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**DIVISION: 06—WOOD AND PLASTICS**
**Section: 06110—Wood Framing**

**REPORT HOLDER:**

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**EVALUATION SUBJECT:**

**NELSONPINE™ LAMINATED VENEER LUMBER™ (LVL)**

## 1.0 EVALUATION SCOPE

**Compliance with the following codes:**

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

**Properties evaluated:**

Structural

## 2.0 USES

NelsonPine™ LVL is intended for structural applications such as beams, headers, joists, rafters, columns, and rim boards. The product may also be used as components in built-up structural members such as flanges for I-joists and chords for trusses.

## 3.0 DESCRIPTION

The laminated veneer lumber (LVL) described in this report complies with the requirements noted in Section 2303.1.9 of the IBC for allowable stress design (item 1 of Section 2301.2) and Section 2303.4 of the BNBC, and is an alternative material to that described in Chapter 23 of the SBC and Chapter 23 of the UBC.

NelsonPine™ LVL is a structural composite lumber consisting of laminated radiata pine veneers with the grain parallel to the face of the member in a lay-up pattern specified in the Nelson Pine Industries Limited quality control manual. An exterior-type phenol-formaldehyde adhesive, complying with the durability requirements of ASTM D 2559, is used in the manufacture of the LVL, to bond the veneers.

NelsonPine™ LVL is available in thicknesses from $^3/_4$ inch (19.1 mm) to $5^1/_4$ inches (133 mm), depths from $1^3/_4$ inches (44.5 mm) to 16 inches (406 mm), and lengths up to 80 feet (24 384 mm). Two grades of LVL, 1.3E and 1.5E LVL, are recognized in this evaluation report.

## 4.0 DESIGN AND INSTALLATION

### 4.1 Design:

**4.1.1 General:** The structural design provisions for sawn lumber noted in the applicable code [Chapter 23 of the BNBC, SBC or UBC, or item 1 of Section 2301.2 of the IBC (for allowable stress design)] are applicable to NelsonPine™ LVL, unless otherwise noted in this report. Allowable unit stresses for the two grades of LVL recognized in this report are noted in Table 1.

Unless otherwise noted, adjustment of the design stresses for duration of load is permitted in accordance with the applicable code. Allowable stresses for the LVL described in this report are based on dry end-use conditions of use at normal load duration. Where members qualify as repetitive members, as defined in Section 8.3.7 of the ANSI/AF&PA NDS-2005, an increase of 4 percent is permitted in the allowable flexural stress.

**4.1.2 Connections:** Allowable lateral loads for nails parallel to the wide face of the LVL (X direction, Figure 1) and for nails or bolts installed perpendicular to the wide face of the LVL (face nailing) are the same as those provided in the applicable code for solid sawn lumber having a minimum specific gravity as shown in Table 2. Bolted connections made in the edge of the LVL are not permitted.

Spacing, edge distance, and end distance of nails installed perpendicular to the glue lines (the wide face of the LVL) are the same as those permitted in the applicable code for sawn lumber.

Spacing of nails and staples installed parallel to the glue lines (the narrow face, or edge) shall be a minimum of 3 inches (76 mm) for 8d common nails and 4 inches (102 mm) for 10d and 12d common nails. 16d common nails shall be spaced a minimum of 8 inches (204 mm) when installed parallel to the glue lines on the narrow face of LVL that is at least $1^1/_2$ inches (38 mm) thick and $5^1/_2$ inches (133 mm) wide.

**4.1.3 Rim Board:** For the purposes of this evaluation report, rim boards are defined as continuously supported structural members (except as noted in the last sentence of Section 4.1.3 of this report), located at the joist elevation either perpendicular to, or parallel to, the joist framing, that are the full depth of the joist space and are used for the following purposes:

1. Transfer, from above to below, vertical loads at the rim board location. (Allowable vertical loads are noted in Table 3.)
2. Provide diaphragm attachment (sheathing to top edge of rim board).
3. Transfer in-plane lateral loads from the diaphragm to the wall plate below.

4. Provide lateral support to the joist or rafter (resistance against rotation) through attachments to the joist or rafter.
5. Provide closure for ends of joists or rafters.
6. Provide attachment base for siding or exterior deck ledger.

The allowable lateral load capacity of $1^1/_4$-inch (31.75 mm), 1.3E and 1.5E rim board used as a boundary element of horizontal diaphragm, transferring in-plane lateral loads from the diaphragm to the wall plate below, is 165 lbs/ft (2408 N/m). This lateral load capacity is not permitted to be increased for duration of load. The depth of the rim board shall not exceed 16 inches (406 mm). See footnote 4 to Table 3 of this report. Toe nailed connections are not limited by the 150 plf (2186 N/m) lateral load capacity noted for Seismic Zones 3 and 4 in Section 2318.3.1 fo the UBC, or Seismic Design Categories D, E, and F in Section 2305.1.4 of the IBC.

Design of rim board installed over wall openings shall not exceed the allowable stress design values noted in Table 1.

### 4.2 Installation:

NelsonPine shall be installed in accordance with this evaluation report and applicable building codes.

## 5.0 CONDITIONS OF USE

The NelsonPine™ Laminated Veneer Lumber™ (LVL) 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** Design stresses shall comply with this report.

**5.2** The material shall be limited to areas in which its moisture content will not exceed 16 percent.

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

**5.4** Increases for duration of load, as provided for wood members and their connections, are permitted in accordance with the limitations specified in the applicable code and as set forth in this report.

**5.5** Where members qualify as repetitive members, as noted in Section 2.2 of this report, an increase of 4 percent in allowable bending stresses is permitted.

**5.6** NelsonPine LVL™ is produced at the Nelson Pine Limited manufacturing plant located in Nelson, New Zealand, under a quality control program with inspections by PFS Corporation.

## 6.0 EVIDENCE SUBMITTED

**6.1** Data in accordance with the ICC-ES Acceptance Criteria for Structural Composite Lumber (AC47), dated October 2006, and the ICC-ES Acceptance Criteria for Wood-based Rim Board Products (AC124), dated January 2008.

**6.2** Quality control manual.

## 7.0 IDENTIFICATION

A stamp noting the product trade name or trademark identifies NelsonPine™ LVL. The stamp also bears the grade, the evaluation report number (ESR-1633), the name and logo of the quality control agency [PFS Corporation (AA-652)], and the manufacturer's mill number (919).

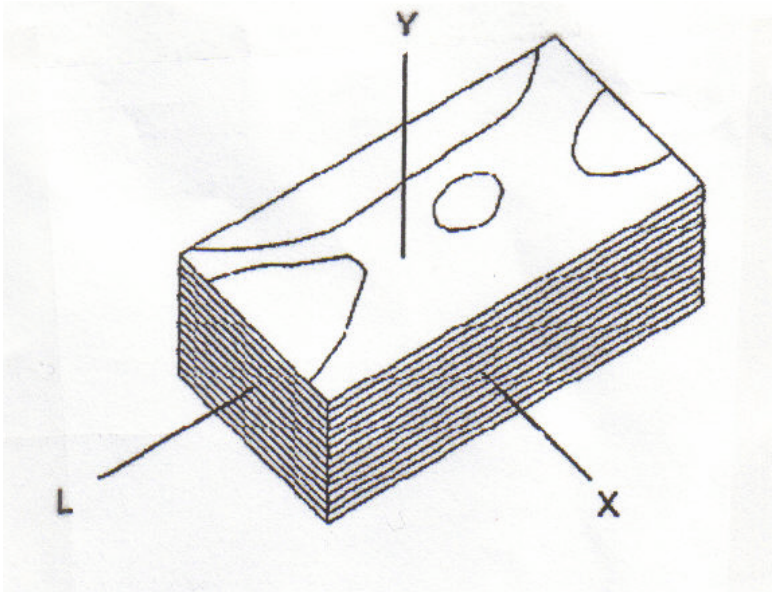


**FIGURE 1—LVL ORIENTATION**

**TABLE 1—ALLOWABLE DESIGN STRESSES FOR NELSONPINE™ LVL (psi)[1,2]**

| PROPERTY (psi) | | 1.3E GRADE | 1.5E GRADE |
|---|---|---|---|
| Modulus of Elasticity (MOE) | Joist | 1,300,000 | 1,500,000 |
| | Plank | 1,300,000 | 1,500,000 |
| Flexural stress, MOR ($F_b$)[3] | Joist | 2,000 | 2,300 |
| | Plank | 2,000 | 2,300 |
| Tensile strength ($F_t$)[4,5] | | 1,500 | 1,700 |
| Longitudinal shear ($F_v$) | Joist | 300 | 300 |
| | Plank | 150 | 150 |
| Compression parallel ($F_c$) | | 2,600 | 2,800 |
| Compression perpendicular ($F_c$) | Joist | 710 | 710 |
| | Plank | 530 | 530 |

For **SI:** 1 inch = 25.4 mm, 1 psi = 6.89 kPa.

[1]The allowable design stresses provided in Table 1 apply to protected, dry service conditions.
[2]The tabulated allowable design stresses above are permitted to be adjusted for duration of load as provided in the appropriate code sections.
[3]The tabulated flexural stresses above are permitted to be increased by 4 percent for repetitive member stresses as provided in the applicable code for solid sawn lumber.
[4]The tabulated tensile stress is based on a reference gage length ($L$) of 4 feet. For other gage lengths, the tabulated tensile stress is adjusted by multiplying $Ft$ by $(4/L)^{0.11}$ where $L$ is measured in feet.
[5]The tabulated flexural stress is based on load of normal duration and a reference depth of 12 inches. For other depths, the tabulated flexural stress is adjusted by a size factor adjustment of $(12/d)^{1/6}$ as shown below:

| DEPTH (inches) | 3.5 | 5.5 | 7.25 | 9.5 | $11^7/_8$ | 14 | 16 | 18 | 24 |
|---|---|---|---|---|---|---|---|---|---|
| 1.3E | 1.23 | 1.14 | 1.09 | 1.04 | 1.00 | 0.97 | 0.95 | 0.93 | 0.89 |
| 1.5E | 1.23 | 1.14 | 1.09 | 1.04 | 1.00 | 0.97 | 0.95 | 0.93 | 0.89 |

**TABLE 2—NELSONPINE™ LVL FASTENER DETAILS**

| FASTENER AND DESCRIPTION | | EQUIVALENT SPECIES (SG) | |
|---|---|---|---|
| | | 1.3E | 1.5E |
| Nail withdrawal - installed in Y direction | Face | Western hemlock (0.47) | Douglas fir–larch - north (0.49) |
| Nail withdrawal - installed in X direction | Edge | | |
| Nail dowel bearing - installed in Y direction | Face | Red pine (0.44) | Douglas fir–larch - north (0.49) |
| Nail dowel bearing - installed in X direction | Edge | | |
| Bolt dowel bearing - installed in Y direction | Parallel | Eng. spruce–lodgepole pine (0.38) | Eastern hemlock (0.41) |
| | Perpendicular | Douglas fir–larch - North (0.49) | Mixed southern pine (0.51) |

[1]Allowable lateral values for nails noted in the applicable code are applicable to the LVL for conditions and species noted in the table.

**TABLE 3—$1^1/_4$-INCH NELSON PINE RIM BOARD DESIGN PROPERTIES[1,2,3]**

| PARAMETER | 1.3 | 1.5 |
|---|---|---|
| Lateral load transfer capacity[4] | 165 lbs/ft | 165 lbs/ft |
| Vertical load transfer capacity | 3,950 lbs | 4,300 lbs |
| Concentrated load transfer capacity | 3,750 lbs | 4,100 lbs |

For **SI:** 1 lbf/ft = 14.6 N/m; 1 lbf = 4.45N.

[1]Tabulated design properties apply to protected, dry service conditions.
[2]Tabulated design properties may be adjusted for duration of load, as provided as provided in the code, except where noted.
[3]Other design properties as provided for in Table 1 of this report.
[4]These products are limited to use in engineered applications, since they do not meet the minimum lateral load transfer capacity of 180 lbs/ft required for “conventional construction.”