APA PRODUCT REPORT®

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OK Laminators CLT PR-L314

OK Laminators, Inc. DBA Mercer Mass Timber Revised January 5, 2024

Products: OK Laminators CLT

OK Laminators, Inc. DBA Mercer Mass Timber, 2176 Government Street, Penticton, British Columbia, Canada V2A 8B5
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1. Basis of the product report:
   - 2021, 2018, and 2015 International Building Code (IBC): Section 2303.1.4 Structural glued cross-laminated timber
   - 2012 IBC: Section 104.11 Alternative materials
   - 2021, 2018, and 2015 International Residential Code (IRC): Sections R502.1.6, R602.1.6, and R802.1.6 Cross-laminated timber
   - 2012 IRC: Section R104.11 Alternative materials
   - ANSI/APA PRG 320-2019 Standard for Performance-Rated Cross-Laminated Timber
   - ANSI/APA PRG 320-2017, PRG 320-2012, and PRG 320-2011 recognized in the 2018 IBC and IRC, 2015 IRC, and 2015 IBC, respectively
   - FPInnovations Reports 301006716, 301007702, and 301010876, UBC Team Reports 2015-06 and 2018-05, APA Reports T2014P-08, T2016P-22, T2020P-19, T2020P-21, T2021P-19, T2021P-24, and T2021P-44, and other qualification data

2. Product description:
   OK Laminators cross-laminated timber (CLT) is manufactured with either spruce-pine-fir (SPF) or Southern pine (SP) lumber in accordance with ANSI/APA PRG 320 or proprietary layup combinations approved by APA through product qualification and/or mathematical models using principles of engineering mechanics. The laminating lumber shall have allowable reference design properties provided in Table 1. The SPF laminations shall be permitted to be replaced by lumber with design properties that are equal to or greater than the corresponding SPF laminations. OK Laminators CLT can be used in floor, roof, and wall applications, and is manufactured with nominal widths of 12 to 120 inches, thicknesses of 3 to 12-3/8 inches, and lengths up to 40 feet.

3. Design properties:
   OK Laminators CLT shall be designed with the allowable design capacities provided in Tables 2 and 3. The design value adjustment factors shall be based on Table 10.3.1. of the 2018 ANSI/AWC National Design Specification (NDS) for Wood Construction. The lateral resistance of OK Laminators 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 Sections 4.4 and 4.5 of the 2021 ANSI/AWC Special Design Provisions for Wind and Seismic (SDPWS), or consulted with the CLT manufacturer and approved by the engineer of record.

4. Product installation:
   OK Laminators CLT shall be installed in accordance with the recommendations provided by the manufacturer 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. Procedures specified in Chapter 16 of the NDS shall be permitted for use in designing OK Laminators CLT for a fire exposure up to 2 hours.

6. Limitations:
   a) OK Laminators CLT shall be designed in accordance with principles of mechanics using the allowable design properties specified in this report or provided by the manufacturer.
   b) OK Laminators CLT shall be limited to dry service conditions where the average equilibrium moisture content of solid-sawn lumber is less than 16%.
   c) Design properties for OK Laminators CLT, when used as beams or lintels with loads applied parallel to the face-bond gluelines, are beyond the scope of this report.
   d) OK Laminators CLT shall be manufactured in accordance with layup combinations specified in ANSI/APA PRG 320 or proprietary OK Laminators CLT manufacturing specifications documented in the in-plant manufacturing standard approved by APA.
   e) OK Laminators CLT is produced at the OK Laminators, Penticton, British Columbia facilities under a quality assurance program audited by APA.
   f) This report is subject to re-examination in one year.

7. Identification:
   OK Laminators CLT described in this report is identified by a label bearing the manufacturer's name (OK Laminators) and/or trademark, the APA assigned plant number (1154), the product standard (ANSI/APA PRG 320), the APA logo, the CLT grade and thickness (or layup ID), the report number PR-L314, and a means of identifying the date of manufacture.

Table 1. ASD Reference Design Values[(a)] for Lumber Laminations Used in OK Laminators CLT (for Use in the U.S.)

CLT Grade	Laminations Used in Major Strength Direction									Laminations Used in Minor Strength Direction								
	Grade & Species	F_b (psi)	E (10^6 psi)	F_t (psi)	F_c (psi)	F_v (psi)	F_s (psi)	$F_{c\perp}$ (psi)	G	Grade & Species	F_b (psi)	E (10^6 psi)	F_t (psi)	F_c (psi)	F_v (psi)	F_s (psi)	$F_{c\perp}$ (psi)	G
E1M3, E1M3.1, & E1M3.2	1650f-1.5E SPF	1,650	1.5	1,020	1,700	135	45	425	0.42	No. 1/No. 2 SPF	875	1.4	450	1,150	135	45	425	0.42
E1M4 & E1M6	2100f-1.8E SPF	2,100	1.8	1,575	1,875	160	50	525	0.46	No. 3 SPF	500	1.2	250	650	135	45	425	0.42
E1M5 & E1M7	2100f-1.8E SPF	2,100	1.8	1,575	1,875	160	50	525	0.46	No. 1/No. 2 SPF	875	1.4	450	1,150	135	45	425	0.42
E4M1	2700f-2.2E SP	2,700	2.2	2,150	2,100	190	60	805	0.57	No. 2 SP	750	1.4	450	1,250	175	55	565	0.55
E4M2	2100f-1.8E SP	2,100	1.8	1,575	1,875	175	55	805	0.57	No. 2 SP	750	1.4	450	1,250	175	55	565	0.55
E4M3 & E4M3.1	2100f-1.8E SP	2,100	1.8	1,575	1,875	175	55	805	0.57	No. 3 SP	450	1.3	250	725	175	55	565	0.55
V2M1, V2M1.1, V2M2, & V2M2.1	No. 1/No. 2 SPF	875	1.4	450	1,150	135	45	425	0.42	No. 1/No. 2 SPF	875	1.4	450	1,150	135	45	425	0.42
V2.1 & V2.1M1	No. 1/No. 2 SPF	875	1.4	450	1,150	135	45	425	0.42	No. 3 SPF	500	1.2	250	650	135	45	425	0.42
V3 & V3.1	No. 2 SP	750	1.4	450	1,250	175	55	565	0.55	No. 3 SP	450	1.3	250	725	175	55	565	0.55
V3M1	No. 2 SP	750	1.4	450	1,250	175	55	565	0.55	No. 2 SP	750	1.4	450	1,250	175	55	565	0.55

For SI: 1 psi = 0.006895 MPa

[(a)] Tabulated values are allowable design values and not permitted to be increased for the lumber size adjustment factor in accordance with the NDS. 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).

Table 2. ASD Reference Design Values[a, b] for OK Laminators CLT Listed in Table 1 (for Use in the U.S.)

CLT Grade[c]	Layup ID[d]	Thick-ness, t_p (in.)	Lamination Thickness (in.) in CLT Layup									Major Strength Direction				Minor Strength Direction			
			=	⊥	=	⊥	=	⊥	=	⊥	=	$(F_bS)_{eff,f,0}$ (lbf-ft/ft)	$(EI)_{eff,f,0}$ (10^6 lbf-in.^{2}/ft)	$(GA)_{eff,f,0}$ (10^6 lbf/ft)	$V_{s,0}$ (lbf/ft)	$(F_bS)_{eff,f,90}$ (lbf-ft/ft)	$(EI)_{eff,f,90}$ (10^6 lbf-in.^{2}/ft)	$(GA)_{eff,f,90}$ (10^6 lbf/ft)	$V_{s,90}$ (lbf/ft)
V2.1[e]	87 V	3.43	1.38	0.67	1.38							1,440	56	0.48	1,230	35	0.36	0.30	240
	139 V	5.47	1.38	0.67	1.38	0.67	1.38					3,325	206	0.96	1,970	540	21	0.60	980
	191 V	7.52	1.38	0.67	1.38	0.67	1.38	0.67	1.38			5,925	503	1.4	2,700	1,220	84	0.91	1,710
	243 V	9.57	1.38	0.67	1.38	0.67	1.38	0.67	1.38	0.67	1.38	9,200	995	1.9	3,450	2,140	210	1.2	2,450
V2M1[e]	99 V	3.90	1.26	1.38	1.26							1,800	79	0.49	1,400	280	3.7	0.52	495
	169 V	6.66	1.26	1.38	1.38	1.38	1.26					4,275	321	1.0	2,400	2,410	96	1.0	1,490
	239 V	9.42	1.26	1.38	1.38	1.38	1.38	1.38	1.26			7,700	818	1.5	3,400	5,550	367	1.6	2,480
	309 V	12.18	1.26	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.26	12,075	1,662	2.1	4,375	9,800	910	2.1	3,475
V2M1.1[e]	105 V	4.14	1.38	1.38	1.38							2,050	96	0.53	1,490	280	3.7	0.53	495
	175 V	6.90	1.38	1.38	1.38	1.38	1.38					4,725	367	1.1	2,480	2,410	96	1.1	1,490
	245 V	9.66	1.38	1.38	1.38	1.38	1.38	1.38	1.38			8,350	910	1.6	3,475	5,550	367	1.6	2,480
	315 V	12.42	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	12,925	1,814	2.1	4,475	9,800	910	2.1	3,475
V2M2[e]	169 V XL	6.66	1.26 + 1.38	1.38	1.38 + 1.26							5,450	409	1.0	2,400	275	3.7	0.61	495
	239 V XL	9.42	1.26 + 1.38	1.38	1.38	1.38	1.38 + 1.26					10,100	1,074	1.5	3,375	2,400	95	1.1	1,490
	309 V XL	12.18	1.26 + 1.38	1.38	1.38	1.38	1.38	1.38	1.38 + 1.26			15,800	2,170	2.0	4,375	5,525	366	1.6	2,480
V2M2.1[e]	175 V XL	6.90	1.38 x 2	1.38	1.38 x 2							5,850	454	1.1	2,480	275	3.7	0.62	495
	245 V XL	9.66	1.38 x 2	1.38	1.38	1.38	1.38 x 2					10,700	1,164	1.6	3,475	2,400	95	1.1	1,490
	315 V XL	12.42	1.38 x 2	1.38	1.38	1.38	1.38	1.38	1.38 x 2			16,550	2,320	2.1	4,475	5,525	366	1.6	2,480
V2.1M1[e]	157 V XL	6.19	1.38 x 2	0.67	1.38 x 2							4,725	330	1.2	2,230	35	0.36	0.43	240
	209 V XL	8.24	1.38 x 2	0.67	1.38	0.67	1.38 x 2					8,150	756	1.6	2,950	540	21	0.73	980
	261 V XL	10.29	1.38 x 2	0.67	1.38	0.67	1.38	0.67	1.38 x 2			12,300	1,426	2.1	3,700	1,220	84	1.0	1,710

Table 2. ASD Reference Design Values[a, b] for OK Laminators CLT Listed in Table 1 (for Use in the U.S.) (continued)

CLT Grade[c]	Layup ID[d]	Thick-ness, t_p (in.)	Lamination Thickness (in.) in CLT Layup									Major Strength Direction				Minor Strength Direction			
			=	⊥	=	⊥	=	⊥	=	⊥	=	$(F_bS)_{eff,f,0}$ (lbf-ft/ft)	$(EI)_{eff,f,0}$ (10^6 lbf-in.^{2}/ft)	$(GA)_{eff,f,0}$ (10^6 lbf/ft)	$V_{s,0}$ (lbf/ft)	$(F_bS)_{eff,f,90}$ (lbf-ft/ft)	$(EI)_{eff,f,90}$ (10^6 lbf-in.^{2}/ft)	$(GA)_{eff,f,90}$ (10^6 lbf/ft)	$V_{s,90}$ (lbf/ft)
V3	105 V	4 1/8	1 3/8	1 3/8	1 3/8							1,740	95	0.49	1,820	140	3.4	0.52	605
	175 V	6 7/8	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8					4,000	363	0.98	3,025	1,230	88	1.0	1,820
	245 V	9 5/8	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8			7,100	899	1.5	4,225	2,825	338	1.6	3,025
	315 V	12 3/8	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8	1 3/8	11,000	1,793	2.0	5,450	5,025	837	2.1	4,225
V3.1	87 V	3.43	1.38	0.67	1.38							1,240	56	0.51	1,510	35	0.39	0.30	295
	139 V	5.47	1.38	0.67	1.38	0.67	1.38					2,850	206	1.0	2,410	485	23	0.61	1,200
	191 V	7.52	1.38	0.67	1.38	0.67	1.38	0.67	1.38			5,075	503	1.5	3,300	1,100	91	0.91	2,100
	243 V	9.57	1.38	0.67	1.38	0.67	1.38	0.67	1.38	0.67	1.38	7,900	996	2.1	4,200	1,920	227	1.2	3,000
V3M1	105 V	4.14	1.38	1.38	1.38							1,750	95	0.53	1,820	235	3.7	0.53	605
	175 V	6.90	1.38	1.38	1.38	1.38	1.38					4,025	366	1.1	3,025	2,060	95	1.1	1,820
	175 V XL	6.90	1.38 x 2	1.38	1.38 x 2							5,000	454	1.1	3,025	235	3.7	0.62	605
	245 V	9.66	1.38	1.38	1.38	1.38	1.38	1.38	1.38			7,125	906	1.6	4,250	4,750	366	1.6	3,025
	245 V XL	9.66	1.38 x 2	1.38	1.38	1.38	1.38 x 2					9,150	1,164	1.6	4,250	2,060	95	1.1	1,820
	315 V	12.42	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	11,050	1,806	2.1	5,450	8,375	906	2.1	4,250
	315 V XL	12.42	1.38 x 2	1.38	1.38	1.38	1.38	1.38	1.38 x 2			14,200	2,320	2.1	5,450	4,750	366	1.6	3,025
E1M3[e]	169 E	6.66	1.26	1.38	1.38	1.38	1.26					8,050	344	1.0	2,400	2,410	96	1.1	1,490
E1M3.1[e]	105 E	4.14	1.38	1.38	1.38							3,875	103	0.53	1,490	280	3.7	0.56	495
	175 E	6.90	1.38	1.38	1.38	1.38	1.38					8,875	393	1.1	2,480	2,410	96	1.1	1,490
	245 E	9.66	1.38	1.38	1.38	1.38	1.38	1.38	1.38			15,725	974	1.6	3,475	5,550	368	1.7	1,480
	315 E	12.42	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	24,375	1,942	2.1	4,475	9,825	911	2.2	3,475
E1M3.2[e]	87 E	3.43	1.38	0.67	1.38							2,725	60	0.55	1,230	65	0.42	0.33	240
	139 E	5.47	1.38	0.67	1.38	0.67	1.38					6,275	220	1.1	1,970	945	25	0.65	980
	191 E	7.52	1.38	0.67	1.38	0.67	1.38	0.67	1.38			11,150	537	1.6	2,700	2,140	98	0.98	1,720
	243 E	9.57	1.38	0.67	1.38	0.67	1.38	0.67	1.38	0.67	1.38	17,350	1,064	2.2	3,450	3,750	245	1.3	2,450
E1M4[e]	87 E	3.43	1.38	0.67	1.38							3,475	72	0.50	1,230	35	0.36	0.38	270
	139 E	5.47	1.38	0.67	1.38	0.67	1.38					7,975	264	0.99	1,970	540	21	0.77	1,090
	191 E	7.52	1.38	0.67	1.38	0.67	1.38	0.67	1.38			14,175	645	1.5	2,700	1,230	84	1.1	1,910
	243 E	9.57	1.38	0.67	1.38	0.67	1.38	0.67	1.38	0.67	1.38	22,075	1,278	2.0	3,450	2,160	212	1.5	2,725

Table 2. ASD Reference Design Values[a, b] for OK Laminators CLT Listed in Table 1 (for Use in the U.S.) (continued)

CLT Grade[c]	Layup ID[d]	Thick-ness, t_p (in.)	Lamination Thickness (in.) in CLT Layup									Major Strength Direction				Minor Strength Direction			
			=	⊥	=	⊥	=	⊥	=	⊥	=	$(F_bS)_{eff,f,0}$ (lbf-ft/ft)	$(EI)_{eff,f,0}$ (10^6 lbf-in.^{2}/ft)	$(GA)_{eff,f,0}$ (10^6 lbf/ft)	$V_{s,0}$ (lbf/ft)	$(F_bS)_{eff,f,90}$ (lbf-ft/ft)	$(EI)_{eff,f,90}$ (10^6 lbf-in.^{2}/ft)	$(GA)_{eff,f,90}$ (10^6 lbf/ft)	$V_{s,90}$ (lbf/ft)
E1M5[e]	105 E	4.14	1.38	1.38	1.38							4,900	123	0.54	1,490	275	3.7	0.66	550
	175 E	6.90	1.38	1.38	1.38	1.38	1.38					11,250	469	1.1	2,480	2,400	95	1.3	1,650
	245 E	9.66	1.38	1.38	1.38	1.38	1.38	1.38	1.38			19,900	1,161	1.6	3,475	5,550	367	2.0	2,750
	315 E	12.42	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	30,850	2,314	2.1	4,475	9,825	909	2.6	3,850
E1M6[e]	157 E XL	6.19	1.38 x 2	0.67	1.38 x 2							11,350	425	1.2	2,230	35	0.36	0.55	270
	209 E XL	8.24	1.38 x 2	0.67	1.38	0.67	1.38 x 2					19,525	972	1.7	2,950	540	21	0.93	1,090
	261 E XL	10.29	1.38 x 2	0.67	1.38	0.67	1.38	0.67	1.38 x 2			29,475	1,833	2.1	3,700	1,230	84	1.3	1,910
E1M7[e]	175 E XL	6.90	1.38 x 2	1.38	1.38 x 2							14,000	584	1.1	2,480	275	3.7	0.79	550
	245 E XL	9.66	1.38 x 2	1.38	1.38	1.38	1.38 x 2					25,625	1,496	1.6	3,475	2,400	95	1.4	1,650
	315 E XL	12.42	1.38 x 2	1.38	1.38	1.38	1.38	1.38	1.38 x 2			39,700	2,979	2.1	4,475	5,550	367	2.1	2,750
E4M1	105 E	4.14	1.38	1.38	1.38							6,300	150	0.54	1,820	235	3.7	0.79	660
	175 E	6.90	1.38	1.38	1.38	1.38	1.38					14,450	573	1.1	3,025	2,060	95	1.6	1,980
	245 E	9.66	1.38	1.38	1.38	1.38	1.38	1.38	1.38			25,525	1,417	1.6	4,250	4,775	368	2.4	3,300
	315 E	12.42	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	39,550	2,821	2.2	5,450	8,450	913	3.1	4,625
E4M2	105 E	4.14	1.38	1.38	1.38							4,900	123	0.54	1,820	235	3.7	0.66	605
	175 E	6.90	1.38	1.38	1.38	1.38	1.38					11,250	469	1.1	3,025	2,060	95	1.3	1,820
	245 E	9.66	1.38	1.38	1.38	1.38	1.38	1.38	1.38			19,900	1,161	1.6	4,250	4,750	367	2.0	3,025
	315 E	12.42	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	30,850	2,314	2.1	5,450	8,425	909	2.6	4,250
E4M3	105 E	4.14	1.38	1.38	1.38							4,900	123	0.50	1,820	140	3.4	0.65	605
	175 E	6.90	1.38	1.38	1.38	1.38	1.38					11,250	469	1.0	3,025	1,240	89	1.3	1,820
	245 E	9.66	1.38	1.38	1.38	1.38	1.38	1.38	1.38			19,875	1,160	1.5	4,250	2,850	341	2.0	3,025
	315 E	12.42	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	30,800	2,312	2.0	5,450	5,050	845	2.6	4,250
E4M3.1	87 E	3.43	1.38	0.67	1.38							3,475	72	0.53	1,510	35	0.39	0.38	295
	139 E	5.47	1.38	0.67	1.38	0.67	1.38					7,975	264	1.1	2,410	485	23	0.77	1,200
	191 E	7.52	1.38	0.67	1.38	0.67	1.38	0.67	1.38			14,200	646	1.6	3,300	1,100	91	1.2	2,100
	243 E	9.57	1.38	0.67	1.38	0.67	1.38	0.67	1.38	0.67	1.38	22,075	1,278	2.1	4,200	1,940	229	1.5	3,000

For SI: 1 in. = 25.4 mm; 1 ft = 304.8 mm; 1 lbf = 4.448N

[a] Tabulated values are allowable design values and not permitted to be increased for the lumber size adjustment factor in accordance with the NDS.

(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:

$$\delta = \frac{22.5wL^4}{(EI)_{eff}} + \frac{9wL^2}{5(GA)_{eff}} \quad [1]$$

where: δ = estimated deflection, inches; w = uniform load, lbf/ft^2;
L = span, feet; $(EI)_{eff}$ = tabulated effective bending stiffness, 10^6 lbf-in.^{2}/ft; and
$(GA)_{eff}$ = tabulated effective in-plane (planar) shear rigidity, 10^6 lbf/ft.

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:

$$\delta = \frac{36PL^3}{(EI)_{eff}} + \frac{18PL}{5(GA)_{eff}} \quad [2]$$

where: δ = estimated deflection, inches; P = concentrated load, lbf/ft of width;
L = span, feet; $(EI)_{eff}$ = tabulated effective bending stiffness, 10^6 lbf-in.^{2}/ft; and
$(GA)_{eff}$ = tabulated effective in-plane (planar) shear rigidity, 10^6 lbf/ft.

(c) The CLT layups are developed based on ANSI/APA PRG 320, as permitted by the standard.
(d) The layup identification (ID) refers to the layup thickness (mm), lamination grade (visual graded or MSR) and series name (e.g. XL).
(e) The SPF laminations shall be permitted to be replaced by lumber with design properties that are equal to or greater than the corresponding SPF laminations.

Table 3. ASD Reference Design Values[a] for In-Plane Shear of OK Laminators CLT (for Use in the U.S.)

CLT Grade	Layup ID	Thickness, t_p (in.)	In-Plane Shear Stress		In-Plane Shear Capacity[b]	
			$F_{v,e,0}$ (psi)	$F_{v,e,90}$ (psi)	$F_{v,e,0}$ t_p (lbf/ft of width)	$F_{v,e,90}$ t_p (lbf/ft of width)
V2.1	87 V	3.43	175	235	7,200	9,700
	139 V	5.47	175[e]	235[e]	11,500[e]	15,400[e]
	191 V	7.52	175[e]	235[e]	15,800[e]	21,200[e]
	243 V	9.57	175[e]	235[e]	20,100[e]	27,000[e]
V2M1	99 V	3.90	175[e]	235[e]	8,200[e]	11,000[e]
	169 V	6.66	175[e]	235[e]	14,000[e]	18,800[e]
	239 V	9.42	175[e]	235[e]	19,800[e]	26,600[e]
	309 V	12.18	175[e]	235[e]	25,600[e]	34,300[e]
V2M1.1	105 V	4.14	195	290	9,700	14,400
	175 V	6.90	270	290[d]	22,400	24,000[d]
	245 V	9.66	270[c]	290[d]	31,300[c]	33,600[d]
	315 V	12.42	270[c]	290[d]	40,200[c]	43,200[d]
V2M2	169 V XL	6.66	175[e]	235[e]	14,000[e]	18,800[e]
	239 V XL	9.42	175[e]	235[e]	19,800[e]	26,600[e]
	309 V XL	12.18	175[e]	235[e]	25,600[e]	34,300[e]
V2M2.1	175 V XL	6.90	175[e]	235[e]	14,500[e]	19,500[e]
	245 V XL	9.66	175[e]	235[e]	20,300[e]	27,200[e]
	315 V XL	12.42	175[e]	235[e]	26,100[e]	35,000[e]
V2.1M1	157 V XL	6.19	175[e]	235[e]	13,000[e]	17,500[e]
	209 V XL	8.24	175[e]	235[e]	17,300[e]	23,200[e]
	261 V XL	10.29	175[e]	235[e]	21,600[e]	29,000[e]
E1M3	169 E	6.66	175[e]	235[e]	14,000[e]	18,800[e]
E1M3.1	105 E	4.14	195[d]	290[d]	9,700[d]	14,400[d]
	175 E	6.90	270[c]	290[d]	22,400[c]	24,000[d]
	245 E	9.66	270[c]	290[d]	31,300[c]	33,600[d]
	315 E	12.42	270[c]	290[d]	40,200[c]	43,200[d]
E1M3.2	87 E	3.43	175[e]	235[e]	7,200[e]	9,700[e]
	139 E	5.47	175[e]	235[e]	11,500[e]	15,400[e]
	191 E	7.52	175[e]	235[e]	15,800[e]	21,200[e]
	243 E	9.57	175[e]	235[e]	20,100[e]	27,000[e]
E1M4	87 E	3.43	175[e]	235[e]	7,200[e]	9,700[e]
	139 E	5.47	175[e]	235[e]	11,500[e]	15,400[e]
	191 E	7.52	175[e]	235[e]	15,800[e]	21,200[e]
	243 E	9.57	175[e]	235[e]	20,100[e]	27,000[e]
E1M5	105 E	4.14	195[d]	290[d]	9,700[d]	14,400[d]
	175 E	6.90	270[c]	290[d]	22,400[c]	24,000[d]
	245 E	9.66	270[c]	290[d]	31,300[c]	33,600[d]
	315 E	12.42	270[c]	290[d]	40,200[c]	43,200[d]
E1M6	157 E XL	6.19	175[e]	235[e]	13,000[e]	17,500[e]
	209 E XL	8.24	175[e]	235[e]	17,300[e]	23,200[e]
	261 E XL	10.29	175[e]	235[e]	21,600[e]	29,000[e]
E1M7	175 E XL	6.90	175[e]	235[e]	14,500[e]	19,500[e]
	245 E XL	9.66	175[e]	235[e]	20,300[e]	27,200[e]
	315 E XL	12.42	175[e]	235[e]	26,100[e]	35,000[e]

For SI: 1 psi = 0.006895 MPa

[a] The tabulated values are allowable design values.
[b] The tabulated values are for the full thickness (t_p) of the CLT. The values shall be reduced when the CLT panel thickness is less than the full thickness.

(c) Based on test results from 175V of V2M1.1.
(d) Based on test results from 105V of V2M1.1.
(e) Based on test results from 87V of V2.1.

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