

Stora Enso S-LVL™ Laminated Veneer Lumber (LVL)

TER No. 1507-01

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Stora Enso Wood Products Oy Ltd.

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DIVISION: 06 00 00 – WOOD, PLASTICS AND COMPOSITES

Section: 06 17 00 – Shop-Fabricated Structural Wood

Section: 06 17 13 – Laminated Veneer Lumber

1. Product(s) Evaluated:

- 1.1. Stora Enso Laminated Veneer Lumber (S-LVL™)
- 1.2. For the most recent version of this Technical Evaluation Report (TER), visit drjengineering.org. For more detailed state professional engineering and code compliance legal requirements and references, visit drjengineering.org/statelaw. DrJ is fully compliant with all state professional engineering and code compliance laws.
- 1.3. This TER can be used to obtain product approval in any country that is an IAF MLA Signatory (all countries found [here](#)) and covered by an [IAF MLA Evaluation](#) per the [Purpose of the MLA](#) (as an example, see [letter to ANSI](#) from the Standards Council of Canada). Manufacturers can go to jurisdictions in the U.S., Canada and other [IAF MLA Signatory Countries](#) and have their products readily approved by authorities having jurisdiction using [DrJ's ANSI accreditation](#).
- 1.4. Building code regulations require that evaluation reports are provided by an approved agency meeting specific requirements, such as those found in [IBC Section 1703](#). Any agency accredited in accordance with ANSI ISO/IEC 17065 meets this requirement within ANSI's scope of accreditation. For a list of accredited agencies, visit ANSI's [website](#). For more information, see drjcertification.org.



This research report is reviewed and sealed by Ryan Dexter, P.E. of DrJ Engineering, LLC, as a specialty engineer.

Given that DrJ is both ISO/IEC 17065 accredited and a professional engineering company, DrJ's certification is comprehensive and fully compliant with IBC Section 1703. A seal by a professional engineer is typically sufficient for approval, as regulated by the state Board of Professional Engineers. As stated in the building code, where this report is not approved, the building official shall respond in writing, stating the reasons the alternative was not approved. This allows DrJ to understand the code section in question and provide a timely code compliance cure.

For more information, contact DrJ at 608-310-6748 or drjengineering.org/our-team.

DrJ is a Professional Engineering Approved Source

 [Learn more about DrJ's Accreditation](#)

- DrJ is an ISO/IEC 17065 accredited product certification body through ANSI Accreditation Services.
- DrJ provides certified evaluations that are signed and sealed by a P.E.
- DrJ's work is backed up by professional liability insurance.
- DrJ is fully compliant with IBC Section 1703.

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- 1.5. Requiring an evaluation report from a specific private company (i.e. ICC-ES, IAPMO, CCMC, DrJ, etc.) can be viewed as discriminatory and is a violation of international, federal, state, provincial and local anti-trust and free trade regulations.
- 1.6. DrJ's code compliance work:
 - 1.6.1. Conforms to code language adopted into law by individual states and any relevant consensus based standard such as an ANSI or ASTM standard.
 - 1.6.2. Complies with accepted engineering practice, all professional engineering laws and by providing an engineer's seal DrJ takes professional responsibility for its specified scope of work.

2. Applicable Codes and Standards:¹

- 2.1. 2012, 2015 and 2018 International Building Code (IBC)
- 2.2. 2012, 2015 and 2018 International Residential Code (IRC)
- 2.3. 2005, 2010 and 2015 National Building Code of Canada (NBC)
- 2.4. ANSI/AWC – National Design Specification® for Wood Construction
- 2.5. ASTM D2559 – Standard Specification for Adhesives for Bonded Structural Wood Products for Use Under Exterior Exposure Conditions
- 2.6. ASTM D5055 – Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists
- 2.7. ASTM D5456 – Standard Specification for Evaluation of Structural Composite Lumber Products
- 2.8. ASTM D7247 – Standard Test Method for Evaluating the Shear Strength of Adhesive Bonds in Laminated Wood Products at Elevated Temperatures
- 2.9. CAN/CSA O86 – Engineering Design in Wood

3. Performance Evaluation:

- 3.1. Stora Enso S-LVL™ was evaluated to determine its resistance properties which are used to develop reference design values for allowable stress design (ASD) and load resistance factor design (LRFD). Additionally, specified strengths are developed for limit states design (LSD). This TER examines Stora Enso S-LVL™ for:
 - 3.1.1. Use as an alternative material to that described in [IBC Chapter 23](#), in particular, compliance with the requirements noted in [IBC Section 2301.2](#) and [IBC Section 2303.1.10](#)² for ASD.
 - 3.1.2. Use as an alternative material to that described in [IBC Chapter 23](#), in particular, compliance with the requirements noted in [IBC Section 2301.2](#) and [IBC Section 2303.1.10](#) for LRFD.
 - 3.1.3. Compliance with [IBC Sections 2304](#) and [2308](#) and [IRC Chapters 5, 6](#) and [8](#) for conventional light-frame construction applications.
 - 3.1.4. Use as an alternative material and method of construction in compliance with [IBC Section 104.11](#) and [IRC Section R104.11](#).
 - 3.1.4.1. When used in an application that exceeds the limits of [IRC Section R301](#), an engineered design shall be submitted in accordance with [Section R301.1.3](#) and this TER.
 - 3.1.5. Structural capacities in accordance with [IBC Section 2303.1.10](#):

2303.1.10 Structural composite lumber. Structural capacities for structural composite lumber shall be established and monitored in accordance with ASTM D5456.
 - 3.1.6. Structural design in accordance with NBC Division B Part 4 and Part 9 and CAN/CSA O86 as follows:
 - 3.1.6.1. Division A, Clause 1.2.1.1.(1)(a), using the following acceptable solution from Division B: Sentence 4.3.1.1.(1), Design Basis for Wood.

¹ Unless otherwise noted, all references in this code compliant technical evaluation report (TER) are from the 2018 version of the codes and the standards referenced therein, including, but not limited to, ASCE 7, SDPWS and WFCM. This product also complies with the 2000-2015 versions of the IBC and IRC and the standards referenced therein. As required by law, where this TER is not approved, the building official shall respond in writing, stating the reasons this TER was not approved. For variations in state and local codes, if any see [Section 8](#).

² 2012 [IBC Section 2303.1.9](#).

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- 3.1.6.2. Division A, Clause 1.2.1.1.(1)(b), as an alternative solution that achieves at least the minimum level of performance required by Division B as defined by the objectives and functional statements attributed to the applicable solutions in Sentence 9.23.4.2.(3) Spans for Joists, Rafters and Beams.
- 3.1.6.3. CSA-O86 specifies that the capacity of structural composite lumber is determined from test data by calculations specified in *ASTM D5456*.

3.2. Fire-resistance properties of Stora Enso S-LVL™ are outside the scope of this TER.

3.3. Any code compliance issues not specifically addressed in this section are outside the scope of this TER.

4. Product Description and Materials:

- 4.1. Stora Enso S-LVL™ is manufactured by Stora Enso Wood Products Oy Ltd. (Stora Enso) at its facility in Varkaus, Finland.
- 4.2. The product is manufactured by laminating wood veneers with an exterior type adhesive (complying with *ASTM D2559*) in a continuous process with the grain of the wood oriented parallel to the length of the member in accordance with an ISO 9001 quality certification system.
- 4.3. The wood veneer properties and species, adhesive, manufacturing parameters and finished product dimensions and tolerances are specified in the approved quality documentation and Stora Enso's in-plant manufacturing standard.

4.4. Material Availability

4.4.1. Thickness:

4.4.1.1. 1-⁵/₁₆" (24 mm)

4.4.1.2. 1-¹/₂" (38 mm)

4.4.1.3. 1-³/₄" (45 mm)

4.4.2. Nominal depths: 3¹/₂" to 24" (89 to 610 mm)

4.4.3. Lengths: up to 60' (24.38 m)

5. Applications:

5.1. Stora Enso S-LVL™ is an alternative to sawn lumber for floor, roof and wall structural members.

5.2. Structural applications include use as beams, columns, headers, joists, rafters, chords and webs of trusses, I-joist flanges, rim boards and wall studs.

5.3. Design

5.3.1. Design of Stora Enso S-LVL™ is governed by the applicable code and the provisions for structural composite lumber (SCL) in *NDS*® Part 8 and *CSA-O86* Section 16.3³.

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

5.3.2.1. The design provisions for wood construction noted in [IBC Section 2301.2](#) and [IRC Section R301.1.3](#) apply to Stora Enso S-LVL™ for allowable stress design (ASD) unless otherwise noted in this report. Allowable unit stresses for Stora Enso S-LVL™ for dry conditions of use are specified in [Table 1](#).

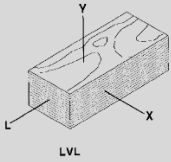
³ Section 13.3 in CSA-O86-09

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Table 1: Reference Design Values for Stora Enso S-LVL™ (Allowable Stress Design)^{1,2,3,4}

| Bending, F_b (psi) | | Tension, F_t (psi) | Compression, F_c (psi) | | | Horizontal Shear, F_v (psi) | | Beam Modulus of Elasticity, E (psi) | | Plank Modulus of Elasticity, E (psi) | | Modulus of Elasticity for Beam & Column Stability, E_{min} (psi) |
|-------------------------|-------|--------------------------------------|-----------------------------|---------------------------|-------|-------------------------------------|-------|---|-----------------------|--|--------------------------|---|
| Beam ^{6,7,8} | Plank | Parallel-to- Grain ^{8,9} | Parallel to- Grain | Perpendicular to-Grain | | Beam | Plank | True ⁵ | Apparent ⁵ | True ^{5,10} | Apparent ^{5,10} | |
| | | | | Beam | Plank | | | | | | | |
| 3,000 | 3,300 | 2,300 | 2,750 | 900 | 550 | 350 | 100 | 2.0×10^6 | 1.9×10^6 | 2.0×10^6 | 1.9×10^6 | 1.1×10^6 |

1. 1 psi = 0.00689 MPa, 1 MPa = 145 psi
2. The reference design values in this table are applicable for the product used in dry, well-ventilated interior applications, in which the equivalent moisture content of sawn lumber is less than 16%. See [Section 9.6.3](#) of this report.
3. The reference design values in this table are for normal load duration. Loads of longer or shorter duration shall be adjusted in accordance with the applicable code. Duration of load adjustments shall not be applied to F_c and E .
4. Orientation nomenclature for S-LVL™.



5. The Apparent E for both beams and planks can be used directly in traditional beam deflection formulas. The True E values (i.e., shear-free) are for both beams and planks. Using True E , deflection is calculated as follows for uniformly loaded simple span beams.

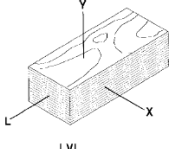
$$\Delta = [5WL^4/(32Ebh^3)] + [12WL^2/(5Ebh)]$$
 where: Δ = deflection in inches (mm)
 W = uniform load in lbs./in. (N/mm)
 L = span in inches (mm)
 E = modulus of elasticity in psi (MPa)
 b = width of beam in inches (mm)
 h = depth of beam in inches (mm)
6. The design value for bending members used in a beam orientation is based on a referenced depth of 12" (305 mm). For other depths, the bending values shall be adjusted by a size factor adjustment of $(12/d)^{0.117}$, where d is measured in inches with a minimum depth of 3-15/16" (100 mm).
7. When structural members qualify as repetitive members in accordance with the applicable code, a 4% increase is permitted.
8. Thicknesses greater than 5-1/4" (134 mm) shall not be used in design.
9. Design value multiplied by $(4.43/L)^{0.129}$ for length effect factors, with L measured in feet. Value limited to members 18" (457 mm) deep and less.
10. Based on 1.75" (44.5 mm) thickness.

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5.3.2.2. The design provisions for wood construction noted in [IBC Section 2301.2](#) and [IRC Section R301.1.3](#) apply to Stora Enso S-LVL™ for LRFD unless otherwise noted in this report. For compliance with the NBC, LSD shall be in accordance with CAN/CSA O86. Ultimate stresses for Stora Enso S-LVL™ for dry conditions of use are specified in [Table 2](#).

Table 2: Specified Strengths for Stora Enso S-LVL™ (Limit States Design)^{1, 2, 3, 4}

| Bending, F _b (psi) | | Tension, F _t (psi) | Compression, F _c (psi) | | Horizontal Shear, F _v (psi) | | Beam Modulus of Elasticity, E (psi) | | Plank Modulus of Elasticity, E (psi) | | Modulus of Elasticity for Beam & Column Stability, E _{min} (psi) | |
|----------------------------------|-------|-------------------------------------|--------------------------------------|---------------------------|--|------|---|-----------------------|--|-----------------------|--|--------------------------|
| Beam ^{6,7,8} | Plank | Parallel to Grain ^{8,9} | Parallel to Grain | Perpendicular to Grain | | Beam | Plank | True ⁵ | Apparent ⁵ | True ^{5,10} | | Apparent ^{5,10} |
| | | | | Beam | Plank | | | | | | | |
| 5,500 | 6,100 | 4,250 | 4,400 | 1,600 | 600 | 650 | 150 | 2.0 x 10 ⁶ | 1.9 x 10 ⁶ | 2.0 x 10 ⁶ | 1.9 x 10 ⁶ | 1.1 x 10 ⁶ |

1. 1 psi = 0.00689 MPa, 1 MPa = 145 psi
 2. The specified strength values in this table are applicable for the product used in dry, well-ventilated interior applications, in which the equivalent moisture content of sawn lumber is less than 16%. See [Section 9.6.3](#) of this report.
 3. The specified strength values in this table are for normal load duration. Loads of longer or shorter duration shall be adjusted in accordance with the applicable code. Duration of load adjustments shall not be applied to F_c and E.
 4. Orientation nomenclature for S-LVL™.
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5. The Apparent E for both beams and planks can be used directly in traditional beam deflection formulas. The True E values (i.e., shear-free) are for both beams and planks. Using True E, deflection is calculated as follows for uniformly loaded simple span beams.

$$\Delta = [5WL^4/(32Ebh^3)] + [12WL^2/(5Ebh)]$$
 where: Δ = deflection in inches (mm)
 W = uniform load in lbs./in. (N/mm)
 L = span in inches (mm)
 E = modulus of elasticity in psi (MPa)
 b = width of beam in inches (mm)
 h = depth of beam in inches (mm)
 6. The specified strength value for bending members used in a beam orientation is based on a referenced depth of 12" (305 mm). For other depths, the bending values shall be adjusted by a size factor adjustment of (12/d)^{0.117}, where d is measured in inches with a minimum depth of 3-15/16" (100 mm).
 7. When structural members are used in a load-sharing system in accordance with the applicable code, a system factor of K_H = 1.04 is permitted.
 8. Thicknesses greater than 5-1/4" (134 mm) shall not be used in design.
 9. Specified strength value multiplied by (4.43/L)^{0.129} for length effect factors, with L measured in feet. Value limited to members 18" (457 mm) deep and less.
 10. Based on 1.75" (44.5 mm) thickness.

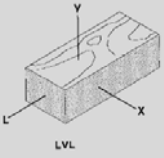
5.3.3. Connections

- 5.3.3.1.** Lateral loads for nails, screws and bolts and withdrawal loads for nails and screws installed in Stora Enso S-LVL™ shall be in accordance with the NDS® and CAN/CSA O86 for sawn lumber having a minimum specific gravity equal to that shown in [Table 2](#).
- 5.3.3.2.** Fastener spacing shall be as prescribed in the applicable code (for sawn lumber) unless specifically indicated in [Table 2](#) or [Table 3](#) or as prescribed in NDS® Part 12.
- 5.3.3.3.** Other nail spacing for specific applications, such as prefabricated steel components or hangers, may be used. Nail spacing for these applications should follow what is specified and detailed in the proprietary catalogues for the specific gravities as defined in [Table 3](#).
- 5.3.3.4.** Allowable lateral loads for machine bolts installed perpendicular to the wide face of Stora Enso S-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 or in accordance with NDS® for sawn lumber with the minimum specific gravity at least equivalent to that defined in [Table 3](#).

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| Table 3: Equivalent Specific Gravities and Minimum Fastener Spacing for Design of Mechanical Connections ^{2,3} | | | | | |
|---|----------|--|----------------|---|---------------------|
| Product | Fastener | Fastener Axis Orientation ¹ | Load Direction | Equivalent Specific Gravity for Design Purposes | Minimum Spacing |
| S-LVL™ | Nails | Y axis | Withdrawal | 0.40 | See footnote 4 |
| | | X axis | Withdrawal | 0.34 | |
| | Nails | Y axis | L and X axes | 0.50 | |
| | | X axis | L and Y axes | 0.35 | |
| | Bolts | Y axis | L axis | 0.41 | Per applicable code |
| | | | X axis | 0.45 | |

1. Orientation nomenclature for S-LVL™



2. Adjustment of the fastener values for duration of load shall be in accordance with the applicable code, *NDS*® or *CSA-O86*, as applicable.

3. Lateral resistance and withdrawal values are as provided in *NDS*® and *CSA-O86* for sawn lumber having equivalent specific gravities as shown.

4. Spacing, edge distance and end distance of nails installed perpendicular to the glue lines of the LVL™ are the same as those permitted in the applicable code for sawn lumber. Spacing of nails installed parallel to the glue lines of the LVL™ must be a minimum of 3" (76 mm) for 8d (0.131" x 2½") (3.3 mm x 63 mm) common nails, 4" (102 mm) for 10d (0.148" x 3") (3.8 mm x 76 mm) and 12d (0.148" x 3¼") (3.8 mm x 83 mm) common nails. The end distances must be a minimum of 2" (51 mm) for 8d (0.131" x 2½") (3.3 mm x 63 mm) common nails, 3" (76 mm) for 10d (0.148" x 3") (3.8 mm x 76 mm) and 12d (0.148" x 3¼") (3.8 mm x 83 mm) common nails. The minimum nail spacing must be 8" (204 mm) for 16d (0.162" x 3½") (4.1 mm x 89 mm) common nails installed parallel to the glue lines of the LVL™ that is at least 1¾" thick by 5½" wide (44mm by 133 mm), and the minimum end distance must be 3" (76 mm). Minimum edge distance must be sufficient to prevent splitting of the LVL™. In addition, maximum nail penetration into the LVL™ must be limited as to prevent splitting.

5.3.3.5. Connection requirements for multiple member side-loaded beams are defined in the following assembly details and have the maximum uniformly distributed load carrying capacity as defined in [Table 4](#).

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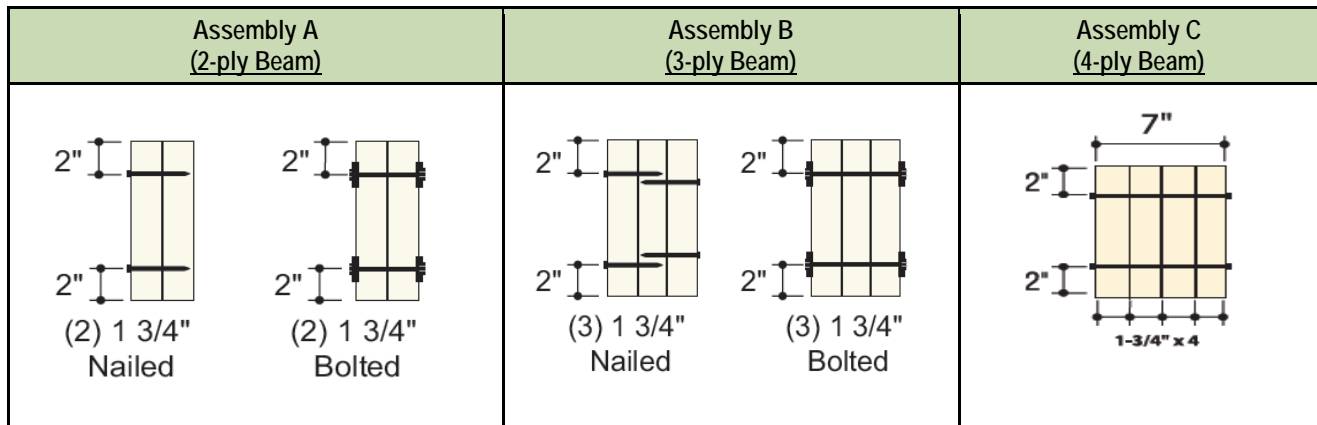
Table 4: Maximum Uniformly Distributed Load (plf) [Factored Uniformly Distributed Load (plf) – Limit States Design] that can be applied to Either Side of Multiple Member Side-Loaded Beams^{1, 2, 3, 4, 5, 6}

| Assembly Detail (See Figure 1) | 2 Rows of 16d (0.162" x 3½") (4.1 mm x 89 mm) Nails at 12" o.c. (305 mm) | 3 Rows of 16d (0.162" x 3½") (4.1 mm x 89 mm) Nails at 12" o.c. (305 mm) | 2 Rows of 12d (0.148" x 3¼") (3.8 mm x 83 mm) Nails at 12" o.c. (305 mm) | 3 Rows of 12d (0.148" x 3¼") (3.8 mm x 83 mm) Nails at 12" o.c. (305 mm) | 2 Rows of ½" (12.7 mm) Bolts at 12" o.c. ^{7, 8} (305 mm) |
|--|--|--|--|--|--|
| A | 565 [885] | 845 [1330] | 470 [750] | 700 [1130] | 870 [1405] |
| B ⁹ | 425 [665] | 635 [995] | 350 [565] | 525 [845] | 650 [1315] |
| C | -- | -- | -- | -- | 580 [1170] |

For SI: 1 plf = 1.488 kg/m

1. Multiply the appropriate table value by:
 - a. 1.5 for nails or bolts spaced at 8" o.c. (203 mm) per row
 - b. 2 for nails or bolts spaced at 6" o.c. (152 mm) per row
 - c. 3 for nails or bolts spaced at 4" o.c. (102 mm) per row
 - d. 0.5 for bolts spaced at 24" o.c. (610 mm) per row
2. Determine the appropriate beam size required to support the load before determining the connection requirements.
3. Screws can be used in place of bolts, provided additional fasteners are used such that the sum of the screw capacities is equal to or greater than that of the ½"-diameter bolts (12.7mm). Refer to the screw manufacturer's literature.
4. Tabulated values assume adequate end distance, edge distance and spacing per *NDS*[®] and *CSA-O86*, as applicable.
5. Tabulated values are for normal load duration. Adjustment of the design stresses for duration of load shall be in accordance with the applicable code, *NDS*[®] or *CSA-O86*, as applicable.
6. For beams greater than 4-ply wide, consult a registered design professional for the attachment requirements.
7. A standard cut steel washer of minimum 0.109" thickness (2.8 mm), with a minimum outside dimension of 1¾" (35 mm), is required on each side of the beam between the wood and bolt head and nut.
8. Bolted connections assume full diameter bolts with bending yield strength (F_{yb}) of 45,000 psi.
9. Nailing is required from both sides for 3-ply beams.

Figures 1A-1C: Connection Requirements for Multiple Member Side-Loaded Beams



6. Installation:

- 6.1. Stora Enso S-LVL™ shall be installed in accordance with the applicable code, the approved construction documents, this TER and the manufacturer's installation instructions.
 - 6.1.1. In the event of a conflict between the manufacturer's installation instructions and this TER, the more restrictive shall govern.

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7. Test and Engineering Substantiating Data:

- 7.1. Test reports and data showing equivalence to the provisions of *ASTM D5456* by VTT.
- 7.2. The product(s) evaluated by this TER fall within the scope of one or more of the model, state or local building codes for building construction. The testing and/or substantiating data used in this TER is limited to buildings, structures, building elements, construction materials and civil engineering related specifically to buildings.
- 7.3. The provisions of model, state or local building codes for building construction do not intend to prevent the installation of any material or to prohibit any design or method of construction. Alternatives shall use consensus standards, performance-based design methods or other engineering mechanics based means of compliance. This TER assesses compliance with defined standards, accepted engineering analysis, performance-based design methods, etc. in the context of the pertinent building code requirements.
- 7.4. Some information contained herein is the result of testing and/or data analysis by other sources, which DrJ relies on to be accurate, as it undertakes its engineering analysis.
- 7.5. DrJ has reviewed and found the data provided by other professional sources are credible. The information in this TER conforms to DrJ's procedure for acceptance of data from approved sources.
- 7.6. DrJ's responsibility for data provided by approved sources conforms to [IBC Section 1703](#) and any relevant professional engineering law.
- 7.7. Where appropriate, DrJ's analysis is based on design values that have been codified into law through codes and standards (e.g., *IRC*, *WFCM*, *IBC*, *SDPWS*, *NDS*[®], *ACI*, *AISI*, *PS-20*, *PS-2*, etc.). This includes review of code provisions and any related test data that aids in comparative analysis or provides support for equivalency to an intended end-use application. Where the accuracy of design values provided herein is reliant upon the published properties of commodity materials (e.g. lumber, steel, concrete, etc), DrJ relies upon grade/properties provided by the raw material supplier to be accurate and conforming to the mechanical properties defined in the relevant material standard.

8. Findings:

- 8.1. When used in accordance with the manufacturer's installation instructions and this TER, Stora Enso S-LVL™ complies with or is a suitable alternative to the requirements of [IBC Chapter 23](#), [IRC Chapter 5](#), [6](#) and [8](#), and *NBC* Articles 1.2, 4.3.11 and 9.23.
- 8.2. [IBC Section 104.11](#) ([IRC Section R104.11](#) and [IFC Section 104.9](#) are similar) state:

104.11 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. An alternative material, design or method of construction shall be *approved* where the *building official* finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, not less than the equivalent of that prescribed in this code. ... Where the alternative material, design or method of construction is not *approved*, the *building official* shall respond in writing, stating the reasons the alternative was not *approved*.
- 8.3. This product has been evaluated with the codes listed in [Section 2](#), and is compliant with all known state and local building codes. Where there are known variations in state or local codes that are applicable to this evaluation, they are listed here:
 - 8.3.1. No known variations
- 8.4. This TER uses professional engineering law, the building code, ANSI/ASTM consensus standards and generally accepted engineering practice as its criteria for all testing and engineering analysis. DrJ's professional engineering work falls under the jurisdiction of each state Board of Professional Engineers, when signed and sealed.

9. Conditions of Use:

- 9.1. Where required by the authority having jurisdiction (AHJ) in which the project is to be constructed, this TER and the installation instructions shall be submitted at the time of permit application.
- 9.2. Any generally accepted engineering calculations needed to show compliance with this TER shall be submitted to the code official for review and approval.

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- 9.3. Design loads shall be determined in accordance with the building code adopted by the jurisdiction in which the project is to be constructed and/or by the Building Designer (e.g., Owner, Registered Design Professional, etc.).
- 9.4. Stora Enso S-LVL™ shall be installed in accordance with the applicable code, the approved construction documents, this TER and the manufacturer's installation instructions. If there is a conflict between this report and the manufacturer's instructions, this TER governs.
- 9.5. The manufacturer's published installation instructions shall be available at the jobsite at all times during installation.
- 9.6. Stora Enso S-LVL™ complies with or is a suitable alternative to sawn lumber as permitted by the codes listed in [Section 2](#), subject to the following conditions:
- 9.6.1. Design calculations and details shall be furnished to the code official verifying that the material is used in compliance with this TER. The calculations must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.
 - 9.6.2. The design values shall not exceed those set forth in this report as modified by all applicable table notes.
 - 9.6.3. The service conditions for Stora Enso S-LVL™ are dry conditions of use, for which the equilibrium moisture content must be less than 16%. Uses in applications exceeding 16% moisture content are outside the scope of this TER.
 - 9.6.4. The service conditions for Stora Enso S-LVL™ with fire-retardant or preservative chemical treatments are outside the scope of this report.
 - 9.6.5. Fastener design values shall be as specified in [Table 3](#) of this report.
 - 9.6.6. Cutting and notching of Stora Enso S-LVL™ is prohibited, except where specifically permitted by the manufacturer's recommendations or where the effects of such alterations are specifically considered in the design of the member by a registered design professional.
 - 9.6.7. Increases for duration of load shall be in accordance with the limitations of the applicable building code.
 - 9.6.8. Where use of Stora Enso S-LVL™ qualifies as repetitive members as defined in *NDS*®, an increase of 4% is permitted in allowable bending stresses.
 - 9.6.9. Stora Enso S-LVL™ may be cut to the specified length and width as appropriate for the application, provided the depth is no less than 3½" (89 mm) wide. The thickness may not be cut.
 - 9.6.10. Minimum bearing length and anchorage of Stora Enso S-LVL™ shall meet the requirements of [IBC Chapter 23](#) or Division B, Article 9.23 of the *NBC* for sawn lumber.
 - 9.6.11. Stora Enso S-LVL™ shall be fabricated in the Stora Enso Wood Products Oy facilities located in Varkaus, Finland, with quality control inspections by an approved third-party quality control inspection agency.
- 9.7. Design
- 9.7.1. Building Designer Responsibility
 - 9.7.1.1. Unless the AHJ allows otherwise, the Construction Documents shall be prepared by a Building Designer for the Building and shall be in accordance with [IRC Section R106](#) and [IBC Section 107](#).
 - 9.7.1.2. The Construction Documents shall be accurate and reliable and shall provide the location, direction and magnitude of all applied loads and shall be in accordance with [IRC Section R301](#) and [IBC Section 1603](#).
 - 9.7.2. Construction Documents
 - 9.7.2.1. Construction Documents shall be submitted to the Building Official for approval and shall contain the plans, specifications and details needed for the Building Official to approve such documents.
- 9.8. Responsibilities
- 9.8.1. The information contained herein is a product, material, detail, design and/or application TER evaluated in accordance with the referenced building codes, testing and/or analysis through the use of accepted engineering practice, experience and technical judgment.

Technical Evaluation Report (TER)

- 9.8.2. DrJ TERs provide an assessment of only those attributes specifically addressed in the Products Evaluated or Code Compliance Process Evaluated sections.
- 9.8.3. The engineering evaluation was performed on the dates provided in this TER, within DrJ's professional scope of work.
- 9.8.4. This product is manufactured under a third-party quality control program in accordance with [/IRC Section R104.4](#) and [R109.2](#) and [/IBC Section 104.4](#) and [110.4](#).
- 9.8.5. The actual design, suitability and use of this TER, for any particular building, is the responsibility of the Owner or the Owner's authorized agent, and the TER shall be reviewed for code compliance by the Building Official.
- 9.8.6. The use of this TER is dependent on the manufacturer's in-plant QC, the ISO/IEC 17020 third-party quality assurance program and procedures, proper installation per the manufacturer's instructions, the Building Official's inspection and any other code requirements that may apply to demonstrate and verify compliance with the applicable building code.

10. Identification:

- 10.1. Stora Enso S-LVL™ described in this TER is identified by a label on the board or packaging material bearing the manufacturer's name, product name, TER number, label of the third-party inspection agency, and other information to confirm code compliance.
- 10.2. Additional technical information can be found at storaenso.com.

11. Review Schedule:

- 11.1. This TER is subject to periodic review and revision. For the most recent version of this TER, visit drjengineering.org.
- 11.2. For information on the current status of this TER, contact [DrJ Engineering](#).



- [Mission and Professional Responsibilities](#)
- [Product Evaluation Policies](#)
- [Product Approval – Building Code, Administrative Law and P.E. Law](#)