ICC-ES Evaluation Report

ESR-5363

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Subject to renewal April 2027

DIVISION: 06 00 00—WOOD, PLASTICS AND COMPOSITES Section: 06 17 19 — Cross-laminated Timber	REPORT HOLDER: ARBOREAL SA Arboreal MASS TIMBER BUILDING SOLUTIONS	EVALUATION SUBJECT: CROSS LAMINATED TIMBER	

1.0 EVALUATION SCOPE

1.1 Compliance with the following codes:

- 2024 and 2021 *International Building Code®* (IBC)
- 2024 and 2021 *International Residential Code®* (IRC)
- ANSI/APA PRG 320-2019 Performance Standard for Cross-Laminated Timber

Properties evaluated:

- Structural
- Fire resistance

2.0 USES

Cross Laminated Timber (CLT) by Arboreal is a cross-laminated timber (CLT) panel for use as components in floors, roofs and walls in construction types permitted by the 2024 or 2021 IBC. When CLT panels are installed under the IRC, an engineered design is required in accordance with IRC Section R301.1.3.

3.0 DESCRIPTION

3.1 General:

The Cross Laminated Timber panels described in this evaluation report comply with requirements noted in Section 2303.1.4 of the 2024 and 2021 IBC, for allowable stress design (ASD) in accordance with IBC Section 2302.1(1) and load and resistance factor design (LRFD) in accordance with IBC Section 2302.1(2) .The CLT by Arboreal panels are plane timber building components which are made of at least three laminations of sawn and planed softwood lumber boards. Adjacent laminations are glued at an angle of 90°. The panels can be produced with a width up to 137.7 inches (3,500 mm) and a length of up to 38.7 feet (11,800 mm). The CLT by Arboreal panels are manufactured by face-bonding each layer of lamination using a formaldehyde-free, polyurethane- based structural adhesive, complying with Section 3.2.2 of this evaluation report. The layers are placed in a press to form a dimensionally stable structural element. Refer to Table 2 for the layups of CLT by Arboreal panels.

3.2 Material:

3.2.1 Wood Laminations: Wood laminations used in manufacturing CLT by Arboreal panels must be in accordance with the approved in-plant manufacturing standard. ASD reference design properties for the wood laminations are equivalent to mechanically graded dimension lumber referenced in the NDS. Table 1 lists ASD reference design values for the wood laminations available.

3.2.2 Adhesives: Adhesive used to face-bond layers of CLT and finger-joints of wood laminations by Arboreal panels is non-formaldehyde based, exterior-type structural adhesive, conforming to ANSI/APA PRG 320-2019 and the product specifications in the approved quality documentation.

4.0 DESIGN AND INSTALLATION

4.1 General:

Design and installation of CLT by Arboreal panels must be in accordance with this evaluation report, the applicable code provisions and the manufacturer's published design and installation instructions. The manufacturer's design and installation instructions must be available at the jobsite at all times during installation. The requirements specified for allowable stress design in accordance with 2024 and 2021 IBC Section 2302.1(1) and Chapter 10 of the NDS, are applicable to CLT by Arboreal.

4.2 Reference Design Values:

Table 3 references design values for bending capacities CLT panels by Arboreal. The reference design values in Table 3 are intended for allowable stress design (ASD) and must be adjusted in accordance with Section 4.3 of this evaluation report.

4.3 Adjustment Factors:

The reference design values in Table 3 must be adjusted using the adjustment factors specified in Table 10.3.1 of the NDS. The reference design values in Table 3 must not be increased for the lumber size adjustment factor in accordance with NDS. The time dependent deformation (creep) factor, K_{cr}, of 2.0, as specified in Section 3.5.2 of the NDS must be used to calculate the total deflection due to long-term loading for Arboreal CLT panels used as components in floors and roofs under dry service conditions where the moisture content in lumber in service is less than 16 percent, as in most covered structures.

4.4 Fire Resistance:

When fire resistance is required, the fire resistance rating (FRR) of the Arboreal CLT panels must be determined by calculation in accordance with Chapter 16 of the NDS. As an alternative to the NDS calculation, the Arboreal CLT panels shall be permitted to be tested in accordance with ASTM E119 or UL 263 and must be rated for fire resistance in accordance with the test results and conditions of such tests, and such tests must be submitted to the code official for approval and are outside the scope of this evaluation report.

5.0 CONDITIONS OF USE:

The Arboreal CLT described in this report complies with, or is a suitable alternative to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 Fabrication, design, and installation must comply with this evaluation report and the manufacturer's published design/installation instructions. In the event of a conflict between the manufacturer's published design/installation instructions and this evaluation report, the most restrictive one governs.

5.2 Use of Arboreal CLT panels must be limited to dry service conditions where the moisture content in lumber in service is less than 16 percent, as in most covered structures.

5.3 Arboreal CLT panels may be used as components in walls, floors and roofs under the IRC when an engineered design is submitted in accordance with Section R301.1.3.

5.4 Calculations and drawings demonstrating compliance with this evaluation report must be submitted to the code official. The calculations and drawings must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

5.5 Connections of Arboreal CLT panels used as components in walls, floors and roofs must be designed by a registered design professional in accordance with the NDS or proprietary connectors and fasteners recognized in an ICC-ES Evaluation Report. Connectors and fasteners must be specified to include size, length, dimension, fastener bearing length and location.

5.6 Arboreal CLT panels used to resist out-of-plane transverse forces in walls must be accompanied by complete detailing and wall design that are acceptable to the code official.

5.7 Arboreal CLT panels used to resist in-plane forces is outside the scope of this evaluation report.

5.8 Cutting, drilling, and notching of Arboreal CLT panels when used as components in walls, floors and roofs have not been evaluated and are outside the scope of this evaluation report.

5.9 Design properties for Arboreal CLT panels, when used as beams or lintels with loads applied parallel to the face-bond gluelines, are outside the scope of this evaluation report.

5.10 Arboreal CLT panel roofs must be covered with approved roof coverings secured to the building or structure in accordance with applicable provisions of IBC Chapter 15.

5.11 The special inspection shall be conducted in accordance with the applicable requirements of Sections 1704 and 1705 of the IBC.

5.12 Arboreal CLT panels are manufactured under an approved quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Cross-laminated Timber Panels for Use as Components in Walls, Floors and Roofs (AC455), approved October 2022 (Editorially revised June 2024).

7.0 IDENTIFICATION

7.1 The ICC-ES mark of conformity, electronic labeling, or the evaluation report number (ICC-ES ESR-5363) along with the name, registered trademark, or registered logo of the report holder must be included in the product label.

7.2 Additionally, Arboreal CLT panels are identified with labels noting material code consisting of layup (first layer orientation, number of layers, subsequent layer orientation), panel thickness, strength grade configuration, and visual classification; dimensions; project identification number; pressing date and time; adhesive; species; QC results; and a section indicating the standard PRG-320.

7.3 The report holder's contact information is the following:

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TABLE 1—ASD REFERENCE DESIGN VALUES FOR LUMBER LAMINATIONS USED IN ARBORAL CLT PANELS

LAMINATION GRADE	EQUIVALENT MSR LUMBER	ASD LAMINATIONS DESIGN VALUES							
		F_b (psi)	E (10^6 psi)	F_t (psi)	F_c (psi)	F_v (psi)	F_s (psi)	$F_{c\perp}$ (psi)	G
E1.0	900f-1.0E	900	1.0	350	1050	160	50	300	0.35
E1.4	1,500f-1.4E	1,500	1.4	900	1,650	165	55	445	0.41
E1.5	1,650f-1.5E	1,650	1.5	1,020	1,700	175	55	465	0.42

For **SI**: 1 psi = 6,895 Pa

[1]Tabulated values are reference design values intended for Allowable Stress Design (ASD) and must be adjusted in accordance with Table 4.3.1 of the 2024 or 2018 NDS, as applicable, except that the lumber size adjustment factor (C_F) must not be applied. 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—ARBOREAL CLT PANEL LAYUPS

LAYUP[1]	THICKNESS t_p[2]	Units	LAMINATION ACTUAL THICKNESS[3]						
			∥	⊥	∥	⊥	∥	⊥	∥
ARB-L3s-93	3.66	in.	1.38	0.91	1.38				
	93	mm	35	23	35				
ARB-L3s-105	4.13	in.	1.38	1.38	1.38				
	105	mm	35	35	35				
ARB-L3s-115	4.53	in.	1.38	1.77	1.38				
	115	mm	35	45	35				
ARB-L3s-125	4.92	in.	1.77	1.38	1.77				
	125	mm	45	35	45				
ARB-L5s-115	4.53	in.	0.91	0.91	0.91	0.91	0.91		
	115	mm	23	23	23	23	23		
ARB-L5s-127	5	in.	0.91	0.91	1.38	0.91	0.91		
	127	mm	23	23	35	23	23		
ARB-L5s-139	5.47	in.	1.38	0.91	0.91	0.91	1.38		
	139	mm	35	23	23	23	35		
ARB-L5s-151	5.94	in.	1.38	0.91	1.38	0.91	1.38		
	151	mm	35	23	35	23	35		
ARB-L5s-163	6.42	in.	1.38	1.38	0.91	1.38	1.38		
	163	mm	35	35	23	35	35		
ARB-L5s-175	6.89	in.	1.38	1.38	1.38	1.38	1.38		
	175	mm	35	35	35	35	35		
ARB-L5s-195	7.68	in.	1.77	1.38	1.38	1.38	1.77		
	195	mm	45	35	35	35	45		
ARB-L5s-215	8.46	in.	1.77	1.77	1.38	1.77	1.77		
	215	mm	45	45	35	45	45		
ARB-L5d-139	5.48	in.	1.38 + 0.91	0.91	0.91 + 1.38				
	139	mm	35 + 23	23	23 + 35				
ARB-L5d-151	5.95	in.	1.38 + 0.91	1.38	0.91 + 1.38				
	151	mm	35 + 23	35	23 + 35				
ARB-L5d-163	6.42	in.	1.38 + 1.38	0.91	1.38 + 1.38				
	163	mm	35 + 35	23	35 + 35				
ARB-L5d-175	7.68	in.	1.38 + 1.38	1.38	1.38 + 1.38				
	195	mm	35 + 35	35	35 + 35				
ARB-L5d-195	7.68	in.	1.77 + 1.38	1.38	1.38 + 1.77				
	195	mm	45 + 35	35	35 + 45				
ARB-L5d-215	8.47	in.	1.77 + 1.77	1.38	1.77 + 1.77				
	215	mm	45 + 45	35	45 + 45				
ARB-L7s-173	6.82	in.	0.91	0.91	0.91	1.38	0.91	0.91	0.91
	173	mm	23	23	23	35	23	23	23
ARB-L7s-233	9.18	in.	1.38	1.38	1.38	0.91	1.38	1.38	1.38
	233	mm	35	35	35	23	35	35	35
ARB-L7s-255	10.04	in.	1.38	1.38	1.38	1.77	1.38	1.38	1.38
	255	mm	35	35	35	45	35	35	35
ARB-L7s-275	10.83	in.	1.77	1.38	1.38	1.77	1.38	1.38	1.77
	275	mm	45	35	35	45	35	35	45
ARB-L7s-295	11.61	in.	1.77	1.77	1.38	1.77	1.38	1.77	1.77
	295	mm	45	45	35	45	35	45	45
ARB-L7s-315	12.4	in.	1.77	1.77	1.77	1.77	1.77	1.77	1.77
	315	mm	45	45	45	45	45	45	45
ARB-L7d-205	8.08	in.	1.77 + 0.91	0.91	0.91	0.91	0.91 + 1.77		
	205	mm	45 + 23	23	23	23	23 + 45		
ARB-L7d-233	9.18	in.	1.38 + 1.38	1.38	0.91	1.38	1.38 + 1.38		
	233	mm	35 + 35	35	23	35	35 + 35		
ARB-L7d-255	10.04	in.	1.38 + 1.38	1.38	1.77	1.38	1.38 + 1.38		
	255	mm	35 + 35	35	45	35	35 + 35		
ARB-L7d-275	10.83	in.	1.77 + 1.38	1.38	1.77	1.38	1.38 + 1.77		
	275	mm	45 +35	35	45	35	35 + 45		
ARB-L7d-295	11.62	in.	1.77 + 1.77	1.38	1.77	1.38	1.77 + 1.77		
	295	mm	45 + 45	35	45	35	45 + 45		
ARB-L7d-315	12.4	in.	1.77 + 1.77	1.77	1.77	1.77	1.77 + 1.77		
	315	mm	45 + 45	45	45	45	45 + 45		

For **SI**: 1 in. = 25.4 mm.

[1]The CLT layups are developed based on the 2019 ANSI/APA PRG 320, using machine stress rated (MSR) sawn lumber noted in Section 3.2.1 of the evaluation report. The layup designation refers to the number of layers, top and bottom layers configuration ("s" for single outermost layers or "d" for outermost parallel layers), and thickness (expressed in mm).

[2]Gross thickness of CLT panels.

[3]Actual thickness of lamination after planning. "∥": Face laminations are oriented parallel to the major strength direction and "⊥": Face laminations are oriented perpendicular to the major strength direction.

TABLE 3—ASD REFERENCE DESIGN VALUES FOR ARBOREAL CLT PANELS[1]

LAYUP[2]	LAMINATIONS STRENGTH CLASS	MAJOR STRENGTH DIRECTION				MINOR STRENGTH DIRECTION			
		$(F_bS)_{eff,f,0}$	$(EI)_{eff,f,0}$	$(GA)_{eff,f,0}$	$V_{s,0}$	$(F_bS)_{eff,f,90}$	$(EI)_{eff,f,90}$	$(GA)_{eff,f,90}$	$V_{s,90}$
		(lb_f-ft/ft)	(x10^6 lb_f-in.^{2}/ft)	(x10^6 lb_f/ft)	(lb_f/ft)	(lb_f-ft/ft)	(x10^6 lb_f-in.^{2}/ft)	(x10^6 lb_f/ft)	(lb_f/ft)
ARB-L3s-93	E1.4-E1.0-E1.4	2,807	67.70	0.39	1,465	123	0.74	0.36	398
	E1.4-E1.4-E1.4	2,807	67.71	0.52	1,611	205	1.04	0.37	398
	E1.5-E1.0-E1.5	3,087	72.54	0.39	1,465	123	0.74	0.39	398
	E1.5-E1.5-E1.5	3,088	72.55	0.56	1,611	225	1.11	0.40	398
ARB-L3s-105	E1.4-E1.0-E1.4	3,500	95.32	0.39	1,654	285	2.62	0.51	606
	E1.4-E1.4-E1.4	3,501	95.36	0.53	1,819	475	3.66	0.53	606
	E1.5-E1.0-E1.5	3,850	102.13	0.39	1,654	285	2.62	0.54	606
	E1.5-E1.5-E1.5	3,851	102.17	0.56	1,819	522	3.92	0.56	606
ARB-L3s-115	E1.4-E1.0-E1.4	4,101	122.33	0.40	1,811	471	5.56	0.64	780
	E1.4-E1.4-E1.4	4,104	122.41	0.55	1,992	785	7.79	0.67	780
	E1.5-E1.0-E1.5	4,511	131.06	0.40	1,811	471	5.56	0.68	780
	E1.5-E1.5-E1.5	4,514	131.15	0.58	1,992	863	8.34	0.72	780
ARB-L3s-125	E1.4-E1.0-E1.4	5,036	163.29	0.49	1,969	285	2.62	0.53	606
	E1.4-E1.4-E1.4	5,037	163.32	0.67	2,165	475	3.66	0.55	606
	E1.5-E1.0-E1.5	5,540	174.94	0.50	1,969	285	2.62	0.56	606
	E1.5-E1.5-E1.5	5,541	174.99	0.72	2,165	522	3.92	0.58	606
ARB-L5s-115	E1.4-E1.0-E1.0-E1.0-E1.4	3,462	103.25	0.50	1,811	1,067	19.33	0.57	1,087
	E1.4-E1.4-E1.4-E1.4-E1.4	3,480	103.81	0.69	1,992	1,779	27.06	0.69	1,195
	E1.5-E1.0-E1.0-E1.0-E1.5	3,804	110.53	0.50	1,811	1,067	19.33	0.58	1,087
	E1.5-E1.5-E1.5-E1.5-E1.5	3,828	111.22	0.74	1,992	1,957	28.99	0.74	1,195
ARB-L5s-127	E1.4-E1.0-E1.0-E1.0-E1.4	4,044	133.21	0.62	2,000	1,406	29.90	0.57	1,276
	E1.4-E1.4-E1.4-E1.4-E1.4	4,088	134.65	0.86	2,200	2,344	41.86	0.71	1,403
	E1.5-E1.0-E1.0-E1.0-E1.5	4,440	142.46	0.63	2,000	1,406	29.90	0.58	1,276
	E1.5-E1.5-E1.5-E1.5-E1.5	4,496	144.27	0.92	2,200	2,579	44.85	0.77	1,403
ARB-L5s-139	E1.4-E1.0-E1.0-E1.0-E1.4	5,624	202.76	0.63	2,189	1,067	19.33	0.61	1,087
	E1.4-E1.4-E1.4-E1.4-E1.4	5,639	203.32	0.86	2,408	1,779	27.06	0.71	1,195
	E1.5-E1.0-E1.0-E1.0-E1.5	6,183	217.15	0.63	2,189	1,067	19.33	0.63	1,087
	E1.5-E1.5-E1.5-E1.5-E1.5	6,203	217.84	0.92	2,408	1,957	28.99	0.77	1,195
ARB-L5s-151	E1.4-E1.0-E1.0-E1.0-E1.4	6,443	252.35	0.76	2,378	1,406	29.90	0.62	1,276
	E1.4-E1.4-E1.4-E1.4-E1.4	6,480	253.79	1.05	2,616	2,344	41.86	0.75	1,403
	E1.5-E1.0-E1.0-E1.0-E1.5	7,081	270.12	0.77	2,378	1,406	29.90	0.63	1,276
	E1.5-E1.5-E1.5-E1.5-E1.5	7,128	271.92	1.12	2,616	2,579	44.85	0.80	1,403
ARB-L5s-163	E1.4-E1.0-E1.0-E1.0-E1.4	7,181	303.62	0.65	2,567	1,981	48.37	0.88	1,465
	E1.4-E1.4-E1.4-E1.4-E1.4	7,204	304.57	0.89	2,824	3,302	67.71	1.04	1,611
	E1.5-E1.0-E1.0-E1.0-E1.5	7,896	325.14	0.65	2,567	1,981	48.37	0.91	1,465
	E1.5-E1.5-E1.5-E1.5-E1.5	7,924	326.32	0.96	2,824	3,633	72.55	1.12	1,611
ARB-L5s-175	E1.4-E1.0-E1.0-E1.0-E1.4	8,016	363.85	0.76	2,756	2,472	68.11	0.86	1,654
	E1.4-E1.4-E1.4-E1.4-E1.4	8,059	365.81	1.05	3,031	4,119	95.36	1.05	1,819
	E1.5-E1.0-E1.0-E1.0-E1.5	8,810	389.49	0.76	2,756	2,472	68.11	0.89	1,654
	E1.5-E1.5-E1.5-E1.5-E1.5	8,865	391.94	1.13	3,031	4,531	102.17	1.13	1,819
ARB-L5s-195	E1.4-E1.0-E1.0-E1.0-E1.4	10,666	539.46	0.87	3,071	2,472	68.11	0.90	1,654
	E1.4-E1.4-E1.4-E1.4-E1.4	10,704	541.41	1.19	3,378	4,119	95.36	1.07	1,819
	E1.5-E1.0-E1.0-E1.0-E1.5	11,725	577.65	0.87	3,071	2,472	68.11	0.92	1,654
	E1.5-E1.5-E1.5-E1.5-E1.5	11,775	580.09	1.28	3,378	4,531	102.17	1.15	1,819
ARB-L5s-215	E1.4-E1.0-E1.0-E1.0-E1.4	12,350	688.71	0.88	3,386	3,556	116.66	1.12	1,969
	E1.4-E1.4-E1.4-E1.4-E1.4	12,396	691.31	1.22	3,724	5,926	163.32	1.34	2,165
	E1.5-E1.0-E1.0-E1.0-E1.5	13,576	737.44	0.88	3,386	3,556	116.66	1.15	1,969
	E1.5-E1.5-E1.5-E1.5-E1.5	13,636	740.69	1.31	3,724	6,519	174.99	1.44	2,165
ARB-L5d-139	E1.4-E1.0-E1.4	6,336	228.43	0.71	2,189	123	0.74	0.44	398
	E1.4-E1.4-E1.4	6,336	228.44	0.94	2,408	205	1.04	0.45	398
	E1.5-E1.0-E1.5	6,969	244.74	0.72	2,189	123	0.74	0.47	398
	E1.5-E1.5-E1.5	6,970	244.75	1.01	2,408	225	1.11	0.48	398
ARB-L5d-151	E1.4-E1.0-E1.4	7,419	290.57	0.65	2,378	285	2.62	0.57	606
	E1.4-E1.4-E1.4	7,420	290.60	0.88	2,616	475	3.66	0.58	606
	E1.5-E1.0-E1.5	8,161	311.32	0.66	2,378	285	2.62	0.61	606
	E1.5-E1.5-E1.5	8,162	311.36	0.94	2,616	522	3.92	0.62	606
ARB-L5d-163	E1.4-E1.0-E1.4	8,727	368.98	0.91	2,567	123	0.74	0.49	398
	E1.4-E1.4-E1.4	8,727	368.98	1.19	2,824	205	1.04	0.49	398
	E1.5-E1.0-E1.5	9,600	395.33	0.92	2,567	123	0.74	0.52	398
	E1.5-E1.5-E1.5	9,600	395.34	1.28	2,824	225	1.11	0.53	398
ARB-L5d-175	E1.4-E1.0-E1.4	10,008	454.29	0.81	2,756	285	2.62	0.61	606
	E1.4-E1.4-E1.4	10,009	454.33	1.09	3,031	475	3.66	0.62	606
	E1.5-E1.0-E1.5	11,009	486.74	0.82	2,756	285	2.62	0.65	606
	E1.5-E1.5-E1.5	11,010	486.78	1.16	3,031	522	3.92	0.66	606
ARB-L5d-195	E1.4-E1.0-E1.4	12,454	629.90	0.96	3,071	285	2.62	0.64	606
	E1.4-E1.4-E1.4	12,455	629.94	1.27	3,378	475	3.66	0.65	606
	E1.5-E1.0-E1.5	13,699	674.89	0.97	3,071	285	2.62	0.69	606
	E1.5-E1.5-E1.5	13,700	674.93	1.36	3,378	522	3.92	0.70	606

TABLE 3—ASD REFERENCE DESIGN VALUES FOR ARBOREAL CLT PANELS[1] (Continued)

LAYUP[2]	LAMINATIONS STRENGTH CLASS	MAJOR STRENGTH DIRECTION				MINOR STRENGTH DIRECTION			
		$(F_bS)_{eff,f,0}$	$(EI)_{eff,f,0}$	$(GA)_{eff,f,0}$	$V_{s,0}$	$(F_bS)_{eff,f,90}$	$(EI)_{eff,f,90}$	$(GA)_{eff,f,90}$	$V_{s,90}$
		(lb_f-ft/ft)	(x10^6 lb_f-in.^{2}/ft)	(x10^6 lb_f/ft)	(lb_f/ft)	(lb_f-ft/ft)	(x10^6 lb_f-in.^{2}/ft)	(x10^6 lb_f/ft)	(lb_f/ft)
ARB-L5d-215	E1.4-E1.0-E1.4	15,161	845.49	1.11	3,386	285	2.62	0.68	606
	E1.4-E1.4-E1.4	15,162	845.53	1.47	3,724	475	3.66	0.69	606
	E1.5-E1.0-E1.5	16,677	905.88	1.13	3,386	285	2.62	0.73	606
	E1.5-E1.5-E1.5	16,678	905.92	1.57	3,724	522	3.92	0.74	606
ARB-L7s-173	E1.4-E1.0-E1.0-E1.0-E1.0-E1.4	6,693	300.34	0.76	2,724	2,885	96.18	0.94	2,000
	E1.4-E1.4-E1.4-E1.4-E1.4-E1.4	6,987	313.53	1.06	2,997	4,809	134.65	1.21	2,200
	E1.5-E1.0-E1.0-E1.0-E1.0-E1.5	7,308	319.43	0.76	2,724	2,885	96.18	0.96	2,000
	E1.5-E1.5-E1.5-E1.5-E1.5-E1.5	7,686	335.93	1.13	2,997	5,290	144.27	1.29	2,200
ARB-L7s-233	E1.4-E1.0-E1.0-E1.0-E1.0-E1.4	12,678	766.22	1.13	3,669	5,085	217.55	1.11	2,567
	E1.4-E1.4-E1.4-E1.4-E1.4-E1.4	13,046	788.44	1.57	4,036	8,475	304.57	1.42	2,824
	E1.5-E1.0-E1.0-E1.0-E1.0-E1.5	13,879	816.99	1.13	3,669	5,085	217.55	1.13	2,567
	E1.5-E1.5-E1.5-E1.5-E1.5-E1.5	14,351	844.76	1.68	4,036	9,323	326.32	1.52	2,824
ARB-L7s-255	E1.4-E1.0-E1.0-E1.0-E1.0-E1.4	14,709	972.89	1.15	4,016	6,220	302.04	1.34	2,913
	E1.4-E1.4-E1.4-E1.4-E1.4-E1.4	15,297	1,011.78	1.59	4,417	10,367	422.85	1.72	3,205
	E1.5-E1.0-E1.0-E1.0-E1.0-E1.5	16,072	1,035.44	1.15	4,016	6,220	302.04	1.36	2,913
	E1.5-E1.5-E1.5-E1.5-E1.5-E1.5	16,827	1,084.05	1.71	4,417	11,404	453.06	1.84	3,205
ARB-L7s-275	E1.4-E1.0-E1.0-E1.0-E1.0-E1.4	18,688	1,333.03	1.25	4,331	6,220	302.04	1.37	2,913
	E1.4-E1.4-E1.4-E1.4-E1.4-E1.4	19,234	1,371.92	1.73	4,764	10,367	422.85	1.73	3,205
	E1.5-E1.0-E1.0-E1.0-E1.0-E1.5	20,457	1,421.31	1.25	4,331	6,220	302.04	1.40	2,913
	E1.5-E1.5-E1.5-E1.5-E1.5-E1.5	21,157	1,469.92	1.85	4,764	11,404	453.06	1.85	3,205
ARB-L7s-295	E1.4-E1.0-E1.0-E1.0-E1.0-E1.4	20,376	1,559.12	1.27	4,646	8,203	441.39	1.60	3,228
	E1.4-E1.4-E1.4-E1.4-E1.4-E1.4	20,909	1,599.87	1.76	5,110	13,672	617.94	2.01	3,551
	E1.5-E1.0-E1.0-E1.0-E1.0-E1.5	22,316	1,663.21	1.27	4,646	8,203	441.39	1.63	3,228
	E1.5-E1.5-E1.5-E1.5-E1.5-E1.5	23,000	1,714.14	1.89	5,110	15,039	662.08	2.15	3,551
ARB-L7s-315	E1.4-E1.0-E1.0-E1.0-E1.0-E1.4	22,766	1,860.08	1.46	4,961	9,404	555.34	1.59	3,543
	E1.4-E1.4-E1.4-E1.4-E1.4-E1.4	23,564	1,925.26	2.03	5,457	15,673	777.47	2.03	3,898
	E1.5-E1.0-E1.0-E1.0-E1.0-E1.5	24,896	1,981.31	1.46	4,961	9,404	555.34	1.61	3,543
	E1.5-E1.5-E1.5-E1.5-E1.5-E1.5	25,920	2,062.77	2.17	5,457	17,240	833.01	2.17	3,898
ARB-L7d-205	E1.4-E1.0-E1.0-E1.0-E1.4	13,340	709.34	1.04	3,228	1,067	19.33	0.73	1,087
	E1.4-E1.4-E1.4-E1.4-E1.4	13,351	709.89	1.41	3,551	1,779	27.06	0.81	1,195
	E1.5-E1.0-E1.0-E1.0-E1.5	14,672	759.91	1.05	3,228	1,067	19.33	0.76	1,087
	E1.5-E1.5-E1.5-E1.5-E1.5	14,686	760.60	1.51	3,551	1,957	28.99	0.87	1,195
ARB-L7d-233	E1.4-E1.0-E1.0-E1.0-E1.4	16,783	1,014.31	1.01	3,669	1,981	48.37	0.98	1,465
	E1.4-E1.4-E1.4-E1.4-E1.4	16,799	1,015.25	1.39	4,036	3,302	67.71	1.10	1,611
	E1.5-E1.0-E1.0-E1.0-E1.5	18,459	1,086.59	1.02	3,669	1,981	48.37	1.02	1,465
	E1.5-E1.5-E1.5-E1.5-E1.5	18,479	1,087.77	1.48	4,036	3,633	72.55	1.18	1,611
ARB-L7d-255	E1.4-E1.0-E1.0-E1.0-E1.4	19,581	1,295.14	1.27	4,016	2,897	87.43	0.99	1,811
	E1.4-E1.4-E1.4-E1.4-E1.4	19,632	1,298.52	1.74	4,417	4,828	122.41	1.16	1,992
	E1.5-E1.0-E1.0-E1.0-E1.5	21,530	1,387.04	1.28	4,016	2,897	87.43	1.02	1,811
	E1.5-E1.5-E1.5-E1.5-E1.5	21,596	1,391.28	1.86	4,417	5,311	131.15	1.24	1,992
ARB-L7d-275	E1.4-E1.0-E1.0-E1.0-E1.4	23,206	1,655.28	1.40	4,331	2,897	87.43	1.03	1,811
	E1.4-E1.4-E1.4-E1.4-E1.4	23,254	1,658.67	1.91	4,764	4,828	122.41	1.19	1,992
	E1.5-E1.0-E1.0-E1.0-E1.5	25,518	1,772.91	1.41	4,331	2,897	87.43	1.07	1,811
	E1.5-E1.5-E1.5-E1.5-E1.5	25,579	1,777.14	2.04	4,764	5,311	131.15	1.28	1,992
ARB-L7d-295	E1.4-E1.0-E1.0-E1.0-E1.4	27,077	2,071.81	1.53	4,646	2,897	87.43	1.07	1,811
	E1.4-E1.4-E1.4-E1.4-E1.4	27,121	2,075.20	2.08	5,110	4,828	122.41	1.22	1,992
	E1.5-E1.0-E1.0-E1.0-E1.5	29,776	2,219.19	1.54	4,646	2,897	87.43	1.11	1,811
	E1.5-E1.5-E1.5-E1.5-E1.5	29,833	2,223.43	2.23	5,110	5,311	131.15	1.31	1,992
ARB-L7d-315	E1.4-E1.0-E1.0-E1.0-E1.4	30,237	2,470.47	1.48	4,961	4,086	144.77	1.26	2,126
	E1.4-E1.4-E1.4-E1.4-E1.4	30,288	2,474.63	2.02	5,457	6,809	202.67	1.45	2,339
	E1.5-E1.0-E1.0-E1.0-E1.5	33,251	2,646.19	1.49	4,961	4,086	144.77	1.31	2,126
	E1.5-E1.5-E1.5-E1.5-E1.5	33,316	2,651.38	2.17	5,457	7,490	217.15	1.56	2,339

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

[1]The tabulated values are reference design values intended for ASD and must be adjusted in accordance with Section 4.3.

[2]The CLT layups are developed based on the 2019 ANSI/APA PRG 320, using machine stress rated (MSR) sawn lumber noted in Section 3.2.1 of the evaluation report. The layup designation refers to the number of layers, top and bottom layers configuration ("s" for single outermost layers or "d" for outermost parallel layers), and thickness (expressed in mm).