ELEMENT5

CROSS-LAMINATED TIMBER (CLT)

Product Specifications & Span Tables

Contents

Introduction **3**

1. Product Highlights **4**

1.1 Panel Characteristics 5

1.2 Available Layups 6

1.3 Appearance Classification 7/8

1.4 Strength and Stiffness V2/E1 9/10

2. Element5 Floor Span Tables

2.0 How to use Span Tables 11/12

2.1 Floor Panel; Superimposed Dead Load: 1.0 kPa; Stress Grade: V2 13

2.2 Floor Panel; Superimposed Dead Load: 1.5 kPa; Stress Grade: V2 14

2.3 Floor Panel; Superimposed Dead Load: 2.0 kPa; Stress Grade: V2 15

2.4 Floor Panel; Superimposed Dead Load: 1.0 kPa; Stress Grade: E1 16

2.5 Floor Panel; Superimposed Dead Load: 1.5 kPa; Stress Grade: E1 17

2.6 Floor Panel; Superimposed Dead Load: 2.0 kPa; Stress Grade: E1 18

3. Element5 Roof Span Tables

3.1 Roof Panel; Superimposed Dead Load: 1.0 kPa; Stress Grade: V2 19

3.2 Roof Panel; Superimposed Dead Load: 1.5 kPa; Stress Grade: V2 20

3.3 Roof Panel; Superimposed Dead Load: 2.0 kPa; Stress Grade: V2 21

3.4 Roof Panel; Superimposed Dead Load: 1.0 kPa; Stress Grade: E1 22

3.5 Roof Panel; Superimposed Dead Load: 1.5 kPa; Stress Grade: E1 23

3.6 Roof Panel; Superimposed Dead Load: 2.0 kPa; Stress Grade: E1 24

Introduction

This document contains information about Element5's cross-laminated timber (CLT) panels, manufactured for use in Canada and the United States. The document includes product specifications and detailed span tables. It was created as a tool for architects, engineers, and other building industry professionals to assist with the design, specification, and construction of buildings using CLT from Element5.

CLT belongs to a category of large format, engineered wood products known collectively as mass timber. CLT is a manufactured, solid wood panel product that offers a sustainable, cost-effective, and human centered alternative to conventional concrete, masonry and steel construction. Prefabricated CLT panels are a versatile, high-performance construction material that can be used in many structural applications including floors, walls, roofs, shearwalls, elevator cores, and stairs.

CLT from Element5 is manufactured and tested for its intended use in compliance with ANSI/APA PRG 320-2019 Standard for Performance-Rated Cross-Laminated Timber. Our state-of-the art production facility in St. Thomas, Ontario, is 3rd party certified by APA - The Engineered Wood Company of Tacoma, WA (USA) for the production of CLT under this Standard.

This publication prepared by Element5 Limited Partnership is intended to serve as a technical guide only. The project designer and professional engineer of record are responsible for providing final documented design and engineering advice for any general or specific use or application where CLT from Element5 is being used. Element5 Limited Partnership will not be held liable for any direct or indirect use or reliance on information published herein.

1. Product Highlights

- Widest panels in Canada
- Attractive, edge-glued panels
- Manufactured in Ontario
- Sustainably sourced SPF lumber inputs
- FSC chain of custody certified plant

As the only CLT manufacturer in Ontario, we support projects in the region and beyond with a suite of professional services as a single point solution for the design, supply and assembly of modern mass timber buildings. Our automated, state-of-the-art manufacturing plant in St. Thomas produces visually superior, edge-glued CLT panels made from sustainably sourced SPF lumber inputs.

Our St. Thomas operation is Forest Stewardship Council® (FSC®) Chain of Custody certified by SCS Global Services. As an FSC Certificate Holder, we have the ability to produce mass timber products certified as FSC Mix (Trademark License Code: FSC-C166066). We take pride knowing our products and buildings are making a difference for people and the planet.

1.1 Panel Characteristics

Grade	E1 and V2 (V2 is the most cost effective)
Standard Panel Width	3.4m (3.1 max visual) / 2.4m / 1.55m (11 ft / 7 ft / 5 ft)
Panel Width Tolerance	+/- 3mm (1/8") of panel width
Standard Panel Length	16.0m / 8.0m / 4.0m (52 ft / 26 ft / 13 ft)
Panel Length Tolerance	+/- 3mm (1/8") of panel length
Maximum Panel Thickness	380 mm (15")
Panel Thickness Tolerance	+/- 1/16" or 2% of panel thickness, whichever is greater
Panel Design	At least three layers of bonded single-layer panels arranged at right angles to each other.
Surface Classification	Visual Grade and Non-Visual Grade
Panel Edges	Standard square edges Optional 6mm (¼") chamfer on edges
Wood Species	SPF (spruce-pine-fir)
Lamstock Sorting Grade	E1: MSR 1950-1.7E SPF for longitudinal layers, SPF No. 1 / No. 2 for transverse layers V2: SPF No. 1 / No. 2 Other grades available upon request
Moisture Content	12% ± 2% at time of production
Bonding Adhesive	Purbond polyurethane adhesive for finger joining and surface bonding (formaldehyde-free, non-VOC)
Visual Quality	See Section 1.3 for details on the characteristics of the appearance grades
Weight	For determining transport weight: approximately 470kg/m^3 (30lb / ft^3)
Squareness	Panel face diagonals shall not deviate by more than +/- 3mm (1/8")
Straightness	Deviation of edges from a straight line between corner points shall not exceed 1.5mm (1/16")

1.2 Available Layups

L Panels (surface layers parallel to panel length)

LAYERS	DEPTH (mm)	‖	⊥	‖	⊥	‖	⊥	‖	⊥	‖
3 PLY	87	35	17	35						
3 PLY	105	35	35	35						
5 PLY	139	35	17	35	17	35				
5 PLY	175	35	35	35	35	35				
7 PLY	191	35	17	35	17	35	17	35		
7 PLY	245	35	35	35	35	35	35	35		
9 PLY	315	35	35	35	35	35	35	35	35	35

C Panels (surface layers perpendicular to panel length)

LAYERS	DEPTH (mm)	⊥	‖	⊥	‖	⊥	‖	⊥	‖	T
3 PLY	87	35	17	35						
3 PLY	105	35	35	35						
5 PLY	139	35	17	35	17	35				
5 PLY	175	35	35	35	35	35				
7 PLY	191	35	17	35	17	35	17	35		
7 PLY	245	35	35	35	35	35	35	35		
9 PLY	315	35	35	35	35	35	35	35	35	35

1.3 Appearance Classification

	Visual	Non-Visual
Intended Use	Where one or both faces are left exposed	Where both faces are covered by another material
Face Layers – V2	SPF #2 or better	SPF #2
Face layers – E1	minimum SPF MSR 1.7E 1950Fb	minimum SPF MSR 1.7E 1950Fb
Sanded Face	80 grit	Not applicable

1.3 Appearance Classification

No.	Characteristics	Visual	Non-Visual
1	Bonding	occasional open joints up to max. 2 mm width permitted	occasional open joints up to max. 3 mm width permitted
2	Blue stains	Maximum 5% blue stain	permitted
3	Discolorations (brown stains, etc)	permitted	permitted
4	Dry cracks	permitted	permitted
5	Knots	As per NLGA #2	As per NLGA #2
6	Wane on Face	not permitted	not permitted
7	Pitch Streaks	permitted	permitted

1.4 Strength and Stiffness: V2

CLT Stress Grade: V2

Layup (mm)	Linear Weight (kg/m²)	Major Axis				Minor Axis			
		$M_{r,0}$ (kN-m/m)	$V_{r,0}$ (kN/m)	$(EI)_{eff,0}$ (x10⁹ N-mm²/m)	$(GA)_{eff,0}$ (x10⁶ N/m)	$M_{r,90}$ (kN-m/m)	$V_{r,90}$ (kN/m)	$(EI)_{eff,90}$ (x10⁹ N-mm²/m)	$(GA)_{eff,90}$ (x10⁶ N/m)
87	36.5	11.3	26.1	518	7.8	-	5.1	3.9	4.4
105	44.1	16.0	31.5	884	7.6	2.2	10.5	34	7.6
139	58.4	26.1	41.7	1908	15.7	7.4	20.7	227	8.7
175	73.5	36.8	52.5	3390	15.1	18.8	31.5	884	15.1
191	80.2	46.4	57.3	4661	23.5	16.7	36.3	902	13.1
245	102.9	65.1	73.5	8394	22.7	43.3	52.5	3390	22.7
315	132.3	101.0	94.5	16738	30.2	76.6	73.5	8394	30.2

1.4 Strength and Stiffness: E1

CLT Stress Grade: E1

Layup (mm)	Linear Weight (kg/m²)	Major Axis				Minor Axis			
		$M_{r,0}$ (kN-m/m)	$V_{r,0}$ (kN/m)	$(EI)_{eff,0}$ (x10⁹ N-mm²/m)	$(GA)_{eff,0}$ (x10⁶ N/m)	$M_{r,90}$ (kN-m/m)	$V_{r,90}$ (kN/m)	$(EI)_{eff,90}$ (x10⁹ N-mm²/m)	$(GA)_{eff,90}$ (x10⁶ N/m)
87	36.5	27.0	26.1	637	8.1	-	5.1	3.9	5.3
105	44.1	38.2	31.5	1088	7.7	2.2	10.5	34	9.1
139	58.4	62.3	41.7	2348	16.2	7.4	20.7	228	10.7
175	73.5	87.8	52.5	4168	15.4	18.8	31.5	884	18.2
191	80.2	110.7	57.3	5733	24.3	16.8	36.3	906	16.0
245	102.9	155.2	73.5	10312	23.1	43.4	52.5	3397	27.3
315	132.3	240.6	94.5	20551	30.8	76.8	73.5	8420	36.5

2.0 How to use Span Tables

The following span tables have been developed to meet the requirements of the National Building Code of Canada (NBCC, 2015) and CSA O86-19, Engineering Design in Wood. The tables indicate the maximum span in meters that may be achieved using the products offered by Element5 under a range of typical loading conditions.
The tables are separated as noted below. Please refer to the table applicable to the intended use.
• the application (floor, subject to live loads due to occupancy, or roof, subject to snow loads);
• CLT grade (V2 or E1);
• assumed super imposed dead load (weight of finishes, MEP, and partitions supported by the panel); and
• number of spans (one and two spans, only).

Note 1: For buildings with an uneven number of structural bays in the direction of the CLT span, governing single span conditions may occur at the end bays and must be considered.
Note 2: The self weight of a CLT panel is considered in the span calculation. It is not included in the superimposed dead load magnitude.

Design Criteria:
To read the tables, please identify the applicable condition and panel depth (for a breakdown of the CLT layups, refer to Section 1.2). Frequently, the maximum span that may be attained for CLT floors is limited by the vibration criteria determined according to CSA O86-19, A.8.5.3, with the vibration governed span noted in the second column of every table. Span lengths shown represent the maximum span that may be attained for the given panel and loading conditions, based on the most critical of the following:

0-hr FRR:
(a) moment resistance;
(b) shear resistance;
(c) deflection at span/180 under total load with creep factor of 2.0 applied to the long-term loads;
(d) elastic deflection at span/360 under live or snow load only.

1-hr FRR:
(a) limiting span for 0-hr FRR based on the above criteria;
(c) moment resistance with reduced section properties following 60min fire exposure;
(d) shear resistance with reduced section properties following 60min fire exposure.

2-hr FRR:
(a) limiting span for 0-hr or 1-hr FRR based on the above criteria;
(c) moment resistance with reduced section properties following 120min fire exposure;
(d) shear resistance with reduced section properties following 120min fire exposure.

Vibration:
Note that maximum spans listed for live load cases may exceed the vibration-controlled span given in the second column. The designer or Engineer of Record is to confirm the building performance criteria before approving acceptable spans.

Additional Notes:
Areas noted in the table with "-" reflect cases for which there is no acceptable span due to excessive loss of strength from charring of the CLT section.
For double span conditions the maximum span may be limited by the maximum panel length that may be produced (16m). These cases are identified by a separate hatch, and the maximum span is 8.0m.

Disclaimer:
The use of these span tables is intended for preliminary schematic design only. Final engineering designs should be performed by a qualified professional and based on independent calculations in accordance with the applicable local codes and standards. The information contained within this document has been developed following the NBCC 2015 and CSA O86-19 Engineering Design in Wood, with efforts made to ensure its accuracy and completeness. Element5 does not assume responsibility for errors or omissions in this document, nor for engineering designs or documents prepared based on the information presented.

2.1 Floor Span Table

Superimposed Dead Load: 1 kPa

CLT Stress Grade: V2

SINGLE SPAN (all span values are in meters)

Layup (mm)	Vibration	LIVE LOAD								
		1.9 kPa			2.4 kPa			4.8 kPa		
		0-hr FRR	1-hr FRR	2-hr FRR	0-hr FRR	1-hr FRR	2-hr FRR	0-hr FRR	1-hr FRR	2-hr FRR
87	3.24	3.56	2.69	-	3.44	2.51	-	2.75	1.96	-
105	3.70	4.19	2.91	-	4.04	2.71	-	3.27	2.13	-
139	4.47	5.36	5.36	2.85	5.19	5.19	2.67	4.29	4.29	2.11
175	5.14	6.34	6.34	2.61	6.14	6.14	2.45	5.16	5.16	1.94
191	5.58	7.03	7.03	6.86	6.82	6.82	6.43	5.79	5.79	5.13
245	6.42	8.29	8.29	6.67	8.06	8.06	6.28	7.00	7.00	5.06
315	7.62	10.12	10.12	10.12	9.86	9.86	9.66	8.83	8.83	7.86

DOUBLE SPAN (all span values are in meters)

Layup (mm)	Vibration	LIVE LOAD								
		1.9 kPa			2.4 kPa			4.8 kPa		
		0-hr FRR	1-hr FRR	2-hr FRR	0-hr FRR	1-hr FRR	2-hr FRR	0-hr FRR	1-hr FRR	2-hr FRR
87	3.89	4.46	2.69	-	4.13	2.51	-	3.19	1.96	-
105	4.44	5.25	2.91	-	4.87	2.71	-	3.77	2.13	-
139	5.37	6.58	6.58	2.85	6.12	6.12	2.67	4.77	4.77	2.11
175	6.17	7.67	7.67	2.61	7.16	7.16	2.45	5.61	5.61	1.94
191	6.70			6.86	7.97	7.97	6.43	6.27	6.27	5.13
245	7.71			6.67			6.28	7.32	7.32	5.06
315										7.86

*Areas in grey are limited by maximum panel length of 16m. Double span continuous panels limited to maximum span of 8.0m.

Notes to Designers:

- The following span tables are generated in accordance with NBC 2015 and CSA O86-19.
- FRR resistance rating (FRR) obtained through charring of the timber is determined according to Annex B of CSA O86-19.
- The following factors were used for calculation of strength under normal loading conditions: K_D = varies with loading, K_S = 1.0, K_T = 1.0, K_H = 1.0.
- For fire design, the following factors were used for calculation of strength: K_{Fi} = 1.5 (V2), K_{Fi} = 1.25 (E1), K_D = 1.15, K_S = 1.0, K_T = 1.0, K_H = 1.0.
- CLT is an orthotropic material. Presented values to be used for bending of panels in the major strength axis direction only.
- Spans shown represent distance between the centerlines of supports and are to be used for preliminary design only. For double span panels, spans are assumed to be equal and uniformly loaded across both spans. Pattern loading of double span members has not been considered.
- Span table above includes panel self weight.
- The maximum panel length is 16.0m.
- For vibration in double span floors, 20% increase in the vibration-controlled span has been considered assuming floor panels are topped with non-structural element enhancing vibration performance.
- Criteria for deflection are span/180 under total load with a creep factor of 2.0 and span/360 under live load only with no creep factor as per CSA O86-19 A.8.5.2. Designer to confirm if L/180 is an appropriate deflection limit for the intended use.

2.2 Floor Span Table

Superimposed Dead Load: 1.5 kPa

CLT Stress Grade: V2

SINGLE SPAN (all span values are in meters)

Layup (mm)	Vibration	LIVE LOAD								
		1.9 kPa			2.4 kPa			4.8 kPa		
		0-hr FRR	1-hr FRR	2-hr FRR	0-hr FRR	1-hr FRR	2-hr FRR	0-hr FRR	1-hr FRR	2-hr FRR
87	3.24	3.33	2.51	-	3.23	2.35	-	2.75	1.88	-
105	3.70	3.92	2.71	-	3.80	2.55	-	3.27	2.05	-
139	4.47	5.03	5.03	2.67	4.90	4.90	2.51	4.29	4.29	2.03
175	5.14	5.97	5.97	2.45	5.81	5.81	2.31	5.16	5.16	1.87
191	5.58	6.63	6.63	6.43	6.47	6.47	6.08	5.79	5.79	4.94
245	6.42	7.85	7.85	6.28	7.66	7.66	5.95	6.95	6.95	4.88
315	7.62	9.62	9.62	9.62	9.41	9.41	9.18	8.58	8.58	7.60

DOUBLE SPAN (all span values are in meters)

Layup (mm)	Vibration	LIVE LOAD								
		1.9 kPa			2.4 kPa			4.8 kPa		
		0-hr FRR	1-hr FRR	2-hr FRR	0-hr FRR	1-hr FRR	2-hr FRR	0-hr FRR	1-hr FRR	2-hr FRR
87	3.89	4.18	2.51	-	3.91	2.35	-	3.08	1.88	-
105	4.44	4.92	2.71	-	4.61	2.55	-	3.65	2.05	-
139	5.37	6.13	6.13	2.67	5.81	5.81	2.51	4.62	4.62	2.03
175	6.17	7.11	7.11	2.45	6.80	6.80	2.31	5.43	5.43	1.87
191	6.70	7.90	7.90	6.43	7.58	7.58	6.08	6.07	6.07	4.94
245	7.71			6.28			5.95	7.10	7.10	4.88
315										7.60

*Areas in grey are limited by maximum panel length of 16m. Double span continuous panels limited to maximum span of 8.0m.

Notes to Designers:

- The following span tables are generated in accordance with NBC 2015 and CSA O86-19.
- FRR resistance rating (FRR) obtained through charring of the timber is determined according to Annex B of CSA O86-19.
- The following factors were used for calculation of strength under normal loading conditions: K_D = varies with loading, K_S = 1.0, K_T = 1.0, K_H = 1.0.
- For fire design, the following factors were used for calculation of strength: K_{Fi} = 1.5 (V2), K_{Fi} = 1.25 (E1), K_D = 1.15, K_S = 1.0, K_T = 1.0, K_H = 1.0.
- CLT is an orthotropic material. Presented values to be used for bending of panels in the major strength axis direction only.
- Spans shown represent distance between the centerlines of supports and are to be used for preliminary design only. For double span panels, spans are assumed to be equal and uniformly loaded across both spans. Pattern loading of double span members has not been considered.
- Span table above includes panel self weight.
- The maximum panel length is 16.0m.
- For vibration in double span floors, 20% increase in the vibration-controlled span has been considered assuming floor panels are topped with non-structural element enhancing vibration performance.
- Criteria for deflection are span/180 under total load with a creep factor of 2.0 and span/360 under live load only with no creep factor as per CSA O86-19 A.8.5.2. Designer to confirm if L/180 is an appropriate deflection limit for the intended use.

2.3 Floor Span Table

Superimposed Dead Load: 2 kPa

CLT Stress Grade: V2

SINGLE SPAN (all span values are in meters)

Layup (mm)	Vibration	LIVE LOAD								
		1.9 kPa			2.4 kPa			4.8 kPa		
		0-hr FRR	1-hr FRR	2-hr FRR	0-hr FRR	1-hr FRR	2-hr FRR	0-hr FRR	1-hr FRR	2-hr FRR
87	3.24	3.14	2.35	-	3.06	2.23	-	2.75	1.82	-
105	3.70	3.70	2.55	-	3.61	2.42	-	3.26	1.98	-
139	4.47	4.77	4.77	2.51	4.66	4.66	2.38	4.23	4.23	1.96
175	5.14	5.67	5.67	2.31	5.54	5.54	2.19	5.04	5.04	1.81
191	5.58	6.31	6.31	6.08	6.17	6.17	5.78	5.63	5.63	4.78
245	6.42	7.49	7.49	5.95	7.33	7.33	5.67	6.71	6.71	4.72
315	7.62	9.21	9.21	9.18	9.03	9.03	8.77	8.31	8.31	7.36

DOUBLE SPAN (all span values are in meters)

Layup (mm)	Vibration	LIVE LOAD								
		1.9 kPa			2.4 kPa			4.8 kPa		
		0-hr FRR	1-hr FRR	2-hr FRR	0-hr FRR	1-hr FRR	2-hr FRR	0-hr FRR	1-hr FRR	2-hr FRR
87	3.89	3.86	2.35	-	3.72	2.23	-	2.99	1.82	-
105	4.44	4.53	2.55	-	4.38	2.42	-	3.53	1.98	-
139	5.37	5.67	5.67	2.51	5.49	5.49	2.38	4.48	4.48	1.96
175	6.17	6.59	6.59	2.31	6.40	6.40	2.19	5.27	5.27	1.81
191	6.70	7.33	7.33	6.08	7.12	7.12	5.78	5.89	5.89	4.78
245	7.71			5.95			5.67	6.89	6.89	4.72
315										7.36

*Areas in grey are limited by maximum panel length of 16m. Double span continuous panels limited to maximum span of 8.0m.

Notes to Designers:

- The following span tables are generated in accordance with NBC 2015 and CSA O86-19.
- FRR resistance rating (FRR) obtained through charring of the timber is determined according to Annex B of CSA O86-19.
- The following factors were used for calculation of strength under normal loading conditions: K_D = varies with loading, K_S = 1.0, K_T = 1.0, K_H = 1.0.
- For fire design, the following factors were used for calculation of strength: K_{Fi} = 1.5 (V2), K_{Fi} = 1.25 (E1), K_D = 1.15, K_S = 1.0, K_T = 1.0, K_H = 1.0.
- CLT is an orthotropic material. Presented values to be used for bending of panels in the major strength axis direction only.
- Spans shown represent distance between the centerlines of supports and are to be used for preliminary design only. For double span panels, spans are assumed to be equal and uniformly loaded across both spans. Pattern loading of double span members has not been considered.
- Span table above includes panel self weight.
- The maximum panel length is 16.0m.
- For vibration in double span floors, 20% increase in the vibration-controlled span has been considered assuming floor panels are topped with non-structural element enhancing vibration performance.
- Criteria for deflection are span/180 under total load with a creep factor of 2.0 and span/360 under live load only with no creep factor as per CSA O86-19 A.8.5.2. Designer to confirm if L/180 is an appropriate deflection limit for the intended use.

2.4 Floor Span Table

Superimposed Dead Load: 1 kPa

CLT Stress Grade: E1

SINGLE SPAN (all span values are in meters)

Layup (mm)	Vibration	LIVE LOAD								
		1.9 kPa			2.4 kPa			4.8 kPa		
		0-hr FRR	1-hr FRR	2-hr FRR	0-hr FRR	1-hr FRR	2-hr FRR	0-hr FRR	1-hr FRR	2-hr FRR
87	3.44	3.81	3.80	-	3.68	3.54	-	2.95	2.76	-
105	3.93	4.48	4.11	-	4.33	3.83	-	3.49	3.00	-
139	4.75	5.74	5.74	4.02	5.55	5.55	3.76	4.59	4.59	2.97
175	5.46	6.78	6.78	3.67	6.57	6.57	3.44	5.52	5.52	2.74
191	5.93	7.53	7.53	7.53	7.30	7.30	7.30	6.20	6.20	6.20
245	6.82	8.87	8.87	8.87	8.62	8.62	8.62	7.49	7.49	7.13
315	8.08	10.82	10.82	10.82	10.54	10.54	10.54	9.44	9.44	9.44

DOUBLE SPAN (all span values are in meters)

Layup (mm)	Vibration	LIVE LOAD								
		1.9 kPa			2.4 kPa			4.8 kPa		
		0-hr FRR	1-hr FRR	2-hr FRR	0-hr FRR	1-hr FRR	2-hr FRR	0-hr FRR	1-hr FRR	2-hr FRR
87	4.13	5.08	3.80	-	4.90	3.54	-	3.91	2.76	-
105	4.72	5.96	4.11	-	5.75	3.83	-	4.62	3.00	-
139	5.70	7.65	7.65	4.02	7.40	7.40	3.76	6.10	6.10	2.97
175	6.55			3.67			3.44	7.31	7.31	2.74
191	7.11									7.24
245										7.13
315										

*Areas in grey are limited by maximum panel length of 16m. Double span continuous panels limited to maximum span of 8.0m.

Notes to Designers:

- The following span tables are generated in accordance with NBC 2015 and CSA O86-19.
- FRR resistance rating (FRR) obtained through charring of the timber is determined according to Annex B of CSA O86-19.
- The following factors were used for calculation of strength under normal loading conditions: K_D = varies with loading, K_S = 1.0, K_T = 1.0, K_H = 1.0.
- For fire design, the following factors were used for calculation of strength: K_{Fi} = 1.5 (V2), K_{Fi} = 1.25 (E1), K_D = 1.15, K_S = 1.0, K_T = 1.0, K_H = 1.0.
- CLT is an orthotropic material. Presented values to be used for bending of panels in the major strength axis direction only.
- Spans shown represent distance between the centerlines of supports and are to be used for preliminary design only. For double span panels, spans are assumed to be equal and uniformly loaded across both spans. Pattern loading of double span members has not been considered.
- Span table above includes panel self weight.
- The maximum panel length is 16.0m.
- For vibration in double span floors, 20% increase in the vibration-controlled span has been considered assuming floor panels are topped with non-structural element enhancing vibration performance.
- Criteria for deflection are span/180 under total load with a creep factor of 2.0 and span/360 under live load only with no creep factor as per CSA O86-19 A.8.5.2. Designer to confirm if L/180 is an appropriate deflection limit for the intended use.

2.5 Floor Span Table

Superimposed Dead Load (DL1): 1.5 kPa

CLT Stress Grade: E1

SINGLE SPAN (all span values are in meters)

Layup (mm)	Vibration	LIVE LOAD								
		1.9 kPa			2.4 kPa			4.8 kPa		
		0-hr FRR	1-hr FRR	2-hr FRR	0-hr FRR	1-hr FRR	2-hr FRR	0-hr FRR	1-hr FRR	2-hr FRR
87	3.44	3.56	3.56	-	3.46	3.32	-	2.95	2.66	-
105	3.93	4.19	4.19	-	4.07	3.60	-	3.49	2.89	-
139	4.75	5.39	5.39	3.76	5.24	5.24	3.55	4.59	4.59	2.86
175	5.46	6.39	6.39	3.44	6.22	6.22	3.25	5.52	5.52	2.64
191	5.93	7.10	7.10	7.10	6.92	6.92	6.92	6.20	6.20	6.20
245	6.82	8.40	8.40	8.40	8.20	8.20	8.20	7.43	7.43	6.88
315	8.08	10.29	10.29	10.29	10.06	10.06	10.06	9.18	9.18	9.18

DOUBLE SPAN (all span values are in meters)

Layup (mm)	Vibration	LIVE LOAD								
		1.9 kPa			2.4 kPa			4.8 kPa		
		0-hr FRR	1-hr FRR	2-hr FRR	0-hr FRR	1-hr FRR	2-hr FRR	0-hr FRR	1-hr FRR	2-hr FRR
87	4.13	4.74	3.54	-	4.60	3.32	-	3.91	2.66	-
105	4.72	5.56	3.83	-	5.40	3.60	-	4.62	2.89	-
139	5.70	7.18	7.18	3.76	6.98	6.98	3.55	6.10	6.10	2.86
175	6.55			3.44			3.25	7.31	7.31	2.64
191	7.11									6.98
245										6.88
315										

*Areas in grey are limited by maximum panel length of 16m. Double span continuous panels limited to maximum span of 8.0m.

Notes to Designers:

- The following span tables are generated in accordance with NBC 2015 and CSA O86-19.
- FRR resistance rating (FRR) obtained through charring of the timber is determined according to Annex B of CSA O86-19.
- The following factors were used for calculation of strength under normal loading conditions: K_D = varies with loading, K_S = 1.0, K_T = 1.0, K_H = 1.0.
- For fire design, the following factors were used for calculation of strength: K_{Fi} = 1.5 (V2), K_{Fi} = 1.25 (E1), K_D = 1.15, K_S = 1.0, K_T = 1.0, K_H = 1.0.
- CLT is an orthotropic material. Presented values to be used for bending of panels in the major strength axis direction only.
- Spans shown represent distance between the centerlines of supports and are to be used for preliminary design only. For double span panels, spans are assumed to be equal and uniformly loaded across both spans. Pattern loading of double span members has not been considered.
- Span table above includes panel self weight.
- The maximum panel length is 16.0m.
- For vibration in double span floors, 20% increase in the vibration-controlled span has been considered assuming floor panels are topped with non-structural element enhancing vibration performance.
- Criteria for deflection are span/180 under total load with a creep factor of 2.0 and span/360 under live load only with no creep factor as per CSA O86-19 A.8.5.2. Designer to confirm if L/180 is an appropriate deflection limit for the intended use.

2.6 Floor Span Table

Superimposed Dead Load: 2 kPa

CLT Stress Grade: E1

SINGLE SPAN (all span values are in meters)

Layup (mm)	Vibration	LIVE LOAD								
		1.9 kPa			2.4 kPa			4.8 kPa		
		0-hr FRR	1-hr FRR	2-hr FRR	0-hr FRR	1-hr FRR	2-hr FRR	0-hr FRR	1-hr FRR	2-hr FRR
87	3.44	3.36	3.32	-	3.28	3.14	-	2.95	2.56	-
105	3.93	3.96	3.60	-	3.86	3.41	-	3.49	2.79	-
139	4.75	5.11	5.11	3.55	4.99	4.99	3.36	4.53	4.53	2.76
175	5.46	6.07	6.07	3.25	5.93	5.93	3.09	5.39	5.39	2.55
191	5.93	6.76	6.76	6.76	6.61	6.61	6.61	6.03	6.03	6.03
245	6.82	8.01	8.01	8.01	7.84	7.84	7.84	7.18	7.18	6.66
315	8.08	9.85	9.85	9.85	9.66	9.66	9.66	8.88	8.88	8.88

DOUBLE SPAN (all span values are in meters)

Layup (mm)	Vibration	LIVE LOAD								
		1.9 kPa			2.4 kPa			4.8 kPa		
		0-hr FRR	1-hr FRR	2-hr FRR	0-hr FRR	1-hr FRR	2-hr FRR	0-hr FRR	1-hr FRR	2-hr FRR
87	4.13	4.47	3.32	-	4.35	3.14	-	3.91	2.56	-
105	4.72	5.25	3.60	-	5.12	3.41	-	4.60	2.79	-
139	5.70	6.80	6.80	3.55	6.64	6.64	3.36	6.02	6.02	2.76
175	6.55			3.25	7.87	7.87	3.09	7.14	7.14	2.55
191	7.11									6.74
245										6.66
315										

*Areas in grey are limited by maximum panel length of 16m. Double span continuous panels limited to maximum span of 8.0m.

Notes to Designers:

- The following span tables are generated in accordance with NBC 2015 and CSA O86-19.
- FRR resistance rating (FRR) obtained through charring of the timber is determined according to Annex B of CSA O86-19.
- The following factors were used for calculation of strength under normal loading conditions: K_D = varies with loading, K_S = 1.0, K_T = 1.0, K_H = 1.0.
- For fire design, the following factors were used for calculation of strength: K_{Fi} = 1.5 (V2), K_{Fi} = 1.25 (E1), K_D = 1.15, K_S = 1.0, K_T = 1.0, K_H = 1.0.
- CLT is an orthotropic material. Presented values to be used for bending of panels in the major strength axis direction only.
- Spans shown represent distance between the centerlines of supports and are to be used for preliminary design only. For double span panels, spans are assumed to be equal and uniformly loaded across both spans. Pattern loading of double span members has not been considered.
- Span table above includes panel self weight.
- The maximum panel length is 16.0m.
- For vibration in double span floors, 20% increase in the vibration-controlled span has been considered assuming floor panels are topped with non-structural element enhancing vibration performance.
- Criteria for deflection are span/180 under total load with a creep factor of 2.0 and span/360 under live load only with no creep factor as per CSA O86-19 A.8.5.2. Designer to confirm if L/180 is an appropriate deflection limit for the intended use.

3.1 Roof Span Table

Superimposed Dead Load: 1 kPa

CLT Stress Grade: V2

SINGLE SPAN SNOW (all span values are in meters)					
Layup (mm)	Snow Load (kPa)				
	1.36	**1.92**	**2.4**	**2.88**	**4**
87	3.72	3.56	3.44	3.33	3.13
105	4.37	4.19	4.05	3.93	3.69
139	5.57	5.36	5.19	5.04	4.76
175	6.58	6.33	6.15	5.98	5.65
191	7.29	7.03	6.83	6.65	6.29
245	8.58	8.29	8.07	7.87	7.46
315	10.43	10.11	9.87	9.64	9.18

DOUBLE SPAN SNOW (all span values are in meters)					
Layup (mm)	Snow Load (kPa)				
	1.36	**1.92**	**2.4**	**2.88**	**4**
87	4.92	4.44	4.13	3.88	3.43
105	5.75	5.23	4.87	4.58	4.05
139	7.10	6.56	6.12	5.76	5.12
175		7.65	7.16	6.75	6.01
191			7.97	7.52	6.71
245					7.82
315					

*Areas in grey are limited by maximum panel length of 16m. Double span continuous panels limited to maximum span of 8.0m.

Notes to Designers:

- The following span tables are generated in accordance with NBC 2015 and CSA O86-19.
- The spans shown do not account for any fire resistance rating of the CLT panels through charring of the timber. Designer to confirm if this is acceptable.
- The following factors were used for calculation of strength under normal loading conditions: K_D = varies with loading, K_S = 1.0, K_T = 1.0, K_H = 1.0.
- CLT is an orthotropic material. Presented values to be used for bending of panels in the major strength axis direction only.
- Spans shown represent distance between the centerlines of supports and are to be used for preliminary design only. For double span panels, spans are assumed to be equal and uniformly loaded across both spans. Pattern loading of double span members has not been considered.
- Span table above includes panel self weight.
- The maximum panel length is 16.0m.
- Criteria for deflection are span/180 under total load with a creep factor of 2.0 and span/240 under snow load only with no creep factor as per CSA O86-19 A.8.5.2. Designer to confirm if these deflection limits are approporiate for the intended use.

3.2 Roof Span Table

Superimposed Dead Load: 1.5 kPa

CLT Stress Grade: V2

SINGLE SPAN SNOW (all span values are in meters)					
Layup (mm)	Snow Load (kPa)				
	1.36	**1.92**	**2.4**	**2.88**	**4**
87	3.45	3.32	3.23	3.15	2.98
105	4.06	3.92	3.81	3.71	3.51
139	5.20	5.03	4.90	4.78	4.54
175	6.16	5.97	5.82	5.68	5.40
191	6.84	6.63	6.47	6.32	6.03
245	8.08	7.85	7.67	7.50	7.16
315	9.89	9.62	9.42	9.23	8.84

DOUBLE SPAN SNOW (all span values are in meters)					
Layup (mm)	Snow Load (kPa)				
	1.36	**1.92**	**2.4**	**2.88**	**4**
87	4.40	4.17	3.91	3.69	3.30
105	5.15	4.91	4.61	4.36	3.90
139	6.40	6.12	5.81	5.49	4.93
175	7.39	7.10	6.80	6.44	5.79
191		7.89	7.58	7.19	6.47
245					7.55
315					

*Areas in grey are limited by maximum panel length of 16m. Double span continuous panels limited to maximum span of 8.0m.

Notes to Designers:

- The following span tables are generated in accordance with NBC 2015 and CSA O86-19.
- The spans shown do not account for any fire resistance rating of the CLT panels through charring of the timber. Designer to confirm if this is acceptable.
- The following factors were used for calculation of strength under normal loading conditions: K_D = varies with loading, K_S = 1.0, K_T = 1.0, K_H = 1.0.
- CLT is an orthotropic material. Presented values to be used for bending of panels in the major strength axis direction only.
- Spans shown represent distance between the centerlines of supports and are to be used for preliminary design only. For double span panels, spans are assumed to be equal and uniformly loaded across both spans. Pattern loading of double span members has not been considered.
- Span table above includes panel self weight.
- The maximum panel length is 16.0m.
- Criteria for deflection are span/180 under total load with a creep factor of 2.0 and span/240 under snow load only with no creep factor as per CSA O86-19 A.8.5.2. Designer to confirm if these deflection limits are approporiate for the intended use.

3.3 Roof Span Table

Superimposed Dead Load: 2 kPa

CLT Stress Grade: V2

SINGLE SPAN SNOW (all span values are in meters)					
Layup (mm)	Snow Load (kPa)				
	1.36	**1.92**	**2.4**	**2.88**	**4**
87	3.24	3.14	3.06	2.99	2.85
105	3.82	3.70	3.61	3.53	3.36
139	4.91	4.77	4.67	4.57	4.36
175	5.83	5.67	5.55	5.43	5.19
191	6.48	6.31	6.18	6.05	5.80
245	7.68	7.49	7.34	7.20	6.90
315	9.43	9.21	9.04	8.87	8.53

DOUBLE SPAN SNOW (all span values are in meters)					
Layup (mm)	Snow Load (kPa)				
	1.36	**1.92**	**2.4**	**2.88**	**4**
87	4.00	3.85	3.72	3.53	3.18
105	4.69	4.53	4.38	4.17	3.76
139	5.85	5.66	5.49	5.26	4.76
175	6.78	6.58	6.40	6.18	5.60
191	7.53	7.32	7.12	6.89	6.25
245				7.99	7.30
315					

*Areas in grey are limited by maximum panel length of 16m. Double span continuous panels limited to maximum span of 8.0m.

Notes to Designers:

- The following span tables are generated in accordance with NBC 2015 and CSA O86-19.
- The spans shown do not account for any fire resistance rating of the CLT panels through charring of the timber. Designer to confirm if this is acceptable.
- The following factors were used for calculation of strength under normal loading conditions: K_D = varies with loading, K_S = 1.0, K_T = 1.0, K_H = 1.0.
- CLT is an orthotropic material. Presented values to be used for bending of panels in the major strength axis direction only.
- Spans shown represent distance between the centerlines of supports and are to be used for preliminary design only. For double span panels, spans are assumed to be equal and uniformly loaded across both spans. Pattern loading of double span members has not been considered.
- Span table above includes panel self weight.
- The maximum panel length is 16.0m.
- Criteria for deflection are span/180 under total load with a creep factor of 2.0 and span/240 under snow load only with no creep factor as per CSA O86-19 A.8.5.2. Designer to confirm if these deflection limits are approporiate for the intended use.

3.4 Roof Span Table

Superimposed Dead Load: 1 kPa

CLT Stress Grade: E1

SINGLE SPAN SNOW (all span values are in meters)					
Layup (mm)	Snow Load (kPa)				
	1.36	**1.92**	**2.4**	**2.88**	**4**
87	3.98	3.81	3.68	3.57	3.35
105	4.68	4.48	4.33	4.20	3.94
139	5.97	5.74	5.56	5.40	5.09
175	7.04	6.78	6.58	6.40	6.04
191	7.81	7.52	7.31	7.12	6.73
245	9.18	8.87	8.63	8.42	7.98
315	11.16	10.82	10.55	10.31	9.82

DOUBLE SPAN SNOW (all span values are in meters)					
Layup (mm)	Snow Load (kPa)				
	1.36	**1.92**	**2.4**	**2.88**	**4**
87	5.30	5.07	4.90	4.74	4.44
105	6.22	5.95	5.75	5.57	5.22
139	7.96	7.64	7.40	7.19	6.77
175					
191					
245					
315					

*Areas in grey are limited by maximum panel length of 16m. Double span continuous panels limited to maximum span of 8.0m.

Notes to Designers:

- The following span tables are generated in accordance with NBC 2015 and CSA O86-19.
- The spans shown do not account for any fire resistance rating of the CLT panels through charring of the timber. Designer to confirm if this is acceptable.
- The following factors were used for calculation of strength under normal loading conditions: K_D = varies with loading, K_S = 1.0, K_T = 1.0, K_H = 1.0.
- CLT is an orthotropic material. Presented values to be used for bending of panels in the major strength axis direction only.
- Spans shown represent distance between the centerlines of supports and are to be used for preliminary design only. For double span panels, spans are assumed to be equal and uniformly loaded across both spans. Pattern loading of double span members has not been considered.
- Span table above includes panel self weight.
- The maximum panel length is 16.0m.
- Criteria for deflection are span/180 under total load with a creep factor of 2.0 and span/240 under snow load only with no creep factor as per CSA O86-19 A.8.5.2. Designer to confirm if these deflection limits are approporiate for the intended use.

3.5 Roof Span Table

Superimposed Dead Load: 1.5 kPa

CLT Stress Grade: E1

SINGLE SPAN SNOW (all span values are in meters)					
Layup (mm)	Snow Load (kPa)				
	1.36	**1.92**	**2.4**	**2.88**	**4**
87	3.69	3.56	3.46	3.37	3.19
105	4.34	4.19	4.07	3.97	3.76
139	5.57	5.39	5.25	5.12	4.86
175	6.59	6.38	6.22	6.08	5.78
191	7.33	7.10	6.93	6.77	6.45
245	8.65	8.40	8.20	8.03	7.66
315	10.57	10.29	10.07	9.87	9.45

DOUBLE SPAN SNOW (all span values are in meters)					
Layup (mm)	Snow Load (kPa)				
	1.36	**1.92**	**2.4**	**2.88**	**4**
87	4.91	4.73	4.60	4.47	4.23
105	5.76	5.56	5.40	5.26	4.97
139	7.42	7.17	6.98	6.81	6.46
175					7.66
191					
245					
315					

*Areas in grey are limited by maximum panel length of 16m. Double span continuous panels limited to maximum span of 8.0m.

Notes to Designers:

- The following span tables are generated in accordance with NBC 2015 and CSA O86-19.
- The spans shown do not account for any fire resistance rating of the CLT panels through charring of the timber. Designer to confirm if this is acceptable.
- The following factors were used for calculation of strength under normal loading conditions: K_D = varies with loading, K_S = 1.0, K_T = 1.0, K_H = 1.0.
- CLT is an orthotropic material. Presented values to be used for bending of panels in the major strength axis direction only.
- Spans shown represent distance between the centerlines of supports and are to be used for preliminary design only. For double span panels, spans are assumed to be equal and uniformly loaded across both spans. Pattern loading of double span members has not been considered.
- Span table above includes panel self weight.
- The maximum panel length is 16.0m.
- Criteria for deflection are span/180 under total load with a creep factor of 2.0 and span/240 under snow load only with no creep factor as per CSA O86-19 A.8.5.2. Designer to confirm if these deflection limits are approporiate for the intended use.

3.6 Roof Span Table

Superimposed Dead Load (DL1): 2 kPa

CLT Stress Grade: E1

SINGLE SPAN SNOW (all span values are in meters)					
Layup (mm)	Snow Load (kPa)				
	1.36	**1.92**	**2.4**	**2.88**	**4**
87	3.47	3.36	3.28	3.21	3.05
105	4.08	3.96	3.87	3.78	3.60
139	5.26	5.11	5.00	4.89	4.67
175	6.24	6.07	5.93	5.81	5.56
191	6.94	6.76	6.62	6.48	6.21
245	8.22	8.01	7.85	7.70	7.38
315	10.09	9.85	9.66	9.49	9.12

DOUBLE SPAN SNOW (all span values are in meters)					
Layup (mm)	Snow Load (kPa)				
	1.36	**1.92**	**2.4**	**2.88**	**4**
87	4.61	4.46	4.35	4.25	4.05
105	5.41	5.24	5.12	5.00	4.75
139	7.00	6.80	6.64	6.50	6.20
175			7.87	7.70	7.36
191					
245					
315					

*Areas in grey are limited by maximum panel length of 16m. Double span continuous panels limited to maximum span of 8.0m.

Notes to Designers:

- The following span tables are generated in accordance with NBC 2015 and CSA O86-19.
- The spans shown do not account for any fire resistance rating of the CLT panels through charring of the timber. Designer to confirm if this is acceptable.
- The following factors were used for calculation of strength under normal loading conditions: K_D = varies with loading, K_S = 1.0, K_T = 1.0, K_H = 1.0.
- CLT is an orthotropic material. Presented values to be used for bending of panels in the major strength axis direction only.
- Spans shown represent distance between the centerlines of supports and are to be used for preliminary design only. For double span panels, spans are assumed to be equal and uniformly loaded across both spans. Pattern loading of double span members has not been considered.
- Span table above includes panel self weight.
- The maximum panel length is 16.0m.
- Criteria for deflection are span/180 under total load with a creep factor of 2.0 and span/240 under snow load only with no creep factor as per CSA O86-19 A.8.5.2. Designer to confirm if these deflection limits are approporiate for the intended use.

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