DrJ CERTIFICATION

Technical Evaluation Report™

TER 2210-02

S-LVL™ Laminated Veneer Lumber (LVL) – Limit States Design (LSD) Canada

Stora Enso Oyj

Product:
S-LVL™ Laminated Veneer Lumber

Issue Date:
April 3, 2023

Revision Date:
March 4, 2024

Subject to Renewal:
April 1, 2025

Use the QR code to access the most recent version or a sealed copy of this Technical Evaluation Report (TER) at drjcertification.org.

COMPANY INFORMATION:	ADDITIONAL LISTEES:

Stora Enso Oyj
Salmisaarenaukio 2
PO Box 309
FI-00101 Helsinki, Finland

Phone: +358 2046 111

Website: www.storaenso.com

CSI Designations:

DIVISION: 06 00 00 - WOOD, PLASTICS AND COMPOSITES

SECTION: 06 17 00 - Shop-Fabricated Structural Wood

SECTION: 06 17 13 - Laminated Veneer Lumber

1 Innovative Product Evaluated[1]

1.1 S-LVL™ Laminated Veneer Lumber

2 Applicable Codes and Standards[2]

2.1 *Codes*

2.1.1 *NBC—10, 15, 20: National Building Code of Canada*

2.1.2 *NECB—17, 20: National Energy Code of Canada for Buildings*

2.1.3 *O Reg. 332/12: Ontario Building Code (OBC)*[3]

2.2 *Standards and Referenced Documents*

2.2.1 *ANSI/AWC NDS: National Design Specification (NDS) for Wood Construction*

2.2.2 *ASTM D2559: Standard Specification for Adhesives for Bonded Structural Wood Products for Use Under Exterior Exposure Conditions*

2.2.3 *ASTM D5055: Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists*

2.2.4 *ASTM D5456: Standard Specification for Evaluation of Structural Composite Lumber Products*

2.2.5 *ASTM D7247: Standard Test Method for Evaluating the Shear Strength of Adhesive Bonds in Laminated Wood Products at Elevated Temperatures*

2.2.6 *CSA O86: Engineering Design in Wood*

[1] For more information, visit drjcertification.org or call us at 608-310-6748.

[2] Unless otherwise noted, all references in this report are from the 2020 version of the NBC. This alternative solution is also approved for use with the 2010 and 2015 NBC and the standards referenced therein.

[3] References in this report to the National Building Code of Canada (NBC) apply to the Ontario Building Code (OBC), unless noted otherwise.

3 Performance Evaluation

3.1 Testing and related engineering evaluations are defined as intellectual property and/or trade secrets.[4]

3.2 Engineering evaluations are conducted within DrJ's ANAB accredited ICS code scope, which are also its areas of professional engineering competence.[5]

3.3 S-LVL was evaluated to determine specified strengths for limit states design. This report examines S-LVL for the following:

3.3.1 Structural design in accordance with NBC Division B Part 4 and Part 9 and CSA O86 as follows:

3.3.1.1 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.

3.3.1.2 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.

3.3.1.3 CSA O86 Clause 16 specifies that the capacity of structural composite lumber is determined from test data by calculations specified in ASTM D5456.

3.4 Fire-resistance properties of S-LVL are outside the scope of this report.

3.5 Any engineering evaluation conducted for this report was performed on the dates provided in this report and within DrJ's professional scope of work.

3.6 Any regulation specific issues not addressed in this section are outside the scope of this report.

4 Product Description and Materials

4.1 The innovative product evaluated in this report is manufactured by Stora Enso Oyj at its facility (LVL mill) 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 33 mm ($^{15}/_{16}$")

4.4.1.2 38 mm ($1^{1}/_{2}$")

4.4.1.3 45 mm ($1^{3}/_{4}$")

4.4.2 *Nominal Depths:*

4.4.2.1 89 to 610 mm ($3^{1}/_{2}$" to 24")

4.4.3 *Lengths:*

4.4.3.1 Up to 19.5 m (64′)

---

[4] 18 U.S. Code § 1831 - Economic espionage - Whoever, intending or knowing that the offense will benefit any foreign government, foreign instrumentality, or foreign agent, knowingly steals, or without authorization appropriates, takes, carries away, or conceals, or by fraud, artifice, or deception obtains a trade secret shall be fined not more than $5,000,000 or imprisoned not more than 15 years, or both. Any organization that commits any offense described shall be fined not more than the greater of $10,000,000 or 3 times the value of the stolen trade secret to the organization, including expenses for research and design and other costs of reproducing the trade secret that the organization has thereby avoided. https://www.law.cornell.edu/uscode/text/18/part-I/chapter-90.

[5] ANAB is part of the USMCA and IAF MLA, where the purpose of these agreements are to ensure mutual recognition of accredited certification and validation/verification statements between agreement signatories, and subsequent acceptance of ANAB accredited certification and validation/verification statements by professional engineers based upon having one universal approval process for the timely approval of innovative materials, products, designs, services, assemblies and/or methods of construction.

5 Applications

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

5.2 *Structural Applications*

5.2.1 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 S-LVL is governed by the applicable code and the provisions for structural composite lumber (SCL) in CSA O86 Section 16.3.

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

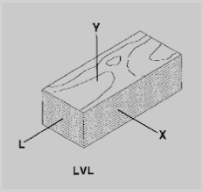
5.3.2.1 The design provisions for wood construction in compliance with the NBC using LSD shall be in accordance with CSA O86. Specified Strength for S-LVL for dry conditions of use are shown in **Table 1**.

Table 1. Specified Strengths for S-LVL (Limit States Design)[1,2,3]

Bending, F_b (MPa)		Tension, F_t (MPa)	Compression, F_c (MPa)			Horizontal Shear, F_v (MPa)		Beam Modulus of Elasticity, E (MPa)		Plank Modulus of Elasticity, E (MPa)		Modulus of Elasticity for Beam & Column Stability, E_{05} (Mpa)
Beam[5,6,7]	Plank	Parallel to Grain[7,8]	Parallel to Grain	Perpendicular to Grain		Beam	Plank	True[4]	Apparent[4]	True[4]	Apparent[4]	
				Beam	Plank							
37.9	42.0	29.3	30.3	11.0	4.1	4.5	1.0	13 770	13 000	13 770	13 000	11 000

1 MPa =145.137 psi

1. 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 sixteen percent (16%). See Section **9.3** of this report.
2. 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 $Fc_{\perp}$ and E.
3. Orientation nomenclature for S-LVL:



4. 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 millimeters
   W = uniform load in N/mm
   L = span in millimeters
   E = modulus of elasticity in MPa
   b = width of beam in millimeters
   h = depth of beam in millimeters
5. The design value for bending members used in a beam orientation is based on a reference depth of 305 mm.
   a. For depths greater than or equal to 100 mm, the bending values shall be adjusted by a size factor adjustment of $(305/d)^{0.117}$ where d is measured in millimeters, with a minimum depth of 100 mm.
   b. For depths greater than or equal to 89 mm and less than 100 mm, the bending values shall be adjusted by a size factor adjustment of 1.139.
6. 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.
7. Thicknesses greater than 134 mm (5 1/4") shall not be used in design.
8. Specified strength value multiplied by $(1.35/L)^{0.129}$ for length effect factors, with L measured in meters. Value limited to members 457 mm deep and less.

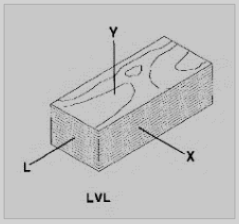
5.3.3 *Connections:*

5.3.3.1 Lateral loads for nails, screws, and bolts and withdrawal loads for nails and screws installed in S-LVL shall be in accordance with CSA O86 for sawn lumber having a minimum specific gravity equal to that shown in **Table 2**.

Table 2. 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	Table Footnote 4 Table Footnote 5 Table Footnote 6
		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 CSA O86 as applicable.
3. Lateral resistance and withdrawal values are as provided in CSA O86 for sawn lumber having equivalent specific gravities as shown.
4. Nails Installed Perpendicular to the Glue Lines of the S-LVL (y direction):
   a. Spacing, edge distance and end distance of nails installed perpendicular to the glue lines of the S-LVL are the same as those permitted in the applicable standard for sawn lumber.
5. Nails Installed Parallel to the Glue Lines of the S-LVL:
   a. Spacing of nails must be at minimum:
      i. 75 mm for 8d (3.3 mm x 63 mm) (0.131" x 2½") common nails,
      i. 100 mm for 10d (3.8 mm x 76 mm) (0.148" x 3") common nails,
      ii. 100 mm for 12d (3.8 mm x 83 mm) (0.148" x 3¼") common nails,
      iii. For S-LVL that is at least 44 mm thick x 133 mm wide (1¾" x 5½"), 200 mm for 16d (4.1 mm x 89 mm) (0.162" x 3½") common nails.
   b. End distances of nails must be at minimum:
      i. 50 mm for 8d (3.3 mm x 63 mm) (0.131" x 2½") common nails,
      i. 75 mm for 10d (3.8 mm x 76 mm) (0.148" x 3") common nails,
      ii. 75 mm for 12d (3.8 mm x 83 mm) (0.148" x 3¼") common nails,
      iii. For S-LVL that is at least 44 mm thick x 133 mm wide (1¾" x 5½"), 75 mm for 16d (4.1 mm x 89 mm) (0.162" x 3½") common nails.
6. Minimum edge distance must be sufficient to prevent splitting of the S-LVL. In addition, maximum nail penetration into the S-LVL must be limited to prevent splitting.

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 CSA O86 Clause 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 2**.

5.3.3.4 Allowable lateral loads for machine bolts installed perpendicular to the wide face of 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 CSA O86 for sawn lumber with the minimum specific gravity at least equivalent to that defined in **Table 2**.

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 3**.

Table 3. Maximum Uniformly Distributed Load that can be Applied to Either Side of Multiple-Member Side-Loaded Beams[1,2,3,4,5,6]

Assembly Detail	Uniformly Distributed Load, Limit States Design, kN/m				
	2 Rows of 16d (4.1 mm x 89 mm) (0.162" x 3½") Nails	3 Rows of 16d (4.1 mm x 89 mm) (0.162" x 3½") Nails	2 Rows of 12d (3.8 mm x 83 mm) (0.148" x 3¼") Nails	3 Rows of 12d (3.8 mm x 83 mm) (0.148" x 3¼") Nails	2 Rows of 12.7 mm (½") Bolts[7,8]
Figure 1	13.1	19.8	11.1	16.8	20.9
Figure 2[9]	9.9	14.8	8.4	12.6	19.5
Figure 3	--	--	--	--	17.4

SI: 1 plf = 0.0146 kN/m

1. Table values assume 300 mm on center fastener spacing. For other fastener spacing, multiply the appropriate table value by:
   a. 1.5 for nails or bolts spaced at 200 mm o.c. per row
   b. 2 for nails or bolts spaced at 150 mm o.c. per row
   c. 3 for nails or bolts spaced at 100 mm o.c. per row
   d. 0.5 for bolts spaced at 600 mm o.c. 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 12.7 mm-diameter bolts (½"). Refer to the screw manufacturer literature.
4. Tabulated values assume adequate end distance, edge distance, and spacing per 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 CSA O86, as applicable.
6. For beams greater than four (4) plies wide, consult a registered design professional for the attachment requirements.
7. A standard cut steel washer of minimum 2.8 mm thickness, with a minimum outside dimension of 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 310 MPa.
9. Nailing is required from both sides for 3-ply beams.

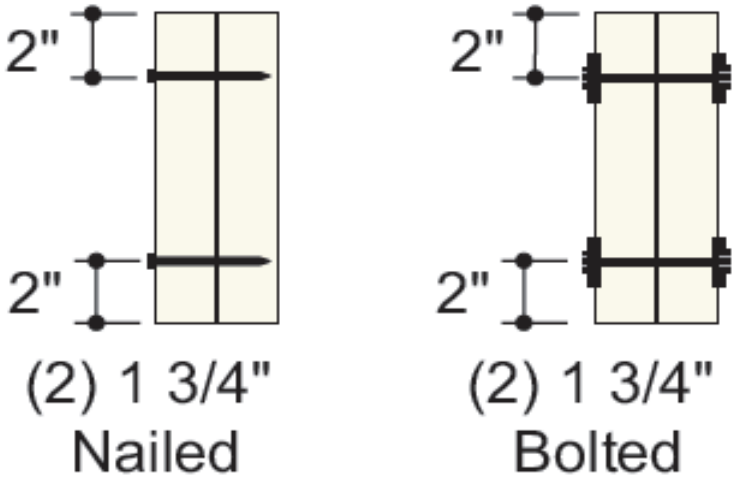


Figure 1. Assembly A (2-Ply Beam)

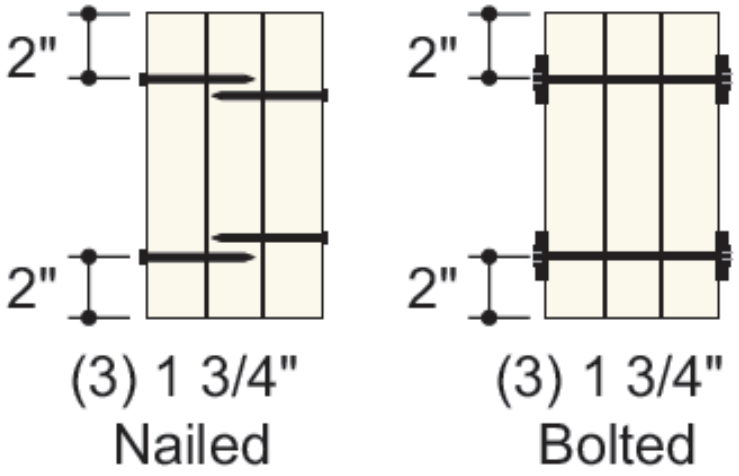


Figure 2. Assembly B (3-Ply Beam)

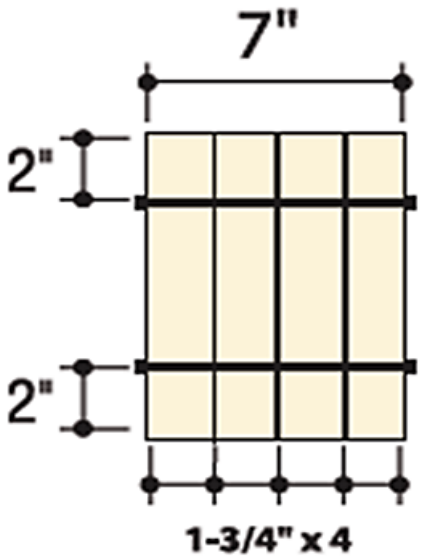


Figure 3. Assembly C (4-Ply Beam)

5.4 Where the application falls outside of the performance evaluation, conditions of use and/or installation requirements set forth herein, alternative techniques shall be permitted in accordance with accepted engineering practice and experience. This includes but is not limited to the following areas of engineering: mechanics or materials, structural, building science and fire science.

6 Installation

6.1 Installation shall comply with the manufacturer installation instructions, this report, the approved construction documents, and the applicable building code.

6.2 In the event of a conflict between the manufacturer installation instructions this report and the applicable building code, the more restrictive shall govern.

7 Substantiating Data

7.1 Testing has been performed under the supervision of a professional engineer and/or under the requirements of ISO/IEC 17025 as follows:

7.1.1 Mechanical properties testing in accordance with ASTM D5456

7.2 Information contained herein is the result of testing and/or data analysis by sources that conform to the evaluation requirements of NBC Volume 1 Relationship of the NBC to Standards Development and Conformity Assessment and/or professional engineering regulations. DrJ relies upon accurate data to perform its ISO/IEC 17065 evaluations.

7.3 Where appropriate, DrJ's analysis is based on provisions that have been codified into law through provincial, territorial, or local adoption of codes and standards. The developers of these codes and standards are responsible for the reliability of published content. DrJ analysis may use code-adopted provisions as a control sample. A control sample versus a test sample establishes an innovative product as being equivalent to that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety.

7.4 The accuracy of the provisions provided herein may be reliant upon the published properties of raw materials, which are defined by the grade mark, grade stamp, mill certificate, Listings, certified reports, duly authenticated reports from approved agencies, and research reports prepared by approved agencies and/or approved sources provided by the suppliers of products, materials, designs, assemblies and/or methods of construction. These are presumed to be minimum properties and relied upon to be accurate. The reliability of DrJ's engineering practice, as contained in this report, may be dependent upon published design properties by others.

7.5 Testing and engineering analysis: The strength, rigidity and/or general performance of component parts and/or the integrated structure are determined by suitable tests that simulate the actual conditions of application that occur and/or by accepted engineering practice and experience.

7.6 Where additional condition of use and/or code compliance information is required, please search for S-LVL on the DrJ Certification website.

8 Findings

8.1 As delineated in Section **3**, S-LVL has performance characteristics that were tested and/or meet pertinent standards and is suitable for use pursuant to its specified purpose.

8.2 When used and installed in accordance with this report and the manufacturer installation instructions, S-LVL shall be approved for the following applications:

8.2.1 NBC Section 1.2, Subsection 4.3.11 and Section 9.23.

8.3 Any application specific issues not addressed herein can be engineered by an RDP. Assistance with engineering is available from Stora Enso Oyj.

8.4 This innovative product has been evaluated in the context of the codes listed in Section **2** and is compliant with all known provincial, territorial and local building codes. Where there are known variations in provincial, territorial or local codes applicable to this report, they are listed here.

8.4.1 No known variations

8.5 NBC Volume 1 Relationship of the NBC to Standards Development and Conformity Assessment:

> **Certification**
> Certification is the confirmation by an independent organization that a product, service, or system meets a requirement…Certification bodies publish lists of certified products and companies…Several organizations, including the Canadian Construction Materials Centre (CCMC), offer such evaluation services.
>
> **Evaluation**
> An evaluation is a written opinion by an independent professional organization that a product will perform its intended function. An evaluation is very often done to determine the ability of an innovative product, for which no standards exist, to satisfy the intent of the Code requirement...

8.6 ISO/IEC 17065 accredited third-party certification bodies,[6] including but not limited to, Standards Council of Canada (SCC)[7] and ANSI National Accreditation Board (ANAB),[8] confirm that product certification bodies have the expertise to provide technical evaluation services within their scope of accreditation. All SCC and ANAB product certification bodies meet NBC requirements to offer evaluation services for alternative solutions.[9]

8.6.1 DrJ is an ISO/IEC 17065 ANAB-Accredited Product Certification Body – Accreditation #1131[10] and employs professional engineers.[11]

8.7 Through ANAB accreditation and the IAF Multilateral Agreements, this report can be used to obtain innovative product approval in any jurisdiction or country that has IAF MLA Members & Signatories to meet the Purpose of the MLA – "*certified once, accepted everywhere*." IAF specifically says, "*Once an accreditation body is a signatory of the IAF MLA, it is required to recognise certificates and validation and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA, with the appropriate scope*."[12]

8.8 Product certification organizations, accredited by the SCC and ANAB, are defined as equivalent evaluation services:

8.8.1 Canada-United States-Mexico Agreement (CUSMA), Article 11.6 Conformity Assessment confirms mutual recognition by stating, "*...each Party shall accord to conformity assessment bodies located in the territory of another Party treatment no less favorable than that it accords to conformity assessment bodies located in its own territory or in the territory of the other Party*."

8.8.2 The SCC National Conformity Assessment Principles states, "*SCC is a member of a number of international organizations developing voluntary conformity assessment agreements that help ensure the international acceptance of Canadian conformity assessment results. Signatories to these agreements (like SCC) recognize each other's accreditations as being equivalent to their own*."[13]

8.9 Building official approval of a licensed professional engineer is performed by verifying the professional engineer and/or their business entity are listed by the engineering regulators of the relevant jurisdiction.

---

6 https://anabpd.ansi.org/Accreditation/product-certification/DirectoryListingAccredited?menuID=1&prgID=1

7 https://iaf.nu/en/member-details/?member_id=91

8 https://iaf.nu/en/member-details/?member_id=14

9 NBC Division A Clause A-1.2.1.1.(1)(b) provides information on code compliance via alternative solutions and defines alternative solutions as "...achiev[ing] at least the minimum level of performance required by Division B." NBC Division C Section 2.3 includes additional guidance for documentation of alternative solutions.

10 https://anabpd.ansi.org/Accreditation/product-certification/AllDirectoryDetails?&prgID=1&OrgId=2125&statusID=4

11 Through ANAB accreditation and the IAF MLA, DrJ certification can be used to obtain material, product, design, or method of construction approval in any jurisdiction or country that has IAF MLA Members & Signatories to meet the Purpose of the MLA – "*certified once, accepted everywhere*".

12 https://iaf.nu/en/about-iaf-mla/#:~:text=required%20to%20recognise

13 The National Conformity Assessment Principles states, "*Product regulations and standards may vary from country to country. If these are set arbitrarily, they could be deemed as protectionist. The World Trade Organization (WTO) Agreement on Technical Barriers to Trade (TBT Agreement) is intended to ensure that technical regulations, standards and conformity assessment procedures of member countries do not create unnecessary obstacles to trade. Under the TBT Agreement, members of the WTO agree to use international standards, including conformity assessment standards and guides, as a basis for their technical requirements.*"

9 Conditions of Use

9.1 Material properties shall not fall outside the boundaries defined in Section **3**.

9.2 As defined in Section **3**, where material and/or engineering mechanics properties are created for load resisting design purposes, the resistance to the applied load shall not exceed the ability of the defined properties to resist those loads using the principles of accepted engineering practice.

9.3 The service conditions for S-LVL are dry conditions of use, for which the equilibrium moisture content must be less than sixteen percent (16%). Uses in applications exceeding sixteen percent (16%) moisture content are outside the scope of this report.

9.4 The service conditions for S-LVL with fire-retardant or preservative chemical treatments are outside the scope of this report.

9.5 Fastener design values shall be as specified in **Table 2** of this report.

9.6 Cutting and notching of S-LVL is prohibited except where specifically permitted by the manufacturer recommendations or where the effects of such alterations are specifically considered in the design of the member by a registered design professional.

9.7 Increases for duration of load shall be in accordance with the limitations of the applicable building code.

9.8 Where use of S-LVL qualifies as being used in a load-sharing system as defined by CSA O86 Section 15.3.2.4, an increase of four percent (4%) is permitted.

9.9 S-LVL may be cut to the specified length and width as appropriate for the application, provided the depth is no less than $3^1/_2$" (89 mm) wide. The thickness may not be cut.

9.10 Minimum bearing length and anchorage of S-LVL shall meet the requirements NBC Division B Section 9.23 for sawn lumber.

9.11 S-LVL shall be fabricated in the Stora Enso Oyj Wood Products facilities located in Varkaus, Finland with quality control inspections by an approved third-party quality control inspection agency.

9.12 Where required by regulation and enforced by the building official, also known as the authority having jurisdiction (AHJ) in which the project is to be constructed:

9.12.1 Any calculations incorporated into the construction documents shall conform to accepted engineering practice, and, when prepared by an approved source, shall be approved when signed and sealed.

9.12.2 This report and the installation instructions shall be submitted at the time of permit application.

9.12.3 This innovative product has an internal quality control program and a third-party quality assurance program.

9.12.4 At a minimum, this innovative product shall be installed per Section **6** of this report.

9.12.5 This report shall be reviewed for code compliance by the AHJ in concert with the duties and powers granted to the building official by the provincial regulations governing such duties and powers.

9.12.6 The application of this innovative product in the context of this report is dependent on the accuracy of the construction documents, implementation of installation instructions, inspections, and any other regulatory requirements that may apply.

9.13 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 designer (i.e., owner).

9.14 The actual design, suitability, and use of this report, for any particular building, is the responsibility of the owner or the authorized agent of the owner.

10 Identification

10.1 The innovative product listed in Section **1.1** is identified by a label on the board or packaging material bearing the manufacturer name, product name, report number, and other information to confirm code compliance.

10.2 Additional technical information can be found at www.storaenso.com.

11 Review Schedule

11.1 This report is subject to periodic review and revision. For the most recent version, visit drjcertification.org.

11.2 For information on the status of this report, contact DrJ Certification.

12 Legislation that Authorizes New Product Approval in International Markets is Found in Appendix A

12.1 S-LVL has been tested by an ISO/IEC 17025 accredited laboratory and/or evaluated to be in conformance with accepted engineering practice to ensure durable, livable and safe construction.

12.2 This report is published by an ISO/IEC 17065 accredited certification body with the expertise to evaluate products, materials, designs, services, assemblies and/or methods of construction.

12.3 This report meets the legislative intent and definition of a duly authenticated report, which shall be accepted by the AHJ, unless there are specific reasons why the alternative shall not be approved as provided for in writing.

Appendix A

1 Legislation that Authorizes New Product Approval in Canada

1.1 The Competition Act is a Canadian federal law governing competition law in Canada. The Act contains both criminal and civil provisions aimed at preventing anti-competitive practices in the marketplace. The Act is enforced and administered by the Competition Bureau, whose regulations encourage the approval of NBC referenced and alternative products, materials, designs, services, assemblies and/or methods of construction that:

1.1.1 Advance Innovation,

1.1.2 Promote competition so all businesses have the opportunity to compete on price and quality in an open market on a level playing field unhampered by anticompetitive constraints, and

1.1.3 Benefit consumers through lower prices, better quality, and greater choice.

1.2 **Approved by International Jurisdictions**: The USMCA and GATT agreements provide for approval of innovative materials, products, designs, services, assemblies and/or methods of construction through the Technical Barriers to Trade (TBT) agreements and the International Accreditation Forum (IAF) Multilateral Recognition Arrangement (MLA), where these agreements proclaim the desire of both countries to have their markets open to innovation.

1.3 These agreements:

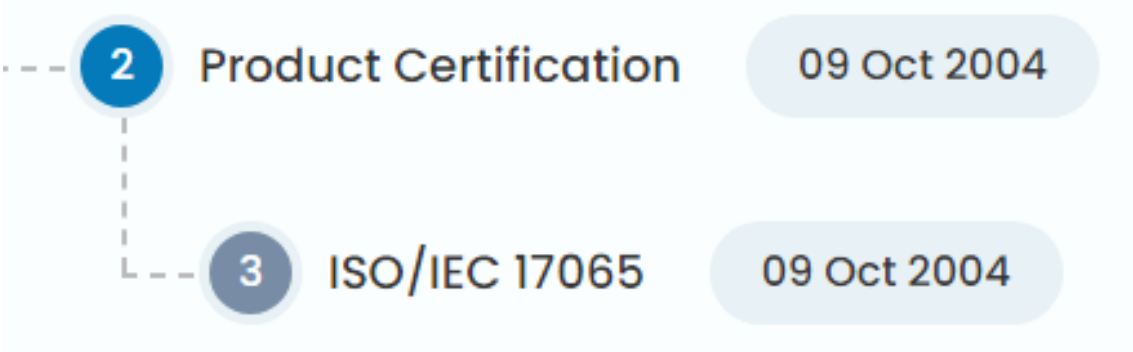
1.3.1 Permit participation of conformity assessment bodies located in the territories of other Members (defined as GATT Countries) under conditions no less favourable than those accorded to bodies located within their territory or the territory of any other country,

1.3.2 State that conformity assessment procedures (i.e., ISO/IEC 17020, 17025, 17065, etc.) are prepared, adopted, and applied so as to grant access for suppliers of like products originating in the territories of other Members under conditions no less favourable than those accorded to suppliers of like products of national origin or originating in any other country, in a comparable situation.

1.3.3 State that conformity assessment procedures are not prepared, adopted, or applied with a view to or with the effect of creating unnecessary obstacles to international trade. This means that conformity assessment procedures shall not be more strict or be applied more strictly than is necessary to give the importing Member adequate confidence that products conform to the applicable technical regulations or standards.

1.4 To this end, Canada operates an accreditation system as follows:

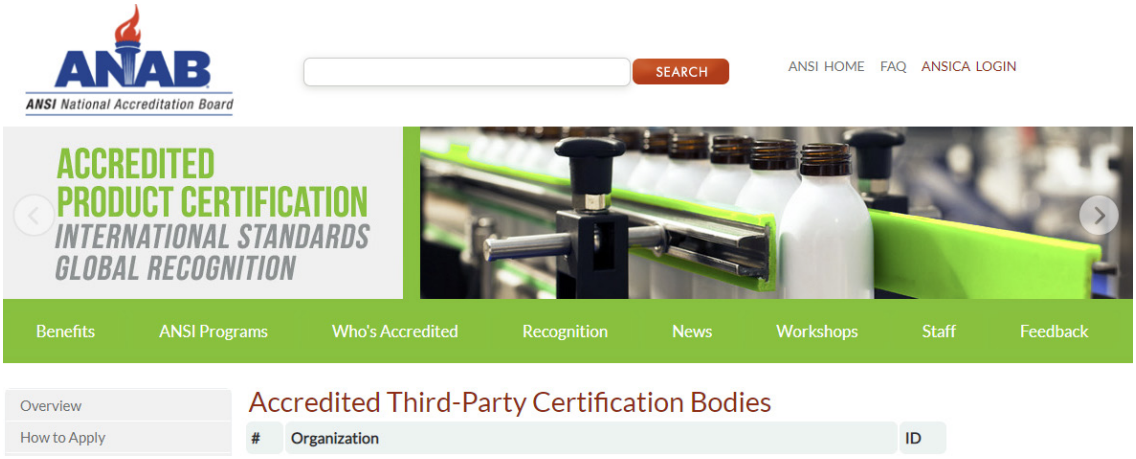
1.5 This includes ISO/IEC 17065 product certification as follows:



1.6 Similarly, the United States operates multiple accreditation process with ANAB being the most prominent ISO/IEC 17065 product certification organization as follows:

1.7 This includes ISO/IEC 17065 product certification as follows:

1.8 The list of ANAB accredited ISO/IEC 17065 product certification organizations can be found at the following link: https://anabpd.ansi.org/Accreditation/product-certification/DirectoryListingAccredited?menuID=1&prgID=1



1.9 Approval is granted via International Agreement, where the purpose of the IAF MLA is to ensure mutual recognition of accredited certification and validation/verification statements between signatories. Subsequent acceptance of accredited certification and validation/verification statements is required so that one accreditation can be used for the timely approval of innovative materials, products, designs, services, assemblies and/or methods of construction. Accreditations granted by IAF MLA signatories are recognised worldwide based on their equivalent accreditation programs, therefore reducing costs and adding value to businesses and consumers.

1.10 Consequently, these agreements permit product approval of innovative Australian and New Zealand products into US markets and vice-versa.

1.11 Finally, a question that often arises is, why do these agreements exist? In addition, another question is why is the ISO/IEC 17065 accredited third-party certification process so important?

1.11.1 The answer is because all countries desire to protect the intellectual property and trade secrets of their country's businesses.

1.11.2 In the US this protection is provided by 18 U.S. Code § 1831 Under Economic Espionage, where it states "whoever, intending or knowing that the offense will benefit any foreign government, foreign instrumentality, or foreign agent, knowingly steals, or without authorization appropriates, takes, carries away, or conceals, or by fraud, artifice, or deception obtains a trade secret shall be fined not more than $5,000,000 or imprisoned not more than 15 years, or both."

1.11.3 Any organization that commits any offense described shall be fined not more than the greater of $10,000,000 or three (3) times the value of the stolen trade secret to the organization, including expenses for research and design and other costs of reproducing the trade secret that the organization has thereby avoided.[14]

1.11.4 Protection of intellectual property and trade secrets reinforces the value of the IAF MLA, the GATT/TBT and the ISO/IEC 17065 product approval process.

1.11.5 The goal is to protect everyone's best interests while also facilitating economic freedom and opportunity by promoting free and fair competition in the marketplace.

[14] https://www.law.cornell.edu/uscode/text/18/part-I/chapter-90