ICC-ES Evaluation Report

ESR-1387

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This report is subject to re-examination in one year.

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

REPORT HOLDER:

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EVALUATION SUBJECT:

STRUCTURAL COMPOSITE LUMBER: TIMBERSTRAND® LAMINATED STRAND LUMBER (LSL), PARALLAM® PARALLEL STRAND LUMBER (PSL), AND MICRO.LLAM® LAMINATED VENEER LUMBER (LVL); TIMBERSTRAND® LSL RIM BOARD; TJ-STRAND® RIM BOARD; e-RIM® BOARD; AND iLevel™ RIM BOARD

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2006 *International Building Code®* (IBC)
- 2006 *International Residential Code®* (IRC)
- BOCA® *National Building Code*/1999 (BNBC)
- 1999 *Standard Building Code®* (SBC)
- 1997 *Uniform Building Code™* (UBC)

Properties evaluated:

- Structural
- Fire resistance

2.0 USES

The structural composite lumber (SCL) products described in this evaluation report are used as alternatives to sawn lumber for wall, floor and roof structural members. These structural applications include use as beams, headers, joists, rafters, columns, wall studs, and rim boards. The products are also used as components of built-up structural members, such as flanges for I-joists and chords for trusses, as detailed in a current ICC-ES evaluation report.

3.0 DESCRIPTION

3.1 General:

The structural composite lumber (SCL) described in this report is an alternative material to that described in Chapter 23 of the IBC, BNBC, SBC, and the UBC, and complies with the requirements noted in Section 2303.1.9 of the IBC, Section 2301.2.1 of the IBC for allowable stress design, and Section 2303.4 of the BNBC. The TimberStrand LSL Rim Board, TJ-Strand Rim Board, e-Rim Board, and iLevel Rim Board comply with Section 104.11 of the IBC, Section 106.4 of the BNBC, Section 103.7 of the SBC and Section 104.2.8 of the UBC as alternative materials and methods of construction. Section 2308 of the IBC, Section 2305 of the BNBC and Chapters 5, 6 and 8 of the IRC are applicable to the SCL, TimberStrand LSL Rim Board, TJ-Strand Rim Board, e-Rim Board, and iLevel Rim Board described in this report.

3.2 Rim Board:

Each rim board product described in this evaluation report is a continuously supported structural element located at the joist elevation in an end bearing wall or parallel to the joist framing that is the full depth of the joist space and manufactured in minimum continuous 8-foot-long (2.44 m) segments for the length of the wall. The rim boards may be used for any combination of the following:

a. To transfer, from above to below, all vertical loads at the rim board location. Allowable vertical loads are noted in Tables 3, 6, 9 and 15.

b. To provide diaphragm attachment (sheathing to top edge of rim board).

c. To transfer in-plane lateral loads from the diaphragm to the wall plate below.

d. To provide lateral support to the joist or rafter (resistance against rotation) through attachment to the joist or rafter.

e. To provide closure for ends of joists or rafters.

f. To provide an attachment base for siding or an exterior deck ledger.

The rim board properties and species, adhesive, manufacturing parameters, and finished product thickness, width and length shall meet the requirements noted in the approved quality control manual that contains the manufacturing standard.

3.3 TimberStrand LSL and TimberStrand LSL Rim Board:

3.3.1 TimberStrand LSL: TimberStrand LSL is manufactured from strands of a single wood species or a combination of wood species blended with an isocyanate-based adhesive. The wood species, species combinations and adhesive used to manufacture TimberStrand LSL are specified in the approved TimberStrand LSL quality control manual and manufacturing standard prepared by Weyerhaeuser. TimberStrand LSL is produced with the wood strands oriented in a direction parallel to the length of the structural composite lumber, and has finished lengths up to 64 feet (19 500 mm), thicknesses up to $5^1/_2$ inches (140 mm), and depths up to 48 inches (1219 mm). TimberStrand LSL treated with zinc borate (ZB), in accordance with the TimberStrand LSL quality control manual and manufacturing standard prepared by Weyerhaeuser, may be used within the building envelope, such as for sill plates supported by masonry or concrete footings, foundations or slabs (including where preservative-treated lumber is required within the building envelope) in accordance with the American Wood Preservers' Association (AWPA) "Use Category UC2." TimberStrand LSL treated with ZB shall not be used in exposed exterior or ground-contact applications. When used under these conditions, the corrosion rate of carbon steel and/or galvanized steel in contact with ZB-treated TimberStrand LSL is not increased by the ZB treatment.

3.3.2 TimberStrand LSL Rim Board: TimberStrand LSL rim board may be used in rim board applications, as defined in Section 3.1.1.

3.4 Parallam PSL:

Parallam PSL is manufactured from strands of a single wood species, or species combinations that are oriented parallel to the length of the member and coated with a phenol-formaldehyde adhesive. The wood species or species combinations and adhesive used in the manufacture of Parallam PSL are specified in the approved quality control manual and manufacturing standard prepared by Weyerhaeuser. Parallam PSL is available in rectangular cross sections having a maximum width of 11 inches (279 mm), a maximum depth of 19 inches (483 mm), and lengths up to 66 feet (20 120 mm). Cross sections up to 7 inches by 54 inches (178 mm by 1372 mm) are available through secondary lamination. See Footnote 9 to Table 4.

3.5 Microllam LVL:

Microllam LVL is manufactured from veneers of a single wood species, or species combinations and adhesives meeting the requirements specified in the approved quality control manual and manufacturing standard prepared by Weyerhaeuser. During manufacture, the veneers are placed in a continuous-feed press, with all grain oriented parallel to the length of the member, and the veneers are bonded together with the approved adhesives. Microllam LVL is available in thicknesses from $^3/_4$ inch (19.1 mm) to $3^1/_2$ inches (89 mm), depths from $2^1/_2$ inches (63.5 mm) to 48 inches (1219 mm), and lengths up to 80 feet (24 380 mm).

3.6 TJ-Strand Rim Board and e-Rim Board:

TJ-Strand Rim Board and e-Rim Board are oriented strand board (OSB) materials manufactured by Weyerhaeuser or J. M. Huber Corporation, and may be used in rim board applications as defined in Section 3.1.1. The OSB material is an alternative material qualified under Section 104.2.8 of the UBC, Section 104.11 of the IBC, Section R104.11 of the IRC, Section 106.4 of the BNBC and Section 103.7 of the SBC. TJ-Strand Rim Board is available in a thickness of $1^1/_4$ inches (31.7 mm), depths up to 16 inches (406 mm), and lengths up to 24 feet (7315 mm). e-Rim Board is available in thicknesses of 1 inch or $1^1/_8$ inches (25.4 or 28.6 mm), depths up to $11^7/_8$ inches (302 mm), and lengths up to 24 feet (7315 mm).

3.7 iLevel Rim Board:

iLevel Rim Board consists of either laminated strand lumber (LSL) or oriented strand board (OSB) material manufactured by Weyerhaeuser. It must be used only in rim board applications, as defined in Section 3.1.1. The LSL is an alternative material qualified under Section 104.11 of the IBC, Section R104.11 of the IRC, Section 104.2.8 of the UBC, Section 106.4 of the BNBC and Section 103.7 of the SBC. iLevel Rim Board is $1^1/_8$ inches (28.6 mm) thick, and is available in depths ranging from $9^1/_2$ to 16 inches (241 to 406 mm). It is available in lengths ranging from 8 to 24 feet (2440 to 7315 mm).

4.0 DESIGN AND INSTALLATION

4.1 General:

The design and installation of Weyerhaeuser structural composite lumber shall comply with this report and the manufacturer's published installation instructions. The manufacturer's published installation instructions shall be available at the jobsite at all times during installation. Design of the structural composite lumber products described in this report is governed by the applicable code and the ANSI/AF&PA National Design Specification for Wood Construction (NDS). This report shall govern if there are conflicts between the manufacturer's published installation instructions and this report.

4.2 TimberStrand LSL and TimberStrand LSL Rim Board:

4.2.1 Prescriptive Code Applications: TimberStrand LSL may be used as wall stud material in accordance with the prescriptive requirements of the applicable code. Cutting, notching and boring of nominally 2-by-4 and 2-by-6 TimberStrand LSL studs is permitted in accordance with Sections 2308.9.10 and 2308.9.11 of the IBC, Section R602.6 of the IRC, Section 2305.5.1 of the BNBC, Section 2308.7 of the SBC, and Sections 2326.11.9 and 2326.11.10 of the UBC.

The allowable shear values for nailed wood structural panel shear walls utilizing TimberStrand LSL framing shall be determined using Table 2306.4.1 of the IBC, Table 23-II-I-1 of the UBC, Table 2310.2B of the SBC and Table 2306.4.6.2 of the BNBC, subject to the following:

TimberStrand LSL, identified with a circled 37 or 43 as part of the product label, shall be considered to be equivalent to sawn lumber studs with a specific gravity of 0.42, with the exception that the minimum boundary nail spacing permitted for grades lower than 1.5E shall be 6 inches (152 mm) on center. TimberStrand LSL of grades1.5E or higher, identified as described above, may be used with boundary nail spacings from 2 inches (51 mm) to 6 inches (152 mm) on center.

1.6E TimberStrand LSL, or higher grade, identified with a circled 45 as part of the product label, shall be considered to be equivalent to sawn lumber studs with a specific gravity of 0.50.

4.2.2 Design and Allowable Stresses: The design provisions for wood construction noted in Chapter 23 of the BNBC, SBC, and UBC, Section 2301.2(1) of the IBC (for allowable stress design) and Section R301.1.3 of the IRC,

shall be applicable to TimberStrand LSL unless otherwise noted in this report. Allowable unit stresses for dry conditions of use, and details of edge loading (joist/beam) and face loading (plank), shall be as noted in Table 1. Unless otherwise noted, adjustment to the design stresses for duration of load shall be in accordance with the applicable code.

Allowable lateral loads for nails installed perpendicular or parallel to the wide face of strands of TimberStrand LSL shall be as prescribed in the applicable code for sawn lumber having a minimum specific gravity of 0.50, such as for Douglas fir–larch, as noted in Table 2. Allowable withdrawal loads for nails installed perpendicular or parallel to the wide face of strands of TimberStrand LSL shall be as noted in Table 2 of this report. Minimum nail spacing for nails installed parallel to the wide face of strands (installed in the edge of TimberStrand LSL) is limited to the values noted in Table 2. Nail spacing for nails installed perpendicular to the wide face of strands (installed in the face of TimberStrand LSL) shall be as prescribed in the applicable code for sawn lumber. Other nail spacings for specific applications, such as prefabricated steel components or hangers, may be used as detailed for TimberStrand LSL in a current ICC-ES evaluation report.

Allowable lateral loads for machine bolts and lag bolts installed perpendicular to the wide face of TimberStrand LSL, with loads applied parallel or perpendicular to the grain of the wood strands, shall be as prescribed in the applicable code for sawn lumber having a specific gravity specified in Table 2.

4.2.3 TimberStrand LSL Rim Board: Toenailed connections are not limited by the 150 plf (2189 N/m) lateral load capacity noted for Seismic Zones 3 and 4 in Section 2318.3.1 of the UBC, or Seismic Design Categories D, E and F in Section 2305.1.4 of the IBC. The ability of TimberStrand LSL rim board to transfer shear shall be as described in Footnote 1 to Table 3 of this report.

4.2.4 Fire-resistance: TimberStrand LSL of equivalent sizes to that of sawn lumber may be used in fire-resistance-rated floor and roof assemblies, and shall be as specified in Table 7-C of the UBC and Table 720.1(3) of the IBC. TimberStrand LSL may be substituted for sawn lumber in code-described fire-resistance-rated floor-ceiling and roof-ceiling assemblies. The use of TimberStrand LSL studs in fire-resistance-rated wall assemblies is beyond the scope of this report. TimberStrand LSL may be used as fire blocking in a minimum net thickness of 1.25 inches (31.7 mm), as an alternative to the nominal 2-inch (51 mm) lumber noted in Section 721.2 of the BNBC, Section 705.3 of the SBC, Section 708.2 of the UBC, Section 717.2.1 of the IBC and Section R602.8.1 of the IRC.

4.3 Parallam PSL:

4.3.1 Design and Allowable Stresses: The design provisions for wood construction noted in Chapter 23 of the BNBC, SBC, and UBC, Section 2301.2(1) of the IBC (for allowable stress design) and Section R301.1.3 of the IRC, shall be applicable to Parallam PSL unless otherwise noted in this report. Allowable unit stresses for dry conditions of use, and details of edge loading (joist/beam) and face loading (plank), shall be as prescribed in Table 4. Unless otherwise noted, adjustment to the design stresses for duration of load shall be permitted in accordance with the applicable code.

Allowable withdrawal and lateral loads for nails installed perpendicular or parallel to the wide face of strands of Parallam PSL shall be as prescribed in the applicable code for sawn lumber having a minimum specific gravity of 0.50, such as for Douglas fir–larch. Nails installed parallel to the wide face of strands (installed in the edge of Parallam PSL) shall be spaced a minimum of 3 inches (76 mm) on center for 8d common nails, a minimum of 4 inches (102 mm) on center for 10d and 12d common nails, and a minimum of 6 inches (152 mm) on center for 16d common nails. Spacing of nails installed perpendicular to the wide face of strands (installed in the face of Parallam PSL) is the same as that permitted in the applicable code for sawn lumber. Other nail spacings for specific applications, such as prefabricated steel components or hangers, may be used as detailed for Parallam PSL in a current ICC-ES evaluation report.

Allowable lateral loads for machine bolts installed perpendicular to the wide face of strands of Parallam PSL, with loads applied parallel or perpendicular to the grain of the wood strands, shall be as prescribed in the applicable code for sawn lumber having a minimum specific gravity of 0.50, such as for Douglas fir–larch.

For nail and bolt connections other than those described in this report, specific approval by the authority having jurisdiction is required.

4.3.2 Fire-resistance: The provisions of IBC Section 721.6.3, design of fire-resistant exposed wood members, shall be applicable to Parallam PSL.

4.4 Microllam LVL:

4.4.1 Design and Allowable Stresses: The design provisions for wood construction noted in Chapter 23 of the BNBC, SBC, and UBC, Section 2301.2(1) of the IBC (for allowable stress design) and Section R301.1.3 of the IRC, shall be applicable to Microllam LVL, unless otherwise noted in this report. Allowable unit stresses, sizes and veneer species for Microllam LVL for dry conditions of use shall be as specified in Table 5 of this report.

Unless otherwise noted, adjustment of the design stresses for duration of load shall be in accordance with the applicable code.

Allowable withdrawal and lateral loads for nails installed perpendicular or parallel to the wide face of Microllam LVL shall be as prescribed in the applicable code for sawn lumber having a minimum specific gravity of 0.50, such as for Douglas fir–larch. Spacings of nails installed perpendicular to the glue lines on the wide face of Microllam LVL shall be as prescribed in Section 2318.3 of the UBC and Part 11 of the ANSI/AF&PA National Design Specification for Wood Construction (NDS), for sawn lumber. Spacing of nails and staples installed parallel to the glue lines on the narrow face of the material shall be as prescribed in Table 9 of this report. Other nail spacings for specific applications, such as prefabricated steel components or hangers, may be used as detailed for Microllam LVL in a current ICC-ES evaluation report.

Allowable lateral loads for machine bolts installed perpendicular to the wide face of Microllam LVL (perpendicular to the glue lines), with loads applied parallel or perpendicular to the grain of the wood veneers, shall be as prescribed in the applicable code for sawn lumber having a minimum specific gravity of 0.50, such as for Douglas fir–larch.

4.4.2 Fire-Resistance: The provisions of IBC Section 721.6.3, design of fire-resistant exposed wood members, shall be applicable to Microllam LVL.

4.5 TJ-Strand Rim Board and e-Rim Board:

4.5.1 Design and Allowable Stresses: Allowable stress design stresses and vertical load capacities for TJ-Strand Rim Board and e-Rim Board shall be as shown in Table 6; allowable fastener details shall be as shown in Table 7; and minimum nail spacing shall be as shown in Table 8.

Toenailed connections are not limited by the 150 plf (2189 N/m) lateral load capacity noted for Seismic Zones 3 and 4 in Section 2318.3.1 of the UBC, or Seismic Design Categories D, E and F in Section 2305.1.4 of the IBC. The ability of TJ-Strand Rim Board to transfer shear shall be as described in Footnote 1 to Table 7 of this report. The ability of e-Rim Board to transfer shear shall be as described in Footnote 2 to Table 7.

4.5.2 Fire-Blocking: TJ-Strand Rim Board and e-Rim Board may be used in lieu of sawn lumber for fire blocking.

4.6 iLevel Rim Board:

4.6.1 Installation: iLevel Rim Board must be laterally supported by floor sheathing at the top and continuously supported by a sill plate at the bottom. iLevel Rim Board must be installed using the nailing schedule given in Table 10. Holes or notches are not permitted in iLevel Rim Board.

4.6.2 Design and Allowable Stresses: Allowable lateral and vertical load capacities for iLevel Rim Board are given in Table 11. Toe nailed connections between the rim board and sill plate, as required in Section 4.6.1 and Table 10, 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, or Seismic Zones 3 and 4 in Section 2318.3.1 of the UBC. The ability of iLevel Rim Board to transfer shear shall be as described in Footnote 2 to Table 11.

4.6.3 Fastener Design Values: For design of connections other than those required in Section 4.6.1, mechanical connections in iLevel Rim Board have allowable lateral design values as provided by the NDS for lumber having equivalent specific gravities as given in Table 12. Minimum allowable nail spacing values are given in Table 13. Adjustment factors in accordance with the NDS must be applied as applicable.

Exception: Lag screw connections between iLevel Rim Board and deck ledgers have an allowable lateral load of 400 pounds (1.78 kN) per lag screw, under the following conditions:

Lag screws must have a minimum diameter of $^1/_2$ inch (12.7 mm), and sufficient length to penetrate through the iLevel Rim Board, not including tips.

Deck ledgers must consist of minimum nominally 2-by-6 lumber having a minimum assigned specific gravity of 0.42.

Sheathing between the iLevel Rim Board and 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.

One flat washer must be used between the deck ledger and the lag screw head.

Adjustment factors in accordance with the NDS must be applied as applicable.

4.6.4 Fire-Blocking: iLevel Rim Board may be used in lieu of sawn lumber for fire blocking.

5.0 CONDITIONS OF USE

The Structural Composite Lumber [TimberStrand® Laminated Strand Lumber (LSL), Parallam® Parallel Strand Lumber (PSL), and Microllam® Laminated Veneer Lumber (LVL)]; TimberStrand® LSL Rim Board; TJ-Strand® Rim Board; e-Rim® Board; and iLevel™ Rim Board products described in this report comply with, or are suitable alternatives to what is specified, in those codes listed in Section 1.0, subject to the following conditions:

5.1 Design stresses shall comply with the values noted in this report.

5.2 Design calculations and details shall be furnished to the code official, verifying that the material is used in compliance with this report. The calculations shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

5.3 TimberStrand LSL, Parallam PSL, Microllam LVL, and all Rim Board products described in this report shall be limited to covered end-use installations with dry conditions of use. Dry conditions of use are those environmental conditions represented by sawn lumber in which the equilibrium moisture content is equal to or less than 16 percent. The use of these products in covered installations, where the moisture content exceeds 16 percent, has not been reviewed and is beyond the scope of this evaluation report.

5.4 Increases for duration of load, as provided for wood members and their connections, shall be in accordance with the limitations specified in the applicable code and as set forth in this report, unless specifically prohibited by this report.

5.5 Where flexural bending members qualify as repetitive members, as defined in the NDS, an increase of 4 percent is permitted in allowable bending stresses.

5.6 Length and depth dimensions of TimberStrand LSL, the Parallam PSL and Microllam LVL may be cut to size for required application. Depth shall not be cut to less than $3^1/_2$ inches (89 mm). Thickness dimension of Parallam PSL and TimberStrand LSL may be cut to a minimum of $1^3/_4$ inches (45 mm). Microllam LVL shall not be cut in thickness. For all material used in structural applications, the product identification described in Section 7.0 shall be maintained on all material, or the material shall be re-stamped with the appropriate identification only under the approval and direction of PFS Corporation or Intertek Testing Services. Additionally, TimberStrand LSL, Parallam PSL and Microllam LVL may be notched, drilled, or tapered end cut provided design is by a design professional.

5.7 Installation, fabrication, identification, and connection details shall be in accordance with this report, the manufacturer's published installation instructions and the applicable code.

5.8 TimberStrand LSL is produced at the Weyerhaeuser manufacturing plants located in Deerwood, Minnesota; Chavies, Kentucky; and Kenora, Ontario, Canada; with quality control inspections by PFS Corporation (AA-652).

5.9 Parallam PSL is produced at the Weyerhaeuser manufacturing plants located in Annacis Island, British Columbia, Canada; Buckhannon, West Virginia; and Colbert, Georgia; with quality control inspections by PFS Corporation (AA-652).

5.10 Parallam PSL is secondary laminated for Weyerhaeuser at Structurlam Products, Ltd., Okanagan Falls, British Columbia, Canada, with quality control inspections by PFS Corporation (AA-652) or Intertek Testing Services (AA-688).

5.11 Microllam LVL is produced at the Weyerhaeuser manufacturing plants located in Albany, Oregon; Buckhannon, West Virginia; Eugene, Oregon; Junction City, Oregon; Natchitoches, Louisiana; Valdosta, Georgia; Castleberry, Alabama; and Simsboro, Louisiana; and at the RedBuilt™ LLC plant in Stayton, Oregon; with quality control inspections by PFS Corporation (AA-652).

5.12 TJ-Strand Rim Board is produced at the Weyerhaeuser manufacturing plants located in Elkin, North Carolina, and Drayton Valley, Alberta, Canada; and by J. M. Huber Corporation at their manufacturing plant in Spring City, Tennessee; with quality control inspections by PFS Corporation (AA-652).

5.13 e-Rim Board is produced at the Weyerhaeuser manufacturing plants located in Elkin, North Carolina, and Drayton Valley, Alberta, Canada; with quality control inspections by PFS Corporation (AA-652).

5.14 iLevel Rim Board is produced at the Weyerhaeuser manufacturing plants located in Elkin, North Carolina, Deerwood, Minnesota, Chavies, Kentucky, and Kenora, Ontario, Canada; with quality control inspections by PFS Corporation (AA-652).

6.0 EVIDENCE SUBMITTED

6.1 Data in accordance with the ICC-ES Acceptance Criteria for Structural Wood-based Products (AC47), dated October 2006.

6.2 Data in accordance with the ICC-ES Acceptance Criteria for Rim Board Products (AC124), dated October 2004.

6.3 Data in accordance with the ICC-ES Acceptance Criteria for Zinc Borate Preservative Treatment of Structural Composite Lumber by Non-pressure Processes (AC203), dated February 2006.

6.4 Data in accordance with the ICC-ES Acceptance Criteria for Wood-Based Studs (AC202), dated October 2003.

6.5 Reports of fire tests conducted in accordance with ASTM E 119.

7.0 IDENTIFICATION

7.1 General:

The structural composite lumber (SCL) products described in this report are identified with a stamp bearing the manufacturer's name (Weyerhaeuser) and/or logo (see Figure 1), the name or logo of the inspection agency (PFS Corporation or Intertek Testing Services), as applicable, and the evaluation report number (ESR-1387).

7.2 TimberStrand LSL and Timberstrand LSL Rim Board:

In addition to the requirements given in Section 7.1, TimberStrand LSL is identified with the plant number, the product designation or type, the production date and the grade. TimberStrand LSL treated with zinc borate, as described in Section 3.2 of this report, is identified with the designations "StrandGuard" and "AWPA UC2." TimberStrand LSL rim board is also identified by the thickness, and the designation "1.3E TimberStrand LSL Rim Board."

7.3 Parallam PSL:

In addition to the requirements given in Section 7.1, Parallam PSL is identified with the plant number, the product designation or type, the production date, the grade, and the species or species group designation.

7.4 Microllam LVL:

In addition to the requirements given in Section 7.1, Microllam LVL is identified with the plant number, the product designation or type, the production date, the grade, and the species or species group designation. Microllam LVL is also identified with the marking "AGS" following the grade designation, if the advanced grading system specified in the approved quality control manual was used in the manufacturing process.

7.5 TJ-Strand Rim Board and e-Rim Board:

In addition to the requirements given in Section 7.1, TJ-Strand Rim Board and e-Rim Board are identified with the production date and shift, the plant number and the product designations "TJ-Strand" and "1.25 0.8E Rim Board" for TJ-Strand Rim Board and "e-Rim" and "Rim Board" for e-Rim Board.

7.6 iLevel Rim Board:

In addition to the requirements given in Section 7.1, iLevel Rim Board is identified with the production date and shift, the plant number, the thickness, and the product designation "iLevel Rim Board."

TABLE 1—TIMBERSTRAND® LSL STRUCTURAL FRAMING LUMBER DESIGN STRESSES [1, 2, 3]
(pounds per square inch)

GRADE MOE (x 10^6)	AXIAL		JOIST/BEAM (EDGE LOADING)			PLANK (FACE LOADING)		
	Ft[5]	Fc	Fb[6, 7]	Fv	Fc⊥[8]	Fb[4]	Fv	Fc⊥[8]
1.3	1075	1400	1700	400	680	1900	150	435 [10]
1.5	1500	1950	2250	400	775	2525	150	475
1.55	1600	2050	2325	400	800	2615	150	485
1.6	1700	2150	2400	400	825	2700	150	490
1.7	1825[9]	2380	2600	400	880	2900	150	510
1.9	2150	2850	3075	400	880	3450	150	510
2.1	2500	3275	3500	400	880	3925	150	510

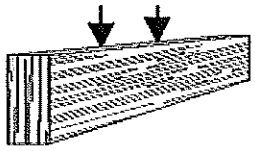
For **SI:** 1 psi = 0.00689 MPa, 1 inch = 25.4 mm.

[1]See figure below for description of strand orientation.
[2]Allowable stresses are based on covered, dry conditions of use, defined as those environmental conditions represented by sawn lumber with equilibrium moisture content less than or equal to 16%.
[3]For uniformly loaded simple span beams, deflection is calculated as follows:

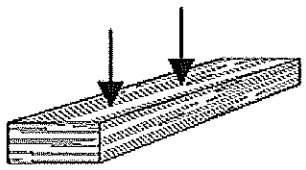
$$\Delta = \frac{270WL^4}{Ebd^3} + \frac{28.8WL^2}{Ebd}$$

Where:

Δ = Deflection, inches
L = Span, feet
d = Beam depth, inches
W = Uniform load, plf
b = Beam width, inches
E = Modulus of Elasticity, psi



EDGE LOADING - parallel to wide face of strands (WFS)



FACE LOADING - perpendicular to wide face of strands (WFS)

[4]Values shown are for thicknesses up to 3.5 inches.
[5]The Ft values in the table are reduced to reflect the volume effects of length, width and thickness for a range of common application conditions. The Ft values for TimberStrand LSL may be higher when approved by Weyerhaeuser for use as a component of engineered products, which are manufactured under a recognized quality control program.
[6]For depths other than 12 inches regardless of thickness, table values must be multiplied by $(12/d)^{0.092}$. Adjustments for common depths are shown below. For depths less than 3.5 inches, the factor for the 3.5 inch depth must be used.

Depth (inches)	3.5	5.5	7.25	9.25	12.0	16.0	20.0	24.0
Multiplier	1.12	1.07	1.05	1.02	1.00	0.97	0.95	0.94

[7]When structural members qualify as repetitive members in accordance with the applicable code, a four percent increase in accordance with NDS is permitted for Fb, in addition to the increases permitted in Footnote 6, above.
[8]Compression perpendicular to grain values (Fc⊥) may not be increased for duration of load.
[9]When 1.7E grade TimberStrand LSL is used as truss chords and webs of engineered wood trusses the design axial tension is 2050 psi. This value includes an adjustment for length effect. The TimberStrand LSL material must be marked as "Truss Chord Grade", and the engineered wood trusses must be manufactured under a recognized quality control program. The plate tooth-holding values for TimberStrand LSL web and chord members are as recognized in ICC-ES evaluation reports.
[10]The allowable compression perpendicular-to-grain, plank orientation, for zinc borate, (ZB) treated 1.3E TimberStrand LSL is 625 psi, for plate applications.

TABLE 2—EQUIVALENT SPECIFIC GRAVITIES AND MINIMUM NAIL SPACING FOR DESIGN OF MECHANICAL CONNECTIONS IN TIMBERSTRAND® LSL [1]

FASTENER	FASTENER AXIS ORIENTATION [2]	LOAD DIRECTION	EQUIVALENT SPECIFIC GRAVITY
Nails and Screws	Perpendicular to edge or perpendicular to face	Lateral (parallel or perpendicular to grain)	0.50 (Douglas-fir-larch).
Nails	Perpendicular to edge	Withdrawal	0.42 (Spruce-pine-fir)[8]
	Perpendicular to face	Withdrawal	0.50 (Douglas-fir-larch)[8]
Bolts [3]	Perpendicular to face	Lateral (parallel to grain)	0.50 (Douglas-fir-larch)
		Lateral (perpendicular to grain)	0.58 (Red maple)
Lag screws	Perpendicular to face	Lateral (parallel to grain)	0.50 (Douglas-fir-larch)
		Lateral (perpendicular to grain)	0.55 (Southern pine); See footnote 4 for deck ledger connections in TimberStrand LSL Rim Board

CLOSEST PERMITTED ON-CENTER SPACING FOR NAILS INSTALLED PERPENDICULAR TO EDGE [5, 6, 7] (inches)
(For TimberStrand LSL stud nail spacing limitation in shearwall applications, see Section 4.2.1)

	MEMBER THICKNESS (inches)							
Common Nail Size	$1^1/_4$	$1^1/_2$ and $1^3/_4$		$2^1/_2$		$3^1/_2$		
	1 row	1 row	2 rows	1 row	2 rows	1 row	2 rows	3 rows
8d	4	3	3	3	$3^1/_2$	3	3	3
10d	4	4	4	3	$3^1/_2$	3	3	3
16d	6	6	6	$3^1/_2$	$3^1/_2$	$3^1/_2$	$3^1/_2$	--

For **SI:** 1 inch = 25.4 mm, 1 lbf. = 4.448 N.

[1]Allowable connection design values are as provided by the NDS for lumber having equivalent specific gravities as shown.
[2]The term "edge" refers to the side on which the strand edges are exposed. The term "face" refers to the side on which the wide faces of the strands are exposed.
3When loading at an angle to grain, the lateral capacity is calculated using the Hankinson formula using an equivalent specific gravity of 0.50 for load parallel to grain and equivalent specific gravity of 0.58 for load perpendicular to grain.
[4]The allowable perpendicular-to-grain lateral load capacity for a $^1/_2$-inch-diameter lag screw connection with full penetration into TimberStrand LSL Rim Board, supporting a $1^1/_2$-inch-thick side member (ledger board) having a minimum specific gravity of 0.50, is 475 pounds. For other lag screw sizes and conditions, the allowable perpendicular-to-grain lateral load value must be determined in accordance with the NDS, using an equivalent specific gravity of 0.50 for load parallel to grain and equivalent specific gravity of 0.55 for load perpendicular to grain.
[5]The closest permitted on center spacing for nails installed perpendicular to face is the same as permitted by the code for sawn lumber.
[6]Multiple rows must be staggered and the minimum spacing between rows must be $^1/_2$ inch.
[7]Multiple rows must be equally spaced from the centerline of the narrow face axis.
[8]For withdrawal of nails in TimberStrand LSL identified with a circled 45 (plant number) as part of the product label, use an equivalent specific gravity of 0.55 (Southern pine).

TABLE 3—1.3E TIMBERSTRAND® LSL RIM BOARD [1, 2, 3]

THICKNESS (inches)	ALLOWABLE VERTICAL LOAD (PLF)[4]	DEPTH RANGE (inches)
1.25[5]	4250	16 and less
1.25[5]	3450	over 16 up to 20
1.50 and 1.75	4140	up to 24

For **SI:** 1 inch = 25.4 mm, 1 plf = 14.59 N/m.

[1]The allowable shear values in pounds per foot for horizontal wood structural panel diaphragms with framing of nominal 2 inch thick Douglas fir-larch or southern pine are applicable to: (1) 1.25 inch thick TimberStrand LSL Rim Board, unblocked diaphragms only, and (2) 1.50 and 1.75 inch thick TimberStrand LSL Rim Board, unblocked and blocked diaphragms.
[2]TimberStrand LSL Rim Board must be laterally supported at the top and continuously supported at the bottom, and the gravity loads must be uniformly applied along the top, in lieu of design by a design professional for other conditions.
[3]Fastener capacities for TimberStrand LSL Rim Board are as given in Table 2, except as provided in Footnote 5, below.
[4]Compression perpendicular-to-grain capacities of the sill plate and floor sheathing must be checked.
[5]The allowable perpendicular-to-grain lateral load capacity for a $^1/_2$-inch-diameter lag screw connection with full penetration into the TimberStrand LSL Rim Board, supporting a $1^1/_2$-inch-thick side member (ledger board) having a minimum specific gravity of 0.50, is 475 pounds.

TABLE 4—PARALLAM® PSL ALLOWABLE FRAMING LUMBER DESIGN STRESSES [1,2,3,9] (pounds per square inch)

SPECIES / GRADE		AXIAL		LOAD II To WFS (Joist)			LOAD ⊥ To WFS (Plank)			MOE (x10^6)
		Ft[4]	Fc	Fb [5,6]	Fv	F c⊥ [7]	Fb [5,6]	Fv	F c⊥ [7]	
DF	1.8E	1755	2500	2500	230	600	2400	190	425	1.80
	1.9E	1890	2700	2700	260	675	2600	200	450	1.90
	2.0E[8]	2025	2900	2900	290	750	2800	210	475	2.00
	2.1E	2160	3100	3100	320	775	3000	220	500	2.10
SP	1.8E	1755	2500	2500	230	600	2400	190	425	1.80
	1.9E	1890	2700	2700	260	675	2600	200	475	1.90
	2.0E	2025	2900	2900	290	750	2800	210	525	2.00
	2.1E	2160	3100	3100	320	825	3000	220	575	2.10
WH	1.8E	1755	2500	2500	230	500	2400	190	380	1.80
	1.9E	1890	2700	2700	260	575	2600	200	415	1.90
	2.0E	2025	2900	2900	290	650	2800	210	450	2.00
	2.1E	2160	3100	3100	320	700	3000	220	475	2.10
YP	1.8E	1755	2500	2500	230	600	2400	190	525	1.80
or	1.9E	1890	2700	2700	260	675	2600	200	600	1.90
YP/RM	2.0E	2025	2900	2900	290	750	2800	210	675	2.00
	2.1E	2160	3100	3100	320	825	3000	220	750	2.10

For **SI:** 1 psi = 0.00689 MPa, 1 inch = 25.4 mm.

[1]WFS - Wide face of strand. See figure below for details on strand orientation. DF = Douglas fir-larch, SP = southern pine, WH = western hemlock, YP = yellow poplar, RM = red maple. DF and WH are permitted to be combined as Western Species (WS). SP, YP and YP/RM are permitted to be combined as Eastern Species (ES). When using the species group designations WS or ES, the allowable stress is the lower value for the species in the group.

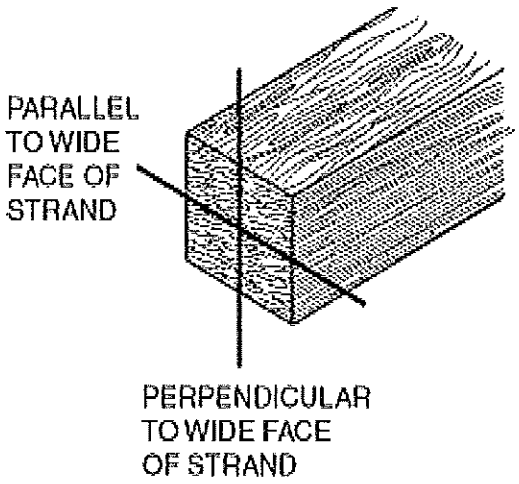
[2]Allowable stresses are based on covered, dry conditions of use. Dry conditions of use are those environmental conditions represented by sawn lumber at which the moisture content is less than or equal to16%.

[3]For uniformly loaded simple span beams, the deflection is calculated as follows:

$$\Delta = \frac{270WL^4}{Ebd^3} + \frac{28.8WL^2}{Ebd}$$

Where,

Δ	=	Deflection, inches
W	=	Uniform load, plf
L	=	Span, feet
b	=	Beam width, inches
h	=	Beam depth, inches
E	=	Modulus of Elasticity, psi



[4]The Ft values in the table are reduced to reflect the volume effects of length, width and thickness for a range of common application conditions.

[5]For 12 inch depth; for other depths, table value must be multiplied by $(12/d)^{0.111}$. Adjustments for common depths are shown below. For depths less than 3.5 inches, the factor for the 3.5 inch depth must be used.

Depth (inches)	3.5	5.5	7.25	9.25	12.0	16.0	20.0	24.0
Multiplier	1.15	1.09	1.06	1.03	1.00	0.97	0.96	0.93

[6]When members qualify as repetitive members in accordance with the applicable code, a 4 percent increase in accordance with NDS is permitted, for Fb, in addition to the increases permitted in Footnote 4, above.

[7]Compression perpendicular to grain values (Fc⊥) may not be increased for duration of load.

[8]When used in cross-sections with depths of 20 inches or greater, through approved secondary lamination, the MOE is 2.20 x 10^6 psi. The allowable design stresses shown in this table are applicable to Parallam PSL, when secondary laminated in accordance with the approved Weyerhaeuser quality control manuals for secondary laminated Parallam PSL.

TABLE 5—Microllam® LVL ALLOWABLE FRAMING LUMBER DESIGN STRESSES [1,2] (pounds per square inch)

BILLET MATERIAL THICKNESS	GRADE SPECIES	AXIAL		JOIST/BEAM				PLANK		
		Ft[4]	Fc	Fb[5,6]	Fv[7]	MOE (x10^6)	Fc⊥[8]	Fb[9]	Fv	Fc⊥[8]
3/4 inch	1.6 DF/LP/WH	1240	2100	2140	285	1.6	750	2530	190	480
To	1.8 DF/LP/WH	1450	2375	2445	285	1.8	750	2890	190	480
3 1/2 inch	1.9 DF/LP/WH	1555	2510	2600	285	1.9	750	3075	190	480
	2.0 DF/LP/WH	1660	2635	2750	285	2.0	750	3255	190	480
	2.0 DF/LP/WH [10]	1660	2635	2900	285	2.0	750	3430	190	480
	2.2 DF/LP/WH	1865	2870	3060	285	2.2	750	3615	190	480
	2.4 DF/LP/WH	2075	3080	3365	285	2.4	750	3980	190	480
	2.6 DF/LP/WH	2285	3270	3675	285	2.6	750	4345	190	480
3/4 inch	1.8 SP/EUC	1575	2375	2445	285	1.8	880	2890	190	525
To	1.9 SP/EUC	1690	2510	2600	285	1.9	880	3075	190	525
3 1/2 inch	2.0 SP/EUC	1805	2635	2750	285	2.0	880	3255	190	525
	2.2 SP/EUC	2030	2870	3060	285	2.2	880	3615	190	525
	2.4 SP/EUC	2260	3080	3365	285	2.4	880	3980	190	525
	2.6 SP/EUC	2485	3270	3675	285	2.6	880	4345	190	525
3/4 inch	1.6 YP	1350	2100	2140	285	1.6	880	2530	190	670
To	1.8 YP	1575	2375	2445	285	1.8	880	2890	190	670
3 1/2 inch	1.9 YP	1690	2510	2600	285	1.9	880	3075	190	670
	2.0 YP	1805	2635	2750	285	2.0	880	3255	190	670
	2.2 YP	2030	2870	3060	285	2.2	880	3615	190	670
3/4 inch to 1 3/4 inch	2.0E-2925Fb SP	1805	3030	2925	285	2.0	880	3455	190	525

For **SI:** 1 psi = 0.00689 MPa, 1 inch = 25.4 mm.

[1]Allowable stresses are based on covered, dry conditions of use. Dry conditions of use are those environmental conditions represented by sawn lumber at which the moisture content is less than or equal to 16%.

[2]For uniformly loaded simple span beams, deflection is calculated as follows:

$$\Delta = \frac{270WL^4}{Ebd^3} + \frac{28.8WL^2}{Ebd}$$

where: W = Uniform load, plf; b = Beam width, inches; Δ = Deflection, inches; d = Beam depth, inches; L = Span, feet; E = Modulus of Elasticity, psi

[3]DF = Douglas fir-larch; LP = lodgepole pine; WH = western hemlock; SP = southern pine; YP = yellow poplar; EUC = Eucalyptus. DF, LP and WH are permitted to be combined as Western Species (WS). SP and YP, or SP and EUC are permitted to be combined as Eastern Species (ES). When using the species group designations WS or ES, the allowable stress is the lower value for the species in the group.

[4]The F_t values in the table are reduced to reflect the volume effects of length, width and thickness for a range of common application conditions. Therefore the F_t values in the Table do not apply to Microllam LVL when used as a component of engineered products manufactured by Weyerhaeuser which are listed in ICC-ES evaluation reports.

[5]Fb includes allowances for variations in span to depth ratio and method of loading and must be used without further adjustment except as noted below. For depths other than 12 inches, regardless of thickness, table values must be multiplied by $(12/d)^{0.136}$. Adjustments for Common depths are shown below. For depths less than 3.5 inches, the factor for the 3.5 inch depth must be used.

Depth	3.5	5.5	7.25	9.25	12	16	20	24
Multiplier	1.18	1.11	1.07	1.04	1.00	0.96	0.93	0.91

[6]When structural members qualify as repetitive members in accordance with the applicable code, a four percent increase in accordance with NDS is permitted, in addition to the increases permitted in Footnote 5, above. This increase does not apply to field assembled multi-member beams.

[7]For simplicity, use 285 psi for depths up to 24 inches and 260 psi for depths greater than 24 inches. When a more accurate analysis is desired, the allowable horizontal shear for all depths greater than 12 inches is $Fv = 285\ (12/d)^{0.065}$.

[8]Compression perpendicular to grain values (Fc⊥) may not be increased for duration of load.

[9]Values shown are for thicknesses up to 3.5 inches.

[10]Used in header or beam applications only.

TABLE 6—TJ-Strand® RIM BOARD[1] and e-Rim® Board CAPACITIES

RIM BOARD MATERIAL	THICKNESS (inches)	DESIGN STRESSES (pounds per square inch)				ALLOWABLE VERTICAL LOAD (plf)[3,4]	DEPTH RANGE (inches)
		MOE x 10^6	Fb[1]	Fv	Fc⊥[2]		
TJ-Strand	1.25	0.80	1200	400	1000	4250	16 and less
e-Rim	1.125	0.71	1000	400	1000	4250	$11^7/_8$ and less
	1.0	0.71	1000	400	1000	4250	$11^7/_8$ and less

For **SI:** 1 inch = 25.4 mm, 1 psi = 0.00689 MPa, 1 plf = 14.59 N/m.

[1]No depth modification applies for depths of 16 inches and less.
[2]Compression perpendicular to grain value may not be increased for duration of load.
[3]J-Strand Rim Board and e-Rim Board must be laterally supported at the top and continuously supported at the bottom, and the gravity loads must be uniformly applied along the top, in lieu of design by a design professional for other conditions.
[4]Compression perpendicular-to-grain capacities of the sill plate and floor sheathing must be checked.

TABLE 7—EQUIVALENT SPECIFIC GRAVITIES FOR DESIGN OF LATERALLY-LOADED[1] MECHANICAL CONNECTIONS IN TJ-Strand® RIM BOARD[2] and e-Rim® BOARD[3]

FASTENER	FASTENER AXIS ORIENTATION[5]	LOAD DIRECTION	EQUIVALENT SPECIFIC GRAVITY[4]
Nails and Screws	Perpendicular to edge	Parallel or perpendicular to grain	0.50 (Douglas fir-larch) for TJ-Strand Rim Board 0.42 (S-P-F) for e-Rim Board
	Perpendicular to face	Parallel or perpendicular to grain	0.50 (Douglas fir-larch)
Bolts	Perpendicular to face	Perpendicular to grain	0.50 (Douglas fir-larch)
Lag Screws	Perpendicular to face	Perpendicular to grain	See footnote 6 for deck ledger connections in TJ-Strand Rim Board; See footnote 7 for deck ledger connections in e-Rim Board

For **SI:** 1 lbf. = 4.448 N, 1 inch = 25.4 mm.

[1]Capacities in withdrawal have not been evaluated.
[2]The allowable shear values in pounds per foot for unblocked horizontal wood structural panel diaphragms with framing of nominal 2 inch thick Douglas fir-larch or southern pine noted in Table 23-II-H of the UBC; Table 2306.4.1 of the NBC; Table 2310.2A of the SBC; and Table 2306.3.1 of the IBC are applicable to TJ-Strand Rim Board only.
[3]e-Rim Board is permitted for use in structures complying with conventional construction requirements as defined in IBC Section 2308, BNBC Section 2305.0, SBC Section 2301.1.2, and UBC Section 2320, and with light-framed construction requirements as defined in IRC Section R301.
[4]Allowable connection design values are as provided by the NDS for lumber having equivalent specific gravities as shown.
[5]The term "edge" refers to the side on which the strand edges are exposed. The term "face" refers to the side on which the wide faces of the strands are exposed.
[6]The allowable perpendicular-to-grain lateral load value for a $^1/_2$-inch-diameter lag screw connection with full penetration into TJ-Strand Rim Board, supporting a $1^1/_2$-inch-thick side member (ledger board) having a minimum specific gravity of 0.50, is 475 pounds.
[7]The allowable perpendicular-to-grain lateral load value for a $^1/_2$-inch-diameter lag screw connection with full penetration into e-Rim Board, supporting a $1^1/_2$-inch-thick side member (ledger board) having a minimum specific gravity of 0.50, is 325 pounds.

TABLE 8—TJ-Strand® RIM BOARD and e-Rim® BOARD CLOSEST ON CENTER NAIL SPACING PARALLEL TO WFS ORIENTATION[1] (inches)

Nail Size	BOX		COMMON	
	TJ-Strand Rim Board	e-Rim Board	TJ-Strand Rim Board	e-Rim Board
8d ($2^1/_2$")	4	6	4	6
10d (3")	4	6	4	6
12d[2] ($3^1/_4$")	4	6	4	6
16d sinker ($3^1/_4$")	4	16[3]	4	16[3]
16d ($3^1/_2$")	4	16[3]	6[2]	16[3]

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

[1]The closest on center spacing for nails perpendicular to WFS is the same as permitted by the code for sawn lumber.
[2]When nailing through the wall sill plate and floor sheathing, the closest on center nail spacing is 4 inches ($1^3/_8$-inch maximum penetration).
[3]When nailing through the wall sill plate and floor sheathing, the closest on center nail spacing is 5 inches ($1^3/_8$-inch maximum penetration).

TABLE 9—SPACING OF NAILS AND STAPLES IN Microllam® LVL

MICROLLAM LVL DIMENSIONS	FASTENER (Installed parallel to glue lines on the narrow face of the material)	MINIMUM SPACING (inches)
Minimum $^3/_4$-inch thick and $3^1/_2$ inches deep	8d nail	3
	10d nail	4
	12d nail	4
	No. 14 gage staple	4
Minimum $1^1/_2$ inches thick and $3^1/_2$ inches deep	10d nail	4
	12d nail	4
	16d nail	8
	No. 14 gage staple	4

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

TABLE 10—NAILING SCHEDULE FOR INSTALLATION OF iLevel™ Rim Board

SHEATHING TO RIM BOARD OR JOIST	RIM BOARD TO SILL PLATES (Toe Nail)	JOIST TO SILL PLATE (Slanted)	RIM BOARD TO JOIST
8d Sinker nails (0.113 x $2^3/_8$ inches) or equivalent at 6 inches on center	Nails with minimum dimensions of 0.131 x 3.0 inches at 6 inches on center	2 nails with minimum dimensions of 0.131 x 3.0 inches; on opposing sides of bottom flange	2 nails with minimum dimensions of 0.131 x 3.0 inches; one into top flange, one into bottom flange

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

TABLE 11—ALLOWABLE LATERAL AND VERTICAL LOAD CAPACITIES FOR iLevel™ Rim Board [1, 2, 3, 4]

THICKNESS (Inches)	ALLOWABLE VERTICAL LOAD (plf)	ALLOWABLE LATERAL LOAD (plf)[5]	DEPTH RANGE (Inches)
$1^1/_8$	4000	180	$9^1/_2$ to 16

For **SI:** 1 inch = 25.4 mm; 1 plf = 14.59 N/m.

[1]iLevel Rim Board must be installed in accordance with Section 4.6.1.
[2]iLevel Rim Board is permitted for use in structures complying with conventional construction requirements as defined in IBC Section 2308, BNBC Section 2305.0, SBC Section 2301.1.2, and UBC Section 2320, and with light-framed construction requirements as defined in IRC Section R301.
[3]Compression perpendicular-to-grain capacities of the sill plate and floor sheathing must be checked.
[4]Values in this table may not be increased for duration of load.
[5]Allowable lateral load values are based on the condition that the rim board is supported by a sill plate or top plate consisting of minimum nominal 2x4 lumber having a minimum assigned specific gravity of 0.42, as determined by Table 11.3.2A of the National DesignSpecification for Wood Construction (NDS).

TABLE 12—EQUIVALENT SPECIFIC GRAVITIES FOR DESIGN OF iLevel RIM BOARD MECHANICAL CONNECTIONS[1, 2]

FASTENER	FASTENER AXIS ORIENTATION	LOAD DIRECTION	EQUIVALENT SPECIFIC GRAVITY
Nails and Screws	Perpendicular to face	Lateral (parallel or perpendicular to grain)	0.50 (Douglas fir-larch)
Nails	Perpendicular to face	Withdrawal	0.38
Bolts	Perpendicular to face	Lateral (parallel or perpendicular to grain)	0.50 (Douglas fir-larch)
Lag Screws	Perpendicular to face	Lateral (perpendicular to long axis of rim board)	(See footnote 3)

[1]Allowable connection design values are as provided by the NDS for lumber having equivalent specific gravities as shown.
[2]When loading at an angle to grain, the lateral capacity is calculated using the Hankinson formula in Appendix J of the NDS.
[3]The allowable lateral load for lag screw connections complying with the Exception to Section 4.6.3 is 400 lb (1.78 kN).

TABLE 13—MINIMUM ALLOWABLE NAIL SPACING ON NARROW EDGE OF iLevel™ Rim Board [1] (Inches)

PENNEYWEIGHT	BOX	COMMON	SINKER
8d	6	6	—
10d	6	6	—
12d	6 [2]	6 [2]	—
16d	16 [3]	16 [3]	16 [3]

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

[1]The minimum allowable on center spacing for nails perpendicular to the face of the rim board is the same as permitted by the applicable code for sawn lumber.
[2]When nailing through the wall sill plate and floor sheathing, such that the maximum penetration into the rim board is $1^3/_8$ inches (35 mm), the minimum allowable on center spacing is 4 inches (102 mm).
[3]When nailing through the wall sill plate and floor sheathing, such that the maximum penetration into the rim board is $1^3/_8$ inches (35 mm), the minimum allowable on center spacing is 5 inches (127 mm).

FIGURE 1—MANUFACTURER LOGO