Please verify availability with the LP SolidStart Engineered Wood Products distributor in your area prior to specifying these products.
Introduction

Designed to Outperform Traditional Lumber

LP® SolidStart® Laminated Veneer Lumber (LVL) is a vast improvement over traditional lumber. Problems that naturally occur as sawn lumber dries — twisting, splitting, checking, crowning and warping — are greatly reduced.

THE STRENGTH IS IN THE ENGINEERING

LP SolidStart LVL is made from ultrasonically and visually graded veneers that are arranged in a specific pattern to maximize the strength and stiffness of the veneers and to disperse the naturally occurring characteristics of wood, such as knots, that can weaken a sawn lumber beam. The veneers are then bonded with waterproof adhesives under pressure and heat. LP SolidStart LVL beams are exceptionally strong, solid and straight, making them excellent for most primary load-carrying beam applications.

SOFTWARE FOR EASY, RELIABLE DESIGN

Our design/specification software enhances your in-house design capabilities. It offers accurate designs for a wide variety of applications with interfaces for printed output or plotted drawings. Through our distributors, we offer component design review services for designs using LP SolidStart Engineered Wood Products.

CODE EVALUATION

LP SolidStart Laminated Veneer Lumber has been evaluated for compliance with major US building codes. For the most current code reports, contact your LP SolidStart Engineered Wood Products distributor. Caution: Failure to provide adequate continuous lateral restraint require special design. Contact your LP SolidStart Engineered Wood Products distributor. Caution: Failure to provide adequate continuous lateral restraint of the compression edge. Continuous restraint is defined as a maximum unbraced length of 24”. This restraint is normally provided by sheathing and/or other framing members, which shall be adequately anchored to the LVL and the supporting structure. Framing conditions that do not provide continuous lateral restraint require special design. Contact your LP SolidStart Engineered Wood Products distributor: Caution: Failure to provide adequate lateral restraint could result in an unstable member and reduce its load capacity.

RESPONSIBLE, SUSTAINABLE

LP Building Products uses logs from SFI® certified forest management and fiber sourcing systems to help ensure that our entire wood supply comes from well managed forests and non-controversial sources. Virtually the entire log is used in the manufacturing process, and wood waste is repurposed or used to help fuel our mills. LP Engineered Wood Products also reduce construction waste on the job site.

LIFETIME LIMITED WARRANTY

LP SolidStart Engineered Wood Products are backed by a lifetime limited warranty. Visit LPCorp.com or call 1 888 820 0325 for a copy of the warranty.

IMPORTANT NOTES

1. LP SolidStart LVL shall be designed for dry-use conditions only. Dry-use applies to products installed in dry, covered and well ventilated interior conditions in which the equivalent moisture content in lumber will not exceed 16%.

2. This guide is valid only for LP SolidStart LVL members supporting loads applied parallel to the face of the veneers (“edge” orientation).

3. Ensure that the design loads, duration of load increases and deflection limits that you use to select products from this guide are appropriate for your application and comply with local code requirements. If you do not know the correct design criteria and all the loads imposed on the component from all parts of the structure, seek qualified help from the architect, engineer or designer of the structure. Additional reference data on wood construction is available in the form of building codes, code evaluation reports and other design references.

4. The Quick Reference and Allowable Load tables in this guide are only for uniform loads on simple (single) or equal, continuous (multiple) span members as noted in each table. For other conditions such as concentrated loads, unequal spans, etc., contact your LP SolidStart Engineered Wood Products distributor.

5. Spans are measured from center-to-center of supports. A structurally adequate bearing surface under the full width (thickness) of the beam must be provided at each support.

6. Minimum bearing length is 1-1/2” (at least one jack stud or cripple is required) unless otherwise noted for a specific table. Refer to the Reaction Capacity charts and the notes for each table. Verify local code requirements for minimum bearing.

7. Total load deflections are based on instantaneous loading. Long term deflection (creep) under sustained load has not been considered.

8. LP SolidStart LVL is not cambered.

9. Higher grades of LP SolidStart LVL can be substituted for the indicated grade.

10. LP SolidStart LVL sized with the tables and design values in this guide requires continuous lateral restraint of the compression edge. Continuous restraint is defined as a maximum unbraced length of 24”. This restraint is normally provided by sheathing and/or other framing members, which shall be adequately anchored to the LVL and the supporting structure. Framing conditions that do not provide continuous lateral restraint require special design. Contact your LP SolidStart Engineered Wood Products distributor: Caution: Failure to provide adequate lateral restraint could result in an unstable member and reduce its load capacity.

11. Lateral restraint shall also be provided at all supports to prevent rotation or twisting.

12. Refer to the Connection Details page for information on designing nailed and bolted connections, minimum nail spacing and end distances and for properly connecting multiple plies of LVL to form a built-up member.
Table of Contents

LVL 2900Fb-2.0E

Product Specifications & Design Values ........................................ 4
Floor Quick Reference Tables ................................................... 5
Combined Quick Reference Tables .............................................. 6-7
Roof Quick Reference Tables .................................................... 8-9
Uniform Floor Load (PLF) Tables ................................................ 10
Uniform Roof Load (PLF) Tables ................................................ 11

GENERAL INFORMATION

Temporary Bracing & Warnings .................................................. 12
Installation Details ................................................................. 13
Connection Details ............................................................... 14-15
Handling and Storage Guidelines ............................................ 16
## LVL 2900Fb-2.0E Product Specifications & Design Values

### ALLOWABLE STRESS DESIGN VALUES (PSI)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Bending Stress Fb</th>
<th>Modulus of Elasticity E (x 10⁶)</th>
<th>Shear Stress Fv</th>
<th>Compression Stress Fc (Parallel To Grain)</th>
<th>Compression Stress Fv (Perpendicular To Grain)</th>
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<tr>
<td>2900Fb-2.0E</td>
<td>2900</td>
<td>2.0</td>
<td>285</td>
<td>3200</td>
<td>750</td>
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### NOTES:
1. LP SolidStart LVL shall be designed for dry-use conditions only. Dry-use applies to products installed in dry, covered and well-ventilated interior conditions in which the equivalent moisture content in lumber will not exceed 16%.
2. The allowable strengths and stiffness are for normal load duration (10 year). Bending, Shear, and Compression parallel-to-grain shall be adjusted according to code. Modulus of Elasticity and Compression perpendicular-to-grain shall not be adjusted.
3. The allowable Bending Stress is tabulated for a standard 12" depth. For depths greater than 12", multiply Fb by (12/depth)⁰.ⁱ⁴³. For depths less than 12", multiply Fb by (12/depth)⁰.¹¹¹. For depths less than 3-1/2", multiply Fb by 1.147.
4. Deflection calculations shall include both bending and shear deformations.

\[
\Delta = \frac{270wL^4}{Ebd^4} + \frac{39.8wL^2}{Ebd} \quad \text{Where:} \quad \Delta = \text{deflection (in)} \quad E = \text{modulus of elasticity (psi)} \quad w = \text{uniform load (psf)} \quad b = \text{width of beam (in)} \quad L = \text{design span (ft)} \quad d = \text{depth of beam (in)}
\]

Equations for other conditions can be found in engineering references.

### SECTION PROPERTIES AND ALLOWABLE CAPACITIES

<table>
<thead>
<tr>
<th>Depth</th>
<th>Weight (lb/ft)</th>
<th>Allowable Moment (lb-ft)</th>
<th>Allowable Shear (lb)</th>
<th>Moment of Inertia (in²)</th>
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<td>27.0</td>
<td>36.1</td>
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</table>

### NOTES:
1. The Reaction Capacity values are based on the compression strength, perpendicular-to-grain, of the LVL. This is suitable for beams bearing on steel or the end-grain of studs.
2. Verify that the support for the beam is structurally adequate to carry the reaction. The compressive strength, parallel-to-grain, of studs may require more studs than the bearing length above indicates.
3. The 3-1/₂", 5-₁/₄", and 7" beam widths listed above can be either a single piece or a combination of thicknesses. For example, a 7" wide beam may be a single billet beam of 7", two plies of 3-1/₂", a single 1-3/₄" attached to a 5-₁/₄" billet beam, a 3-1/₂" with a 1-3/₄" ply attached to each face, or four plies of 1-3/₄". Refer to the Connection Assemblies details on page 14 for additional information.
4. The tabulated weight is an estimate and shall only be used for design purposes. Contact LP for actual shipping weights.

### FASTENERS:
Refer to pages 14-15 for information on connecting multiple plies and for the equivalent specific gravity for design of nailed and bolted connections.

### REACTION CAPACITY (LBS)

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<tr>
<th>Bearing Length</th>
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<th>11&quot;</th>
<th>11-1/₂&quot;</th>
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<td>49875</td>
<td>52500</td>
<td>55125</td>
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</table>

### NOTES:
1. The Reaction Capacity values are based on the compression strength, perpendicular-to-grain, of the LVL. This is suitable for beams bearing on steel or the end-grain of studs.
2. Verify that the support for the beam is structurally adequate to carry the reaction. The compressive strength, parallel-to-grain, of studs may require more studs than the bearing length above indicates.
3. For beams bearing on wood plates, the required bearing length will increase based on the bearing strength (compression perpendicular-to-grain) of the species and grade used for the plate material.
4. Verify local code requirements concerning minimum bearing.
TO USE:
1. Select the correct table for the supported floor joist condition (simple or continuous — see notes below).
2. Choose the required center-to-center span for the beam in the Span column.
3. Select the span carried by the beam across the top of the table.
4. Read the beam size or choice of beam sizes from the table.

EXAMPLE: A beam with a 10’ span carries 15’-0” simple span joists on each side.

SOLUTION: Using the Continuous-Span Floor Joists table with 30’-0” span carried, select either 3-1/2” x 11-1/4” or 5-1/4” x 9-1/4”.

NOTES:
1. Use the Continuous Floor Joists table where the floor joists are continuous (multiple span) over the beam.
2. Use the Simple-Span Floor Joists table where the floor joists frame into the side or end on top of the beam.
3. End supports require 3” bearing. Interior supports require 6” bearing except 7-1/2” is required where bold. The bearing length is based on the compression strength, perpendicular-to-grain, of the LVL. See the Reaction Capacity table on page 4 for additional information.
4. Deflections are limited to L/360 live load and L/240 total load.
5. Beam width can be either a single piece of LVL or built up from multiple plies that are nailed, bolted or connected with other approved fasteners.
6. Do not use where marked “-”.

### SIMPLE-SPAN FLOOR JOISTS

<table>
<thead>
<tr>
<th>Span Carried By Beam</th>
<th>20'</th>
<th>22'</th>
<th>24'</th>
<th>26'</th>
<th>28'</th>
<th>30'</th>
<th>32'</th>
<th>34'</th>
<th>36'</th>
<th>38'</th>
<th>40'</th>
</tr>
</thead>
<tbody>
<tr>
<td>6'-0&quot;</td>
<td>3-1/2’</td>
<td>3-1/2’</td>
<td>3-1/2’</td>
<td>3-1/2’</td>
<td>3-1/2’</td>
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<tr>
<td>8'-0&quot;</td>
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### CONTINUOUS FLOOR JOISTS

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<td>24'-0&quot;</td>
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<td>3-1/2’</td>
<td>3-1/2’</td>
</tr>
</tbody>
</table>
TO USE:
1. Select the correct table for the roof loads needed.
2. Select the span carried by the beam across the top of the table.
3. Select the beam width from the table.

EXAMPLE: A beam with a 9'-6" span supports a 32'-0" span carried for a 20 psf roof live load.

SOLUTION: Using the correct table for the roof load with 32'-0" span carried, select either 3-1/2" x 11-1/4" or 5-1/4" x 9-1/4".

<table>
<thead>
<tr>
<th>Span Width</th>
<th>20'</th>
<th>22'</th>
<th>24'</th>
<th>26'</th>
<th>28'</th>
<th>30'</th>
<th>32'</th>
<th>34'</th>
<th>36'</th>
<th>38'</th>
<th>40'</th>
</tr>
</thead>
<tbody>
<tr>
<td>6'-0&quot;</td>
<td></td>
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<tr>
<td>3-1/2&quot;</td>
<td>7-1/4&quot;</td>
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<td>10'-0&quot;</td>
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</tr>
</tbody>
</table>

**NOTES:**
1. Span is center-to-center of supports and is valid for simple beam spans only.
2. End supports require 3" bearing except 4-1/2" is required where bold. The end supports for the standard garage door spans of 9'-6", 16'-6" and 18'-6" have been limited to 3" (two trimmers) on each end. The bearing length is based on the compression strength, perpendicular-to-grain, of the LVL. See the Reaction Capacity table on page 4 for additional information.
3. Deflections are limited to L/360 live or snow load and L/240 total load.
4. Loads include 100 psf for an exterior wall and assume a 2' maximum overhang on the roof and an interior support at mid-span of the floor joists.
5. Beam width can be either a single piece of LVL or built up from multiple plies that are nailed, bolted or connected with other approved fasteners. Refer to pages 14-15 for connection details.
6. Do not use where marked "-".
**DESIGN LOADS**

1. Select the correct table for the roof loads needed.
2. Read the beam size or choice of beam sizes from the table.
3. Select the span carried by the beam across the top of the table.

**EXAMPLE:** A beam with a 9'-6" span supports a 32'-0" span carried for a 40 psf roof snow load.

**SOLUTION:**

Using the correct table for the roof load with 32'-0" span carried, select either 5-1/4" x 9-1/4" or 3-1/2" x 11-1/4".

**NOTES:**

1. End supports require 3" bearing except 4-1/2" is required where bold.
2. The end supports for the standard garage door spans of 9'-6", 16'-6" and 18'-6" have been limited to 3" (two trimmers) on each end. The bearing length is based on the compression strength, perpendicular-to-grain, of the LVL. See the Reaction Capacity table on page 4 for additional information.
3. Deflections are limited to L/360 live or snow load and L/240 total load.
4. Do not use where marked "-".
5. Span is center-to-center of supports and is valid for simple beam spans only.
6. End supports require 3" bearing except 4-1/2" is required where bold.
7. The end supports for the standard garage door spans of 9'-6", 16'-6" and 18'-6" have been limited to 3" (two trimmers) on each end. The bearing length is based on the compression strength, perpendicular-to-grain, of the LVL. See the Reaction Capacity table on page 4 for additional information.
8. See the Combined Beam Quick Reference Tables for further details.

**LVL 2900Fb-2.0E Combined Beam Quick Reference Tables**

<table>
<thead>
<tr>
<th>Span</th>
<th>Beams Width</th>
<th>Span Carried By Beam</th>
</tr>
</thead>
<tbody>
<tr>
<td>6'-0&quot;</td>
<td>3-1/2&quot;</td>
<td>7'-1/4&quot; 7'-1/4&quot; 7'-1/4&quot; 7'-1/4&quot; 7'-1/4&quot; 7'-1/4&quot; 7'-1/4&quot; 7'-1/4&quot;</td>
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<td>5-1/4&quot;</td>
<td>18&quot; 18&quot; 18&quot; 18&quot; 18&quot; 18&quot; 18&quot; 18&quot;</td>
</tr>
</tbody>
</table>

**NOTES:**

1. Span is center-to-center of supports and is valid for simple beam spans only.
2. The end supports for the standard garage door spans of 9'-6", 16'-6" and 18'-6" have been limited to 3" (two trimmers) on each end. The bearing length is based on the compression strength, perpendicular-to-grain, of the LVL. See the Reaction Capacity table on page 4 for additional information.
3. Deflections are limited to L/360 live or snow load and L/240 total load.
4. Do not use where marked "-".
TO USE:
1. Select the correct table for the roof loads needed.
2. Choose the required center-to-center span for the beam in the Span column.
3. Select the span carried by the beam across the top of the table.
4. Read the beam size or choice of beam sizes from the table.
5. Beam width can be either a single piece of LVL or built up from multiple plies that are nailed, bolted or connected with other approved fasteners.
6. Do not use where marked “-”.
7. Deflections are limited to L/360 live or snow load and L/240 total load.
8. Loads assume a 2’ maximum overhang on the roof.
9. The end supports for the standard garage door spans of 9’-6”, 16’-6” and 18’-6” have been limited to 3” (two trimmers) on each end. The bearing length is based on the compression strength, perpendicular-to-grain, of the LVL. See the Reaction Capacity table on page 4 for additional information.

EXAMPLE: A beam with a 16’-6” span supports a 38’-0” span carried for a 25 psf roof snow load.

SOLUTION: Using the correct table for the roof load with 38’-0” span carried, select either 3-1/2” x 16” or 5-1/4” x 14”.

NOTES:
1. Span is center-to-center of supports and is valid for simple beam spans only.
2. End supports require 3” bearing except 4-1/2” is required where bold. The end supports for the standard garage door spans of 9’-6”, 16’-6” and 18’-6” have been limited to 3” (two trimmers) on each end. The bearing length is based on the compression strength, perpendicular-to-grain, of the LVL. See the Reaction Capacity table on page 4 for additional information.
3. Deflections are limited to L/360 live or snow load and L/240 total load.
4. Loads assume a 2’ maximum overhang on the roof.
5. Beam width can be either a single piece of LVL or built up from multiple plies that are nailed, bolted or connected with other approved fasteners.
6. Do not use where marked “-”.

### LVL 2900Fb-2.0E Roof Beam Quick Reference Tables

<table>
<thead>
<tr>
<th>Span</th>
<th>Beam Width</th>
<th>Span Carried By Beam</th>
</tr>
</thead>
<tbody>
<tr>
<td>6’-0”</td>
<td>3-1/2”</td>
<td>20’</td>
</tr>
<tr>
<td>3-1/2”</td>
<td>22’</td>
<td>7-1/4”</td>
</tr>
<tr>
<td>5-1/4”</td>
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</tr>
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<td>5-1/4”</td>
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</table>
TO USE:
1. Select the correct table for the roof loads needed.
2. Choose the required center-to-center span for the beam in the Span column.
3. Select the span carried by the beam across the top of the table.
4. Read the beam size or choice of beam sizes from the table.

EXAMPLE: A beam with a 16'-6" span supports a 38'-0" span carried for a 40 psf roof snow load.

SOLUTION: Using the correct table for the roof load with 38'-0" span carried, select a 5-1/4" x 16".

NOTE: A 3-1/2" beam does not work.

<table>
<thead>
<tr>
<th>Beam Width</th>
<th>20&quot;</th>
<th>22&quot;</th>
<th>24&quot;</th>
<th>26&quot;</th>
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</table>

**NOTES:**
1. Span is center-to-center of supports and is valid for simple beam spans only.
2. End supports require 3" bearing except 4-1/2" is required where bold. The end supports for the standard garage door spans of 9'-6", 16'-6" and 18'-6" have been limited to 3" (two trimmers) on each end. The bearing length is based on the compression strength, perpendicular-to-grain, of the LVL. See the Reaction Capacity table on page 4 for additional information.
3. Deflections are limited to L/360 live or snow load and L/240 total load.
4. Loads assume a 2" maximum overhang on the roof.
5. Beam width can be either a single piece of LVL or built up from multiple plies that are nailed, bolted or connected with other approved fasteners. Refer to pages 14-15 for connection details.
6. Do not use where marked "-".
**TO USE:**
1. Select the required Span.
2. Divide the design loads by the desired number of plies to verify each ply of the beam.
3. Select a beam that exceeds the Total Load and the appropriate Live Load.
4. Check the bearing requirements.

**EXAMPLE:**
For a 16'-6" span, select a 2- and 3-ply beam that satisfies an L/360 Live Load deflection limit for the following design loads. Live Load = 440 plf, Total Load = 605 plf.

**SOLUTION FOR A 2-PLY BEAM:**
Design Total Load per ply = 605 / 2 = 303 plf
Design Live Load per ply = 440 / 2 = 220 plf

**Use 2 plies 1-3/4" x 14"**
(Total Load = 360 plf, Live Load L/360 = 245 plf)

**SOLUTION FOR A 3-PLY BEAM:**
Design Total Load per ply = 605 / 3 = 202 plf
Design Live Load per ply = 440 / 3 = 147 plf

**Use 3 plies 1-3/4" x 11-7/8"**
(Total Load = 223 plf, Live Load L/360 = 152 plf)

**DESIGN ASSUMPTIONS:**
1. Span is the center-to-center distance of the supports and is valid for simple or continuous span applications.
2. The values in the tables are for uniform loads only.
3. Total Load is for normal (100%) duration and has been adjusted for the Self Weight of the member.
4. Depths of 16" and greater shall be used with a minimum of two plies unless designed specifically as a single ply with proper lateral bracing, such as a marriage beam for each half of a manufactured home.
5. The allowable loads in the table are for a single ply of LVL. Multiply the values by the number of equal thickness plies to directly verify the capacity of each individual ply. Example: double the allowable loads in the table for a 2-ply member or divide the required uniform loads by 2 to verify each ply of a 2-ply member.
6. The member width shall be properly built up by connecting plies of the same grade of LVL.
7. Do not use a product where designated "-" without further analysis by a design professional.

**ADDITIONAL NOTES:**
1. The allowable loads represent the capacity of the member in pounds per lineal foot (plf) of length. The designer shall check both the Total Load and the appropriate Live Load column.
2. The Live Load is blank, the Total Load governs the design.
3. The designer shall check both the Total Load and the appropriate Live Load column.
4. Depths of 16" and greater shall be used with a minimum of two plies unless designed specifically as a single ply with proper lateral bracing, such as a marriage beam for each half of a manufactured home.
5. The allowable loads in the table are for a single ply of LVL. Multiply the values by the number of plies of equal thickness to size a built-up member or divide the required loads by the number of equal thickness plies to directly verify the capacity of each individual ply. Example: double the allowable loads in the table for a 2-ply member or divide the required uniform loads by 2 to verify each ply of a 2-ply member.
6. Where the Live Load is blank, the Total Load governs the design.
7. Do not use a product where designated "-" without further analysis by a design professional.

**ACTUAL DEFLECTION BASED ON SPAN AND LIMIT**

<table>
<thead>
<tr>
<th>Span (ft)</th>
<th>10'</th>
<th>12'</th>
<th>14'</th>
<th>16'</th>
<th>18'</th>
<th>20'</th>
<th>22'</th>
<th>24'</th>
<th>26'</th>
<th>28'</th>
<th>30'</th>
</tr>
</thead>
<tbody>
<tr>
<td>L/480</td>
<td>1/4</td>
<td>1/8</td>
<td>1/4</td>
<td>3/8</td>
<td>3/8</td>
<td>7/16</td>
<td>1/2</td>
<td>1/2</td>
<td>1/2</td>
<td>1/2</td>
<td>1/2</td>
</tr>
<tr>
<td>L/240</td>
<td>1/2</td>
<td>5/8</td>
<td>11/16</td>
<td>13/16</td>
<td>7/8</td>
<td>11/8</td>
<td>1-1/8</td>
<td>1-1/8</td>
<td>1-1/8</td>
<td>1-1/8</td>
<td>1-1/8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Span (ft)</th>
<th>10'</th>
<th>12'</th>
<th>14'</th>
<th>16'</th>
<th>18'</th>
<th>20'</th>
<th>22'</th>
<th>24'</th>
<th>26'</th>
<th>28'</th>
<th>30'</th>
</tr>
</thead>
<tbody>
<tr>
<td>L/480</td>
<td>1/4</td>
<td>1/8</td>
<td>1/4</td>
<td>3/8</td>
<td>3/8</td>
<td>7/16</td>
<td>1/2</td>
<td>1/2</td>
<td>1/2</td>
<td>1/2</td>
<td>1/2</td>
</tr>
<tr>
<td>L/240</td>
<td>1/2</td>
<td>5/8</td>
<td>11/16</td>
<td>13/16</td>
<td>7/8</td>
<td>11/8</td>
<td>1-1/8</td>
<td>1-1/8</td>
<td>1-1/8</td>
<td>1-1/8</td>
<td>1-1/8</td>
</tr>
</tbody>
</table>

**LVL 2900Fb-2.0E Uniform Floor Load (PLF) Tables**
TO USE:
1. Select the required Span. For beams with a pitch greater than 1:12, multiply the horizontal span by the slope adjustment factor from the table below.
2. Divide the design loads by the desired number of piers to obtain each pier of the beam.
3. Select a beam that exceeds the appropriate Total Load (Snow 115% or Non-Snow 125%) and the appropriate Snow/Live (L/360 or L/240).
4. Check the bearing requirements.

EXAMPLE:
For a 16' horizontal span with a pitch of 4:12, select a 2- and 3-ply beam that satisfies an L/360 Snow Load deflection limit of 1/32." Total Load = 11:28 pf

CALCULATE BEAM SPAN: 16' x 1:054 = 16.9'  
Use Span = 17'

SOLUTION FOR A 2-PLY BEAM:
Design Total Load per ply = 1128/2 / 2 = 564 pf
Design Snow Load per ply = 720 / 2 = 360 pf
Use 2 plies 1-3/4" x 18'

SOLUTION FOR A 3-PLY BEAM:
Design Total Load per ply = 1128/3 / 3 = 376 pf
Design Snow Load per ply = 720 / 3 = 240 pf
Use 3 plies 1-3/4" x 16'

ADDITIONAL NOTES:
1. The allowable loads represent the capacity of the member in pounds per lineal foot (plf) of length.
2. The designer shall check both the appropriate Total Load and the appropriate Live Load column.
3. The Snow/Live loads in the table are for a single ply of LVL. Multiply the values by the number of plies of multiple-ply connections on pages 14-15.
4. Snow/Live Load deflection has been limited to L/360 or L/240 as noted in the table. To design for a Snow or Roof Load Live Load deflection of L/480, use the Uniform Load tables on page 10.
5. Total deflection has been limited to L/180. Long term deflection (creep) has not been considered.
6. These tables assume full lateral support of the compression edge. Full support is considered to be a minimum unbraced length of 1/4." Proper bearing must be provided. Bearing length must be checked for support reactions with the table on page 4.

SLOPE ADJUSTMENT FACTOR

<table>
<thead>
<tr>
<th>Slope</th>
<th>2:12</th>
<th>3:12</th>
<th>4:12</th>
<th>5:12</th>
<th>6:12</th>
<th>8:12</th>
<th>10:12</th>
<th>11:12</th>
<th>12:12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor</td>
<td>1.014</td>
<td>1.031</td>
<td>1.054</td>
<td>1.083</td>
<td>1.118</td>
<td>1.158</td>
<td>1.202</td>
<td>1.250</td>
<td>1.302</td>
</tr>
<tr>
<td></td>
<td>1.357</td>
<td>1.414</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Temporary Bracing & Warnings

**WARNING:**
Temporary construction bracing required for lateral support before decking is completed. Failure to use bracing could result in serious injury or death. See Installation Guide for specifics.

**WARNING:**
Don’t use visually damaged products without first checking with your local LP SOLIDSTART Engineered Wood Products Distributor or Sales Office. (See back cover for details.)

Don’t bore holes or notch unless reviewed by a design professional. Exception: small holes may be drilled in accordance with the beam hole details on page 13.

NOTE:
Some details have been left out for clarity.
Installation Details

NOTES:
1. These guidelines apply to uniformly loaded beams selected from the Quick Reference Tables or the Uniform Load Tables or designed with LP’s design/specification software only. For all other applications, such as beams with concentrated loads, please contact your LP SolidStart Engineered Wood Products distributor for assistance.
2. Round holes can be drilled anywhere in “Area A” provided that: no more than four holes are cut, with the minimum spacing described in the diagram. The maximum hole size is 1-1/2” for depths up to 9-1/4”, and 2” for depths greater than 9-1/4”.
3. Rectangular holes are NOT allowed.
4. DO NOT drill holes in cantilevers without prior approval from the project designer.
5. Other hole sizes and configurations MAY be possible with further engineering analysis. For more information, contact your LP SolidStart Engineered Wood Products distributor.
6. Up to three 3/4” holes may be drilled in “Area B” to accommodate wiring and/or water lines. These holes shall be at least 12” apart. The holes shall be located in the middle third of the depth, or a minimum of 3” from the bottom and top of the beam. For beams shallower than 9-1/4”, locate holes at mid-depth.
7. Protect plumbing holes from moisture.

BEAM HOLE DETAILS

<table>
<thead>
<tr>
<th>Area A</th>
<th>Area B</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/3 beam depth</td>
<td>Clear span</td>
</tr>
<tr>
<td>Minimum 2 x diameter of larger hole</td>
<td>1 foot</td>
</tr>
<tr>
<td>1 foot</td>
<td></td>
</tr>
</tbody>
</table>

BEAM CONNECTION
- Structurally adequate hanger
- Hanger shall apply load equally to each ply or special design required

STEEL COLUMN & WOOD COLUMN
- Simpson® CCOL USP® CCS or equal column cap
- Provide specified bearing length

CONCRETE WALL
- Simpson GLB, USP LBS or equal seat
- Provide specified or prescriptive bearing length

FLOOR BEAM (Flush ceiling)
- Top mount hangers recommended
- Prevent the beam from rotating by using rim or blocking
- Check stiffener/filler requirements depending on load and hanger type

MASONRY HANGER
- Simpson WM, USP MPH, or equal hanger
- Continuous plate
- Provide specified or prescriptive bearing length

NOTE: Protect wood from contact with concrete as required by code

WINDOW/DOOR HEADER
- Rim Board
- Prevent the beam from rotating by using rim or blocking

NOTE: Protect wood from contact with concrete as required by code

BEAM CONNECTION
- Simpson PC or CC, USP PCM or CC or equal post or column cap
- Provide specified bearing length

WINDOW/DOOR HEADER
- Simpson® CCO, USP® CCS or equal column cap
- Provide specified bearing length

Q4
- MASONRY HANGER
- Simpson WM, USP MPH, or equal hanger

Q1
- WINDOW/DOOR HEADER
- Rim Board

Q2
- WINDOW/DOOR HEADER
- Continuous plate
- Provide specified or prescriptive bearing length

Q5
- STEEL COLUMN & WOOD COLUMN
- Simpson PC or CC, USP PCM or CC or equal post or column cap
- Provide specified bearing length

Q6
- FLOOR BEAM (Flush ceiling)
- Top mount hangers recommended
- Prevent the beam from rotating by using rim or blocking
- Check stiffener/filler requirements depending on load and hanger type

Q7
- CONCRETE WALL
- Simpson GLB, USP LBS or equal seat
- Provide specified or prescriptive bearing length

Q3
- BEAM CONNECTION
- Simpson® CCOL USP® CCS or equal column cap
- Provide specified bearing length

P4
- STEEL COLUMN & WOOD COLUMN
- Simpson PC or CC, USP PCM or CC or equal post or column cap
- Provide specified bearing length

P5
- BEAM CONNECTION
- Simpson® CCOL USP® CCS or equal column cap
- Provide specified bearing length

P6
- FLOOR BEAM (Flush ceiling)
- Top mount hangers recommended
- Prevent the beam from rotating by using rim or blocking
- Check stiffener/filler requirements depending on load and hanger type

P7
- CONCRETE WALL
- Simpson GLB, USP LBS or equal seat
- Provide specified or prescriptive bearing length

P8
- BEAM CONNECTION
- Simpson® CCOL USP® CCS or equal column cap
- Provide specified bearing length

P9
- STEEL COLUMN & WOOD COLUMN
- Simpson PC or CC, USP PCM or CC or equal post or column cap
- Provide specified bearing length

P10
- FLOOR BEAM (Flush ceiling)
- Top mount hangers recommended
- Prevent the beam from rotating by using rim or blocking
- Check stiffener/filler requirements depending on load and hanger type

P11
- CONCRETE WALL
- Simpson GLB, USP LBS or equal seat
- Provide specified or prescriptive bearing length

P12
- BEAM CONNECTION
- Simpson® CCOL USP® CCS or equal column cap
- Provide specified bearing length

P13
- STEEL COLUMN & WOOD COLUMN
- Simpson PC or CC, USP PCM or CC or equal post or column cap
- Provide specified bearing length
Connection Details

**TOP-LOADED BEAM – NAILED CONNECTION**

(See Connection Assemblies for more details)

**TOP-LOADED BEAM – BOLTED CONNECTION**

(See Connection Assemblies for more details)

**SIDE-LOADED BEAM**

(See Connection Assemblies for more details)

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**NOTES:**

1. The Uniform Side-Load Capacity values are the maximum load that can be applied to either side of the beam, based on the selected connection detail, and represent loads applied uniformly such as joists supported by hangers spaced 24" or less. Connections for discrete point loads may be determined with this table by calculating the equivalent fastener schedule within a 2' length centered about the point load. Details B and D shall have the back ply connected with a number of nails equal to half that used to connect the front ply – see the Side-Load Connection Example and detail on page 15. All nail and bolt spacing requirements shall be verified. The full length of the beam shall be connected with the standard connection or with the appropriate uniform side-load connection from this table. The beam shall be designed to support all applied loads.

2. Values are for normal load duration and shall be adjusted according to code.

3. The values for Uniform Side-Load Capacity for nails and Lateral Load Capacity (From Nail Schedule) are based on Douglas Fir lumber equivalence (SG = 0.50) for a 16d box (3-1/2" x 0.145") nails for 1-3/4" LVL. For other nail sizes, multiply the Uniform Side-Load Capacity by the Nail Size Factor from the Nail Schedule. For 1-1/2" UD, multiply by the Nail Size Factor for the appropriate 3" nail. Higher capacities may be calculated using the equivalent specific gravities tabulated in the Fastener Design table on page 15.

4. The values for the Uniform Side-Load Capacity for bolts are based on Douglas Fir lumber equivalence (SG = 0.50) for ASTM grade A-307, 1/2"Ø bolts, for loads applied perpendicular to-grain. For 1-1/2" LVL, multiply these values by 0.86 or calculate for the needed detail. Higher bolt capacities may be calculated using the equivalent specific gravities tabulated in the Fastener Design table on page 15.

5. For nails at 8" oc, multiply the capacity by 1.5. For nails at 6" oc, multiply the capacity by 2. For four rows of nails, double the two-row capacity.

6. Use 2 rows of nails for depths to 12". Use 3 rows of nails for depths greater than 12" up to 18".

7. Unless specifically designed, use 3-1/2" nails for 1-3/4" and 2" thick plies and use 3" nails for 1-1/2" thick plies. If the nails do not fully penetrate the second ply (main member), then the nails shall be driven from both faces.

8. For detail A, or when attaching the first two plies for detail B (and optionally for details F and H – see note 11), the nails may be driven all from one face or alternating from both faces. If the nails do not fully penetrate the second ply, then the nails shall be driven from both faces.

9. When driving nails from each face, alternate every other nail in each row.

10. For details C and E, when side-loaded, the larger side-load shall be applied to the thicker ply (main member).

11. For details F and H, it is permissible to nail the plies together before bolting or driving Simpson SDS or SDW (or equal) screws. Nail two plies together (see note 8) then nail one additional ply to each side.

12. Beams wider than 5-1/2" shall be top-loaded or side-loaded from both sides to prevent rotation. For side loads applied to one side of a beam only, the project designer shall verify torsional capacity or detail the beam to prevent rotation due to any side loads. Consult a design professional for other options.

13. Power-driven nails shall conform to ICC-ES report ESR-1539 (International Staple, Nail and Tool Association) for power-driven staples and nails.

14. Other nail, screw or bolt configurations are possible. Refer to the Fastener Design table on page 15 or contact your LP SolidStart Engineered Wood Products distributor.

---

**UNIFORM SIDE-LOAD CAPACITY (PLF)**

<table>
<thead>
<tr>
<th>Connection Detail</th>
<th>2 Rows of Nails at 12&quot; oc</th>
<th>3 Rows of Nails at 12&quot; oc</th>
<th>2 Rows of 1/2&quot; Bolts at 24&quot; oc</th>
<th>2 Rows of 1/2&quot; Bolts at 12&quot; oc</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>412</td>
<td>618</td>
<td>506</td>
<td>1012</td>
</tr>
<tr>
<td>B</td>
<td>309</td>
<td>464</td>
<td>380</td>
<td>760</td>
</tr>
<tr>
<td>C</td>
<td>309</td>
<td>464</td>
<td>522</td>
<td>1044</td>
</tr>
<tr>
<td>D</td>
<td>275</td>
<td>412</td>
<td>464</td>
<td>928</td>
</tr>
<tr>
<td>E</td>
<td>275</td>
<td>412</td>
<td>464</td>
<td>928</td>
</tr>
<tr>
<td>F</td>
<td>na</td>
<td>na</td>
<td>337</td>
<td>674</td>
</tr>
<tr>
<td>G</td>
<td>na</td>
<td>na</td>
<td>858</td>
<td>1716</td>
</tr>
</tbody>
</table>

H Refer to Simpson Strong-Tie® catalog for SDS & SDW installation requirements & capacities.

---

**NAIL SCHEDULE**

<table>
<thead>
<tr>
<th>Nail Type</th>
<th>Nail Length (in)</th>
<th>Nail Diameter (in)</th>
<th>Lateral Load Capacity (lbs)</th>
<th>Nail Size Factor</th>
<th>Nail Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>3&quot;</td>
<td>0.148</td>
<td>0.096</td>
<td>99</td>
<td>Power-driven nail*</td>
<td></td>
</tr>
<tr>
<td>3-1/2&quot;</td>
<td>0.128</td>
<td>0.088</td>
<td>91</td>
<td>Power-driven nail*</td>
<td></td>
</tr>
<tr>
<td>3-1/4&quot;</td>
<td>0.120</td>
<td>0.079</td>
<td>81</td>
<td>Power-driven nail*</td>
<td></td>
</tr>
</tbody>
</table>

---

* Minimum of 2" or the screw mfg’s edge distance.
NAIL SPACING REQUIREMENTS

<table>
<thead>
<tr>
<th>LVL Ply Thickness</th>
<th>Fastener Orientation</th>
<th>Common Nail Size</th>
<th>Minimum End Distance</th>
<th>Minimum Nail Spacing per Row</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1/2&quot;</td>
<td>Edge</td>
<td>8d &amp; smaller</td>
<td>2-1/2&quot;</td>
<td>3&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10d &amp; 12d</td>
<td>2-1/2&quot;</td>
<td>4&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16d</td>
<td>3-1/2&quot;</td>
<td>5&quot;</td>
</tr>
<tr>
<td></td>
<td>Face</td>
<td>8d &amp; smaller</td>
<td>1-1/2&quot;</td>
<td>3&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10d &amp; 12d</td>
<td>1-1/2&quot;</td>
<td>3&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16d</td>
<td>1-1/2&quot;</td>
<td>5&quot;</td>
</tr>
</tbody>
</table>

NOTES:
1. Edge distance shall be such that does not cause splitting.
2. Multiple rows of nails shall be offset at least 1/2" and staggered.
3. Edge orientation refers to nails driven into the narrow edge of the LVL, parallel to the face of the veneers. Face orientation refers to nails driven into the wide face of the LVL, perpendicular to the face of the veneers. (See Fastener & Load Orientation details above.)
4. For box nails, the end distance and minimum spacing of the next shorter nail may be used.
5. 16d sinkers (3-1/4" x 0.148"Ø) can be spaced the same as the 10d & 12d nails.
6. Minimum nail spacing may be reduced 1" for LVL stamped with plant numbers 1066 and 1071.
7. Minimum nail spacing may be reduced 1" for LVL stamped with plant number 1089, for thickness of 1-3/4" or greater.

SIDE-LOAD CONNECTION EXAMPLE

EXAMPLE: Assuming a properly designed 3-ply 14" beam, determine the equivalent connection to support a 3300 lb point load applied to the side of the beam.

SOLUTION:
1. Determine the equivalent PLF load over the 2' length by dividing the applied load by 2: 3300 lb / 2' = 1650 plf
2. Divide the equivalent PLF load by the capacity for the appropriate detail. For a 14" depth, 3 rows of nails are required.
3. The required total number of nails is 3.6 * 3 rows of nails @ 12" oc = 10.8 nails per foot
4. Connect the front (loaded) ply with the nailing determined in step 3: drive 11 16d box nails within 12" to each side of the point load (a total of 22 nails). Verify nail spacing.
5. Connect the back ply with half the number of nails determined in step 4: drive 6 16d box nails, from the back, within 12" to each side of the point load (a total of 12 nails). Verify nail spacing.
6. Connect full length of member with the standard nailing or as required for side loads.
7. Project designer shall detail to prevent rotation of the beam due to the applied side load.
Handling & Storage Guidelines

WARNING: Failure to follow proper procedures for handling, storage and installation could result in unsatisfactory performance, unsafe structures and possible collapse.

Keep LP SolidStart Engineered Wood Products dry. These products are intended to resist the effects of moisture on structural performance from normal construction delays but are not intended for permanent exposure to the weather.

Unload products carefully, by lifting. Support the bundles to reduce excessive bowing. Individual products shall be handled in a manner which prevents physical damage during measuring, cutting, erection, etc. I-Joists shall be handled vertically and not flatwise.

Keep products stored in wrapped and strapped bundles, stacked no more than 10' high. Support and separate bundles with 2x4 (or larger) stickers spaced no more than 10' apart. Keep stickers in line vertically.

Product must not be stored in contact with the ground, or have prolonged exposure to the weather.

Use forklifts and cranes carefully to avoid damaging product.

Do not use a visually damaged product. Call your local LP SolidStart Engineered Wood Products distributor for assistance when damaged products are encountered.

For satisfactory performance, LP SolidStart Engineered Wood Products must be used under dry, covered and well-ventilated interior conditions in which the equivalent moisture content in lumber will not exceed 16%.

For built-up members, LP SolidStart I-Joists, LSL and LVL shall be dry before nailing or bolting to avoid trapping moisture.

LP SolidStart I-Joists, LSL and LVL shall not be used for unintended purposes such as ramps and planks.

LP SolidStart LVL
2900FB-2.0E

Standard Thickness of 1-3/4 (also available in 1-1/2"
Billet thicknesses of 3-1/2", 5-1/4" and 7"
Lengths up to 60'

A water-resistant coating called SiteCote™ is applied to LP LVL for extra weather protection during construction.

Handling & Storage Guidelines

CODE EVALUATION

Code evaluation reports can be obtained at www.lpcorp.com

ICC ESR 2403
APA PR-L280
Florida FL15228
LP City RR-25783

For more information on the full line of LP SolidStart Engineered Wood Products or the nearest distributor, visit our web site at LPCorp.com.

Phone: 1-888-820-0325
E-mail: customer.support@LPCorp.com.

LP SolidStart Engineered Wood Products are manufactured at different locations in the United States and Canada. Please verify availability with the LP SolidStart Engineered Wood Products distributor in your area before specifying these products.

Cal. Prop 65 Warning:

WARNING: Drilling, sawing, sanding or machining wood products can expose you to wood dust, a substance known to the State of California to cause cancer. Avoid inhaling wood dust or use a dust mask or other safeguards for personal protection. For more information go to www.P65Warnings.ca.gov.wood.

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