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www.icc-es.org

Business/Regional Office ■ 5360 Workman Mill Road, Whittier, California 90601 ■ (562) 699-0543
Regional Office ■ 900 Montclair Road, Suite A, Birmingham, Alabama 35213 ■ (205) 599-9800
Regional Office ■ 4051 West Flossmoor Road, Country Club Hills, Illinois 60478 ■ (708) 799-2305

Legacy report on the 1997 Uniform Building Code™

DIVISION: 06—WOOD AND PLASTICS
Section: 06170—Prefabricated Structural Wood

SHELTON LOCK-DECK LAMINATED DECKING

SHELTON LAM & DECK
192 DOWNIE ROAD
CHEHALIS, WASHINGTON 98532

1.0 SUBJECT

Shelton Lock-Deck Laminated Decking.

2.0 DESCRIPTION

2.1 General:

Lock-Deck is a glued-laminated decking constructed of kiln-dried lumber graded in accordance with grading rules developed by Shelton Lam & Deck.

The product is available in nominal thicknesses from 3 to 5 inches (76 to 127 mm). Actual final thickness, thicknesses of the layers, and section properties corresponding to a 12-inch-wide (305 mm) section are given in Table 1.

The minimum of three laminations are offset 3/4 inch (19.1 mm) to form a tongue-and-groove interlocking effect along the sides and ends of the individual deck planks. Each decking plank shall be nailed with two nails to each support, using 20-penny common nails for the 3-inch-thick (76 mm), 30-penny common nails for the 3-inch (76 mm) super-thick and 4-inch-thick (102 mm), and 50-penny common nails for the 5-inch-thick (127 mm) decks. Each course of the decking shall be secured by slant-face nailing to the adjacent courses with 8-penny common nails for the 3-inch (76 mm) decks and 16-penny common nails for the 4-inch (102 mm) and 5-inch (127 mm) decks. The nails shall be spaced at 30 inches (762 mm) on center, with nailing in alternate courses offset 15 inches (381 mm). Additional nailing shall be required where the regularly spaced nails do not provide a nail within 12 inches (305 mm) of each side of each end joint.

2.2 Materials:

The decking is permitted to be manufactured from a single species or combination of species listed under Section 2.3 of this report. The material (lamination) is kiln-dried and surfaced prior to grading by Western Wood Products Association-certified graders.

The following general rules apply for all Lock-Deck:

- Material for all decking laminations is graded on the basis of structural characteristics.

- Surfaces of the laminations shall be suitable for adhesive bonding. Differential moisture content between adjacent laminations will not exceed 5 percent, with a maximum of 14 percent for a board. Average moisture content of the decking shall be 12 percent or less.
• The decking is manufactured with an exterior-type glue using resin adhesives conforming to ASTM D 2559.
• Spacing of structural end joints meeting code requirements is not restricted. Butting of ends in inner laminations is permitted provided the approved joints in the face lamination are staggered a minimum of 6 inches (152 mm). Only unglued joints in the core shall be spaced a minimum of 3 inches (76 mm) from another unglued or approved core joint and from the maximum permitted strength-reducing characteristics.
• Gluing, type of glue, and grade mix of laminations in the product shall be certified by APA—The Engineered Wood Association (AA-649).

2.3 Design and Construction:

Structural design and construction with Lock-Deck shall be based on the following:

1. Properties of the individual planks in bending (modulus of elasticity E in millions and design stress f) are the following: E = 1.2 and f = 1200 psi (8.2 MPa) for western red cedar; E = 1.5 and f = 1400 psi (9.6 MPa) for Engelmann spruce (grown in Idaho north of the Salmon River), ponderosa pine, Idaho white pine, and hem-fir; and E = 1.8 and f = 2000 psi (13.8 MPa) for Douglas fir (coast or inland north) and western larch. Designs with decking featuring a combination of these species shall be based on principles of beam mechanics applied to composite beams and the above-listed design stresses. Such analysis and consideration of test data permits use of one E = 1.5 center lamination in Douglas fir and western larch at E = 1.8 rating.
2. The listed design stresses correspond to 12 percent moisture content and normal duration of loading conditions. Proper adjustments shall be made for other conditions and for repetitive use case.
3. Two thirds of the net section properties (see Table 1) shall be assumed effective for the continuous random-length lay-up framing in calculating for bending stress (f).
4. Fire-retardant-treated white fir is permitted to be used for face lamination.

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2.4 Rules for End Joint Locations and Construction for Simple and Two Span Framing:

- All end joints shall occur on supports.
- All two-span framing shall be full-length planks, with no end joints permitted.

2.5 Rules for End Joint Locations and Construction for Controlled Random Length Lay-up Framing:

- The distance between end joints in adjacent courses of decking shall be at least 2 feet (610 mm).
- End joints in rows not directly adjacent to one another shall be separated by one course of decking and 1 foot (305 mm) measured along the axis of the plank, or by two continuous courses of decking.
- Within a 1-foot (305 mm) section of decking, the number of end joints shall not exceed one third of the total number of decking courses.
- Each decking plank shall rest on at least one support.

There shall be only one end joint in each course between supports, and a joint on a support shall be considered as a joint in either of the adjacent spans.

In end spans, one third of all courses of decking shall be free of end joints, except where overhangs of one fifth of the normal end span or greater occur, or where end spans are shortened to achieve a deflection comparable to an interior span.

Joints shall be end-matched.

2.6 Allowable Roof Loads:

Allowable roof loads for the 3-inch-, 4-inch- and 5-inch-thick (76, 102 and 127 mm) Lock-Deck decking are listed in Table 2.

2.7 Identification:

The decking set forth in Table 2 is identified in the field by an imprint grade mark; the Shelton Lam & Deck name; the

evaluation report number (ER-1379); and the name of the inspection agency, APA—The Engineered Wood Association (AA-649). Where a fire-retardant face ply is installed, the product shall be identified on the back of each piece with the words “APA Laminated Wood Product—Exterior Type Glue—Product for dry use only—Fire-retardant Face Ply.”

3.0 EVIDENCE SUBMITTED

Load tests, grading rules, working stresses, allowable spans and sectional properties.

4.0 FINDINGS

That the Shelton Lock-Deck Laminated Decking is an alternate type of construction to that specified in the 1997 Uniform Building Code™ (UBC), subject to the following conditions:

- 4.1 The allowable roof loads and spans shall comply with Table 2 or be determined by design using the allowable stresses and sectional properties set forth in this report.
- 4.2 The decking is not used as a floor sheathing or as a support for plaster ceiling unless deflection is limited as required by the UBC.
- 4.3 The Lock-Deck, when used as a floor sheathing, is provided with a flooring or an underlayment complying with the appropriate section of the UBC.
- 4.4 The glued diaphragm is to be installed under the supervision of a special inspector in accordance with the appropriate section of the UBC.
- 4.5 The decking is manufactured at the Shelton Lam & Deck facility located at 192 Downie Road, Chehalis, Washington, under a quality control program with inspections by APA—The Engineered Wood Association (AA-649).

This report is subject to re-examination in two years.

TABLE 1—DESIGNATIONS, SIZES AND SECTIONAL PROPERTIES OF LOCK-DECK LAMINATED DECKING

DESIGNATION OF DECKING ¹	NUMBER OF LAMINATIONS	APPROXIMATE NET THICKNESS OF LAMINATIONS (inches)			NET FINISH THICKNESS (inches) ²	SECTIONAL PROPERTIES ²		
		Face	Centers	Back		Area (inches ²)	Moment of Inertia (inches ⁴)	Section Modulus (Inches ³)
3-inch	3	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$2\frac{3}{16}$	25.88	10.29	9.39
3-inch superthick	3	$\frac{3}{4}$	$1\frac{1}{4}$	$\frac{3}{4}$	$2\frac{21}{32}$	31.61	17.57	13.70
3-inch superthick	4	$1\frac{1}{4}$ ³	$\frac{3}{4}$	$\frac{3}{4}$	$2\frac{21}{32}$	31.61	17.57	13.70
4-inch	3	$\frac{3}{4}$	$1\frac{3}{8}$	$\frac{3}{4}$	$2\frac{7}{8}$	33.95	23.44	16.30
4-inch	3	$\frac{3}{4}$	$1\frac{1}{2}$	$\frac{3}{4}$	3	35.70	27.02	18.11
5-inch	5	$\frac{3}{4}$	$3\frac{3}{4}$	$\frac{3}{4}$	$3\frac{21}{32}$	43.13	48.04	26.26

For SI: 1 inch = 25.4 mm.

¹Net decking plank widths are $5\frac{1}{4}$, 7, 9 and 11 inches for any designation of decking.

²Sectional properties are per foot of decking width.

³The plank “face” consists of a resawn board of face-grade quality directly laminated to a $\frac{3}{4}$ -inch board of back grade quality.

TABLE 2—TOTAL ALLOWABLE ROOF LOADS (psf)^{1,2,4,5}

MOE ³ AND BENDING STRESS ⁴	SPAN FOOT	3-INCH-THICK ⁷				4-INCH-THICK				5-INCH-THICK			
		Simple Span		RLC ⁶		Simple Span		RLC ⁶		Simple Span		RLC ⁶	
		1/180	1/240	1/180	1/240	1/180	1/240	1/180	1/240	1/180	1/240	1/180	1/240
1,200,000 <i>f</i> = 1590 psi	6	169	127	23(<i>f</i>)	192	385	289	400(<i>f</i>)	400(<i>f</i>)	773(<i>f</i>)	592	645(<i>f</i>)	645(<i>f</i>)
	7	107	80	161	121	242	182	294(<i>f</i>)	275	498	374	473(<i>f</i>)	473(<i>f</i>)
	8	71	54	108	81	163	122	225(<i>f</i>)	184	334	250	362(<i>f</i>)	362(<i>f</i>)
	9	50	38	76	57	114	86	173	130	234	176	286(<i>f</i>)	265(<i>f</i>)
	10	37	27	55	41	83	63	126	94	171	128	258	193
	11	27	21	42	31	63	47	95	71	128	96	194	145
	12	21	16	32	24	48	36	73	55	99	74	149	112
	13	17	12	25	19	38	28	57	43	78	58	117	88
	14			20	15	30	23	46	34	62	47	94	71
	15					25	19	37	28	51	38	76	57
	16							31	23	42	31	63	47
	17							26	19	35	26	53	39
	18									29	22	44	33
1,500,000 <i>f</i> = 1850 psi	9	63	47	95	71	143	107	207(<i>f</i>)	162	213	160	333(<i>f</i>)	332
	10	46	34	69	52	104	78	157	118	160	120	270(<i>f</i>)	242
	11	34	26	52	39	78	59	118	89	124	93	223(<i>f</i>)	182
	12	26	20	40	30	60	45	91	68	97	73	187	140
	13	21	16	31	24	47	36	72	54	78	58	147	110
	14			25	19	38	28	57	43	63	47	118	88
	15			20	15	31	23	47	35	63	47	96	72
	16					25	19	38	29	52	39	79	59
	17					21	16	32	24	43	33	66	49
	18							27	20	37	27	55	41
19							23	17	31	23	47	35	
1,800,000 <i>f</i> = 2645 psi	9	75	56	114	85	171	129	259	194	351	264	476(<i>f</i>)	398
	10	55	41	83	62	125	94	189	142	256	192	385(<i>f</i>)	290
	11	41	31	62	47	94	70	142	106	192	144	291	218
	12	32	24	48	36	72	54	109	82	148	111	224	168
	13	25	19	38	28	57	43	86	64	117	87	176	132
	14			30	23	46	34	69	52	93	70	141	106
	15			25	18	37	28	56	42	76	57	115	86
	16			20	15	31	23	46	35	63	47	94	71
	17					25	19	38	29	52	39	79	59
	18							32	24	44	33	66	50
	19							28	21	37	28	56	42
20							24	18	32	24	48	36	

For **SI**: 1 psf = 0.0479 kN/m².

¹Loads indicated are total allowable for roofs in pounds per square foot and may not be increased for duration of load.

²Allowable bending stresses govern the allowable total roof loads labeled (*f*), deflection all others.

³Modulus of elasticity.

⁴Bending stresses indicated have a 15 percent increase for repetitive members and a 15 percent increase for a two-month duration of load.

⁵Allowable loads for 1.5 MOE material treated with fire retardant per description in Section 2.0 should be reduced by 10 percent.

⁶Corresponds to random-length continuous lay-up frame.

⁷Based on 2³/₁₆-inch net finish thickness.