PRODUCT REPORT®
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Element5 Cross-Laminated Timber
Element5 Limited Partnership

PR-L339(C)
Revised April 18, 2025

Products: Element5 Cross-Laminated Timber
Element5 Limited Partnership, 70 Dennis Road, St. Thomas, Ontario
Canada N5P 0B6
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www.elementfive.co

1. Basis of the product report:
   - 2020 National Building Code of Canada (NBC): Clause 1.2.1.1 of Division A and Clauses 4.1, 4.3.1.1, and 9.23 of Division B
   - CAN/CSA O86-19 Engineering Design in Wood
   - ANSI/APA PRG 320-2019 Standard for Performance-Rated Cross-Laminated Timber
   - ANSI/APA PRG 320-2018 recognized in CSA O86-19
   - PFS TECO Reports No. 20-202, 20-211, 21-031, 21-044, 21-052, 21-053, 21-113, 21-132, 21-504, 21-609, 21-610, 21-689, and 21-690, APA Reports T2023P-06 and T2023P-28, and other qualification data

2. Product description:
   Element5 cross-laminated timber (CLT) is manufactured with laminating lumber in accordance with custom layups approved by APA through product qualification and/or mathematical models using principles of engineering mechanics in accordance with ANSI/APA PRG 320. The laminating lumber shall have Limit States design (LSD) specified strength and modulus of elasticity provided in Table 1. Element5 CLT can be used in floor, roof, and wall applications, and is manufactured with nominal widths up to 3,500 mm (137.8 inches), thicknesses of 78 to 315 mm (3.1 to 12.4 inches), and lengths up to 16 m (52.5 feet).

3. Design properties:
   Element5 CLT shall be designed with the design properties and capacities provided in Table 2. The design value adjustment factors shall be based on CSA O86. The lateral resistance of Element5 CLT, when used as shear walls or diaphragms, depends on the panel-to-panel connection and anchorage designs, and shall be designed in accordance with Clause 11.9 of CSA O86, or consulted with the CLT manufacturer and approved by the engineer of record.

4. Product installation:
   Element5 CLT shall be installed in accordance with the recommendations provided by the manufacturer (www.elementfive.co) and the engineering drawing approved by the engineer of record. Permissible details shall be in accordance with the engineering drawing.

5. Fire-rated assemblies:
   Fire-rated assemblies shall be constructed in accordance with the recommendations provided by the manufacturer (see link above). Procedures specified in Annex B of CSA O86 shall be permitted for use in the fire design of Element5 CLT when approved by the authority having jurisdiction.

6. Limitations:
   a) Element5 CLT shall be designed in accordance with principles of mechanics using the design properties specified in this report or provided by the manufacturer.

b) Element5 CLT shall be limited to dry service conditions where the average equilibrium moisture content of solid-sawn lumber over a year is 15% or less and does not exceed 19%.
c) Design properties for Element5 CLT, when used as beams or lintels with loads applied parallel to the face-bond gluelines, are beyond the scope of this report.
d) Element5 CLT shall be manufactured in compliance with ANSI/APA PRG 320 and documented in Element5's in-plant manufacturing standard approved by APA.
e) Element5 CLT is produced at the Element5 Limited Partnership, St. Thomas, Ontario facility under a quality assurance program audited by APA.
f) This report is subject to re-examination in one year.

7. Identification:
Element5 CLT described in this report is identified by a label bearing the manufacturer's name (Element5) and/or trademark, the APA assigned plant number (1145), the product standard (ANSI/APA PRG 320), the APA logo, the CLT grade and thickness (or layup ID), the report number PR-L339 or PR-L339C, and a means of identifying the date of manufacture.

Table 1. LSD Specified Strengths and Modulus of Elasticity[a] for Lumber Laminations Used in Element5 CLT (for Use in Canada)

CLT Grade	Laminations Used in Major Strength Direction									Laminations Used in Minor Strength Direction								
	Grade & Species	f_b (MPa)	E (MPa)	f_t (MPa)	f_c (MPa)	f_v (MPa)	f_s (MPa)	f_{cp} (MPa)	G	Grade & Species	f_b (MPa)	E (MPa)	f_t (MPa)	f_c (MPa)	f_v (MPa)	f_s (MPa)	f_{cp} (MPa)	G
E1M10 & E1M10.2	2100f-1.8E SPF	30.4	12,400	17.7	19.9	1.5	0.50	6.5	0.47	No. 1/No. 2 SPF	11.8	9,500	5.5	11.5	1.5	0.50	5.3	0.42
E1M12 & E1M12.2	1650f-1.5E SPF	23.9	10,300	11.4	18.1	1.5	0.50	5.3	0.42	No. 1/No. 2 SPF	11.8	9,500	5.5	11.5	1.5	0.50	5.3	0.42
E1M14 & E1M14.1	2100f-1.8E SPF	30.4	12,400	17.7	19.9	1.5	0.50	6.5	0.47	No. 3 SPF	7.0	9,000	3.2	9.0	1.5	0.50	5.3	0.42
E1M15-U[b]	2100f-1.8E SPF[c]	30.4	12,400	17.7	19.9	1.5	0.50	6.5	0.47	No. 1/No. 2 SPF	11.8	9,500	5.5	11.5	1.5	0.50	5.3	0.42
	No. 1/No. 2 SPF	11.8	9,500	5.5	11.5	1.5	0.50	5.3	0.42									
V2 & V2.8	No. 1/No. 2 SPF	11.8	9,500	5.5	11.5	1.5	0.50	5.3	0.42	No. 3 SPF	7.0	9,000	3.2	9.0	1.5	0.50	5.3	0.42
V2M7 & V2M7.2	No. 1/No. 2 SPF	11.8	9,500	5.5	11.5	1.5	0.50	5.3	0.42	No. 1/No. 2 SPF	11.8	9,500	5.5	11.5	1.5	0.50	5.3	0.42

For Imperial: 1 MPa = 145.04 psi

[a] Tabulated values are Limit States design values and not permitted to be increased for the lumber size adjustment factor in accordance with CSA O86. The design values shall be used in conjunction with the section properties provided by the CLT manufacturer based on the actual layup used in manufacturing the CLT panel (see Table 2).

[b] Unbalanced CLT layups.

[c] The 2100-1.8E SPF MSR lumber lamination is used in the outermost layer on the bottom side only of the unbalanced CLT. Other laminations used in the major strength direction are made of No. 1/No. 2 SPF.

Table 2. LSD Stiffness and Unfactored Resistance Values[a,b] for Element5 **Balanced** CLT (for Use in Canada)

CLT Grade[c]	Layup ID	Thick-ness, t_p (mm)	Lamination Thickness (mm) in CLT Layup									Major Strength Direction				Minor Strength Direction			
			=	⊥	=	⊥	=	⊥	=	⊥	=	$(F_bS)_{eff,f,0}$ (10^6 N-mm/m)	$(EI)_{eff,f,0}$ (10^9 N-mm^2/m)	$(GA)_{eff,f,0}$ (10^6 N/m)	$V_{s,0}$ (kN/m)	$(F_bS)_{eff,f,90}$ (10^6 N-mm/m)	$(EI)_{eff,f,90}$ (10^9 N-mm^2/m)	$(GA)_{eff,f,90}$ (10^6 N/m)	$V_{s,90}$ (kN/m)
E1M10	3-ply	105	35	35	35							46	1,153	7.7	35	2.4	34	9.6	12
	5-ply	175	35	35	35	35	35					105	4,416	15	58	21	884	19	35
	5-ply XL	175	35 x 2	35	35 x 2							131	5,495	16	58	2.4	34	11	12
	7-ply	245	35	35	35	35	35	35	35			186	10,922	23	82	48	3,399	29	58
	7-ply XL	245	35 x 2	35	35	35	35 x 2					239	14,074	23	82	21	884	21	35
	9-ply	315	35	35	35	35	35	35	35	35	35	288	21,764	31	105	85	8,428	38	82
	9-ply XL	315	35 x 2	35	35	35	35	35	35 x 2			371	28,024	31	105	48	3,399	30	58
E1M10.2	3-ply	87	35	17	35							32	676	8.2	29	0.57	3.9	5.6	6
	5-ply	139	35	17	35	17	35					75	2,488	16	46	8.2	228	11	23
	7-ply	191	35	17	35	17	35	17	35			133	6,074	24	64	19	908	17	40
	7-ply XL	209	35 x 2	17	35	17	35 x 2					182	9,146	27	70	8.2	228	14	23
	9-ply	243	35	17	35	17	35	17	35	17	35	206	12,030	33	81	33	2,282	23	58
	9-ply XL	261	35 x 2	17	35	17	35	17	35 x 2			275	17,246	35	87	19	908	19	40

Table 2. LSD Stiffness and Unfactored Resistance Values[a,b] for Element5 **Balanced** CLT (for Use in Canada) (Continued)

CLT Grade[c]	Layup ID	Thick-ness, t_p (mm)	Lamination Thickness (mm) in CLT Layup									Major Strength Direction				Minor Strength Direction			
			=	⊥	=	⊥	=	⊥	=	⊥	=	$(F_bS)_{eff,f,0}$ (10^6 N-mm/m)	$(EI)_{eff,f,0}$ (10^9 N-mm^2/m)	$(GA)_{eff,f,0}$ (10^6 N/m)	$V_{s,0}$ (kN/m)	$(F_bS)_{eff,f,90}$ (10^6 N-mm/m)	$(EI)_{eff,f,90}$ (10^9 N-mm^2/m)	$(GA)_{eff,f,90}$ (10^6 N/m)	$V_{s,90}$ (kN/m)
E1M12	3-ply	105	35	35	35							36	958	7.6	35	2.4	34	8.1	12
	5-ply	175	35	35	35	35	35					83	3,673	15	58	21	884	16	35
	7-ply	245	35	35	35	35	35	35	35			146	9,091	23	82	48	3,392	24	58
	9-ply	315	35	35	35	35	35	35	35	35	35	227	18,125	30	105	85	8,403	33	82
E1M12.2	3-ply	87	35	17	35							25	561	7.9	29	0.57	3.9	4.7	6
	5-ply	139	35	17	35	17	35					59	2,068	16	46	8.2	227	9.4	23
	7-ply	191	35	17	35	17	35	17	35			104	5,051	24	64	19	904	14	40
	9-ply	243	35	17	35	17	35	17	35	17	35	162	10,005	32	81	33	2,268	19	58
E1M14	3-ply	105	35	35	35							46	1,153	7.3	35	1.4	32	9.5	12
	5-ply	175	35	35	35	35	35					105	4,414	15	58	12	838	19	35
	7-ply	245	35	35	35	35	35	35	35			186	10,916	22	82	29	3,222	29	58
	9-ply	315	35	35	35	35	35	35	35	35	35	288	21,749	29	105	51	7,992	38	82
E1M14.1	3-ply	87	35	17	35							32	675	7.8	29	0.34	3.7	5.6	6
	5-ply	139	35	17	35	17	35					75	2,487	16	46	4.9	216	11	23
	7-ply	191	35	17	35	17	35	17	35			133	6,073	23	64	11	861	17	40
	9-ply	243	35	17	35	17	35	17	35	17	35	206	12,026	31	81	19	2,166	22	58
V2	3-ply	105	35	35	35							18	884	7.2	35	1.4	32	7.5	12
	5-ply	175	35	35	35	35	35					41	3,388	14	58	12	837	15	35
	7-ply	245	35	35	35	35	35	35	35			72	8,388	22	82	29	3,213	23	58
	9-ply	315	35	35	35	35	35	35	35	35	35	112	16,724	29	105	51	7,958	30	82
	9-ply XL	315	35 x 2	35	35	35	35	35	35 x 2			144	21,490	29	105	29	3,213	24	58
V2.8	3-ply	87	35	17	35							13	518	7.5	29	0.34	3.7	4.4	6
	5-ply	139	35	17	35	17	35					29	1,907	15	46	4.9	215	8.7	23
	7-ply	191	35	17	35	17	35	17	35			52	4,659	22	64	11	856	13	40
	9-ply	243	35	17	35	17	35	17	35	17	35	80	9,230	30	81	19	2,147	17	58
V2M7	3-ply	105	35	35	35							18	884	7.6	35	2.4	34	7.6	12
	5-ply	175	35	35	35	35	35					41	3,390	15	58	21	884	15	35
	5-ply XL	175	35 x 2	35	35 x 2							51	4,210	16	58	2.4	34	8.9	12
	7-ply	245	35	35	35	35	35	35	35			72	8,394	23	82	48	3,390	23	58
	7-ply XL	245	35 x 2	35	35	35	35 x 2					93	10,789	23	82	21	884	16	35
	9-ply	315	35	35	35	35	35	35	35	35	35	112	16,738	30	105	85	8,394	30	82
	9-ply XL	315	35 x 2	35	35	35	35	35	35 x 2			144	21,496	30	105	48	3,390	24	58

Table 2. LSD Stiffness and Unfactored Resistance Values[a,b] for Element5 **Balanced** CLT (for Use in Canada) (Continued)

CLT Grade[c]	Layup ID	Thick-ness, t_p (mm)	Lamination Thickness (mm) in CLT Layup									Major Strength Direction				Minor Strength Direction			
			=	⊥	=	⊥	=	⊥	=	⊥	=	$(F_bS)_{eff,f,0}$ (10^6 N-mm/m)	$(EI)_{eff,f,0}$ (10^9 N-mm²/m)	$(GA)_{eff,f,0}$ (10^6 N/m)	$V_{s,0}$ (kN/m)	$(F_bS)_{eff,f,90}$ (10^6 N-mm/m)	$(EI)_{eff,f,90}$ (10^9 N-mm²/m)	$(GA)_{eff,f,90}$ (10^6 N/m)	$V_{s,90}$ (kN/m)
V2M7.2	3-ply	87	35	17	35							13	518	7.8	29	0.57	3.9	4.4	6
	5-ply	139	35	17	35	17	35					29	1,908	16	46	8.2	227	8.7	23
	7-ply	191	35	17	35	17	35	17	35			52	4,661	23	64	19	902	13	40
	7-ply XL	209	35 x 2	17	35	17	35 x 2					71	7,009	26	70	8.2	227	11	23
	9-ply	243	35	17	35	17	35	17	35	17	35	80	9,234	31	81	32	2,262	17	58
	9-ply XL	261	35 x 2	17	35	17	35	17	35 x 2			107	13,220	33	87	19	902	15	40

For Imperial: 1 mm = 0.0394 in.; 1 m = 3.28 ft; 1 N = 0.2248 lbf

(a) Tabulated values are unfactored Limit States design values and not permitted to be increased for the lumber size adjustment factor in accordance with CSA O86.

(b) Deflection under a specified uniformly distributed load, w, acting perpendicular to the face of a single-span CLT panel shall be permitted to be calculated as a sum of the deflections due to moment and shear effects using the effective bending stiffness, $(EI)_{eff}$, and the effective in-plane (planar) shear rigidity, $(GA)_{eff}$, as follows:

$$\delta = \frac{5wL^4}{384(EI)_{eff}} + \frac{wL^2}{8000(GA)_{eff}} \quad [1]$$

where: δ = estimated deflection, mm; w = uniform load, N/m²;
L = span, m; $(EI)_{eff}$ = tabulated effective bending stiffness, 10^9 N-mm²/m; and
$(GA)_{eff}$ = tabulated effective in-plane (planar) shear rigidity, 10^6 N/m.

For a concentrated load, P, located in the middle of a single span CLT panel acting perpendicular to the panel, the deflection shall be permitted to be calculated as follows:

$$\delta = \frac{PL^3}{48(EI)_{eff}} + \frac{PL}{4000(GA)_{eff}} \quad [2]$$

where: δ = estimated deflection, mm; P = concentrated load, N/m of width;
L = span, m; $(EI)_{eff}$ = tabulated effective bending stiffness, 10^9 N-mm²/m; and
$(GA)_{eff}$ = tabulated effective in-plane (planar) shear rigidity, 10^6 N/m.

(c) The CLT grade and layups are developed based on ANSI/APA PRG 320, as permitted by the standard.

Table 3. LSD Stiffness and Unfactored Resistance Values[a,b] for Element5 **Unbalanced** CLT (for Use in Canada)

CLT Grade[c]	Layup ID	Thick-ness, t_p (mm)	Lamination Thickness (mm) in CLT Layup									Major Strength Direction					Minor Strength Direction			
			=	⊥	=	⊥	=	⊥	=	⊥	=	$(F_bS)^{+}_{eff,f,0}$[d]	$(F_bS)^{-}_{eff,f,0}$[e]	$(EI)_{eff,f,0}$ (10^9 N-mm²/m)	$(GA)_{eff,f,0}$ (10^6 N/m)	$V_{s,0}$ (kN/m)	$(F_bS)_{eff,f,90}$ (10^6 N-mm/m)	$(EI)_{eff,f,90}$ (10^9 N-mm²/m)	$(GA)_{eff,f,90}$ (10^6 N/m)	$V_{s,90}$ (kN/m)
												(10^6 N-mm/m)								
E1M15-U	3-ply	105	35	35	35							44	19	1,002	7.6	35	2.4	34	8.5	12
	5-ply	175	35	35	35	35	35					99	43	3,852	15	58	13	884	16	35
	7-ply	245	35	35	35	35	35	35	35			171	77	9,446	23	82	34	3,390	24	58
	9-ply	315	35	35	35	35	35	35	35	35	35	259	119	18,626	30	105	66	8,394	31	82

For Imperial: 1 mm = 0.0394 in.; 1 m = 3.28 ft; 1 N = 0.2248 lbf

[a] Tabulated values are unfactored Limit States design values and not permitted to be increased for the lumber size adjustment factor in accordance with CSA O86.

[b] Deflection under a specified uniformly distributed load, w, acting perpendicular to the face of a single-span CLT panel shall be permitted to be calculated as a sum of the deflections due to moment and shear effects using the effective bending stiffness, $(EI)_{eff}$, and the effective in-plane (planar) shear rigidity, $(GA)_{eff}$, as shown in Equations 1 and 2 to Table 2.

[c] The CLT grade and layups are developed based on ANSI/APA PRG 320, as permitted by the standard. The unbalanced CLT layups are intended primarily for simple-span applications. The compression side must be stamped with the word "TOP" and shall be installed on the compression (top) side of the simple-span bending member.

[d] The tabulated moment capacity denoted with "+" is the positive bending moment capacity where the outermost layer on the bottom side is stressed in tension.

[e] The tabulated moment capacity denoted with "-" is the negative bending moment capacity where the outermost layer on the bottom side is stressed in compression.

APA – The Engineered Wood Association is an approved national standards developer accredited by American National Standards Institute (ANSI). APA publishes ANSI standards and Voluntary Product Standards for wood structural panels and engineered wood products. APA is an accredited certification body under ISO/IEC 17065 by Standards Council of Canada (SCC), an accredited inspection agency under ISO/IEC 17020 by ANSI National Accreditation Board (ANAB), and an accredited testing organization under ISO/IEC 17025 by ANAB. APA is also an approved Product Certification Agency, Testing Laboratory, Quality Assurance Entity, Validation Entity, and Product Evaluation Entity by the State of Florida, and an approved testing laboratory by City of Los Angeles.

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