 644	2 699 637
2 127	5 021	769	2 304	2 396 404	6 083	932	2 697	2 903 526
2 178	5 265	787	2 349	2 572 949	6 379	954	2 750	3 117 431
2 229	5 514	806	2 394	2 757 958	6 681	976	2 802	3 341 593
2 280	5 769	824	2 439	2 951 631	6 990	999	2 855	3 576 250
2 330	6 025	842	2 483	3 150 107	7 300	1 021	2 906	3 816 727
2 384	6 308	862	2 530	3 374 242	7 642	1 044	2 961	4 088 293
2 435	6 580	880	2 574	3 595 459	7 973	1 067	3 013	4 356 324

a) The factored bending moment resistance values, M_r, shall be adjusted by the lesser of size factor or lateral stability factor, K_{Zbg} or K_L, respectively, as defined in Clause 7.5.6.5.1 of CSA O86:19.

b) Tabulated $W_rL^{0,18}$ values are based on a simply supported beam with a uniformly distributed load (C_v = 3.69). For other conditions, determine the appropriate C_v value as per Clause 7.5.7.6 of CSA O86:19 and multiply the tabulated $W_rL^{0,18}$ value by C_v / 3.69.

Notes:

1. Final design shall include a complete analysis including the verification of the factored bearing resistance and fire-resistance requirements.
2. The tabulated values are based on dry service conditions, standard-term duration of load, and on beams that are not notched.

Beams – Design Properties (continued)

Depth (mm)	Width (mm)							
	346				395			
	M_r (a) (kN-m)	V_r (kN)	$W_rL^{0.18}$ (b) ($kN\text{-}m^{0.18}$)	E_sI (10^9 N-mm²)	M_r (a) (kN-m)	V_r (kN)	$W_rL^{0.18}$ (b) ($kN\text{-}m^{0.18}$)	E_sI (10^9 N-mm²)
140								
191								
241								
292								
343								
394	247	204	778	21 868				
445	316	231	859	31 506	360	264	958	35 968
495	390	257	938	43 364	446	293	1 045	49 505
546	475	283	1 016	58 196	542	324	1 133	66 438
597	568	310	1 093	76 075	648	354	1 219	86 848
648	669	336	1 169	97 284	764	384	1 304	111 061
699	779	363	1 244	122 109	889	414	1 387	139 402
749	894	389	1 317	150 232	1 020	444	1 468	171 507
803	1 027	417	1 394	185 124	1 173	476	1 554	211 341
854	1 162	443	1 467	222 685	1 327	506	1 635	254 221
905	1 305	470	1 538	265 010	1 490	536	1 714	302 540
956	1 456	496	1 609	312 385	1 662	566	1 793	356 625
1 006	1 613	522	1 677	364 008	1 841	596	1 870	415 558
1 057	1 780	549	1 747	422 223	2 032	626	1 947	482 017
1 108	1 956	575	1 816	486 335	2 233	656	2 024	555 209
1 159	2 140	602	1 884	556 630	2 443	687	2 100	635 459
1 210	2 333	628	1 952	633 392	2 663	717	2 175	723 092
1 260	2 530	654	2 017	715 201	2 888	747	2 249	816 487
1 311	2 738	680	2 084	805 610	3 126	777	2 323	919 699
1 362	2 956	707	2 150	903 333	3 374	807	2 397	1 031 262
1 413	3 181	733	2 216	1 008 656	3 632	837	2 470	1 151 500
1 464	3 415	760	2 282	1 121 863	3 899	867	2 543	1 280 739
1 514	3 652	786	2 345	1 240 778	4 169	897	2 614	1 416 495
1 565	3 902	812	2 410	1 370 439	4 455	927	2 686	1 564 518
1 619	4 176	840	2 478	1 517 250	4 768	959	2 762	1 732 120
1 670	4 444	867	2 542	1 665 198	5 073	989	2 833	1 901 021
1 721	4 719	893	2 605	1 822 465	5 388	1 020	2 904	2 080 560
1 772	5 003	920	2 668	1 989 334	5 712	1 050	2 974	2 271 060
1 822	5 289	946	2 730	2 162 528	6 038	1 080	3 043	2 468 781
1 873	5 590	972	2 792	2 349 253	6 381	1 110	3 113	2 681 951
1 924	5 898	999	2 855	2 546 430	6 733	1 140	3 182	2 907 052
1 975	6 215	1 025	2 916	2 754 342	7 095	1 170	3 251	3 144 408
2 026	6 540	1 051	2 978	2 973 274	7 466	1 200	3 320	3 394 344
2 076	6 867	1 077	3 038	3 198 885	7 839	1 230	3 387	3 651 906
2 127	7 208	1 104	3 099	3 440 480	8 229	1 260	3 455	3 927 715
2 178	7 558	1 130	3 160	3 693 943	8 629	1 290	3 523	4 217 073
2 229	7 916	1 157	3 221	3 959 558	9 037	1 321	3 590	4 520 305
2 280	8 283	1 183	3 281	4 237 611	9 456	1 351	3 657	4 837 735
2 330	8 650	1 209	3 340	4 522 560	9 875	1 381	3 723	5 163 038
2 384	9 056	1 237	3 403	4 844 348	10 338	1 413	3 794	5 530 397
2 435	9 447	1 264	3 463	5 161 946	10 785	1 443	3 860	5 892 973

a) The factored bending moment resistance values, M_r, shall be adjusted by the lesser of size factor or lateral stability factor, K_{Zbg} or K_L, respectively, as defined in Clause 7.5.6.5.1 of CSA O86:19.

b) Tabulated $W_rL^{0,18}$ values are based on a simply supported beam with a uniformly distributed load (C_v = 3.69). For other conditions, determine the appropriate C_v value as per Clause 7.5.7.6 of CSA O86:19 and multiply the tabulated $W_rL^{0,18}$ value by C_v / 3.69.

Notes:

1. Final design shall include a complete analysis including the verification of the factored bearing resistance and fire-resistance requirements.
2. The tabulated values are based on dry service conditions, standard-term duration of load, and on beams that are not notched.

Beams – Design Properties (continued)

Depth (mm)	Width (mm)							
	448				502			
	M_r [(a)] (kN-m)	V_r (kN)	$W_rL^{0.18}$ [(b)] (kN-m$^{0.18}$)	E_sI (10^9 N-mm²)	M_r [(a)] (kN-m)	V_r (kN)	$W_rL^{0.18}$ [(b)] (kN-m$^{0.18}$)	E_sI (10^9 N-mm²)
140								
191								
241								
292								
343								
394								
445								
495	505	333	1 159	56 148				
546	615	367	1 256	75 352	689	411	1 379	84 435
597	735	401	1 351	98 501	824	450	1 484	110 374
648	866	435	1 445	125 963	971	488	1 587	141 146
699	1 008	470	1 538	158 107	1 130	526	1 688	177 164
749	1 157	503	1 628	194 520	1 297	564	1 787	217 966
803	1 330	540	1 723	239 698	1 491	605	1 892	268 591
854	1 505	574	1 813	288 331	1 686	643	1 990	323 086
905	1 690	608	1 901	343 134	1 893	681	2 087	384 494
956	1 885	642	1 988	404 475	2 113	720	2 183	453 229
1 006	2 088	676	2 073	471 316	2 340	758	2 276	528 127
1 057	2 305	710	2 159	546 693	2 583	796	2 370	612 589
1 108	2 533	745	2 244	629 706	2 838	834	2 463	705 608
1 159	2 771	779	2 328	720 724	3 105	873	2 556	807 597
1 210	3 020	813	2 412	820 115	3 385	911	2 648	918 968
1 260	3 275	847	2 493	926 041	3 670	949	2 737	1 037 662
1 311	3 546	881	2 576	1 043 101	3 973	987	2 828	1 168 832
1 362	3 827	915	2 658	1 169 633	4 288	1 026	2 918	1 310 616
1 413	4 119	950	2 739	1 306 005	4 615	1 064	3 007	1 463 426
1 464	4 422	984	2 820	1 452 585	4 955	1 102	3 096	1 627 674
1 514	4 729	1 017	2 899	1 606 557	5 299	1 140	3 182	1 800 204
1 565	5 053	1 052	2 979	1 774 441	5 662	1 178	3 270	1 988 324
1 619	5 408	1 088	3 063	1 964 532	6 059	1 219	3 362	2 201 328
1 670	5 754	1 122	3 141	2 156 095	6 447	1 258	3 449	2 415 981
1 721	6 110	1 157	3 220	2 359 723	6 847	1 296	3 535	2 644 154
1 772	6 478	1 191	3 298	2 575 785	7 259	1 334	3 620	2 886 259
1 822	6 849	1 224	3 374	2 800 036	7 674	1 372	3 704	3 137 540
1 873	7 237	1 259	3 451	3 041 808	8 110	1 410	3 789	3 408 454
1 924	7 637	1 293	3 528	3 297 112	8 557	1 449	3 873	3 694 531
1 975	8 047	1 327	3 605	3 566 315	9 017	1 487	3 957	3 996 184
2 026	8 468	1 361	3 681	3 849 788	9 489	1 526	4 041	4 313 825
2 076	8 891	1 395	3 755	4 141 909	9 963	1 563	4 122	4 641 156
2 127	9 333	1 429	3 831	4 454 725	10 458	1 602	4 205	4 991 679
2 178	9 786	1 464	3 906	4 782 909	10 966	1 640	4 288	5 359 420
2 229	10 250	1 498	3 981	5 126 827	11 486	1 678	4 370	5 744 793
2 280	10 725	1 532	4 055	5 486 849	12 017	1 717	4 452	6 148 210
2 330	11 200	1 566	4 128	5 855 800	12 550	1 754	4 532	6 561 633
2 384	11 725	1 602	4 206	6 272 450	13 139	1 795	4 618	7 028 504
2 435	12 232	1 636	4 280	6 683 675	13 707	1 834	4 698	7 489 297

a) The factored bending moment resistance values, M_r, shall be adjusted by the lesser of size factor or lateral stability factor, K_{Zbg} or K_L, respectively, as defined in Clause 7.5.6.5.1 of CSA O86:19.

b) Tabulated $W_rL^{0,18}$ values are based on a simply supported beam with a uniformly distributed load (C_v = 3.69). For other conditions, determine the appropriate C_v value as per Clause 7.5.7.6 of CSA O86:19 and multiply the tabulated $W_rL^{0,18}$ value by C_v / 3.69.

Notes:

1. Final design shall include a complete analysis including the verification of the factored bearing resistance and fire-resistance requirements.
2. The tabulated values are based on dry service conditions, standard-term duration of load, and on beams that are not notched.

Beams – Design Properties (continued)

Depth (mm)	Width (mm) 552				603			
	M_r [(a)] (kN-m)	V_r (kN)	$W_rL^{0.18}$ [(b)] (kN-m$^{0.18}$)	E_sI (10^9 N-mm²)	M_r [(a)] (kN-m)	V_r (kN)	$W_rL^{0.18}$ [(b)] (kN-m$^{0.18}$)	E_sI (10^9 N-mm²)
140								
191								
241								
292								
343								
394								
445								
495								
546								
597	906	494	1 604	121 368				
648	1 067	537	1 715	155 205	1 166	586	1 844	169 544
699	1 242	579	1 825	194 810	1 357	632	1 962	212 809
749	1 426	620	1 932	239 676	1 558	677	2 077	261 820
803	1 639	665	2 045	295 343	1 791	726	2 199	322 630
854	1 854	707	2 151	355 266	2 025	772	2 313	388 089
905	2 082	749	2 256	422 791	2 274	819	2 425	461 853
956	2 323	792	2 359	498 371	2 538	865	2 537	544 417
1 006	2 573	833	2 460	580 729	2 810	910	2 645	634 383
1 057	2 840	875	2 562	673 604	3 102	956	2 755	735 839
1 108	3 121	917	2 663	775 888	3 409	1 002	2 863	847 573
1 159	3 415	960	2 763	888 034	3 730	1 048	2 971	970 081
1 210	3 722	1 002	2 862	1 010 498	4 066	1 094	3 077	1 103 860
1 260	4 036	1 043	2 959	1 141 014	4 408	1 140	3 181	1 246 434
1 311	4 369	1 086	3 057	1 285 250	4 773	1 186	3 287	1 403 996
1 362	4 715	1 128	3 154	1 441 155	5 151	1 232	3 391	1 574 306
1 413	5 075	1 170	3 251	1 609 185	5 544	1 278	3 495	1 757 860
1 464	5 448	1 212	3 346	1 789 793	5 952	1 324	3 598	1 955 154
1 514	5 827	1 254	3 440	1 979 507	6 365	1 369	3 698	2 162 397
1 565	6 226	1 296	3 535	2 186 364	6 801	1 416	3 800	2 388 365
1 619	6 663	1 341	3 634	2 420 583	7 278	1 464	3 907	2 644 224
1 670	7 089	1 383	3 728	2 656 617	7 744	1 511	4 008	2 902 065
1 721	7 529	1 425	3 821	2 907 516	8 224	1 557	4 108	3 176 145
1 772	7 982	1 467	3 914	3 173 735	8 719	1 603	4 208	3 466 961
1 822	8 439	1 509	4 004	3 450 044	9 218	1 648	4 305	3 768 798
1 873	8 918	1 551	4 096	3 747 942	9 741	1 694	4 403	4 094 219
1 924	9 410	1 593	4 187	4 062 513	10 279	1 740	4 502	4 437 853
1 975	9 915	1 635	4 278	4 394 210	10 831	1 786	4 599	4 800 197
2 026	10 434	1 678	4 368	4 743 488	11 398	1 833	4 696	5 181 745
2 076	10 955	1 719	4 456	5 103 423	11 967	1 878	4 791	5 574 935
2 127	11 500	1 761	4 546	5 488 858	12 563	1 924	4 887	5 995 981
2 178	12 058	1 803	4 635	5 893 227	13 172	1 970	4 983	6 437 710
2 229	12 630	1 846	4 724	6 316 983	13 796	2 016	5 079	6 900 618
2 280	13 214	1 888	4 812	6 760 582	14 435	2 062	5 174	7 385 201
2 330	13 800	1 929	4 899	7 215 182	15 075	2 107	5 267	7 881 802
2 384	14 447	1 974	4 992	7 728 554	15 782	2 156	5 367	8 442 606
2 435	15 072	2 016	5 079	8 235 243	16 464	2 202	5 461	8 996 108

a) The factored bending moment resistance values, M_r, shall be adjusted by the lesser of size factor or lateral stability factor, K_{Zbg} or K_L, respectively, as defined in Clause 7.5.6.5.1 of CSA O86:19.

b) Tabulated $W_rL^{0,18}$ values are based on a simply supported beam with a uniformly distributed load (C_v = 3.69). For other conditions, determine the appropriate C_v value as per Clause 7.5.7.6 of CSA O86:19 and multiply the tabulated $W_rL^{0,18}$ value by C_v / 3.69.

Notes:

1. Final design shall include a complete analysis including the verification of the factored bearing resistance and fire-resistance requirements.
2. The tabulated values are based on dry service conditions, standard-term duration of load, and on beams that are not notched.

Beams – Fire Resistance

Beams – Maximum Design Load Ratio

Depth (mm)	Width (mm)							
	184				215			
	Fire-resistance rating (min)				Fire-resistance rating (min)			
	30	60	90	120	30	60	90	120
140								
191								
241	1.00	0.70	-	-				
292	1.00	0.77	-	-	1.00	0.89	0.48	-
343	1.00	0.81	-	-	1.00	0.95	0.52	-
394	1.00	0.85	-	-	1.00	0.99	0.56	-
445	1.00	0.88	-	-	1.00	1.00	0.59	-
495	1.00	0.90	-	-	1.00	1.00	0.61	-
546	1.00	0.92	-	-	1.00	1.00	0.63	-
597	1.00	0.93	-	-	1.00	1.00	0.65	-
648	1.00	0.95	-	-	1.00	1.00	0.66	-
699	1.00	0.96	-	-	1.00	1.00	0.67	-
749	1.00	0.97	-	-	1.00	1.00	0.68	-
803	1.00	0.98	-	-	1.00	1.00	0.69	-
854	1.00	0.99	-	-	1.00	1.00	0.70	-
905	1.00	0.99	-	-	1.00	1.00	0.70	-
956	1.00	1.00	-	-	1.00	1.00	0.71	-
1 006	1.00	1.00	-	-	1.00	1.00	0.72	-
1 057	1.00	1.00	-	-	1.00	1.00	0.72	-
1 108	1.00	1.00	-	-	1.00	1.00	0.73	-
1 159	1.00	1.00	-	-	1.00	1.00	0.73	-
1 210	1.00	1.00	-	-	1.00	1.00	0.73	-
1 260	1.00	1.00	-	-	1.00	1.00	0.74	-
1 311	1.00	1.00	-	-	1.00	1.00	0.74	-
1 362	1.00	1.00	-	-	1.00	1.00	0.75	-
1 413	1.00	1.00	-	-	1.00	1.00	0.75	-
1 464	1.00	1.00	-	-	1.00	1.00	0.75	-
1 514	1.00	1.00	-	-	1.00	1.00	0.75	-
1 565	1.00	1.00	-	-	1.00	1.00	0.76	-
1 619	1.00	1.00	-	-	1.00	1.00	0.76	-
1 670	1.00	1.00	-	-	1.00	1.00	0.76	-
1 721	1.00	1.00	-	-	1.00	1.00	0.76	-
1 772	1.00	1.00	-	-	1.00	1.00	0.76	-
1 822	1.00	1.00	-	-	1.00	1.00	0.77	-
1 873	1.00	1.00	-	-	1.00	1.00	0.77	-
1 924	1.00	1.00	-	-	1.00	1.00	0.77	-
1 975	1.00	1.00	-	-	1.00	1.00	0.77	-
2 026	1.00	1.00	-	-	1.00	1.00	0.77	-
2 076	1.00	1.00	-	-	1.00	1.00	0.77	-
2 127	1.00	1.00	-	-	1.00	1.00	0.77	-
2 178	1.00	1.00	-	-	1.00	1.00	0.78	-
2 229					1.00	1.00	0.78	-
2 280					1.00	1.00	0.78	-
2 330					1.00	1.00	0.78	-
2 384					1.00	1.00	0.78	-
2 435					1.00	1.00	0.78	-

Notes:

1. The tabulated design load ratios represent the maximum M_f / M_r ratio to meet fire-resistance requirements.
2. Final design shall include a complete analysis including the verification of the factored shear and bearing resistances and a consideration for live load and total load deflections.
3. The tabulated values are based on dry service conditions, standard-term duration of load, and on a flexural member exposed on three sides.
4. The beam shall be laterally supported at points of bearing and along all compression edges.

Beams – Maximum Design Load Ratio (continued)

Depth (mm)	Width (mm)							
	241				292			
	Fire-resistance rating (min)				Fire-resistance rating (min)			
	30	60	90	120	30	60	90	120
140								
191								
241	1.00	0.89	0.50	0.23				
292	1.00	0.98	0.58	0.28	1.00	1.00	0.71	0.42
343	1.00	1.00	0.63	0.31	1.00	1.00	0.78	0.48
394	1.00	1.00	0.67	0.34	1.00	1.00	0.84	0.53
445	1.00	1.00	0.71	0.37	1.00	1.00	0.88	0.57
495	1.00	1.00	0.73	0.39	1.00	1.00	0.91	0.60
546	1.00	1.00	0.76	0.40	1.00	1.00	0.94	0.62
597	1.00	1.00	0.78	0.42	1.00	1.00	0.96	0.64
648	1.00	1.00	0.79	0.43	1.00	1.00	0.98	0.66
699	1.00	1.00	0.81	0.44	1.00	1.00	1.00	0.68
749	1.00	1.00	0.82	0.45	1.00	1.00	1.00	0.69
803	1.00	1.00	0.83	0.46	1.00	1.00	1.00	0.70
854	1.00	1.00	0.84	0.46	1.00	1.00	1.00	0.71
905	1.00	1.00	0.85	0.47	1.00	1.00	1.00	0.72
956	1.00	1.00	0.85	0.48	1.00	1.00	1.00	0.73
1 006	1.00	1.00	0.86	0.48	1.00	1.00	1.00	0.74
1 057	1.00	1.00	0.87	0.49	1.00	1.00	1.00	0.75
1 108	1.00	1.00	0.87	0.49	1.00	1.00	1.00	0.75
1 159	1.00	1.00	0.88	0.49	1.00	1.00	1.00	0.76
1 210	1.00	1.00	0.88	0.50	1.00	1.00	1.00	0.76
1 260	1.00	1.00	0.89	0.50	1.00	1.00	1.00	0.77
1 311	1.00	1.00	0.89	0.50	1.00	1.00	1.00	0.77
1 362	1.00	1.00	0.89	0.51	1.00	1.00	1.00	0.78
1 413	1.00	1.00	0.90	0.51	1.00	1.00	1.00	0.78
1 464	1.00	1.00	0.90	0.51	1.00	1.00	1.00	0.79
1 514	1.00	1.00	0.90	0.51	1.00	1.00	1.00	0.79
1 565	1.00	1.00	0.91	0.52	1.00	1.00	1.00	0.79
1 619	1.00	1.00	0.91	0.52	1.00	1.00	1.00	0.80
1 670	1.00	1.00	0.91	0.52	1.00	1.00	1.00	0.80
1 721	1.00	1.00	0.92	0.52	1.00	1.00	1.00	0.80
1 772	1.00	1.00	0.92	0.52	1.00	1.00	1.00	0.80
1 822	1.00	1.00	0.92	0.52	1.00	1.00	1.00	0.81
1 873	1.00	1.00	0.92	0.53	1.00	1.00	1.00	0.81
1 924	1.00	1.00	0.92	0.53	1.00	1.00	1.00	0.81
1 975	1.00	1.00	0.93	0.53	1.00	1.00	1.00	0.81
2 026	1.00	1.00	0.93	0.53	1.00	1.00	1.00	0.82
2 076	1.00	1.00	0.93	0.53	1.00	1.00	1.00	0.82
2 127	1.00	1.00	0.93	0.53	1.00	1.00	1.00	0.82
2 178	1.00	1.00	0.93	0.53	1.00	1.00	1.00	0.82
2 229	1.00	1.00	0.93	0.53	1.00	1.00	1.00	0.82
2 280	1.00	1.00	0.93	0.54	1.00	1.00	1.00	0.82
2 330	1.00	1.00	0.94	0.54	1.00	1.00	1.00	0.83
2 384	1.00	1.00	0.94	0.54	1.00	1.00	1.00	0.83
2 435	1.00	1.00	0.94	0.54	1.00	1.00	1.00	0.83

Notes:

1. The tabulated design load ratios represent the maximum M_f / M_r ratio to meet fire-resistance requirements.
2. Final design shall include a complete analysis including the verification of the factored shear and bearing resistances and a consideration for live load and total load deflections.
3. The tabulated values are based on dry service conditions, standard-term duration of load, and on a flexural member exposed on three sides.
4. The beam shall be laterally supported at points of bearing and along all compression edges.

Beams – Maximum Design Load Ratio (continued)

Depth (mm)	Width (mm)							
	346				395			
	Fire-resistance rating (min)				Fire-resistance rating (min)			
	30	60	90	120	30	60	90	120
140								
191								
241								
292								
343								
394	1.00	1.00	0.96	0.67				
445	1.00	1.00	1.00	0.71	1.00	1.00	1.00	0.81
495	1.00	1.00	1.00	0.75	1.00	1.00	1.00	0.85
546	1.00	1.00	1.00	0.78	1.00	1.00	1.00	0.89
597	1.00	1.00	1.00	0.81	1.00	1.00	1.00	0.92
648	1.00	1.00	1.00	0.83	1.00	1.00	1.00	0.95
699	1.00	1.00	1.00	0.85	1.00	1.00	1.00	0.97
749	1.00	1.00	1.00	0.87	1.00	1.00	1.00	0.99
803	1.00	1.00	1.00	0.88	1.00	1.00	1.00	1.00
854	1.00	1.00	1.00	0.90	1.00	1.00	1.00	1.00
905	1.00	1.00	1.00	0.91	1.00	1.00	1.00	1.00
956	1.00	1.00	1.00	0.92	1.00	1.00	1.00	1.00
1 006	1.00	1.00	1.00	0.93	1.00	1.00	1.00	1.00
1 057	1.00	1.00	1.00	0.94	1.00	1.00	1.00	1.00
1 108	1.00	1.00	1.00	0.95	1.00	1.00	1.00	1.00
1 159	1.00	1.00	1.00	0.96	1.00	1.00	1.00	1.00
1 210	1.00	1.00	1.00	0.96	1.00	1.00	1.00	1.00
1 260	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00
1 311	1.00	1.00	1.00	0.97	1.00	1.00	1.00	1.00
1 362	1.00	1.00	1.00	0.98	1.00	1.00	1.00	1.00
1 413	1.00	1.00	1.00	0.98	1.00	1.00	1.00	1.00
1 464	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00
1 514	1.00	1.00	1.00	0.99	1.00	1.00	1.00	1.00
1 565	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 619	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 670	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 721	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 772	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 822	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 873	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 924	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 975	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2 026	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2 076	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2 127	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2 178	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2 229	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2 280	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2 330	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2 384	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2 435	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Notes:

1. The tabulated design load ratios represent the maximum M_f / M_r ratio to meet fire-resistance requirements.
2. Final design shall include a complete analysis including the verification of the factored shear and bearing resistances and a consideration for live load and total load deflections.
3. The tabulated values are based on dry service conditions, standard-term duration of load, and on a flexural member exposed on three sides.
4. The beam shall be laterally supported at points of bearing and along all compression edges.

Beams – Maximum Design Load Ratio (continued)

Depth (mm)	Width (mm)							
	448				502			
	Fire-resistance rating (min)				Fire-resistance rating (min)			
	30	60	90	120	30	60	90	120
140								
191								
241								
292								
343								
394								
445								
495	1.00	1.00	1.00	0.94				
546	1.00	1.00	1.00	0.98	1.00	1.00	1.00	1.00
597	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
648	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
699	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
749	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
803	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
854	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
905	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
956	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 006	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 057	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 108	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 159	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 210	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 260	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 311	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 362	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 413	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 464	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 514	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 565	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 619	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 670	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 721	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 772	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 822	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 873	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 924	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1 975	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2 026	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2 076	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2 127	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2 178	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2 229	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2 280	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2 330	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2 384	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2 435	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Notes:

1. The tabulated design load ratios represent the maximum M_f / M_r ratio to meet fire-resistance requirements.
2. Final design shall include a complete analysis including the verification of the factored shear and bearing resistances and a consideration for live load and total load deflections.
3. The tabulated values are based on dry service conditions, standard-term duration of load, and on a flexural member exposed on three sides.
4. The beam shall be laterally supported at points of bearing and along all compression edges.

Columns – Selection Tables

Columns – Factored Compressive Resistances

Column width – 137 mm

L (m)	137 P_{rx} (kN)	137 P_{ry} (kN)	191 P_{rx} (kN)	191 P_{ry} (kN)	241 P_{rx} (kN)	241 P_{ry} (kN)	292 P_{rx} (kN)	292 P_{ry} (kN)
2.0	390	390	627	542	805	668	971	794
2.5	324	324	563	442	751	547	922	651
3.0	257	257	495	350	693	434	872	519
3.5	199	199	428	273	632	339	819	407
4.0	154	154	364	211	570	264	763	317
4.5	119	119	306	164	508	205	706	247
5.0	93	93	256	128	448	161	647	194
5.5	73	73	214	102	393	128	589	154
6.0	59	59	179	81	343	102	533	123
6.5	47	47	150	66	299	83	480	100
7.0			126		260		431	
7.5			107		226		386	
8.0			91		197		345	
8.5			78		172		308	
9.0			67		150		275	
9.5			58		132		245	
10.0					116		219	
10.5					102		196	
11.0					91		176	
11.5					81		158	
12.0					72		143	
12.5							129	
13.0							117	
13.5							106	
14.0							96	
14.5							88	
15.0								
15.5								

Notes:
1. Final design shall include a complete analysis including the verification of the factored bearing resistance and fire-resistance requirements.
2. The tabulated values are based on dry service conditions, standard-term duration of load, and on simply axially loaded columns subjected to concentric end loads (no eccentricity). P_{rx} and P_{ry} are the factored compressive resistance parallel to grain about the X-X (strong) axis and the Y-Y (weak) axis, respectively.
3. For L ≤ 2.0 m, use P_r for L = 2.0 m.
4. L = unsupported length.

Columns – Factored Compressive Resistances (continued)

Column width – 184 mm

L (m)	Depth (mm)							
	184		241		292		343	
	P_{rx} (kN)	P_{ry} (kN)	P_{rx} (kN)	P_{ry} (kN)	P_{rx} (kN)	P_{ry} (kN)	P_{rx} (kN)	P_{ry} (kN)
2.0	778	778	1 042	987	1 257	1 170	1 460	1 348
2.5	695	695	974	884	1 194	1 049	1 399	1 211
3.0	608	608	901	775	1 130	922	1 340	1 066
3.5	521	521	823	667	1 063	795	1 280	921
4.0	440	440	744	565	993	675	1 218	783
4.5	368	368	665	474	919	567	1 152	659
5.0	306	306	588	395	845	474	1 084	552
5.5	254	254	517	329	771	395	1 015	461
6.0	212	212	453	274	700	330	945	385
6.5	177	177	395	229	631	276	875	323
7.0	148	148	344	193	568	232	807	272
7.5	125	125	300	163	509	196	741	230
8.0	106	106	261	138	455	167	679	195
8.5	91	91	228	118	407	143	620	167
9.0	78	78	200	102	364	123	566	144
9.5			176		326		515	
10.0			155		291		469	
10.5			137		261		427	
11.0			121		235		389	
11.5			108		211		354	
12.0			96		190		323	
12.5					172		295	
13.0					156		269	
13.5					141		246	
14.0					128		225	
14.5					117		207	
15.0							190	
15.5							175	

Notes:

1. Final design shall include a complete analysis including the verification of the factored bearing resistance and fire-resistance requirements.
2. The tabulated values are based on dry service conditions, standard-term duration of load, and on simply axially loaded columns subjected to concentric end loads (no eccentricity). P_{rx} and P_{ry} are the factored compressive resistance parallel to grain about the X-X (strong) axis and the Y-Y (weak) axis, respectively.
3. For L ≤ 2.0 m, use P_r for L = 2.0 m.
4. L = unsupported length.

Columns – Factored Compressive Resistances (continued)

Column width – 215 mm

L (m)	Depth (mm) 215		292		343		394	
	P_{rx} (kN)	P_{ry} (kN)	P_{rx} (kN)	P_{ry} (kN)	P_{rx} (kN)	P_{ry} (kN)	P_{rx} (kN)	P_{ry} (kN)
2.0	1 062	1 062	1 440	1 389	1 673	1 600	1 897	1 807
2.5	978	978	1 369	1 281	1 603	1 477	1 827	1 670
3.0	888	888	1 296	1 166	1 536	1 346	1 762	1 523
3.5	794	794	1 220	1 046	1 468	1 209	1 698	1 370
4.0	700	700	1 140	925	1 397	1 071	1 634	1 215
4.5	610	610	1 057	809	1 323	938	1 567	1 066
5.0	527	527	973	701	1 246	814	1 497	926
5.5	453	453	889	604	1 167	703	1 425	800
6.0	388	388	807	519	1 087	604	1 351	689
6.5	332	332	729	445	1 008	519	1 276	592
7.0	285	285	656	382	930	446	1 200	509
7.5	244	244	589	329	856	384	1 124	439
8.0	211	211	528	283	784	331	1 050	379
8.5	182	182	472	245	717	287	978	328
9.0	158	158	422	213	655	249	909	286
9.5	138	138	378	186	597	218	842	249
10.0	121	121	339	163	544	191	780	219
10.5	106	106	304	143	495	168	721	192
11.0			273		451		666	
11.5			246		411		615	
12.0			221		375		567	
12.5			200		342		523	
13.0			181		313		483	
13.5			164		286		446	
14.0			150		262		412	
14.5			136		241		381	
15.0					221		353	
15.5					204		327	

Notes:

1. Final design shall include a complete analysis including the verification of the factored bearing resistance and fire-resistance requirements.
2. The tabulated values are based on dry service conditions, standard-term duration of load, and on simply axially loaded columns subjected to concentric end loads (no eccentricity). P_{rx} and P_{ry} are the factored compressive resistance parallel to grain about the X-X (strong) axis and the Y-Y (weak) axis, respectively.
3. For L ≤ 2.0 m, use P_r for L = 2.0 m.
4. L = unsupported length.

Columns – Factored Compressive Resistances (continued)

Column width – 241 mm

L (m)	Depth (mm) 241 P_{rx} (kN)	241 P_{ry} (kN)	292 P_{rx} (kN)	292 P_{ry} (kN)	343 P_{rx} (kN)	343 P_{ry} (kN)	394 P_{rx} (kN)	394 P_{ry} (kN)
2.0	1 320	1 320	1 591	1 562	1 848	1 798	2 095	2 030
2.5	1 235	1 235	1 513	1 462	1 772	1 684	2 018	1 903
3.0	1 144	1 144	1 433	1 356	1 698	1 564	1 947	1 768
3.5	1 048	1 048	1 350	1 244	1 623	1 436	1 877	1 626
4.0	949	949	1 262	1 128	1 545	1 304	1 806	1 478
4.5	850	850	1 171	1 012	1 464	1 172	1 733	1 329
5.0	754	754	1 078	900	1 380	1 043	1 656	1 185
5.5	665	665	986	794	1 293	922	1 577	1 049
6.0	583	583	896	698	1 206	811	1 496	923
6.5	509	509	810	610	1 118	711	1 413	810
7.0	444	444	730	533	1 033	622	1 330	709
7.5	388	388	655	466	951	543	1 247	620
8.0	339	339	588	407	872	475	1 166	543
8.5	296	296	526	357	798	417	1 086	476
9.0	260	260	471	313	729	366	1 010	418
9.5	228	228	422	275	665	322	937	368
10.0	201	201	378	243	606	284	867	325
10.5	178	178	339	215	552	252	802	288
11.0	158	158	305	191	503	224	741	256
11.5	141	141	274	170	459	199	685	228
12.0	126	126	248	152	419	178	632	204
12.5			224		382		584	
13.0			203		350		539	
13.5			184		320		498	
14.0			167		293		460	
14.5			153		269		426	
15.0					247		394	
15.5					228		365	

Notes:

1. Final design shall include a complete analysis including the verification of the factored bearing resistance and fire-resistance requirements.
2. The tabulated values are based on dry service conditions, standard-term duration of load, and on simply axially loaded columns subjected to concentric end loads (no eccentricity). P_{rx} and P_{ry} are the factored compressive resistance parallel to grain about the X-X (strong) axis and the Y-Y (weak) axis, respectively.
3. For L ≤ 2.0 m, use P_r for L = 2.0 m.
4. L = unsupported length.

Columns – Factored Compressive Resistances (continued)

Column width – 292 mm

L (m)	Depth (mm)							
	292		343		394		445	
	P_{rx} (kN)	P_{ry} (kN)	P_{rx} (kN)	P_{ry} (kN)	P_{rx} (kN)	P_{ry} (kN)	P_{rx} (kN)	P_{ry} (kN)
2.0	1 881	1 881	2 184	2 165	2 477	2 444	2 762	2 717
2.5	1 790	1 790	2 095	2 061	2 386	2 327	2 667	2 588
3.0	1 697	1 697	2 009	1 955	2 302	2 208	2 583	2 458
3.5	1 600	1 600	1 921	1 844	2 220	2 084	2 504	2 321
4.0	1 497	1 497	1 831	1 728	2 138	1 954	2 426	2 178
4.5	1 391	1 391	1 736	1 607	2 052	1 819	2 347	2 028
5.0	1 283	1 283	1 637	1 483	1 963	1 680	2 265	1 875
5.5	1 174	1 174	1 536	1 359	1 871	1 542	2 181	1 722
6.0	1 069	1 069	1 434	1 239	1 776	1 406	2 094	1 572
6.5	968	968	1 332	1 123	1 679	1 276	2 005	1 428
7.0	873	873	1 231	1 014	1 582	1 153	1 913	1 291
7.5	785	785	1 135	912	1 485	1 039	1 821	1 164
8.0	704	704	1 042	820	1 389	934	1 727	1 047
8.5	631	631	954	735	1 296	839	1 634	941
9.0	566	566	873	659	1 206	752	1 543	845
9.5	507	507	797	591	1 120	675	1 452	759
10.0	455	455	727	531	1 038	606	1 365	682
10.5	408	408	663	477	961	545	1 280	613
11.0	367	367	605	429	889	491	1 199	552
11.5	331	331	552	387	821	442	1 122	498
12.0	298	298	504	349	759	400	1 048	450
12.5	270	270	460	316	701	362	979	407
13.0	245	245	421	286	648	328	914	369
13.5	222	222	386	260	599	298	853	336
14.0	202	202	354	237	554	271	796	306
14.5	184	184	325	216	512	247	742	279
15.0			298		474		693	
15.5			275		440		647	

Notes:

1. Final design shall include a complete analysis including the verification of the factored bearing resistance and fire-resistance requirements.
2. The tabulated values are based on dry service conditions, standard-term duration of load, and on simply axially loaded columns subjected to concentric end loads (no eccentricity). P_{rx} and P_{ry} are the factored compressive resistance parallel to grain about the X-X (strong) axis and the Y-Y (weak) axis, respectively.
3. For L ≤ 2.0 m, use P_r for L = 2.0 m.
4. L = unsupported length.

Columns – Factored Compressive Resistances (continued)

Column width – 346 mm

L (m)	Depth (mm) 346 P_{rx} (kN)	346 P_{ry} (kN)	394 P_{rx} (kN)	394 P_{ry} (kN)	445 P_{rx} (kN)	445 P_{ry} (kN)	495 P_{rx} (kN)	495 P_{ry} (kN)
2.0	2 553	2 553	2 871	2 859	3 201	3 179	3 518	3 488
2.5	2 450	2 450	2 767	2 744	3 092	3 052	3 404	3 349
3.0	2 351	2 351	2 670	2 634	2 996	2 931	3 305	3 217
3.5	2 251	2 251	2 576	2 523	2 904	2 808	3 214	3 083
4.0	2 148	2 148	2 481	2 409	2 814	2 682	3 127	2 945
4.5	2 040	2 040	2 383	2 289	2 724	2 549	3 040	2 802
5.0	1 928	1 928	2 281	2 164	2 630	2 412	2 953	2 652
5.5	1 812	1 812	2 176	2 036	2 534	2 271	2 863	2 498
6.0	1 695	1 695	2 067	1 906	2 434	2 127	2 771	2 341
6.5	1 578	1 578	1 956	1 775	2 332	1 983	2 677	2 184
7.0	1 463	1 463	1 844	1 647	2 227	1 840	2 580	2 028
7.5	1 350	1 350	1 732	1 522	2 121	1 702	2 480	1 877
8.0	1 243	1 243	1 622	1 402	2 013	1 569	2 379	1 731
8.5	1 141	1 141	1 514	1 288	1 907	1 442	2 276	1 592
9.0	1 045	1 045	1 410	1 181	1 801	1 323	2 173	1 461
9.5	956	956	1 311	1 081	1 697	1 212	2 070	1 339
10.0	874	874	1 216	988	1 596	1 109	1 968	1 226
10.5	799	799	1 126	904	1 498	1 014	1 867	1 122
11.0	729	729	1 043	826	1 404	927	1 769	1 026
11.5	666	666	964	755	1 314	848	1 673	939
12.0	609	609	891	690	1 229	776	1 581	859
12.5	557	557	824	632	1 149	710	1 492	787
13.0	510	510	762	579	1 073	651	1 406	721
13.5	468	468	705	531	1 002	597	1 325	662
14.0	429	429	652	487	935	548	1 247	608
14.5	394	394	604	448	873	504	1 174	559
15.0	363	363	559	412	815	464	1 104	515
15.5	334	334	518	380	761	428	1 039	475

Notes:

1. Final design shall include a complete analysis including the verification of the factored bearing resistance and fire-resistance requirements.
2. The tabulated values are based on dry service conditions, standard-term duration of load, and on simply axially loaded columns subjected to concentric end loads (no eccentricity). P_{rx} and P_{ry} are the factored compressive resistance parallel to grain about the X-X (strong) axis and the Y-Y (weak) axis, respectively.
3. For L ≤ 2.0 m, use P_r for L = 2.0 m.
4. L = unsupported length.

Columns – Factored Compressive Resistances (continued)

Column width – 395 mm

L (m)	Depth (mm) 395		445		495		546	
	P_{rx} (kN)	P_{ry} (kN)	P_{rx} (kN)	P_{ry} (kN)	P_{rx} (kN)	P_{ry} (kN)	P_{rx} (kN)	P_{ry} (kN)
2.0	3 230	3 230	3 593	3 583	3 948	3 931	4 305	4 282
2.5	3 113	3 113	3 471	3 454	3 820	3 790	4 170	4 128
3.0	3 005	3 005	3 363	3 335	3 710	3 660	4 055	3 987
3.5	2 900	2 900	3 261	3 219	3 608	3 534	3 952	3 851
4.0	2 795	2 795	3 161	3 103	3 510	3 407	3 855	3 713
4.5	2 686	2 686	3 059	2 983	3 414	3 276	3 761	3 572
5.0	2 573	2 573	2 956	2 859	3 317	3 141	3 668	3 425
5.5	2 455	2 455	2 848	2 730	3 217	3 000	3 574	3 273
6.0	2 335	2 335	2 738	2 597	3 115	2 855	3 479	3 116
6.5	2 211	2 211	2 624	2 461	3 010	2 707	3 381	2 956
7.0	2 087	2 087	2 507	2 323	2 902	2 558	3 280	2 794
7.5	1 962	1 962	2 389	2 186	2 791	2 408	3 177	2 631
8.0	1 839	1 839	2 269	2 050	2 678	2 259	3 072	2 470
8.5	1 719	1 719	2 150	1 917	2 564	2 114	2 964	2 313
9.0	1 602	1 602	2 032	1 788	2 449	1 973	2 855	2 159
9.5	1 490	1 490	1 916	1 665	2 334	1 837	2 744	2 012
10.0	1 384	1 384	1 803	1 547	2 220	1 708	2 633	1 871
10.5	1 283	1 283	1 693	1 435	2 108	1 585	2 523	1 737
11.0	1 189	1 189	1 588	1 330	1 998	1 470	2 413	1 612
11.5	1 100	1 100	1 487	1 231	1 891	1 362	2 304	1 494
12.0	1 018	1 018	1 392	1 140	1 787	1 261	2 197	1 384
12.5	942	942	1 301	1 055	1 687	1 167	2 092	1 282
13.0	871	871	1 216	976	1 592	1 081	1 990	1 187
13.5	806	806	1 136	904	1 500	1 001	1 891	1 099
14.0	746	746	1 061	837	1 413	927	1 795	1 019
14.5	691	691	991	775	1 330	859	1 703	944
15.0	641	641	925	719	1 252	797	1 615	876
15.5	594	594	864	667	1 178	740	1 531	813

Notes:

1. Final design shall include a complete analysis including the verification of the factored bearing resistance and fire-resistance requirements.
2. The tabulated values are based on dry service conditions, standard-term duration of load, and on simply axially loaded columns subjected to concentric end loads (no eccentricity). P_{rx} and P_{ry} are the factored compressive resistance parallel to grain about the X-X (strong) axis and the Y-Y (weak) axis, respectively.
3. For L ≤ 2.0 m, use P_r for L = 2.0 m.
4. L = unsupported length.

Columns – Factored Compressive Resistances (continued)

Column width – 448 mm

L (m)	Depth (mm)							
	448		495		546		597	
	P_{rx} (kN)	P_{ry} (kN)	P_{rx} (kN)	P_{ry} (kN)	P_{rx} (kN)	P_{ry} (kN)	P_{rx} (kN)	P_{ry} (kN)
2.0	4 033	4 033	4 406	4 399	4 804	4 791	5 196	5 179
2.5	3 897	3 897	4 263	4 251	4 653	4 630	5 036	5 005
3.0	3 777	3 777	4 140	4 120	4 525	4 488	4 903	4 852
3.5	3 664	3 664	4 027	3 997	4 410	4 355	4 785	4 708
4.0	3 553	3 553	3 919	3 877	4 303	4 224	4 677	4 568
4.5	3 441	3 441	3 812	3 756	4 199	4 093	4 573	4 427
5.0	3 327	3 327	3 704	3 632	4 096	3 959	4 473	4 283
5.5	3 209	3 209	3 594	3 504	3 992	3 821	4 373	4 134
6.0	3 087	3 087	3 481	3 372	3 886	3 678	4 273	3 981
6.5	2 961	2 961	3 364	3 236	3 778	3 531	4 171	3 823
7.0	2 833	2 833	3 245	3 097	3 667	3 380	4 066	3 661
7.5	2 702	2 702	3 122	2 955	3 552	3 227	3 960	3 496
8.0	2 570	2 570	2 997	2 812	3 436	3 072	3 851	3 329
8.5	2 438	2 438	2 871	2 669	3 316	2 916	3 739	3 162
9.0	2 307	2 307	2 743	2 526	3 195	2 762	3 625	2 996
9.5	2 178	2 178	2 616	2 386	3 073	2 610	3 509	2 832
10.0	2 052	2 052	2 490	2 249	2 950	2 461	3 391	2 671
10.5	1 930	1 930	2 365	2 116	2 827	2 317	3 273	2 515
11.0	1 812	1 812	2 243	1 988	2 705	2 177	3 154	2 365
11.5	1 699	1 699	2 124	1 865	2 584	2 043	3 035	2 220
12.0	1 592	1 592	2 008	1 748	2 465	1 916	2 916	2 082
12.5	1 490	1 490	1 897	1 636	2 349	1 794	2 799	1 951
13.0	1 394	1 394	1 790	1 531	2 235	1 680	2 683	1 827
13.5	1 303	1 303	1 688	1 432	2 125	1 572	2 569	1 710
14.0	1 218	1 218	1 590	1 339	2 019	1 470	2 458	1 600
14.5	1 139	1 139	1 498	1 252	1 916	1 375	2 349	1 497
15.0	1 064	1 064	1 410	1 171	1 817	1 286	2 243	1 400
15.5	995	995	1 328	1 095	1 723	1 203	2 140	1 310

Notes:

1. Final design shall include a complete analysis including the verification of the factored bearing resistance and fire-resistance requirements.
2. The tabulated values are based on dry service conditions, standard-term duration of load, and on simply axially loaded columns subjected to concentric end loads (no eccentricity). P_{rx} and P_{ry} are the factored compressive resistance parallel to grain about the X-X (strong) axis and the Y-Y (weak) axis, respectively.
3. For L ≤ 2.0 m, use P_r for L = 2.0 m.
4. L = unsupported length.

Columns – Factored Compressive Resistances (continued)

Column width – 502 mm

L (m)	502		546		597		648	
	P_{rx} (kN)	P_{ry} (kN)	P_{rx} (kN)	P_{ry} (kN)	P_{rx} (kN)	P_{ry} (kN)	P_{rx} (kN)	P_{ry} (kN)
2.0	4 925	4 925	5 304	5 299	5 737	5 727	6 164	6 151
2.5	4 767	4 767	5 138	5 129	5 561	5 544	5 978	5 954
3.0	4 631	4 631	4 997	4 982	5 414	5 386	5 824	5 785
3.5	4 506	4 506	4 870	4 849	5 284	5 242	5 690	5 631
4.0	4 388	4 388	4 752	4 722	5 165	5 105	5 568	5 484
4.5	4 271	4 271	4 638	4 597	5 051	4 970	5 454	5 340
5.0	4 153	4 153	4 525	4 471	4 941	4 835	5 345	5 195
5.5	4 034	4 034	4 411	4 343	4 831	4 698	5 238	5 049
6.0	3 911	3 911	4 295	4 212	4 721	4 557	5 132	4 898
6.5	3 785	3 785	4 176	4 077	4 609	4 411	5 025	4 743
7.0	3 655	3 655	4 054	3 938	4 495	4 262	4 916	4 584
7.5	3 522	3 522	3 929	3 796	4 378	4 109	4 806	4 420
8.0	3 386	3 386	3 801	3 650	4 258	3 953	4 693	4 253
8.5	3 249	3 249	3 671	3 503	4 136	3 795	4 578	4 084
9.0	3 110	3 110	3 538	3 354	4 011	3 635	4 461	3 913
9.5	2 971	2 971	3 404	3 205	3 884	3 474	4 341	3 742
10.0	2 832	2 832	3 269	3 057	3 755	3 315	4 219	3 571
10.5	2 695	2 695	3 134	2 910	3 625	3 156	4 095	3 401
11.0	2 560	2 560	3 000	2 765	3 495	3 001	3 970	3 234
11.5	2 429	2 429	2 867	2 624	3 364	2 848	3 844	3 071
12.0	2 301	2 301	2 736	2 486	3 234	2 700	3 717	2 912
12.5	2 177	2 177	2 608	2 353	3 105	2 556	3 590	2 758
13.0	2 057	2 057	2 483	2 225	2 977	2 417	3 464	2 609
13.5	1 943	1 943	2 361	2 102	2 852	2 284	3 338	2 466
14.0	1 834	1 834	2 244	1 984	2 729	2 157	3 214	2 329
14.5	1 730	1 730	2 130	1 872	2 609	2 036	3 091	2 199
15.0	1 631	1 631	2 022	1 765	2 493	1 921	2 970	2 075
15.5	1 537	1 537	1 917	1 664	2 379	1 811	2 852	1 957

Depth (mm)

Notes:

1. Final design shall include a complete analysis including the verification of the factored bearing resistance and fire-resistance requirements.
2. The tabulated values are based on dry service conditions, standard-term duration of load, and on simply axially loaded columns subjected to concentric end loads (no eccentricity). P_{rx} and P_{ry} are the factored compressive resistance parallel to grain about the X-X (strong) axis and the Y-Y (weak) axis, respectively.
3. For L ≤ 2.0 m, use P_r for L = 2.0 m.
4. L = unsupported length.

Columns – Factored Compressive Resistances (continued)

Column width – 552 mm

L (m)	Depth (mm) 552 P_{rx} (kN)	552 P_{ry} (kN)	597 P_{rx} (kN)	597 P_{ry} (kN)	648 P_{rx} (kN)	648 P_{ry} (kN)	699 P_{rx} (kN)	699 P_{ry} (kN)
2.0	5 816	5 816	6 231	6 227	6 695	6 687	7 154	7 143
2.5	5 635	5 635	6 040	6 033	6 493	6 479	6 940	6 921
3.0	5 481	5 481	5 880	5 869	6 326	6 303	6 765	6 733
3.5	5 344	5 344	5 740	5 722	6 180	6 146	6 614	6 566
4.0	5 216	5 216	5 611	5 585	6 048	6 000	6 479	6 410
4.5	5 093	5 093	5 488	5 454	5 925	5 859	6 354	6 260
5.0	4 971	4 971	5 368	5 324	5 807	5 720	6 235	6 112
5.5	4 848	4 848	5 250	5 193	5 691	5 580	6 121	5 963
6.0	4 724	4 724	5 131	5 061	5 576	5 439	6 008	5 813
6.5	4 597	4 597	5 010	4 925	5 461	5 294	5 896	5 659
7.0	4 467	4 467	4 887	4 786	5 344	5 146	5 784	5 501
7.5	4 333	4 333	4 761	4 644	5 225	4 993	5 670	5 340
8.0	4 196	4 196	4 632	4 498	5 103	4 838	5 555	5 174
8.5	4 056	4 056	4 499	4 349	4 979	4 678	5 438	5 005
9.0	3 914	3 914	4 365	4 198	4 852	4 517	5 318	4 833
9.5	3 770	3 770	4 227	4 044	4 723	4 353	5 196	4 658
10.0	3 624	3 624	4 088	3 889	4 591	4 187	5 071	4 483
10.5	3 479	3 479	3 948	3 734	4 458	4 022	4 944	4 306
11.0	3 334	3 334	3 807	3 580	4 322	3 856	4 816	4 130
11.5	3 191	3 191	3 666	3 427	4 186	3 692	4 685	3 956
12.0	3 049	3 049	3 525	3 275	4 049	3 530	4 554	3 783
12.5	2 910	2 910	3 385	3 127	3 912	3 371	4 421	3 613
13.0	2 773	2 773	3 247	2 981	3 775	3 215	4 288	3 447
13.5	2 641	2 641	3 111	2 839	3 639	3 063	4 154	3 285
14.0	2 513	2 513	2 978	2 702	3 505	2 915	4 021	3 128
14.5	2 388	2 388	2 848	2 569	3 372	2 773	3 888	2 975
15.0	2 269	2 269	2 722	2 441	3 241	2 635	3 757	2 828
15.5	2 154	2 154	2 599	2 318	3 113	2 503	3 627	2 687

Notes:

1. Final design shall include a complete analysis including the verification of the factored bearing resistance and fire-resistance requirements.
2. The tabulated values are based on dry service conditions, standard-term duration of load, and on simply axially loaded columns subjected to concentric end loads (no eccentricity). P_{rx} and P_{ry} are the factored compressive resistance parallel to grain about the X-X (strong) axis and the Y-Y (weak) axis, respectively.
3. For L ≤ 2.0 m, use P_r for L = 2.0 m.
4. L = unsupported length.

Columns – Factored Compressive Resistances (continued)

Column width – 603 mm

L (m)	Depth (mm)							
	603		648		699		749	
	P_{rx} (kN)	P_{ry} (kN)	P_{rx} (kN)	P_{ry} (kN)	P_{rx} (kN)	P_{ry} (kN)	P_{rx} (kN)	P_{ry} (kN)
2.0	6 788	6 788	7 230	7 227	7 726	7 719	8 206	8 198
2.5	6 581	6 581	7 012	7 006	7 495	7 484	7 964	7 948
3.0	6 408	6 408	6 832	6 822	7 306	7 288	7 766	7 740
3.5	6 256	6 256	6 675	6 661	7 143	7 115	7 596	7 557
4.0	6 116	6 116	6 533	6 512	6 997	6 957	7 446	7 389
4.5	5 984	5 984	6 400	6 372	6 862	6 808	7 308	7 231
5.0	5 856	5 856	6 273	6 236	6 735	6 663	7 179	7 078
5.5	5 729	5 729	6 148	6 101	6 612	6 520	7 056	6 926
6.0	5 602	5 602	6 025	5 966	6 491	6 376	6 936	6 774
6.5	5 473	5 473	5 901	5 830	6 370	6 231	6 818	6 620
7.0	5 341	5 341	5 775	5 690	6 250	6 083	6 701	6 464
7.5	5 207	5 207	5 647	5 548	6 128	5 931	6 584	6 304
8.0	5 069	5 069	5 517	5 402	6 004	5 776	6 465	6 140
8.5	4 928	4 928	5 383	5 253	5 878	5 618	6 344	5 972
9.0	4 785	4 785	5 247	5 101	5 749	5 456	6 222	5 801
9.5	4 638	4 638	5 108	4 946	5 618	5 291	6 098	5 627
10.0	4 490	4 490	4 967	4 788	5 484	5 124	5 971	5 450
10.5	4 340	4 340	4 823	4 629	5 348	4 955	5 841	5 272
11.0	4 189	4 189	4 678	4 469	5 210	4 785	5 710	5 091
11.5	4 038	4 038	4 532	4 309	5 070	4 614	5 577	4 911
12.0	3 887	3 887	4 384	4 149	4 929	4 443	5 441	4 730
12.5	3 737	3 737	4 237	3 989	4 786	4 274	5 304	4 551
13.0	3 588	3 588	4 090	3 832	4 643	4 106	5 166	4 373
13.5	3 442	3 442	3 944	3 676	4 499	3 940	5 027	4 197
14.0	3 298	3 298	3 799	3 523	4 356	3 777	4 887	4 024
14.5	3 157	3 157	3 656	3 374	4 214	3 618	4 747	3 855
15.0	3 020	3 020	3 515	3 228	4 072	3 462	4 607	3 690
15.5	2 886	2 886	3 377	3 086	3 932	3 310	4 468	3 529

Notes:

1. Final design shall include a complete analysis including the verification of the factored bearing resistance and fire-resistance requirements.
2. The tabulated values are based on dry service conditions, standard-term duration of load, and on simply axially loaded columns subjected to concentric end loads (no eccentricity). P_{rx} and P_{ry} are the factored compressive resistance parallel to grain about the X-X (strong) axis and the Y-Y (weak) axis, respectively.
3. For L ≤ 2.0 m, use P_r for L = 2.0 m.
4. L = unsupported length.

Decking – Diaphragm

Decking may be used as diaphragms in conjunction with structural wood panels. The decking substructure may be considered as blocked framing, thus, provisions given by the CSA O86:19, Clause 11, may be used for factored shear resistance.

Refer to CSA O86:19, Clause 11.6.4 for moment resistance of nailed diaphragms. Also, refer to CSA O86:19, Clauses 11.7 and 11.8 for deflection of diaphragms and seismic design considerations, respectively. Note that openings in the diaphragms alter the load path and require additional considerations.

Factored Shear Resistance, v_{rs} (kN/m)

Decking thickness	Panel thickness	Common wire nail		Factored shear resistance, v_{rs} (kN/m)			
		Diameter	Length	Nail spacing at panel edges (mm)			
(mm)	(mm)	(mm)	(mm)	150	100	75	50 [a]
38	*Consult Nordic for more information*						
44	15.5	2.52	57	3.9	5.8	7.4	9.6
54	12.5	3.25	64	5.0	7.4	9.5	12.3
	15.5	3.25	64	5.5	8.1	10.3	13.4
	18.5	3.25	64	5.9	8.8	11.2	14.5
	25.5	3.66	76	7.6	11.3	14.4	18.7
89	12.5	3.66	76	5.8	8.6	11.0	14.3
	15.5	3.66	76	6.3	9.4	11.9	15.5
	18.5	3.66	76	6.8	10.1	12.8	16.7
	25.5	3.66	76	7.6	11.3	14.4	18.7

a) Where the nail spacing at panel edges is 50 mm, the nails shall be staggered.

Notes:

1. Resistances are based on nails used in diaphragm construction (J_D = 1.3), dry service conditions, short-term duration of load, and on Canadian softwood plywood (CSP) or OSB panels.
2. Nails shall be placed not less than 9 mm from the panel edge and shall be firmly driven into decking but shall not be over-driven more than 15% of the panel thickness. In addition, a row of nails spaced 300 mm shall be installed every 600 mm spacing along the length of decking.
3. Structural panels shall not be less than 1 200 x 2 400 mm in plane dimensions, except near boundaries and changes in framing where up to two short or narrow panels may be used. A gap of not less than 2 mm shall be left between structural panels.

Decking – Design Properties and Fire Resistance

Decking – Design Properties

Bending about Y-Y axis	Thickness (mm)			
	38	44	54	89
Bending moment, M_r (kN-m/m) [(a)]	4.9	6.5	9.8	30
Longitudinal shear, V_r (kN/m)	34	40	49	117
Bending stiffness, E_sI (10^9 N-mm^2/m)	47	73	135	728

a) The factored bending moment resistance values, M_r, shall be adjusted by the lesser of size factor or lateral stability factor, K_{Zbg} or K_L, respectively, as defined in Clause 7.5.6.5.1 of CSA O86:19.

Notes:

1. Final design shall include a complete analysis including the verification of the factored bearing resistance and fire-resistance requirements.
2. The tabulated values are based on dry service conditions and standard-term duration of load.

Decking – Maximum Design Load Ratio

Fire-resistance rating (min)	Thickness (mm)			
	38	44	54	89
0	1.00	1.00	1.00	1.00
30	-	-	-	1.00
60	-	-	-	0.55
90	-	-	-	-
120	-	-	-	-

Notes:

1. The tabulated design load ratios represent the maximum M_f / M_r ratio to meet fire-resistance requirements.
2. Final design shall include a complete analysis including the verification of the factored shear and bearing resistances and a consideration for live load and total load deflections. If applicable, the final design shall include a consideration for floor vibration and the verification of a concentrated live load as defined in Article 4.1.5.9. of the 2015 NBC.
3. The tabulated values are based on dry service conditions, standard-term duration of load, and the most restrictive of simple span or multiple spans.

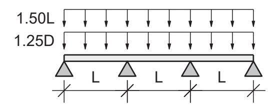
Decking – Selection Tables

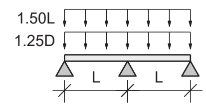
Ultimate Limit States – Factored Bending Moment and Shear Resistances

Maximum factored uniform load (kPa)

L (m)	Thickness (mm)			
	38	44	54	89
1.0				
1.2				
1.4				
1.6				
1.8	12.0			
2.0	9.70	13.0		
2.2	8.02	10.8		
2.4	6.74	9.03	13.6	
2.6	5.74	7.70	11.6	
2.8	4.95	6.64	10.0	
3.0	4.31	5.78	8.71	
3.2	3.79	5.08	7.65	
3.4	3.36	4.50	6.78	
3.6	2.99	4.02	6.05	
3.8	2.69	3.60	5.43	
4.0		3.25	4.90	
4.2		2.95	4.44	13.8
4.4		2.69	4.05	12.6
4.6			3.70	11.5
4.8			3.40	10.6

Ultimate limit states
- $M_r \geq M_f$
- $V_r \geq V_f$



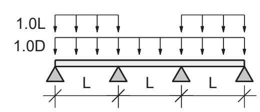


Serviceability Limit States – L/240

Maximum specified uniform total load (kPa)

L (m)	Thickness (mm)			
	38	44	54	89
1.0				
1.2	11.5			
1.4	7.27	11.2		
1.6	4.89	7.57	14.0	
1.8	3.45	5.34	9.83	
2.0	2.53	3.91	7.19	
2.2		2.96	5.42	
2.4			4.20	
2.6			3.32	
2.8			2.68	
3.0				11.5
3.2				9.49
3.4				7.93
3.6				6.71
3.8				5.73
4.0				4.93
4.2				4.28
4.4				3.74
4.6				3.30
4.8				2.91

Serviceability limit states
- $\Delta_{tot} \leq L/240$



Notes:

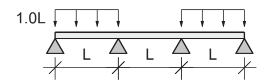
1. Final design shall include a complete analysis including the verification of the factored bending moment, shear, and bearing resistances and a consideration for live load and total load deflections. If applicable, the final design shall include a consideration for floor vibration, the verification of a concentrated live load as defined in Article 4.1.5.9. of the 2015 NBC, and fire-resistance requirements.
2. The tabulated values are based on dry service conditions, standard-term duration of load, and on multiple spans. For simple spans, multiply the maximum specified uniform loads by 0.76.

Serviceability Limit States – L/360

Maximum specified uniform live load (kPa)

L (m)	Thickness (mm)			
	38	44	54	89
1.0	13.2			
1.2	7.63	11.8		
1.4	4.80	7.46	13.8	
1.6	3.22	4.99	9.24	
1.8		3.51	6.49	
2.0		2.55	4.73	
2.2			3.55	
2.4			2.73	
2.6				
2.8				
3.0				7.55
3.2				6.22
3.4				5.19
3.6				4.37
3.8				3.72
4.0				3.18
4.2				2.75
4.4				
4.6				
4.8				

Serviceability limit states
- $\Delta_L \leq L/360$

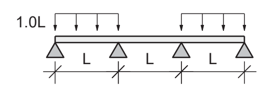


Serviceability Limit States – L/480

Maximum specified uniform live load (kPa)

L (m)	Thickness (mm)			
	38	44	54	89
1.0	9.89			
1.2	5.72	8.88		
1.4	3.61	5.59	10.3	
1.6		3.74	6.93	
1.8		2.63	4.86	
2.0			3.54	
2.2			2.66	
2.4				
2.6				
2.8				
3.0				5.66
3.2				4.67
3.4				3.89
3.6				3.27
3.8				2.78
4.0				
4.2				
4.4				
4.6				
4.8				

Serviceability limit states
- $\Delta_L \leq L/480$



Notes:

1. Final design shall include a complete analysis including the verification of the factored bending moment, shear, and bearing resistances 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 Article 4.1.5.9. of the 2015 NBC, and fire-resistance requirements.
2. The tabulated values are based on dry service conditions, standard-term duration of load, and on multiple spans. For simple spans, multiply the maximum specified uniform loads by 0.76.

NORDIC

TECHNICAL GUIDE
NORDIC LAM+

NS-GT5

ENGLISH

VERSION
2026-02-01

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 millimetres (mm), unless otherwise noted.

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

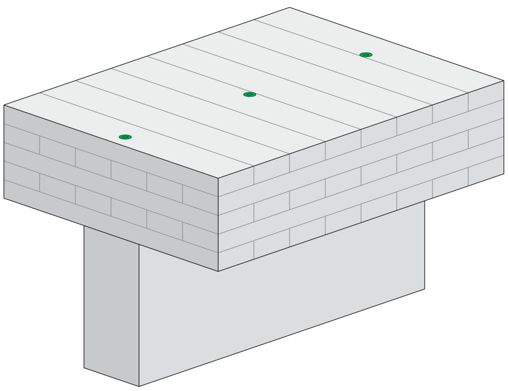
2.0 Design of Connections

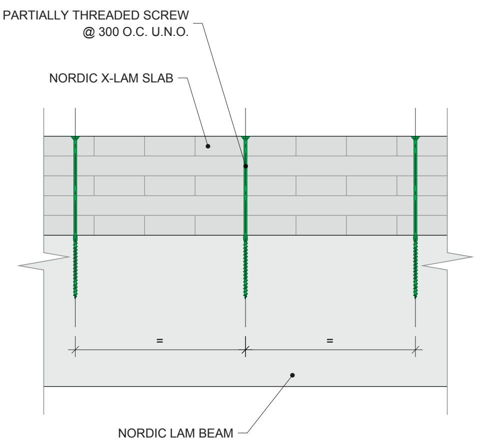
2.1 The design of connections, including fire resistance if required, shall be in accordance with CSA O86-14, Engineering design in wood.

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.

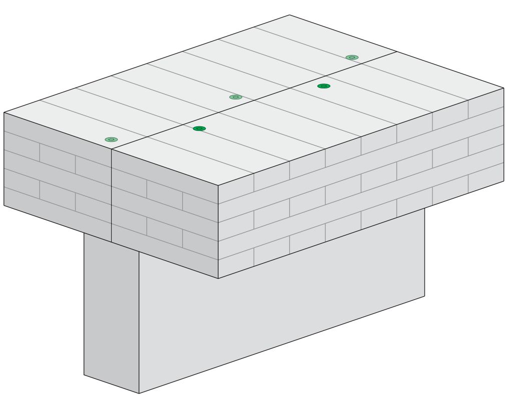
2.3 The connections shown in this document are provided for information purposes only, and conceptually. Note that many possibilities and variants are possible.

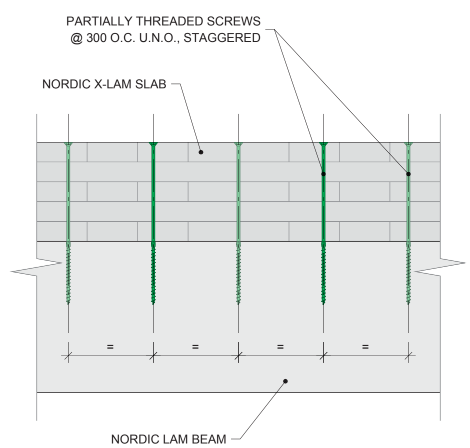
Structure, GL-CLT | Continuous Floor Slab on Beam | NS-DS2001



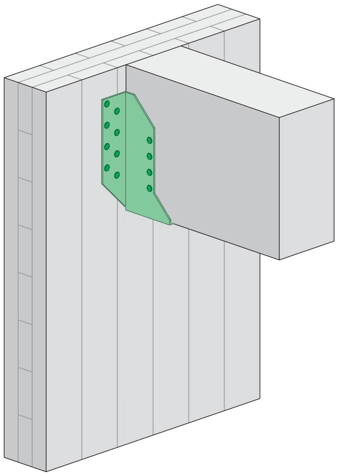


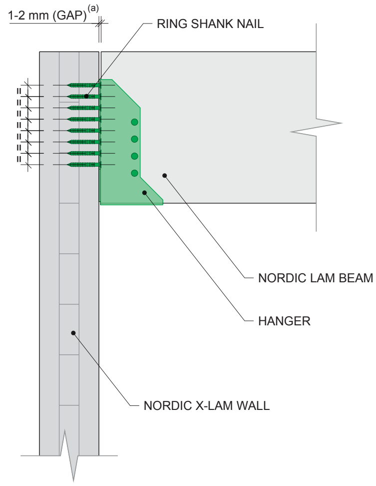
Structure, GL-CLT | Single Floor Slab on Beam | NS-DS2002





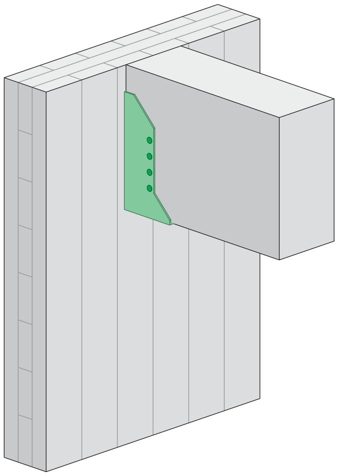
Structure, GL-CLT | Face-mount Hanger | NS-DS2003

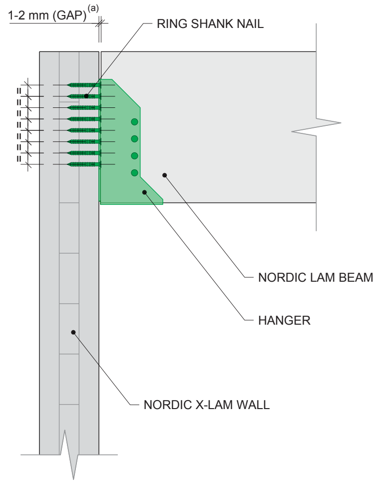




a) The 1-2 mm gap may not be required depending on the detail on the other side of the beam.

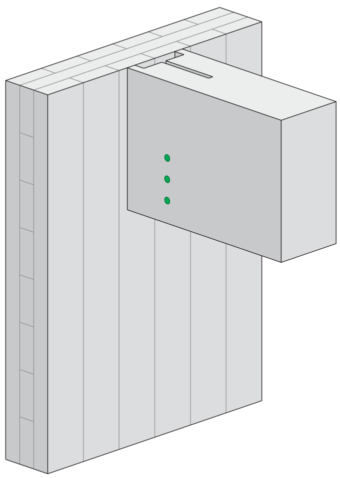
Structure, GL-CLT | Face-mount Hanger with Concealed Flanges | NS-DS2067

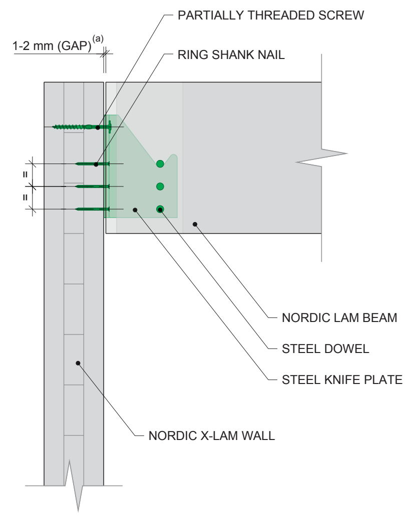




a) The 1-2 mm gap may not be required depending on the detail on the other side of the beam.

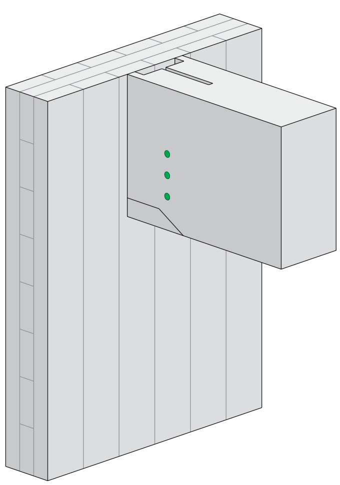
Structure, GL-CLT | Knife Plate | NS-DS2004

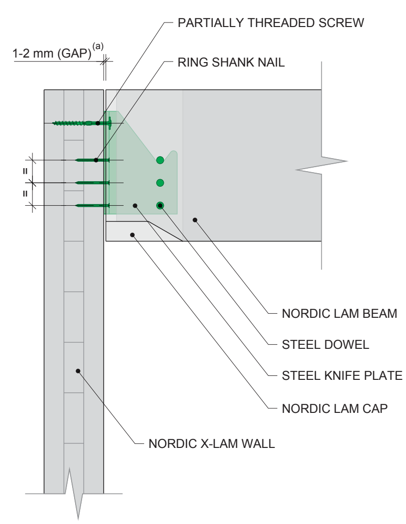




a) The 1-2 mm gap may not be required depending on the detail on the other side of the beam.

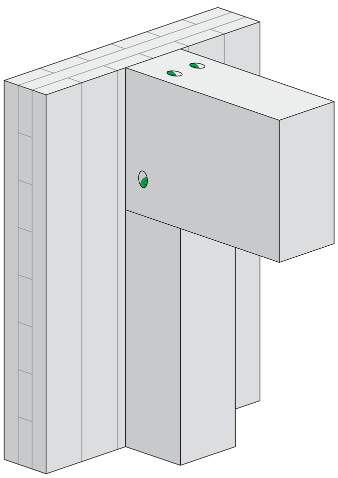
Structure, GL-CLT | Knife Plate with Cap | NS-DS2005

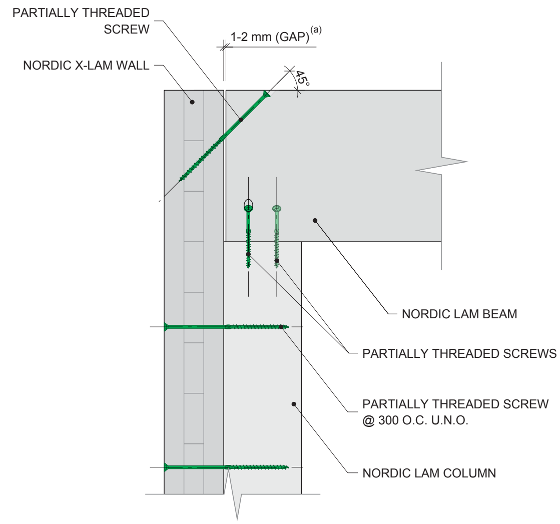




a) The 1-2 mm gap may not be required depending on the detail on the other side of the beam.

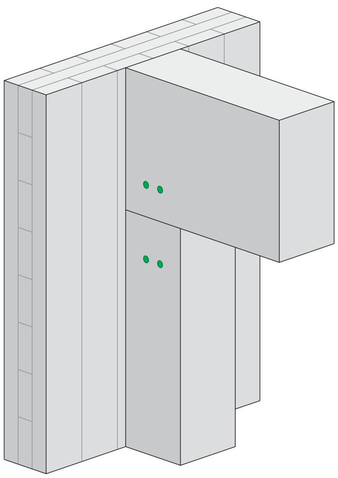
Structure, GL-CLT | Screwed Beam to Column | NS-DS2006

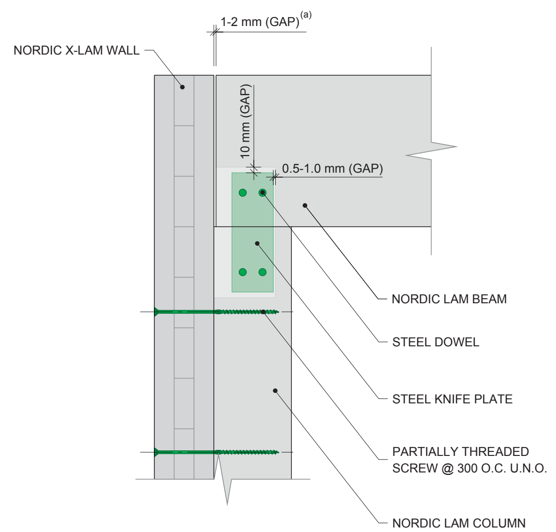




a) The 1-2 mm gap may not be required depending on the detail on the other side of the beam.

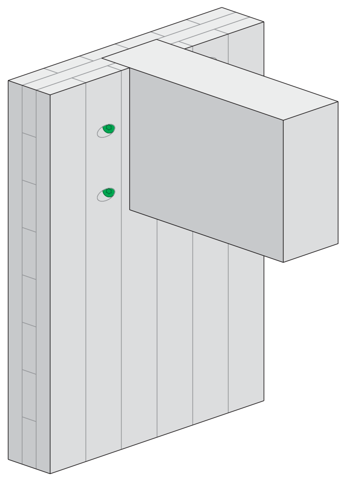
Structure, GL-CLT | Beam to Column with Knife Plate | NS-DS2007

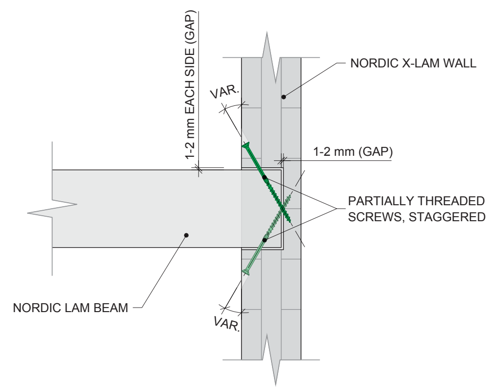




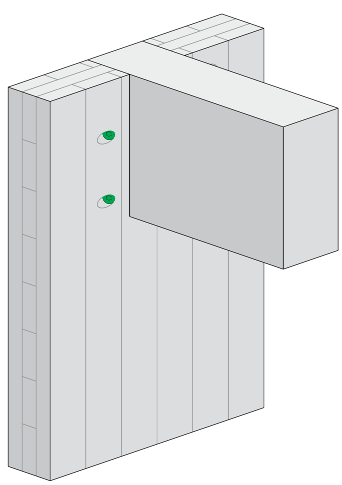
a) The 1-2 mm gap may not be required depending on the detail on the other side of the beam.

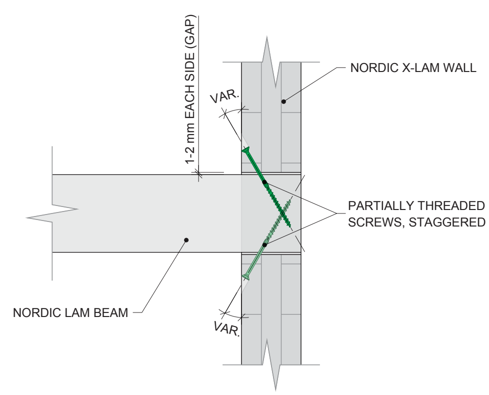
Structure, GL-CLT | Pocket for Beam | NS-DS2008



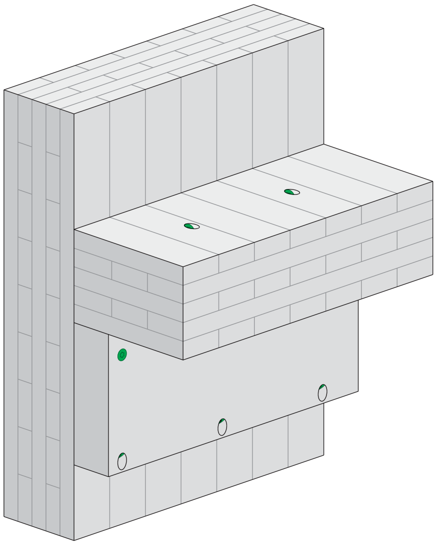


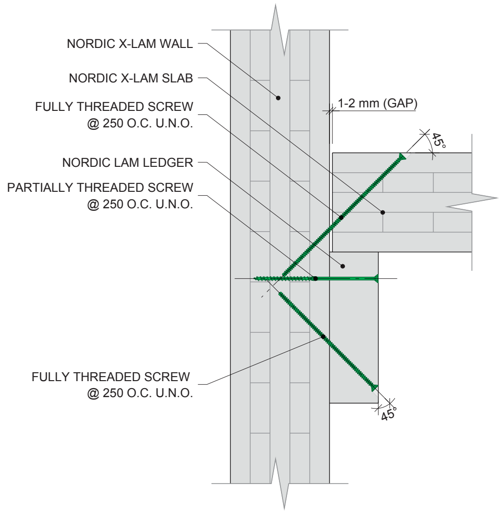
Structure, GL-CLT | Through Pocket for Beam | NS-DS2009



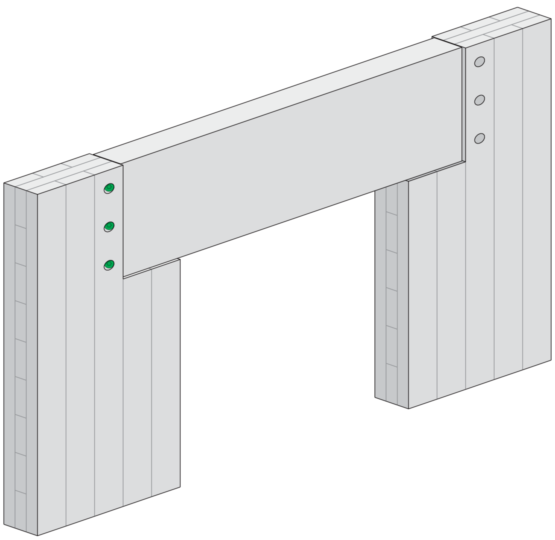


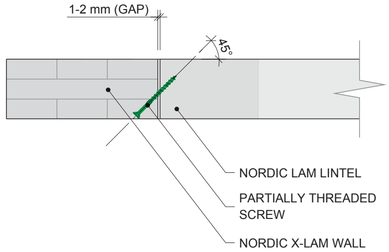
Structure, Floor/Roof-Wall | Ledger | NS-DS2018



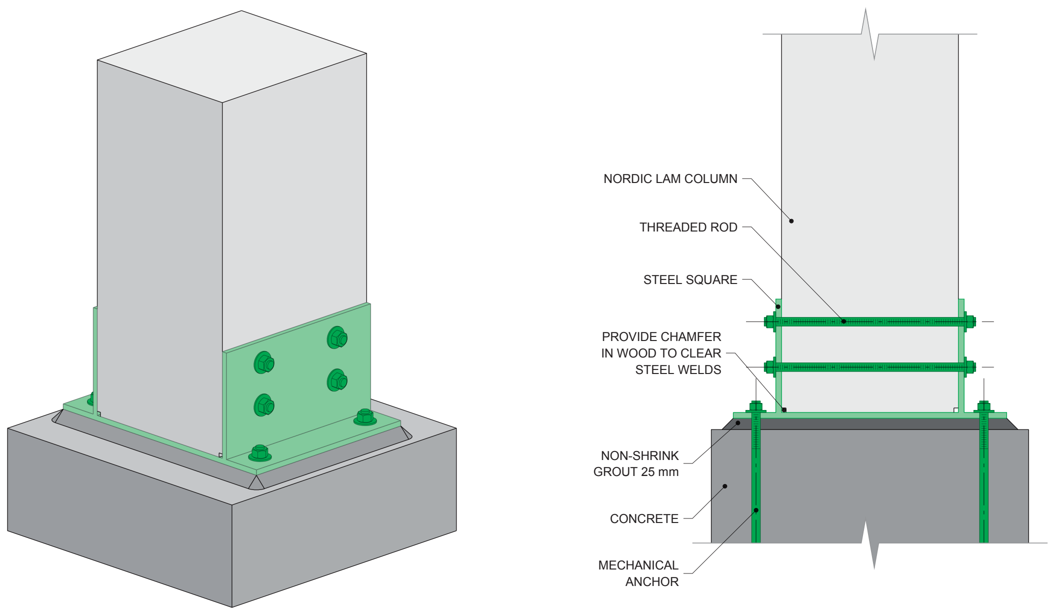


Structure, Lintel | Glulam Lintel | NS-DS2027

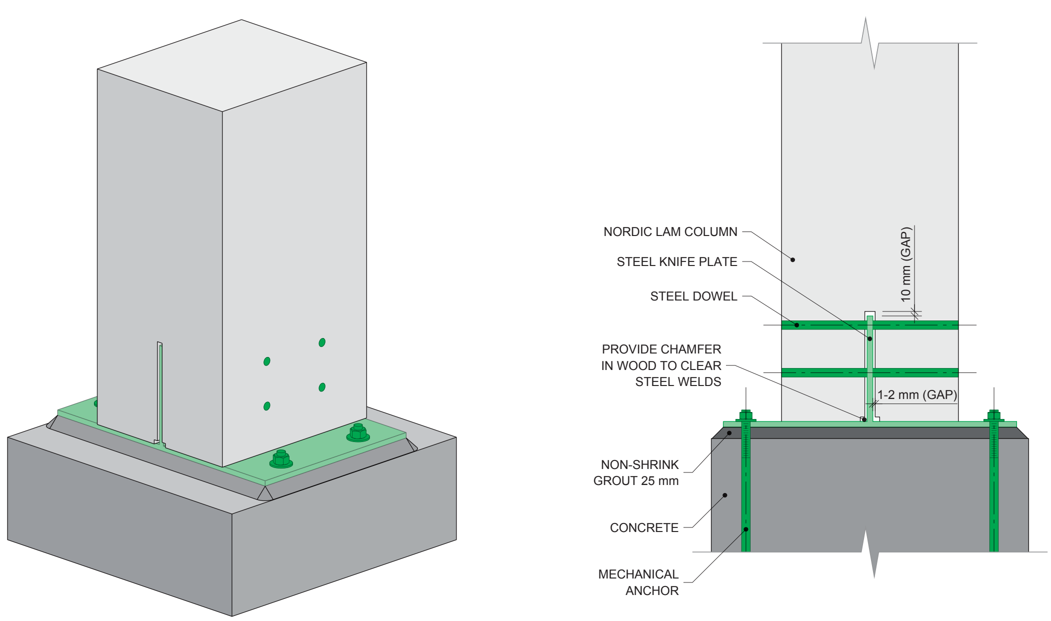




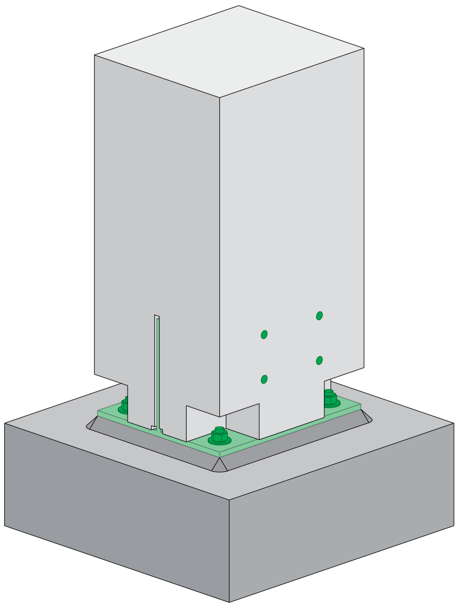
Structure, Base Plate | Base Plate with Steel Square | NS-DS2037

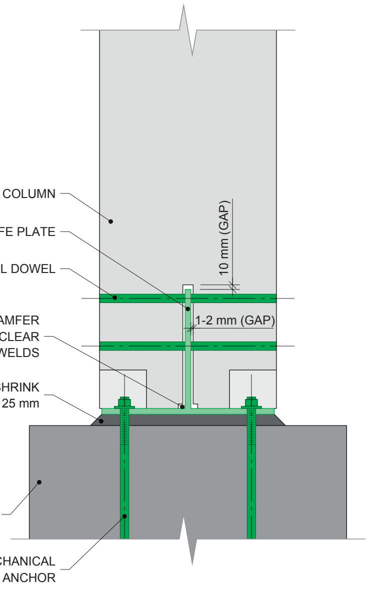


Structure, Base Plate | Base Plate with Knife Plate and Four Mechanical Anchors | NS-DS2038

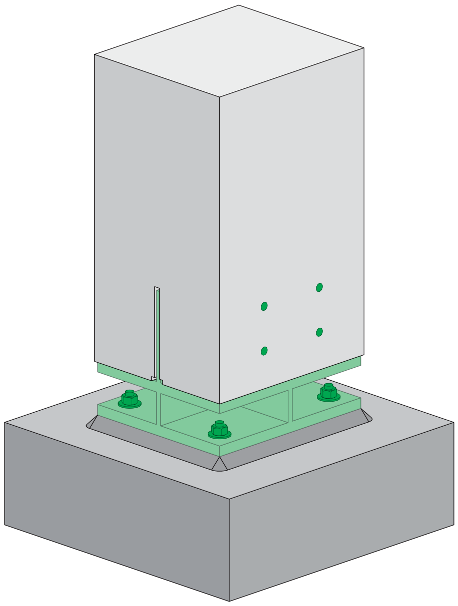


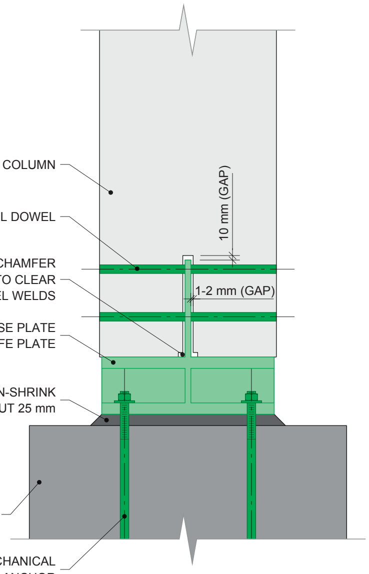
Structure, Base Plate | Base Plate with Knife Plate and Four Hidden Mechanical Anchors | NS-DS2039



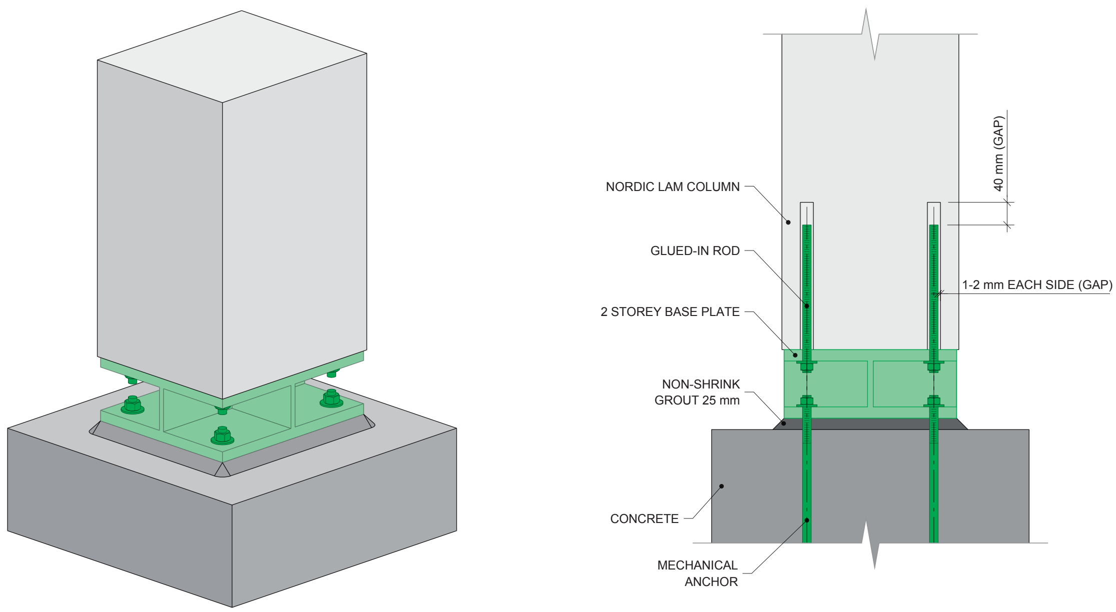


Structure, Base Plate | Two-storey Base Plate with Knife Plate | NS-DS2040

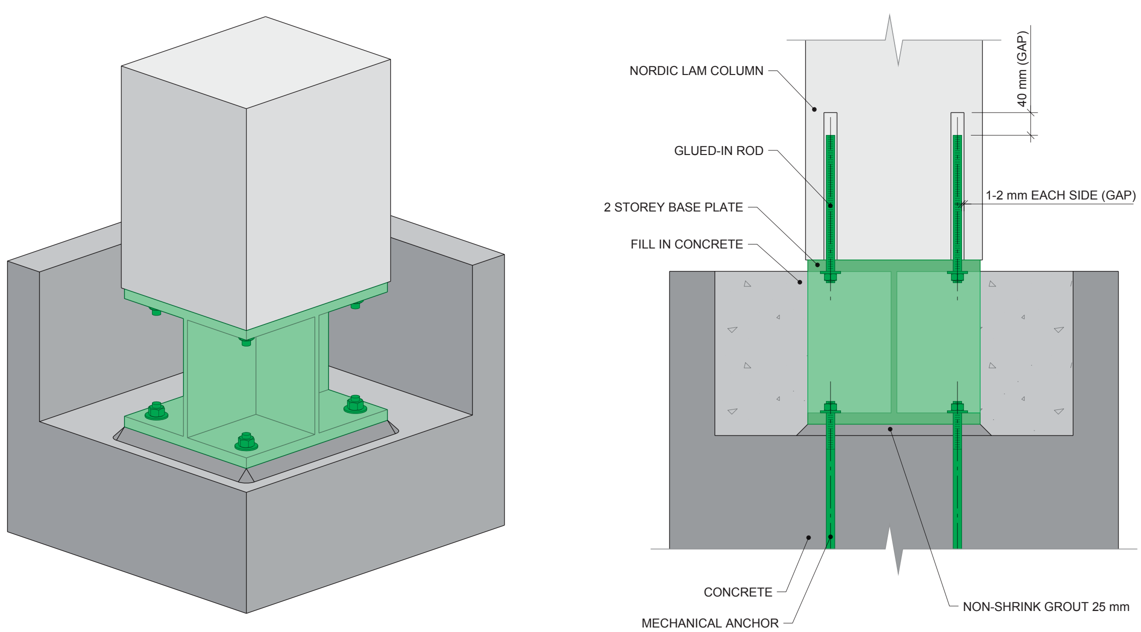




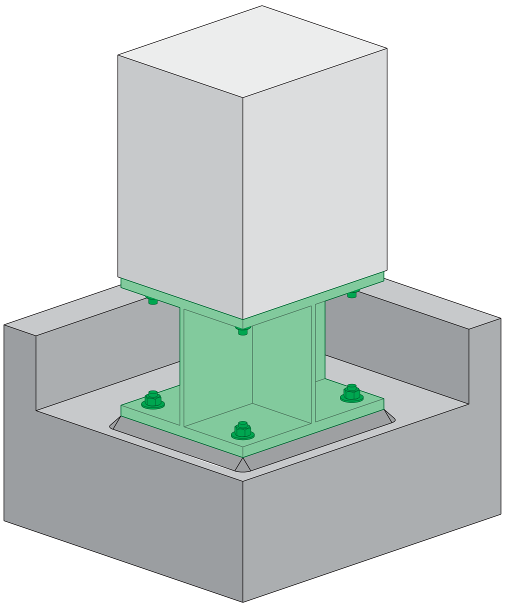
Structure, Base Plate | Two-storey Base Plate with Glued-in Rod | NS-DS2041

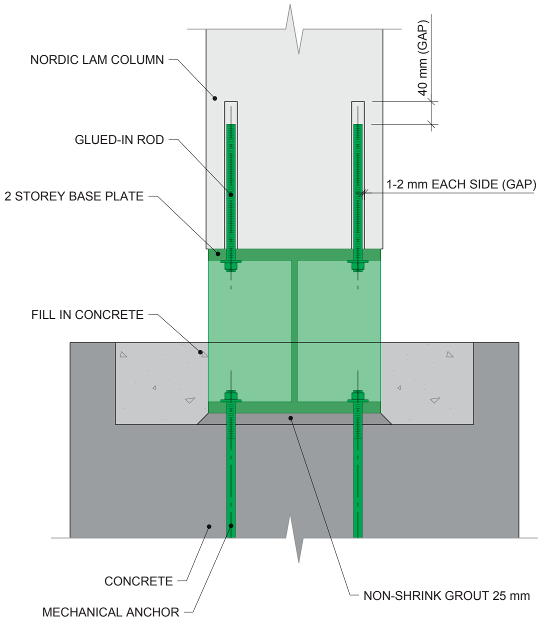


Structure, Base Plate | Two-storey Base Plate with Glued-in Rod and Pocket | NS-DS2042

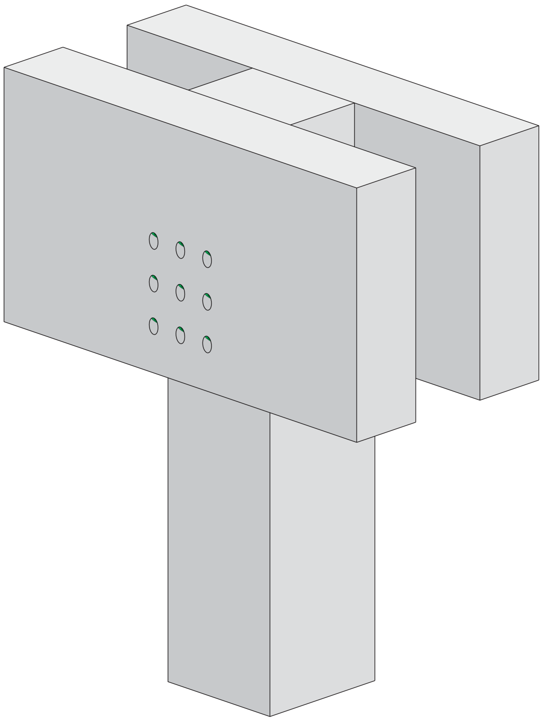


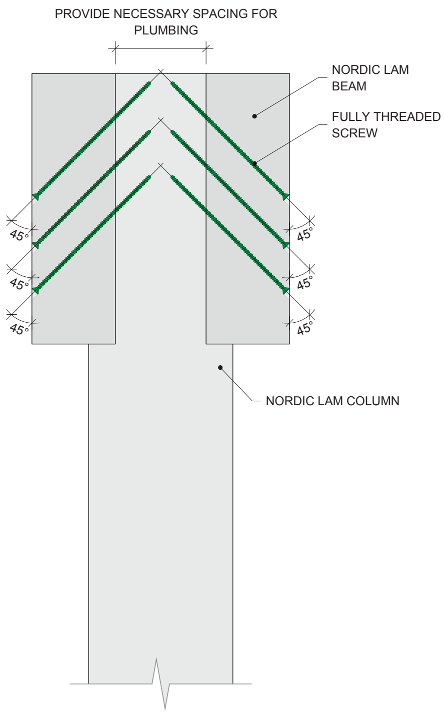
Structure, Beam-Column | Two-storey Base Plate with Glued-in Rod and Half-height Pocket | NS-DS2070



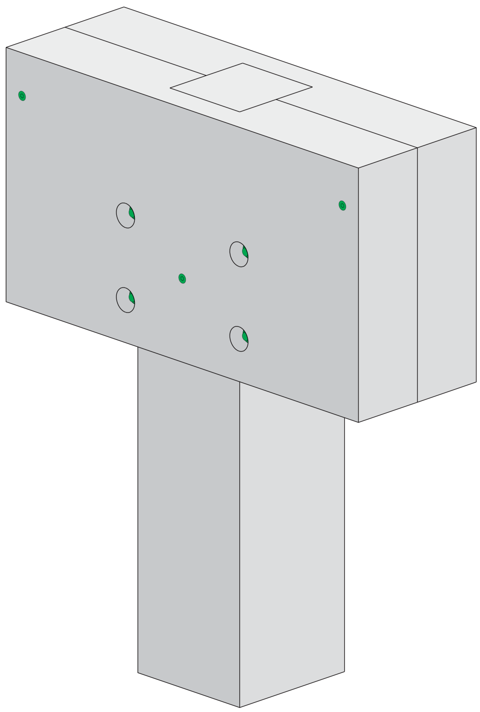


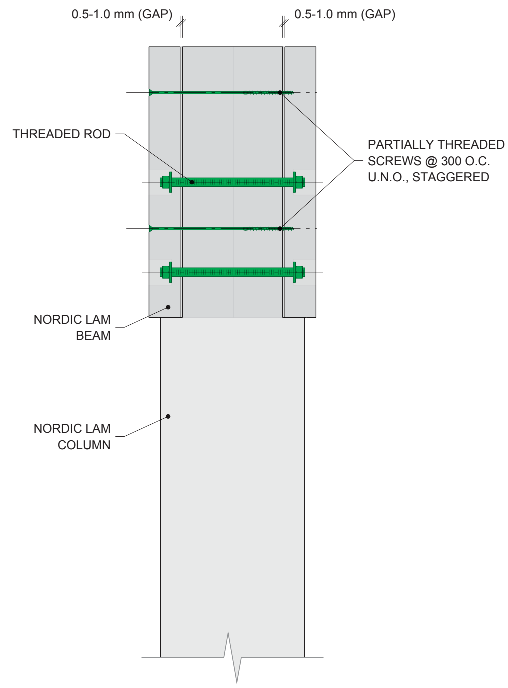
Structure, Beam-Column | Double Member Beam with Spacing | NS-DS2043



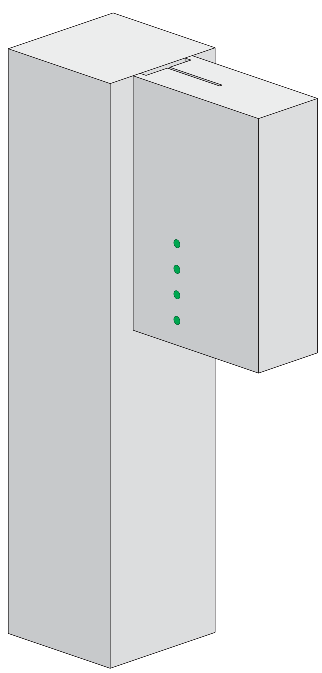


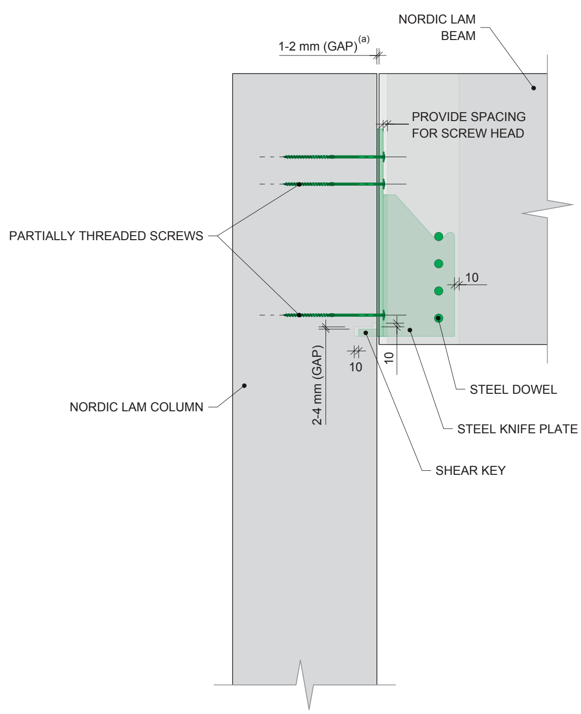
Structure, Beam-Column | Double Member Beam Without Spacing | NS-DS2044





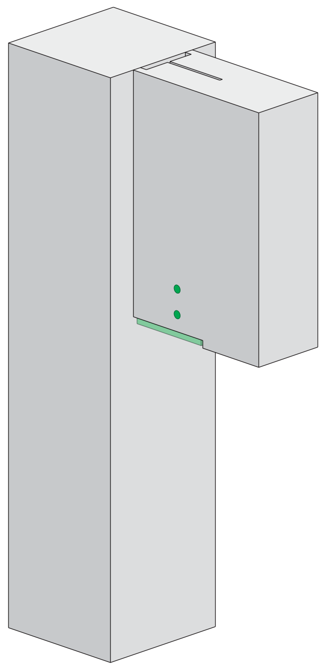
Structure, Beam-Column | Knife Plate with Shear Key | NS-DS2045

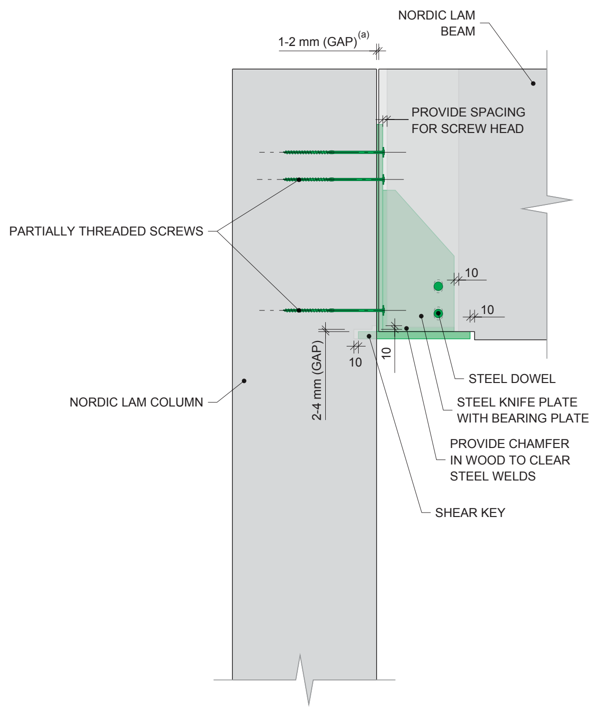




a) The 1-2 mm gap may not be required depending on the detail on the other side of the beam.

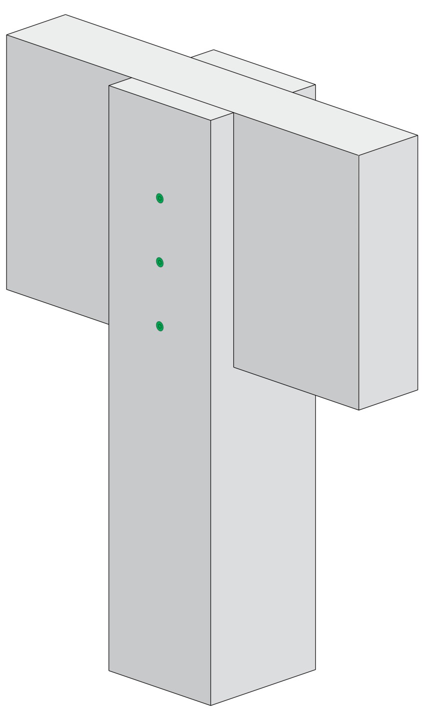
Structure, Beam-Column | Knife Plate with Shear Key and Bearing Plate | NS-DS2046

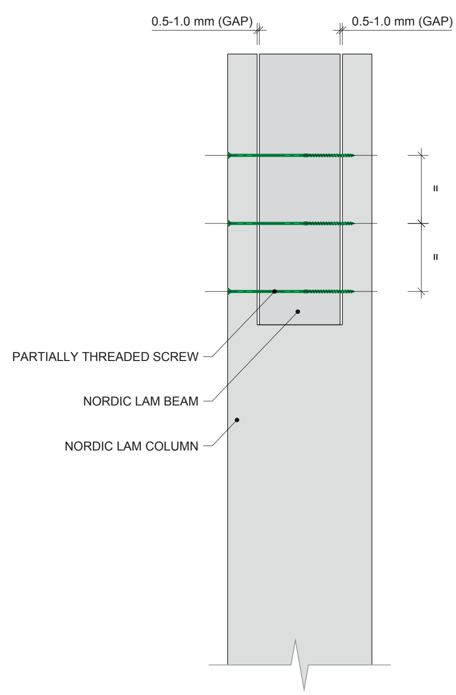




a) The 1-2 mm gap may not be required depending on the detail on the other side of the beam.

Structure, Beam-Column | Single Beam, Bridle Joint | NS-DS2047





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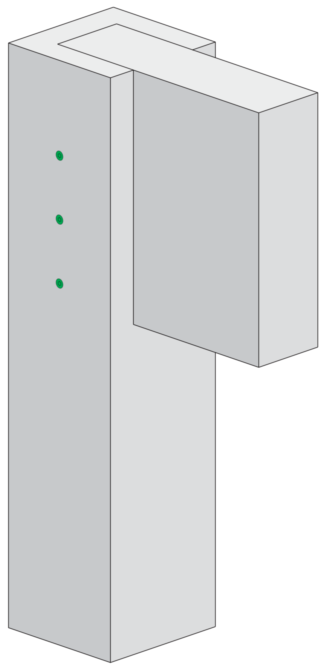
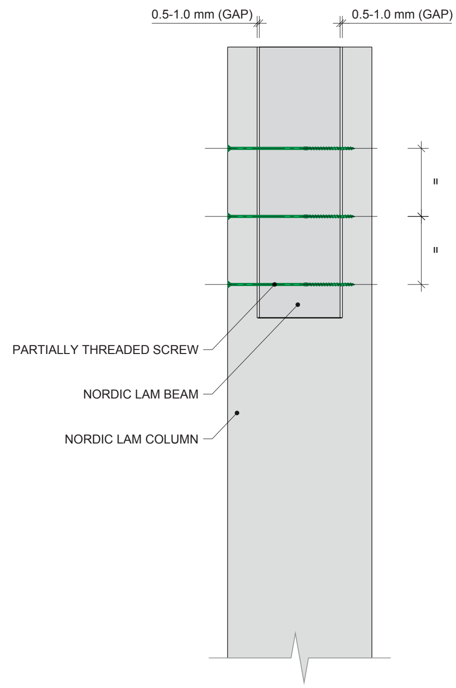
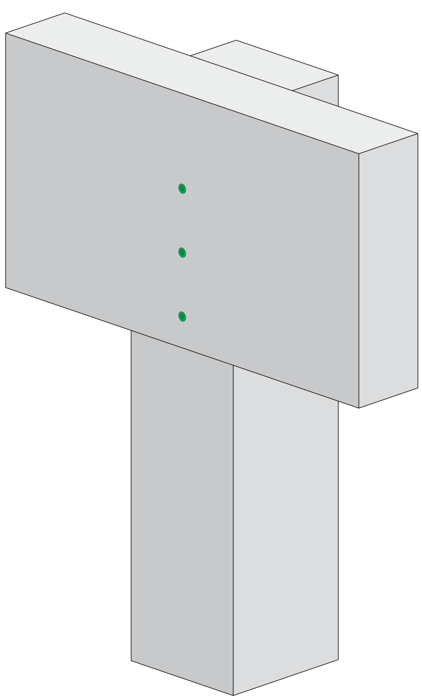
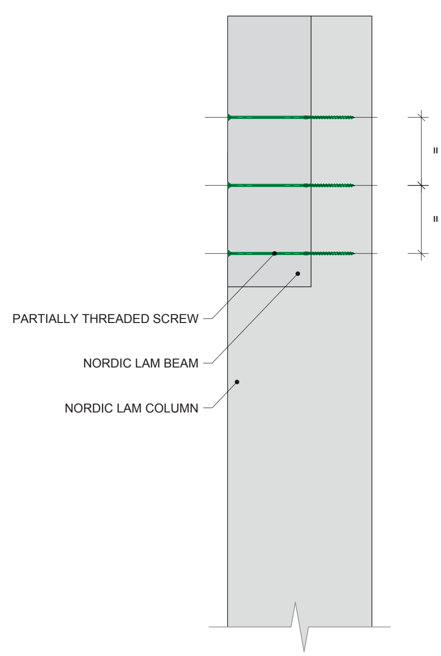
Structure, Beam-Column | Continuous Beam, Bridle Joint | NS-DS2048



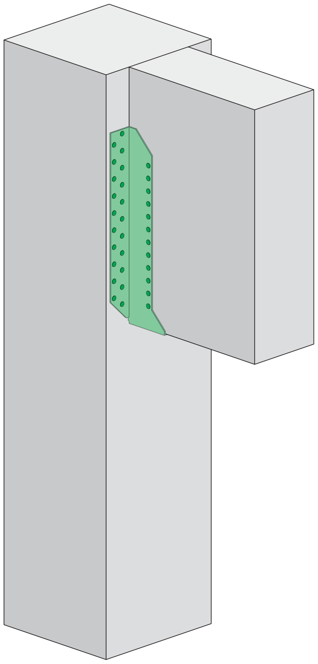


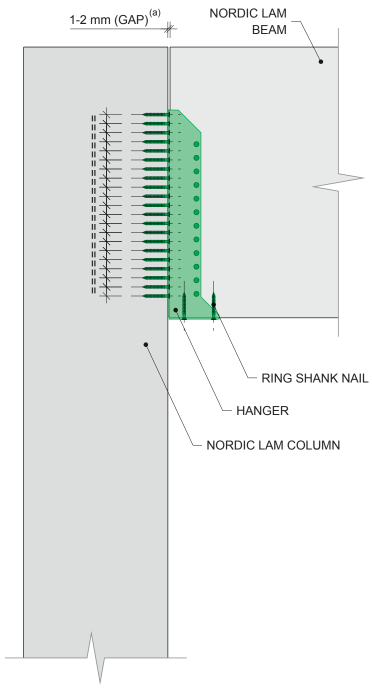
Structure, Beam-Column | Half-lap Joint | NS-DS2049





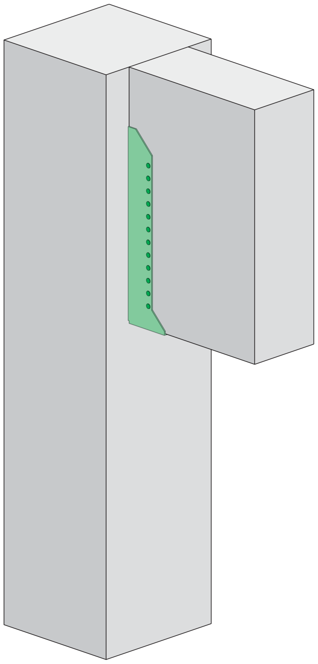
Structure, Beam-Column | Face-mount Hanger | NS-DS2050

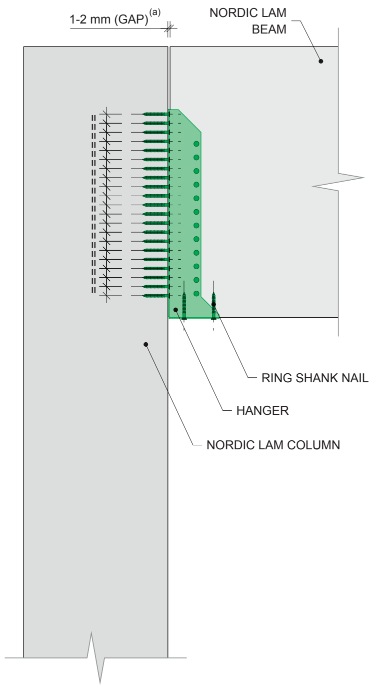




a) The 1-2 mm gap may not be required depending on the detail on the other side of the beam.

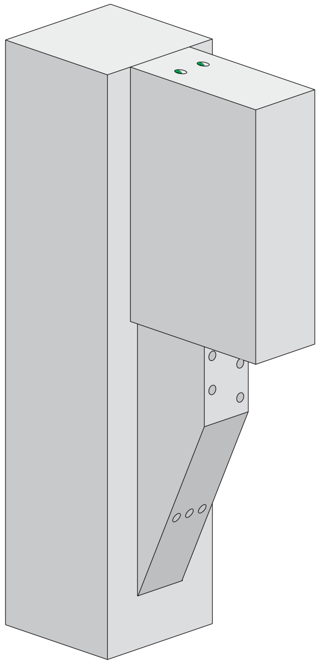
Structure, Beam-Column | Face-mount Hanger with Concealed Flanges | NS-DS2051

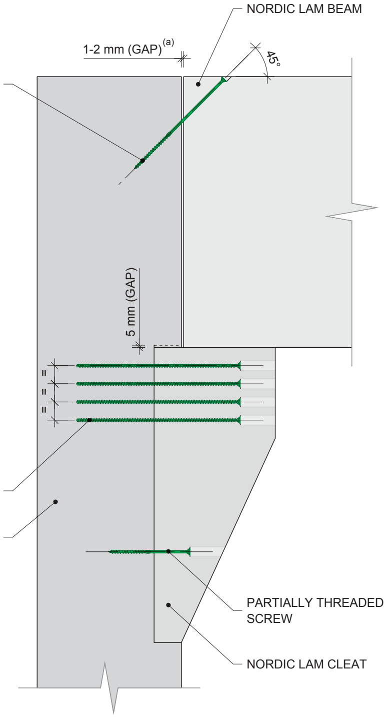




a) The 1-2 mm gap may not be required depending on the detail on the other side of the beam.

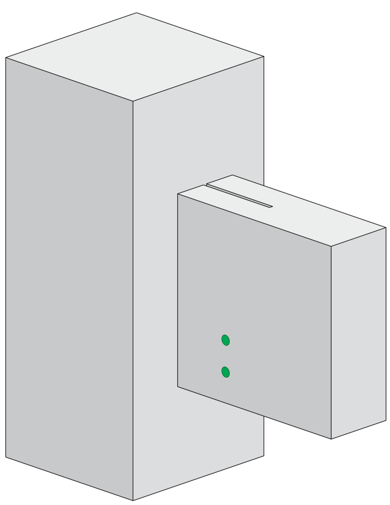
Structure, Beam-Column | Beam on Cleat | NS-DS2053

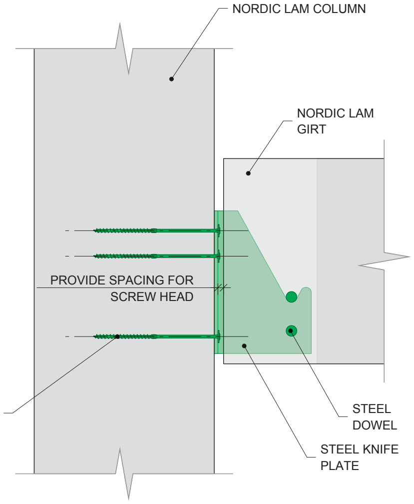




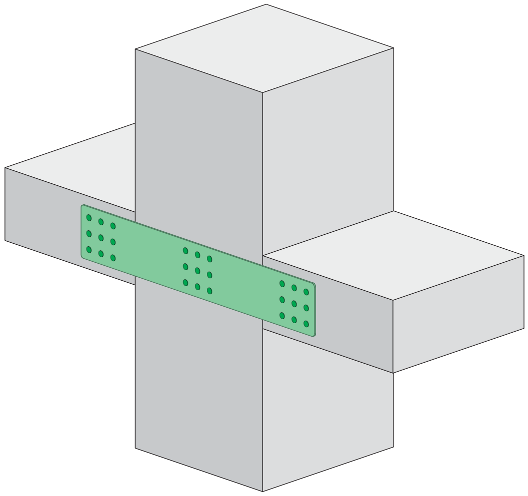
a) The 1-2 mm gap may not be required depending on the detail on the other side of the beam.

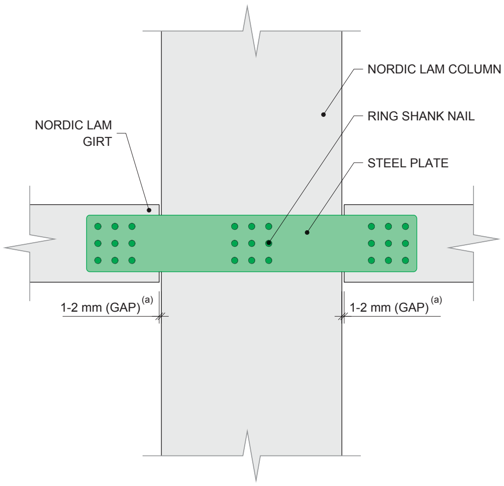
Structure, Girt-Column | Knife Plate | NS-DS2055





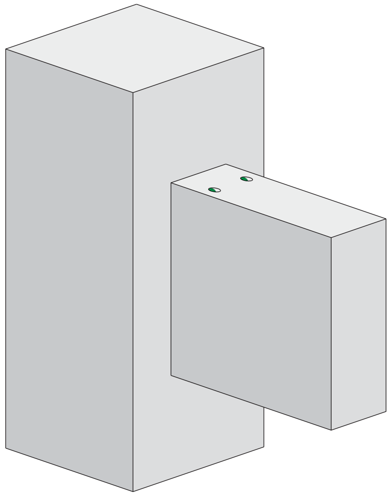
Structure, Girt-Column | Steel Plates | NS-DS2056

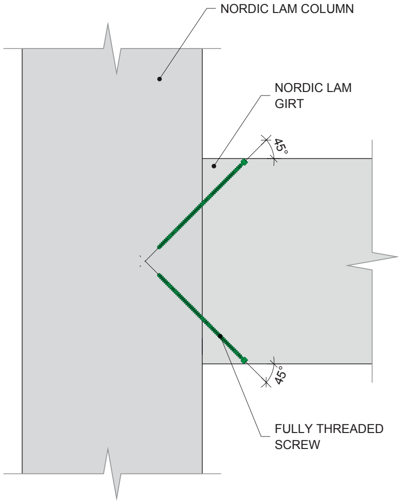




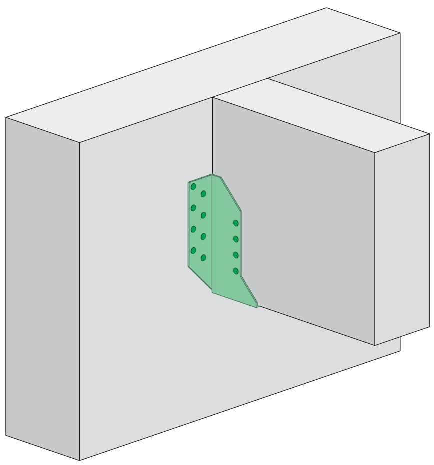
a) The 1-2 mm gap may not be required depending on the detail on the other side of the beam.

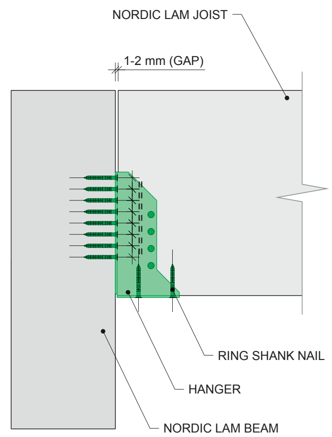
Structure, Girt-Column | 45° Screws | NS-DS2057



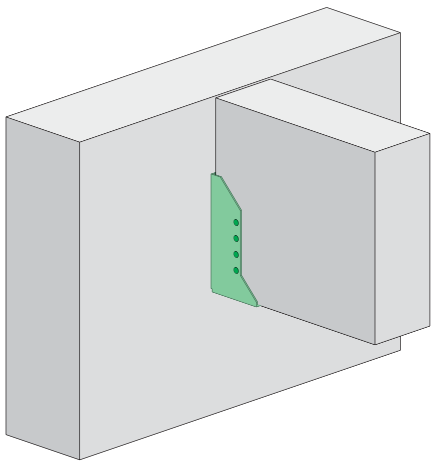


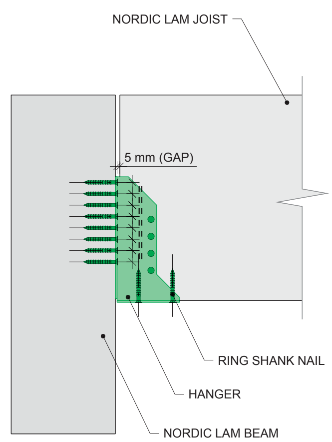
Structure, Joist-Beam | Nailed Face-mount Hanger | NS-DS2058



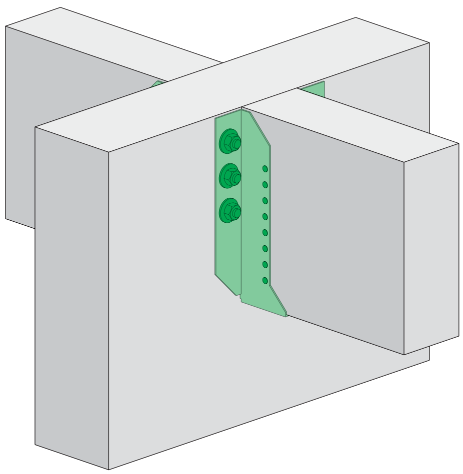


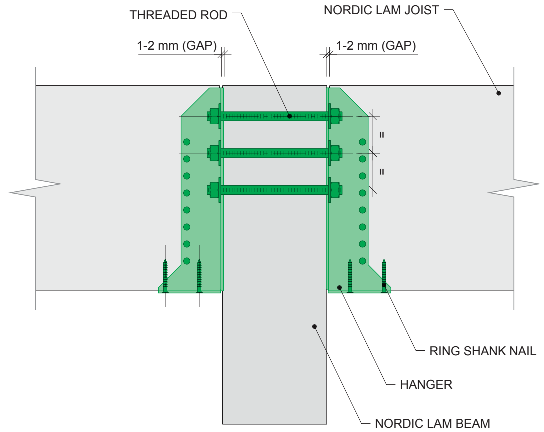
Structure, Joist-Beam | Nailed Face-mount Hanger with Concealed Flanges | NS-DS2059



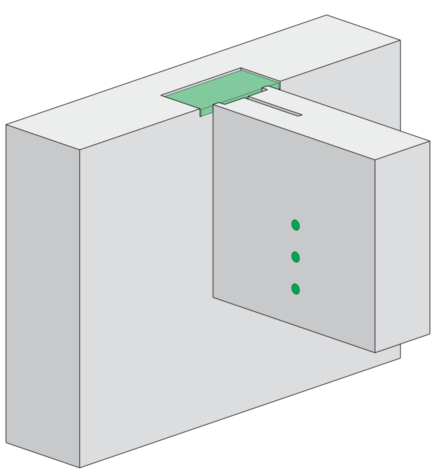


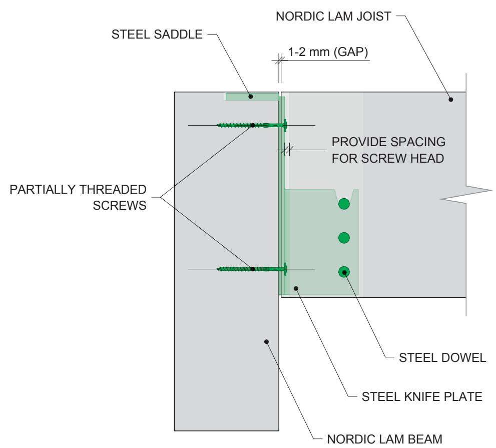
Structure, Joist-Beam | Bolted Face-mount Hanger | NS-DS2060



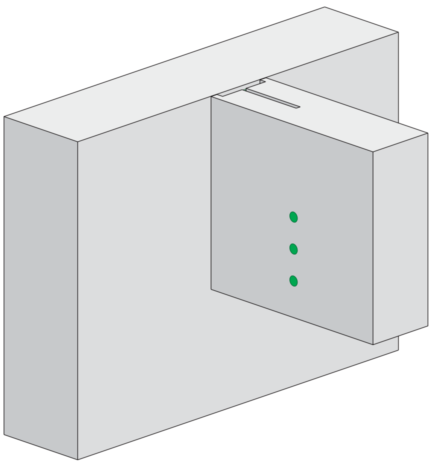


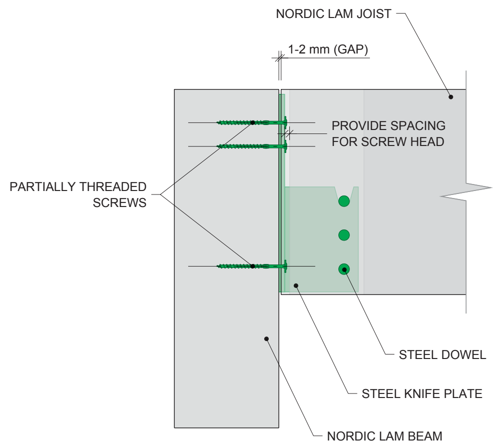
Structure, Joist-Beam | Knife Plate with Saddle | NS-DS2061



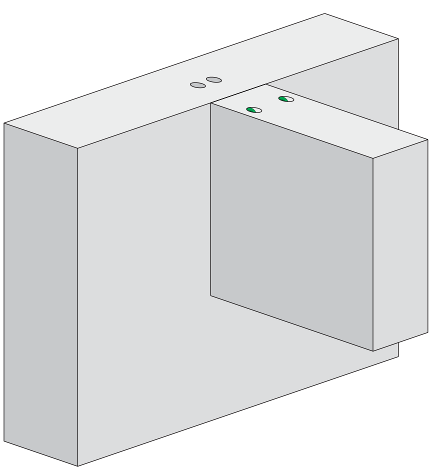


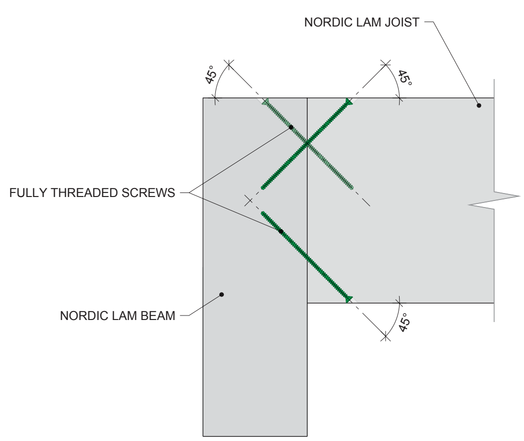
Structure, Joist-Beam | Knife Plate | NS-DS2062



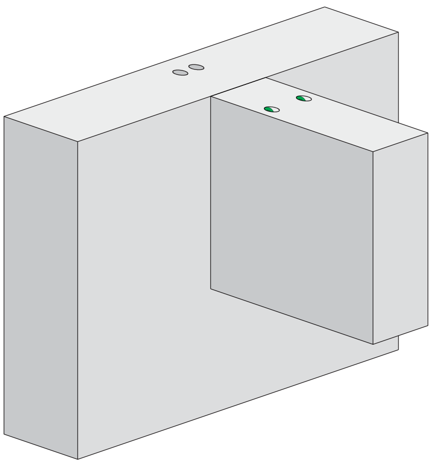


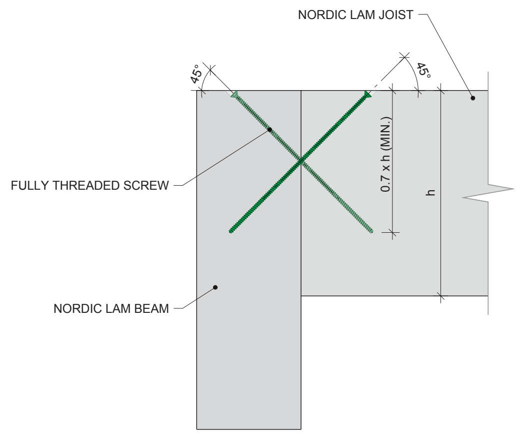
Structure, Joist-Beam | 45° Screws – Option 1 | NS-DS2063



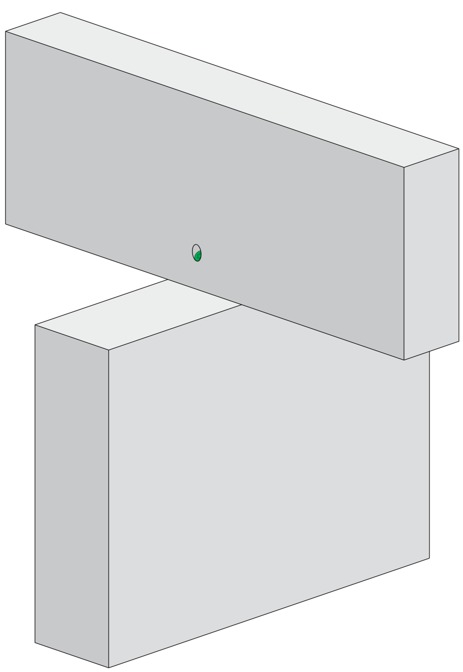


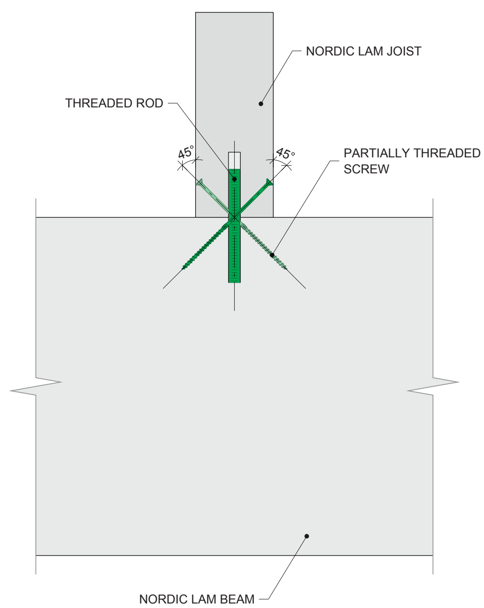
Structure, Joist-Beam | 45° Screws – Option 2 | NS-DS2064



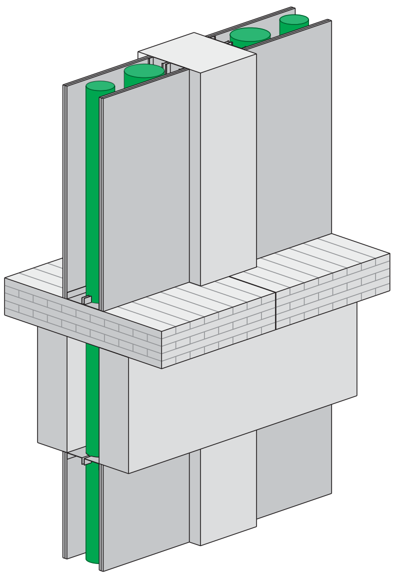


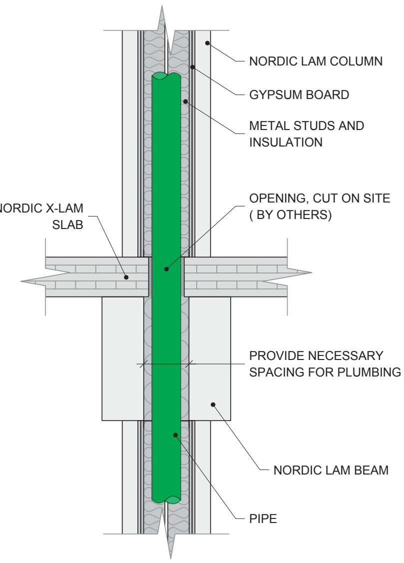
Structure, Joist-Beam | Joist on Beam with 45° Screws and Glued-in Rod | NS-DS2065



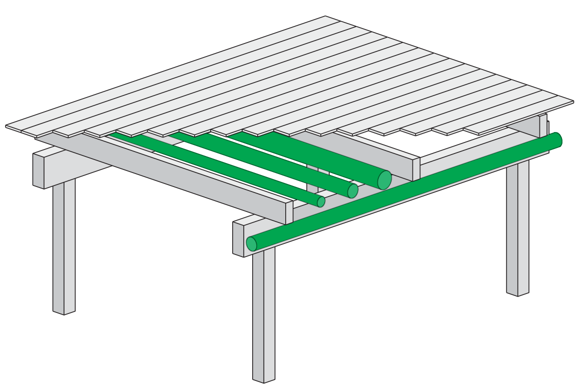


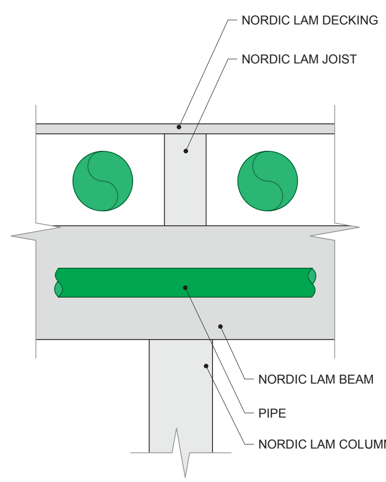
Mechanical, Electrical, and Plumbing | Vertical, Double-member Beam | NS-DS2501



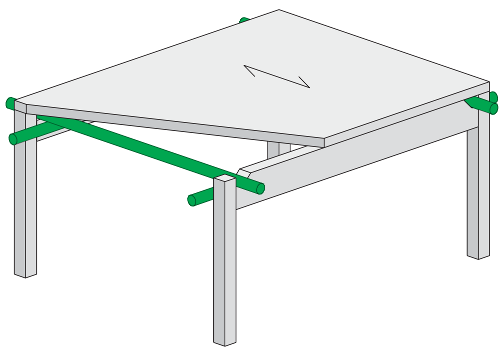


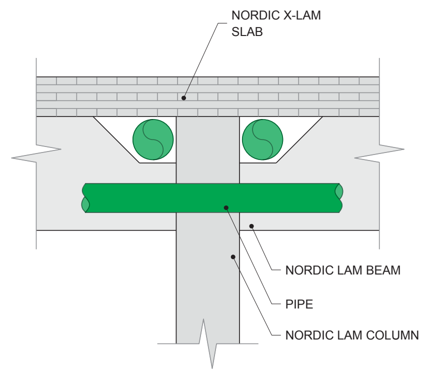
Mechanical, Electrical, and Plumbing | Horizontal, Joist on Beam | NS-DS2506



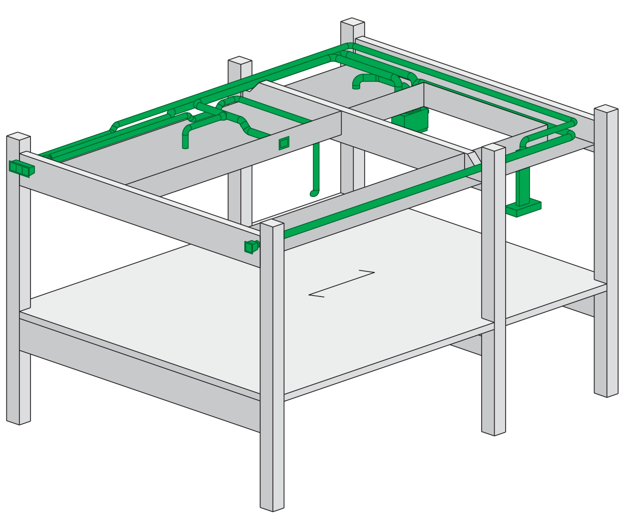


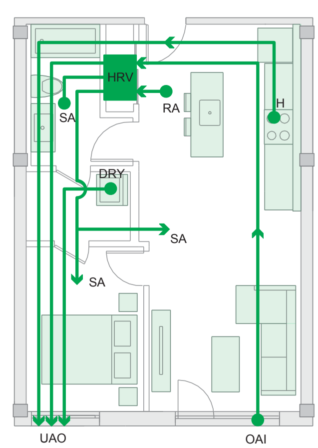
Mechanical, Electrical, and Plumbing | Horizontal, Bevelled Beam | NS-DS2507





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

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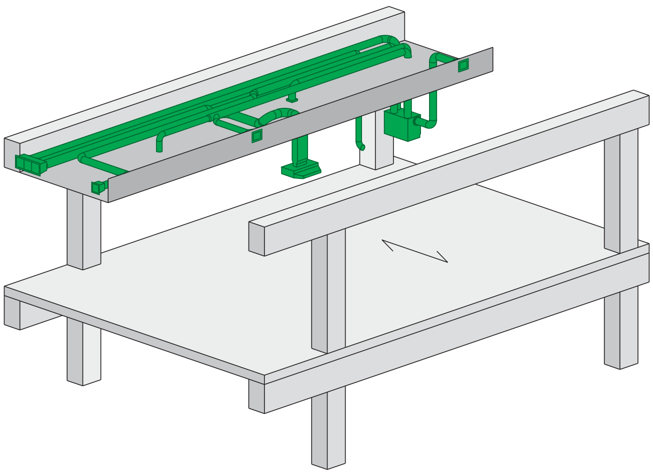
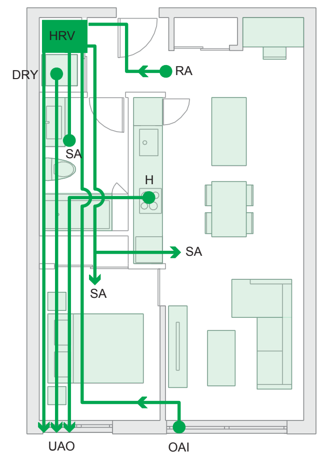
Mechanical, Electrical, and Plumbing | Multi-residential Unit Diagram – Option 2 | NS-DS2509





Legend

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

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TECHNICAL GUIDE
NORDIC LAM+

NS-GT5

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VERSION
2026-02-01

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 Annex B of CSA O86-14, Engineering design in wood. The fire resistance rating may also be determined on the basis of the results of tests conducted in conformance with CAN/ULC-S101, Fire Endurance 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, RSI, 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-CA-en, 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 (mm)	λ (W/mK)	RSI (m^2K/W)
Nordic Lam	25	0.13	0.19
Nordic X-Lam	25	0.13	0.19
Sawn lumber	25	0.12	0.21
Spray polyurethane (BASF)	50	0.02	2.50
Stone wool (Rockwool ComfortBatt R24)	139.7	0.033	4.23
Gypsum board	12.7	0.159	0.08
Polyisocyanurate (SOPRA-ISO)	-	0.025	-
Air cavity – Wall	13-20	-	0.16
Air cavity – Ceiling	13-40	-	0.15
	40-90	-	0.16
Interior air film – Wall	-	-	0.12
Interior air film – Ceiling	-	-	0.11
Exterior air film	-	-	0.03

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 Apparent Sound Transmission Class (ASTC) takes into consideration the performance of the separating element as well as the flanking transmission paths. Moreover, building professionals should ensure that floors are designed to minimize impact transmission. For more details, see Appendix Note A-9.11. of the NBC 2015.

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 Appendix Note A-9.11.1.4. of the NBC 2015.

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

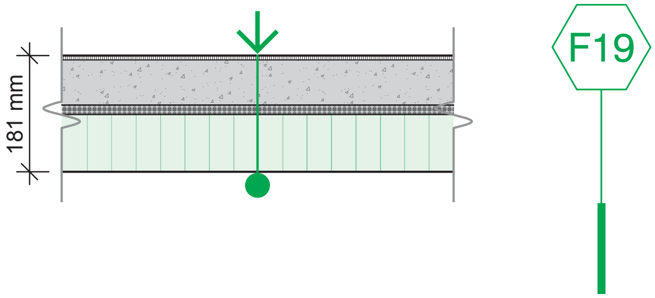
4.4 The use of prefabricated concrete topping in floor assemblies is only required by the acoustical testing procedure.

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 | Floor | NS-DA2218

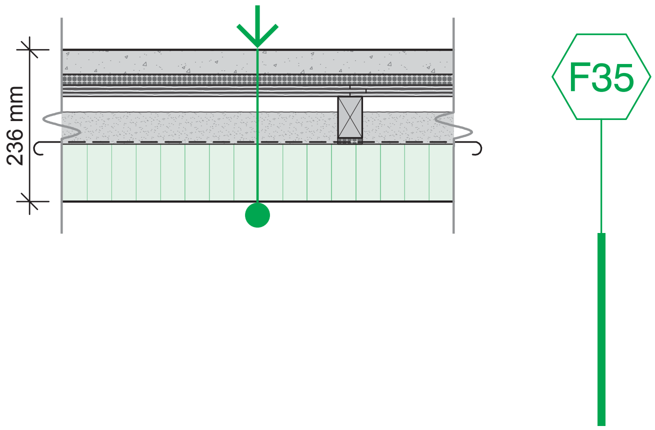


Fire-resistance rating	FRR [a]	1 h		
Thermal resistance	RSI / R	n.a.	/	n.a.
Acoustic ratings	STC / ASTC	52	/	n.a.
	IIC / AIIC	51	/	n.a.

a) The fire-resistance rating is based on a span of 4 m and on a specified uniform load of 4.75 kPa.

– CARPET TILES 7 mm
– PREFABRICATED CONCRETE TOPPING (2310 kg/m³) 70 mm
– UNDERLAY OF TYPE “INSONOMAT” 15 mm
– NORDIC LAM DECKING 89 mm

Architecture, Assembly | Floor | NS-DA2234

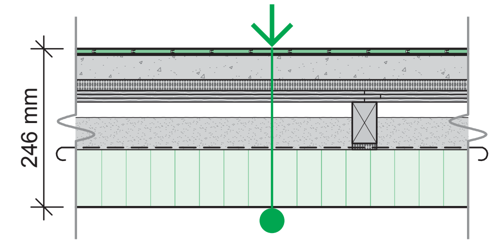


Fire-resistance rating	FRR [a]	1 h		
Thermal resistance	RSI / R	n.a.	/	n.a.
Acoustic ratings	STC / ASTC	65	/	n.a.
	IIC / AIIC	59	/	n.a.

a) The fire-resistance rating is based on a span of 4 m and on a specified uniform load of 4.75 kPa.

– PREFABRICATED CONCRETE TOPPING 38 mm
– UNDERLAY OF TYPE “REGUPOL SONUS WAVE” 17 mm
– TONGUE AND GROOVE OSB SHEATHING 18 mm
– WOOD RAFTERS 38 mm X 64 mm @ 610 mm O.C.
– SILICA SAND (#71) 50 mm
– RUBBER MEMBRANE BANDS 10 mm UNDER RAFTERS
– POLYETHYLENE SHEETING 6 mil
– NORDIC LAM DECKING 89 mm

Architecture, Assembly | Floor | NS-DA2240



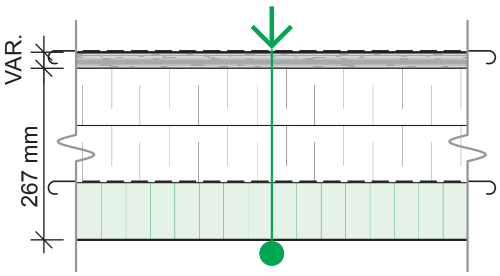
F41

Fire-resistance rating	FRR [a]	1 h
Thermal resistance	RSI / R	n.a. / n.a.
	STC / ASTC	65 / n.a.
Acoustic ratings	IIC / AIIC	62 / n.a.

a) The fire-resistance rating is based on a span of 4 m and on a specified uniform load of 4.75 kPa.

- LAMINATED FLOORING 8 mm
- UNDERLAY OF TYPE “ROBERTS SOFT STRIDE” 2 mm
- PREFABRICATED CONCRETE TOPPING 38 mm
- UNDERLAY OF TYPE “REGUPOL SONUS WAVE” 17 mm
- TONGUE AND GROOVE OSB SHEATHING 18 mm
- WOOD RAFTERS 38 mm X 64 mm @ 610 mm O.C.
- SILICA SAND (#71) 50 mm
- RUBBER MEMBRANE BANDS 10 mm UNDER RAFTERS
- POLYETHYLENE SHEETING 6 mil
- NORDIC LAM DECKING 89 mm

Architecture, Assembly | Roof | NS-DA2309



R10

Fire-resistance rating	FRR [a]	1 h
Thermal resistance	RSI / R	7.8 / 44
	STC / ASTC	n.a. / n.a.
Acoustic ratings	IIC / AIIC	n.a. / n.a.

a) The fire-resistance rating is based on a span of 4 m and on a specified uniform load of 4.75 kPa.

- TWO-LAYER ELASTOMERIC MEMBRANE ROOFING
- ROOFING UNDERLAY (UP TO THE DESIGNER)
- 2 ROWS OF POLYISOCYANURATE INSULATION 89 mm EA.
- VAPOUR BARRIER MEMBRANE
- PLYWOOD 12.7 mm
- NORDIC LAM DECKING 89 mm

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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

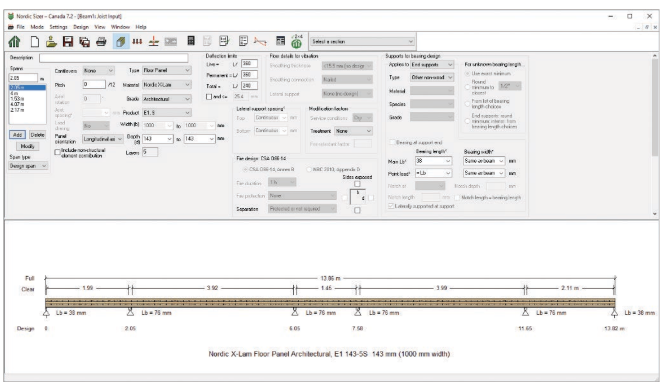
Fill in the form (contact.nordic.ca/en/nordic-sizer-software-request/) to receive instructions by email within the next business day.

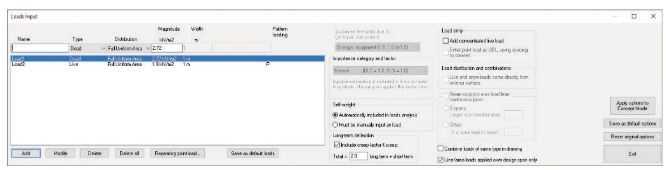
For assistance, please contact the technical support at 514-871-8526, ext. 2 or tech@nordic.ca.

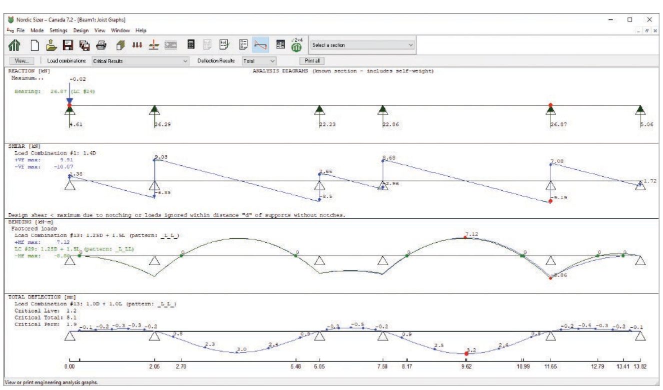
WOODWORKS SOFTWARE TUTORIALS

Canadian Training Videos and User Guide

woodworks-software.com/support/support-canadian-edition/







NORDIC STRUCTURES

COMPANY
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PROJECT
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

	0	2.05	6.05	7.58	11.65	13.82
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

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