

ICC-ES Evaluation Report

ESR-2909

Issued September 1, 2009

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

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

REPORT HOLDER:

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EVALUATION SUBJECT:

PACIFIC WOODTECH® LAMINATED VENEER LUMBER (LVL), AND PACIFIC WOODTECH® 1 1/4-INCH X 1.5E RIM BOARD

ADDITIONAL LISTEES:

GEORGIA-PACIFIC WOOD PRODUCTS LLC
 1000 NORTH PARK DRIVE
 ROXBORO, NORTH CAROLINA 27573

ALLIANCE LUMBER
 1800 WEST BROADWAY ROAD, SUITE 2
 TEMPE, ARIZONA 85282

HPM BUILDING SUPPLY
 380 KANOELEHUA AVENUE
 HILO, HAWAII 96720

1.0 EVALUATION SCOPE
Compliance with the following codes:

- 2006 *International Building Code*® (IBC)
- 2006 *International Residential Code*® (IRC)

Properties evaluated:

- Structural
- Fireblocking

2.0 USES

Pacific Woodtech® laminated veneer lumber (LVL) is used in structural applications such as beams, headers, joists and rafters. Pacific Woodtech® 1 1/4-inch x 1.5E rim board is used in rim board applications as described in this report.

3.0 DESCRIPTION

Pacific Woodtech Corporation manufactures and private-labels the LVL products described in this report. Private-label products are produced for the additional listees in this

report, and also for others. All Pacific Woodtech LVL, regardless of the private label, are identified as described in Section 7.0 of this report.

Pacific Woodtech LVL and Pacific Woodtech rim board are structural composite lumber products complying with ASTM D 5456 and additional performance requirements specified in the ICC-ES Acceptance Criteria for Structural Wood-based Products (AC47) and the Acceptance Criteria for Rim Board Products (AC124). Qualified adhesives, veneer species and veneer grades are as specified in the approved quality control manual. The veneers are laminated with the grain parallel to the length of the LVL member. Pacific Woodtech LVL is available in thicknesses from 3/4 inch (19.1 mm) to 3 1/2 inches (89 mm) and depths from 1 3/4 inches (44.5 mm) to 24 inches (610 mm). Pacific Woodtech rim board is manufactured from 1.5E grade Pacific Woodtech LVL having a thickness of 1 1/4 inches (32 mm), a maximum depth of 16 inches (406 mm), and a minimum length of 8 feet (2438 mm).

4.0 DESIGN AND INSTALLATION
4.1 Design:

4.1.1 General: The design provisions for structural composite lumber in the AF&PA *National Design Specification for Wood Construction* (NDS), as referenced in the applicable code, are applicable to Pacific Woodtech LVL, unless otherwise noted in this report. Reference design values for Pacific Woodtech LVL are provided in Table 1.

4.1.2 Connections: Reference lateral and withdrawal design values for nailed or bolted connections in Pacific Woodtech LVL are as specified in the NDS for structural composite lumber having equivalent specific gravities as given in Table 3 of this report. For fasteners installed perpendicular to the wide face of the veneers, spacing, edge distances and end distances must be as required in the NDS for sawn lumber. Minimum required spacing, edge distances and end distances for fasteners installed into the narrow face of the LVL (faces showing the narrow edge of all veneers) are as given in Table 4. Bolted connections are not permitted in member edges.

Connections, other than the nailed and bolted connections described herein, are outside the scope of this report.

Exception: Lag screw connections between Pacific Woodtech 1 1/4-inch x 1.5E rim board and deck ledgers have an allowable lateral load of 350 pounds (1.56 kN) per lag screw, under the following conditions:

- a. Lag screws must have a minimum nominal diameter of $\frac{1}{2}$ inch (12.7 mm), and sufficient length so that the full diameter of the lag screw shank penetrates through the rim board (the tapered tip must pass completely through the rim board).
- b. Deck ledgers must consist of minimum 2-by-6 lumber having a minimum assigned specific gravity of 0.42.
- c. Sheathing between the rim board and the deck ledger must consist of wood structural panels meeting PS-1 or PS-2 and be attached to the rim board in accordance with the applicable code.
- d. One flat washer must be used between the deck ledger and the lag screw head.
- e. Edge distances from the center of the lag screw to the edges of the rim board and deck ledger must be 2 inches (51 mm) or greater. End distances must be 4 inches (102 mm) or greater.
- f. The lag screws must be installed, and adjustment factors must be applied as applicable, in accordance with the NDS.
- g. Rim board and deck ledgers must be checked for load-carrying capacity at connections in accordance with Section 10.1.2 of the NDS.

4.1.3 Rim Board: Allowable loads for Pacific Woodtech $1\frac{1}{4}$ -inch x 1.5E rim boards are given in Table 2. Toe-nailed connections of rim boards are not limited by the 150 plf (2189 N/m) lateral load capacity noted for Seismic Design Categories D, E, and F in Section 2305.1.4 of the IBC.

4.1.4 Fireblocking: Pacific Woodtech LVL may be used as fireblocking in lieu of the materials listed in IBC Section 717.2.1 or IRC Section R602.8.1, as applicable. LVL used as fireblocking must have a minimum thickness of $1\frac{1}{2}$ inches (38 mm), with the exception that $\frac{3}{4}$ -inch-thick (19 mm) LVL may be used, provided the joints are backed by a second layer of $\frac{3}{4}$ -inch-thick (19 mm) LVL.

4.2 Installation:

4.2.1 General: Installation of Pacific Woodtech LVL and Pacific Woodtech rim board must comply with this report and with the manufacturer's published installation instructions. The manufacturer's published installation instructions must be available at the jobsite at all times during installation.

4.2.2 Rim Board: Pacific Woodtech rim board must be installed as a continuously supported structural element located at the joist elevation in an end bearing wall or parallel to the joist framing. It must be the full depth of the joist space and be used for any combination of the following: (1) transfer of vertical loads, from above to below, at the rim board location; (2) diaphragm attachment (e.g., sheathing to top edge of rim board); (3) transfer of in-plane lateral loads from the diaphragm to the wall plate below; (4) to provide lateral support to the joist (i.e.,

resistance against rotation) through attachment to the joist; (5) to provide closure for ends of joists; or (6) as an attachment base for siding and/or exterior deck ledgers.

5.0 CONDITIONS OF USE

The Pacific Woodtech® LVL and Pacific Woodtech® $1\frac{1}{4}$ -inch x 1.5E Rim board described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1** Design and installation must comply with this report, the manufacturer's published installation instructions, and the applicable code. In the event of a conflict between this report and the manufacturer's published installation instructions, this report governs.
- 5.2** Design calculations and/or drawings, demonstrating compliance with this report, must be provided to the code official upon request. These documents must be sealed by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.
- 5.3** Applications in unprotected, wet service conditions, where the moisture content of the LVL will reach 16 percent or greater, are beyond the scope of this report.
- 5.4** Pacific Woodtech® LVL products are produced at the Pacific Woodtech Corporation manufacturing plant located in Burlington, Washington, under a quality control program with inspections by APA—The Engineered Wood Association (AA-649).

6.0 EVIDENCE SUBMITTED

- 6.1** Data in accordance with the ICC-ES Acceptance Criteria for Structural Wood-based Products (AC47), dated June 2009.
- 6.2** Data in accordance with the ICC-ES Acceptance Criteria for Rim Board Products (AC124), dated October 2004 (editorially revised January 2008).

7.0 IDENTIFICATION

Pacific Woodtech® LVL is identified by a stamp noting the manufacturer's name (Pacific Woodtech) or registered trademark, grade, species, production date, evaluation report number (ESR-2909), name of the inspection agency (APA EWS) and manufacturer's APA mill number (1047).

Pacific Woodtech® $1\frac{1}{4}$ inch x 1.5E rim board is identified by a stamp noting the manufacturer's name (Pacific Woodtech) or registered trademark, product name or registered trademark, grade, species, thickness ($1\frac{1}{4}$ inches), production date, evaluation report number (ESR-2909), name of the inspection agency (APA EWS) and manufacturer's APA mill number (1047).

TABLE 1—PACIFIC WOODTECH® LVL REFERENCE DESIGN VALUES (psi)^{1, 2}

Species ³	Grade	Beam ⁴			Plank ⁵			Axial		E ⁸
		F _b ⁶	F _v	F _{c⊥}	F _b ⁶	F _v	F _{c⊥}	F _t ⁷	F _c	
DF	1.5E	2250	230	750	2250	150	450	1500	1950	1.5x10 ⁶
DF	1.8E	2750	285	850	2750	150	450	1850	2450	1.8x10 ⁶
DF	2.0E	3100	285	850	3100	150	450	2100	2750	2.0x10 ⁶
DF+	2.4E	3550	285	850	3550	150	650	3050	3400	2.4x10 ⁶

For **SI**: 1 psi = 6.895 kPa, 1 inch = 25.4 mm.

¹Reference design values are based on dry conditions of use, in which the in-service moisture content of the LVL is less than 16 percent. Applications where the moisture content will equal or exceed 16 percent are outside the scope of this report.

²Reference design values must be adjusted, as applicable, in accordance with Section 8.3 of the NDS.

³Species designations are as follows: DF = Douglas fir, DF+ = Douglas fir core and bottom face sheets with a top face sheet of a species as identified in the approved quality documentation.

⁴Beam values apply to members loaded and supported on faces showing the narrow edge of all veneers, typically the narrow faces of the member.

⁵Plank values apply to members loaded and supported on faces showing the wide face of one veneer, typically the wide faces of the member.

⁶The volume factor, C_v, which is applicable to reference bending design values, F_b, in accordance with Section 8.3 of the NDS, must be calculated as follows:

For *beam* orientation: $C_v = (12/d)^{0.20} \leq 1.47$

For *plank* orientation: $C_v = (1.75/d)^{0.33} \leq 1.00$, where *d* is the member depth in inches.

⁷Reference tension design values parallel to grain, F_t, apply to a 4-foot member length. For longer lengths, F_t must be multiplied by a factor of (4/L)^{0.10}, where L is the length of the member, in feet.

⁸The reference modulus of elasticity for beam stability and column stability calculations, E_{min}, must be calculated in accordance with Appendix D of the NDS. When calculating E_{min}, the coefficient of variation of modulus of elasticity, COV_E, may be taken as 0.10.

TABLE 2—1¼ INCH x 1.5E RIM BOARD ALLOWABLE LOADS^{1, 2, 3, 4}

Lateral Load Capacity ⁵	200 plf
Vertical Load Capacity	3450 plf
Deck Ledger Connection with ½-inch-Diameter Lag Screw - Lateral Load Capacity ⁶	350 lb ⁽⁶⁾

For **SI**: 1 plf = 14.59 N/m, 1 lb = 4.448 N.

¹The design loads given in this table are for 1¼-inch x 1.5E rim board installed in accordance with Section 4.2.2.

²Tabulated design values are based on dry conditions of use, in which the in-service moisture content of the LVL is less than 16 percent. Applications where the moisture content will equal or exceed 16 percent are outside the scope of this report.

³Tabulated design values may be adjusted for duration of load in accordance with Section 2.3.2 of the NDS, except where otherwise noted.

⁴Other design values are as provided for 1.5E grade Pacific Woodtech LVL in Table 1.

⁵The tabulated lateral load capacity applies to a ten-minute wind or earthquake load duration (C_D = 1.60). No further increase is permitted for duration of load.

⁶Lag screw connections between 1¼-inch x 1.5E rim board and deck ledgers have an allowable lateral load of 350 pounds per lag screw, provided the conditions in the exception to Section 4.1.2 are met.

TABLE 3—EQUIVALENT SPECIFIC GRAVITY FOR CONNECTION DESIGN^{1, 2}

Connection Type – Load Direction	FASTENER ORIENTATION	
	Face ³	Edge ⁴
Nail – Withdrawal	0.50	0.47
Nail – Lateral	0.50	0.50
Bolt – Lateral	0.50	N.A.

¹Reference lateral and withdrawal design values for bolted and nailed connections in Pacific Woodtech LVL are as specified in the NDS for structural composite lumber having equivalent specific gravities as indicated in the table above.

²Connections in which fasteners are installed into the end grain of the LVL are outside the scope of this report.

³Values given under the heading 'Face' apply to connections in which the fastener axis is installed perpendicular to the faces showing the wide face of one veneer.

⁴Values given under the heading 'Edge' apply to connections in which the fastener axis is installed perpendicular to the faces showing the narrow edge of all veneers.

TABLE 4—MINIMUM EDGE FASTENER SPACING^{1, 2}

LVL DIMENSIONS	FASTENER	MAXIMUM FASTENER PENETRATION INTO LVL ³ (inches)	MINIMUM FASTENER SPACING (inches)
Minimum 1¼ inches thick and 3½ inches deep	8d Nail	2 ¹ / ₈	3
	10d Nail	2 ⁹ / ₁₆	4
	12d Nail	2 ⁹ / ₁₆	4
	16d Nail	2	6
		1 ³ / ₈	4

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

¹Minimum fastener spacing values apply to a single row of nails.

²Minimum edge and end distances for nails driven into the edge of the LVL (i.e., into the faces showing the narrow edge of all veneers) have not been evaluated. Edge and end distances must be sufficient to prevent splitting of the LVL.

³Penetration length includes nail tip.