



Listing and Technical Evaluation Report™

Report No: 1507-01



Issue Date: February 7, 2017

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Subject to Renewal: April 1, 2025

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

Trade Secret Report Holder:

Stora Enso Oyj

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 Evaluated¹

1.1 Stora Enso S-LVL™ Laminated Veneer Lumber

2 Product Description and Materials

2.1 The innovative product evaluated in this report is shown in **Figure 1**.



Figure 1. Stora Enso S-LVL Laminated Veneer Lumber



- 2.2 Stora Enso S-LVL is manufactured by Stora Enso Oyj at its facility in Varkaus, Finland.
- 2.3 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.
- 2.4 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 Oyj's in-plant manufacturing standard.
- 2.5 *Material Availability*
 - 2.5.1 *Thickness:*
 - 2.5.1.1 1⁵/₁₆" (33 mm)
 - 2.5.1.2 1¹/₂" (38 mm)
 - 2.5.1.3 1³/₄" (45 mm)
 - 2.5.2 *Nominal Depths:*
 - 2.5.2.1 3¹/₂" to 24" (89 to 610 mm)
 - 2.5.3 *Lengths:*
 - 2.5.3.1 Up to 64' (19.5 m)
- 2.6 As needed, review material properties for design in Section 6 and to regulatory evaluation in Section 8.

3 Definitions

- 3.1 New Materialsⁱⁱ are defined as building materials, equipment, appliances, systems, or methods of construction not provided for by prescriptive and/or legislatively adopted regulations, known as alternative materials.ⁱⁱⁱ The design strengths and permissible stresses shall be established by tests^{iv} and/or engineering analysis.^v
- 3.2 Duly Authenticated Reports^{vi} and Research Reports^{vii} are test reports and related engineering evaluations, which are written by an approved agency^{viii} and/or an approved source.^{ix}
 - 3.2.1 These reports contain intellectual property and/or trade secrets, which are protected by the Defend Trade Secrets Act (DTSA).^x
- 3.3 An approved agency is "approved" when it is ANAB ISO/IEC 17065 accredited. DrJ Engineering, LLC (DrJ) is listed in the ANAB directory.
- 3.4 An approved source is "approved" when a professional engineer (i.e., Registered Design Professional) is properly licensed to transact engineering commerce. The regulatory authority governing approved sources is the state legislature via its professional engineering regulations.^{xi}
- 3.5 Testing and/or inspections conducted for this Duly Authenticated Report were performed by an ISO/IEC 17025 accredited testing laboratory, an ISO/IEC 17020 accredited inspection body, and/or a licensed Registered Design Professional (RDP).
 - 3.5.1 The Center for Building Innovation (CBI) is ANAB^{xii} ISO/IEC 17025 and ISO/IEC 17020 accredited.
- 3.6 The regulatory authority shall enforce^{xiii} the specific provisions of each legislatively adopted regulation. If there is a non-conformance, the specific regulatory section and language of the non-conformance shall be provided in writing^{xiv} stating the nonconformance and the path to its cure.
- 3.7 The regulatory authority shall accept Duly Authenticated Reports from an approved agency and/or an approved source with respect to the quality and manner of use of new materials or assemblies as provided for in regulations regarding the use of alternative materials, designs, or methods of construction.^{xv}



- 3.8 ANAB is an International Accreditation Forum (IAF) Multilateral Recognition Arrangement (MLA) signatory where recognition of certificates, validation, and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA with the appropriate scope, shall be approved.^{xvi} Therefore, all ANAB ISO/IEC 17065 Duly Authenticated Reports are approval equivalent.^{xvii}
- 3.9 Approval equity is a fundamental commercial and legal principle.^{xviii}

4 Applicable Standards for the Listing; Regulations for the Regulatory Evaluation^{xix}

4.1 Standards

- 4.1.1 *ANSI/AWC NDS: National Design Specification (NDS) for Wood Construction*
- 4.1.2 *ASTM D2559: Standard Specification for Adhesives for Bonded Structural Wood Products for Use Under Exterior Exposure Conditions*
- 4.1.3 *ASTM D5055: Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists*
- 4.1.4 *ASTM D5456: Standard Specification for Evaluation of Structural Composite Lumber Products*
- 4.1.5 *ASTM D7247: Standard Test Method for Evaluating the Shear Strength of Adhesive Bonds in Laminated Wood Products at Elevated Temperatures*
- 4.1.6 *CSA O86: Engineering Design in Wood*

4.2 Regulations

- 4.2.1 *IBC – 15, 18, 21: International Building Code®*
- 4.2.2 *IRC – 15, 18, 21: International Residential Code®*
- 4.2.3 *FBC-B—20, 23: Florida Building Code – Building^{xx} (FL 29268)*
- 4.2.4 *FBC-R—20, 23: Florida Building Code – Residential^{xx} (FL 29268)*
- 4.2.5 *NBC—10, 15: National Building Code of Canada*

5 Listed^{xxi}

- 5.1 A nationally recognized testing laboratory such as CBI, states that the materials, designs, methods of construction, and/or equipment have met nationally recognized standards and/or have been tested and found suitable for use in a specified manner.

6 Tabulated Properties Generated from Nationally Recognized Standards

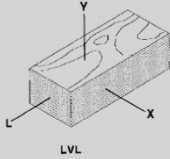
- 6.1 Stora Enso S-LVL is an alternative to sawn lumber for floor, roof and wall structural members.
- 6.2 Structural applications include use as beams, columns, headers, joists, rafters, chords and webs of trusses, I-joint flanges, rim boards and wall studs.
- 6.3 *Design*
- 6.3.1 Design of Stora Enso S-LVL is governed by the applicable code and the provisions for Structural Composite Lumber (SCL) in NDS Part 8 and CSA O86 Section 16.3.^{xxii}
 - 6.3.2 Unless otherwise noted, adjustment of the design stresses for duration of load shall be in accordance with the applicable code.
 - 6.3.3 The design provisions for wood construction noted in IBC Section 2302.1^{xxiii} 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**.

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

Bending, ^{8,9} 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 ^{5,6,7}	Plank	Parallel to Grain ^{10,11}	Parallel to Grain	Perpendicular to-Grain		Beam	Plank	True ⁴	Apparent ⁴	True ⁴		Apparent ⁴
				Beam	Plank							
3,000	3,300	2,300	2,750	900	550	350	100	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

SI: 1 psi = 0.00689 MPa

- 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 sixteen percent (16%). See Section 12.6 of this report.
- 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_{cL} and E.
- Orientation nomenclature for S-LVL:



- 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.

$$\Delta = \frac{5WL^4}{32Ebh^3} + \frac{12WL^2}{5Ebh}$$

where:

Δ = deflection in inches (mm)

W = uniform load in lb/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)

- The design value for bending members used in a beam orientation is based on a referenced depth of 12" (305 mm).
- For depths greater than or equal to 3¹⁵/₁₆", 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 3¹⁵/₁₆" (100 mm).
- For depths greater than or equal to 3¹/₂" and less than 3¹⁵/₁₆", the bending values shall be adjusted by a size factor adjustment of 1.139.
- When structural members qualify as repetitive members in accordance with the applicable code, a four percent (4%) increase is permitted.
- Thicknesses greater than 5¹/₄" (134 mm) shall not be used in design.
- Design value multiplied by (4.59L)^{0.129} for length effect factors, with L measured in feet. Value limited to members 17¹¹/₁₆" (450 mm) deep and less.

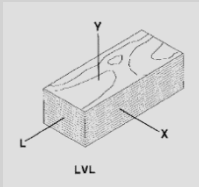
6.3.4 The design provisions for wood construction noted in IBC Section 2302.1^{xxiv} and IRC Section R301.1.3 apply to Stora Enso S-LVL for LRFD unless otherwise noted in this report. For compliance with the NBC, LSD shall be in accordance with CSA O86. Ultimate stresses for Stora Enso S-LVL for dry conditions of use are specified in **Table 2**.

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

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_0 (psi)	
Beam ^{5,6,7}	Plank	Parallel to Grain ^{10,11}	Parallel to Grain	Perpendicular to Grain		Beam	Plank	True ⁴	Apparent ⁴	True ⁴		Apparent ⁴
				Beam	Plank							
5,500	6,100	4,250	4,400	1,600	600	650	150	2.0×10^6	1.9×10^6	2.0×10^6	1.9×10^6	1.6×10^6

SI: 1 psi = 0.00689 MPa

- 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 12.6 of this report.
- 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_{cL} and E.
- Orientation nomenclature for S-LVL™:



- 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.

$$\Delta = \frac{5WL^4}{32Ebh^3} + \frac{12WL^2}{5Ebh}$$

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)

- The design value for bending members used in a beam orientation is based on a referenced depth of 12" (305 mm).
- For depths greater than or equal to $3^{15}/16$ ", 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).
- For depths greater than or equal to $3^{1}/2$ " and less than $3^{15}/16$ ", the bending values shall be adjusted by a size factor adjustment of 1.139.
- 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.
- Thicknesses greater than $5^{1}/4$ " (134 mm) shall not be used in design.
- Specified strength value multiplied by $(4.59/L)^{0.129}$ for length effect factors, with L measured in feet. Value limited to members $17^{11}/16$ " (450 mm) deep and less.

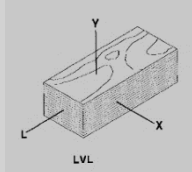
6.3.5 Connections:

6.3.5.1 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 CSA O86 for sawn lumber having a minimum specific gravity equal to that shown in **Table 3**.

Table 3. Equivalent Specific Gravities and Minimum Fastener Spacing for Design of Mechanical Connections^{1,2,3}

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 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. Nails Installed Perpendicular to the Glue Lines of the S-LVL:
 - 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 code for sawn lumber.
5. Nails Installed Parallel to the Glue Lines of the S-LVL:
 - a. Spacing of nails must be at minimum:
 - i. 3" (76 mm) for 8d (0.131" x 2 1/2") (3.3 mm x 63 mm) common nails
 - ii. 4" (102 mm) for 10d (0.148" x 3") (3.8 mm x 76 mm) common nails
 - iii. 4" (102 mm) for 12d (0.148" x 3 1/4") (3.8 mm x 83 mm) common nails
 - iv. For S-LVL™ that is at least 1 3/4" thick x 5 1/2" wide (44mm x 133 mm), 8" (204 mm) for 16d (0.162" x 3 1/2") (4.1 mm x 89 mm) common nails
 - b. End distances of nails must be at minimum:
 - i. 2" (51 mm) for 8d (0.131" x 2 1/2") (3.3 mm x 63 mm) common nails
 - ii. 3" (76 mm) for 10d (0.148" x 3") (3.8 mm x 76 mm) common nails
 - iii. 3" (76 mm) for 12d (0.148" x 3 1/4") (3.8 mm x 83 mm) common nails
 - iv. For S-LVL™ that is at least 1 3/4" thick x 5 1/2" wide (44mm x 133 mm), 3" (76 mm) for 16d (0.162" x 3 1/2") (4.1 mm x 89 mm) 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 as to prevent splitting.

6.3.5.2 Fastener spacing shall be as prescribed in the applicable code (for sawn lumber) unless specifically indicated in **Table 3** or **Table 4** or as prescribed in NDS Part 12.

6.3.5.3 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**.



- 6.3.5.4 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**.
- 6.3.5.5 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**.

Table 4. 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, ASD and [Limit States Design] (plf)				
	2 Rows of 16d (0.162" x 3 1/2") (4.1 mm x 89 mm) Nails	3 Rows of 16d (0.162" x 3 1/2") (4.1 mm x 89 mm) Nails	2 Rows of 12d (0.148" x 3 1/4") (3.8 mm x 83 mm) Nails	3 Rows of 12d (0.148" x 3 1/4") (3.8 mm x 83 mm) Nails	2 Rows of 1/2" (12.7 mm) Bolts ^{7,8}
Figure 2	565 [885]	845 [1,330]	470 [750]	700 [1,130]	870 [1,405]
Figure 3⁹	425 [665]	635 [995]	350 [565]	525 [845]	650 [1,315]
Figure 4	--	--	--	--	580 [1,170]

SI: 1 plf = 1.488 kg/m

1. Table values assume 12" o.c. (305 mm) fastener spacing. For other fastener spacing, 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 1/2" diameter bolts (12.7mm). Refer to the screw manufacturer 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 an RDP for the attachment requirements.
7. A standard cut steel washer of minimum 0.109" thickness (2.8 mm), with a minimum outside dimension of 1 3/8" (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.

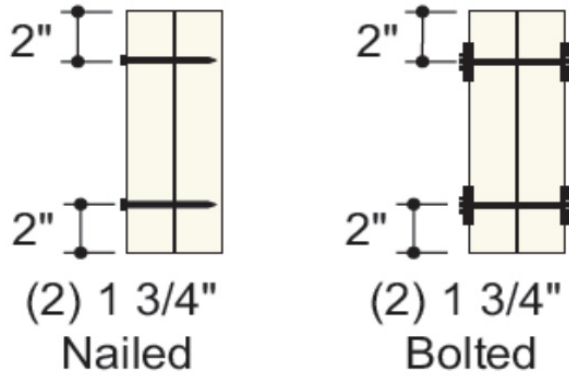


Figure 2. Assembly A (2-Ply Beam)

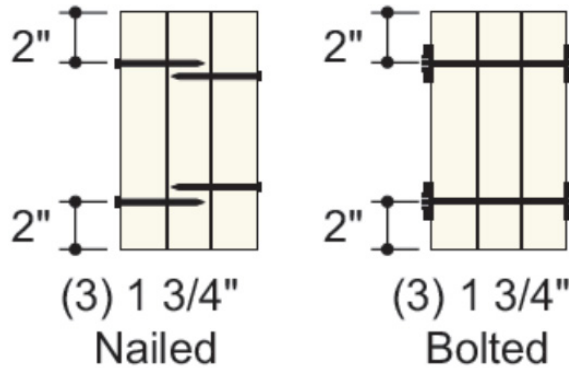


Figure 3. Assembly B (3-Ply Beam)

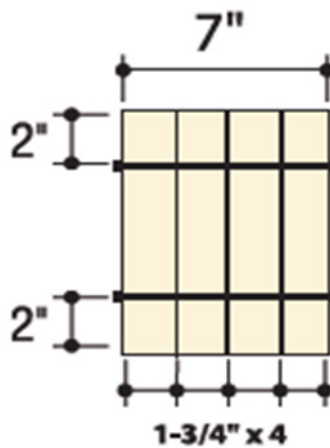


Figure 4. Assembly C (4-Ply Beam)

6.4 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.



7 Certified Performance^{xxv}

- 7.1 All construction methods shall conform to accepted engineering practices to ensure durable, livable, and safe construction and shall demonstrate acceptable workmanship reflecting journeyman quality of work of the various trades.^{xxvi}
- 7.2 The strength and rigidity of the component parts and/or the integrated structure shall be determined by engineering analysis or by suitable load tests to simulate the actual loads and conditions of application that occur.^{xxvii}

8 Regulatory Evaluation and Accepted Engineering Practice

- 8.1 Stora Enso S-LVL complies with the following legislatively adopted regulations and/or accepted engineering practice for the following reasons:
 - 8.1.1 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 report examines Stora Enso S-LVL for the following:
 - 8.1.1.1 Compliance with the requirements noted in IBC Section 2302.1^{xxviii} and IBC Section 2303.1.10 for ASD.
 - 8.1.1.2 Compliance with the requirements noted in IBC Section 2302.1 and IBC Section 2303.1.10 for LRFD.
 - 8.1.1.3 Compliance with IBC Section 2304, IBC Section 2308, IRC Chapter 5, IRC Chapter 6 and IRC Chapter 8 for conventional light frame construction applications.
 - 8.1.1.4 When used in an application that exceeds the limits of IRC Section R301, an engineered design shall be submitted in accordance with IRC Section R301.1.3 and this report.
 - 8.1.1.5 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.
 - 8.1.1.6 Structural design in accordance with NBC Division B Part 4 and Part 9 and CSA O86 as follows:
 - 8.1.1.6.1 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.
 - 8.1.1.6.2 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.
 - 8.1.1.6.3 CSA O86 specifies that the capacity of structural composite lumber is determined from test data by calculations specified in ASTM D5456.
 - 8.1.1.7 Fire-resistance properties of Stora Enso S-LVL are outside the scope of this report.
 - 8.2 Any building code, regulation, and/or accepted engineering evaluations (i.e., research reports, Duly Authenticated Reports, etc.) that are conducted for this Listing were performed by DrJ Engineering, LLC (DrJ), an ISO/IEC 17065 accredited certification body and a professional engineering company operated by RDP/approved sources. DrJ is qualified^{xxix} to practice product and regulatory compliance services within its scope of accreditation and engineering expertise, respectively.
 - 8.3 Engineering evaluations are conducted with DrJ's ANAB accredited ICS code scope of expertise, which are also its areas of professional engineering competence.
 - 8.4 Any regulation specific issues not addressed in this section are outside the scope of this report.



9 Installation

- 9.1 Installation shall comply with the approved construction documents, the manufacturer installation instructions, this report and the applicable building code.
- 9.2 In the event of a conflict between the manufacturer installation instructions and this report, the more restrictive shall govern.

10 Substantiating Data

- 10.1 Testing has been performed under the supervision of a professional engineer and/or under the requirements of ISO/IEC 17025 as follows:
 - 10.1.1 Mechanical properties testing in accordance with ASTM D5456
- 10.2 Information contained herein may include the result of testing and/or data analysis by sources that are approved agencies, approved sources, and/or RDPs. Accuracy of external test data and resulting analysis is relied upon.
- 10.3 Where pertinent, testing and/or engineering analysis are based upon provisions that have been codified into law through state or local adoption of regulations and standards. The developers of these regulations and standards are responsible for the reliability of published content. DrJ's engineering practice may use a regulation-adopted provision as the control. A regulation-endorsed control versus a simulation of the conditions of application to occur establishes a new material as being equivalent to the regulatory provision in terms of quality, strength, effectiveness, fire resistance, durability, and safety.
- 10.4 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, or Duly Authenticated Reports from approved agencies and/or approved sources provided by the supplier. These are presumed to be minimum properties and relied upon to be accurate. The reliability of DrJ's engineering practice, as contained in this Duly Authenticated Report, may be dependent upon published design properties by others.
- 10.5 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.^{xxx}
- 10.6 Where additional condition of use and/or regulatory compliance information is required, please search for Stora Enso S-LVL on the DrJ Certification website.

11 Findings

- 11.1 As outlined in Section 6, Stora Enso S-LVL has performance characteristics that were tested and/or meet applicable regulations and is suitable for use pursuant to its specified purpose.
- 11.2 When used and installed in accordance with this Duly Authenticated Report and the manufacturer installation instructions, Stora Enso S-LVL shall be approved for the following applications:
 - 11.2.1 Stora Enso S-LVL complies with or is a suitable alternative to the requirements of IBC Chapter 23, IRC Chapter 5, IRC Chapter 6 and IRC Chapter 8, plus NBC Section 1.2, Subsection 4.3.11, and Section 9.23.
- 11.3 Unless exempt by state statute, when Stora Enso S-LVL is to be used as a structural and/or building envelope component in the design of a specific building, the design shall be performed by an RDP.
- 11.4 Any application specific issues not addressed herein can be engineered by an RDP. Assistance with engineering is available from Stora Enso Oyj.



11.5 IBC Section 104.11 (IRC Section R104.11 and IFC Section 104.10^{xxxii} are similar) in pertinent part states:

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. 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.

11.6 **Approved:**^{xxxii} Building regulations require that the building official shall accept Duly Authenticated Reports.^{xxxiii}

11.6.1 An approved agency is “approved” when it is ANAB ISO/IEC 17065 accredited.

11.6.2 An approved source is “approved” when an RDP is properly licensed to transact engineering commerce.

11.6.3 Federal law, Title 18 US Code Section 242, requires that where the alternative product, material, service, design, assembly, and/or method of construction is not approved, the building official shall respond in writing, stating the reasons why the alternative was not approved. Denial without written reason deprives a protected right to free and fair competition in the marketplace.

11.7 DrJ is a licensed engineering company, employs licensed RDPs and is an ANAB-Accredited Product Certification Body – Accreditation #1131.

11.8 Through the IAF Multilateral Agreements (MLA), this Duly Authenticated Report can be used to obtain product approval in any jurisdiction or country because all ANAB ISO/IEC 17065 Duly Authenticated Reports are equivalent.^{xxxiv}

12 Conditions of Use

12.1 Material properties shall not fall outside the boundaries defined in Section 6.

12.2 As defined in Section 6, 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.

12.3 The manufacturer published installation instructions shall be available at the jobsite at all times during installation.

12.4 Design calculations and details shall be furnished to the code official verifying that the material is used in compliance with this report. The calculations must be prepared by an RDP where required by the statutes of the jurisdiction in which the project is to be constructed.

12.5 The design values shall not exceed those set forth in this report as modified by all applicable table notes.

12.6 The service conditions for Stora Enso 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.

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

12.8 Fastener design values shall be as specified in **Table 3** of this report.

12.9 Cutting and notching of Stora Enso 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 an RDP.

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

12.11 Where use of Stora Enso S-LVL qualifies as repetitive members as defined in NDS, an increase of four percent (4%) is permitted in allowable bending stresses.



- 12.12 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 3¹/₂" (89 mm) wide. The thickness may not be cut.
- 12.13 Minimum bearing length and anchorage of Stora Enso S-LVL shall meet the requirements of IBC Chapter 23 or NBC Division B Section 9.23 for sawn lumber.
- 12.14 Stora Enso S-LVL shall be fabricated in the Stora Enso Oyj facilities located in Varkaus, Finland, with quality control inspections by an approved third-party quality control inspection agency.
- 12.15 When required by adopted legislation and enforced by the building official, also known as the authority having jurisdiction (AHJ) in which the project is to be constructed:
- 12.15.1 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.
 - 12.15.2 This report and the installation instructions shall be submitted at the time of permit application.
 - 12.15.3 This innovative product has an internal quality control program and a third-party quality assurance program.
 - 12.15.4 At a minimum, this innovative product shall be installed per Section 9 of this report.
 - 12.15.5 The review of this report by the AHJ shall comply with IBC Section 104 and IBC Section 105.4.
 - 12.15.6 This innovative product has an internal quality control program and a third party quality assurance program in accordance with IBC Section 104.4, IBC Section 110.4, IBC Section 1703, IRC Section R104.4, and IRC Section R109.2.
 - 12.15.7 The application of this innovative product in the context of this report is dependent upon the accuracy of the construction documents, implementation of installation instructions, inspection as required by IBC Section 110.3, IRC Section R109.2, and any other regulatory requirements that may apply.
- 12.16 The approval of this report by the AHJ shall comply with IBC Section 1707.1, where legislation states in part, "*the building official shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new material or assemblies as provided for in Section 104.11," all of IBC Section 104, and IBC Section 105.4.*
- 12.17 Design loads shall be determined in accordance with the regulations adopted by the jurisdiction in which the project is to be constructed and/or by the building designer (i.e., owner or RDP).
- 12.18 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.



13 Identification

- 13.1 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, this report number, and other information to confirm code compliance.
- 13.2 Additional technical information can be found at www.storaenso.com.

14 Review Schedule

- 14.1 This report is subject to periodic review and revision. For the latest version, visit drjcertification.org.
- 14.2 For information on the status of this report, please contact [DrJ Certification](#).

15 Approved for Use Pursuant to U.S. and International Legislation Defined in Appendix A

- 15.1 Stora Enso S-LVL™ Laminated Veneer Lumber is included in this report published by an approved agency that is concerned with evaluation of products or services, maintains periodic inspection of the production of listed materials or periodic evaluation of services. This report states either that the material, product, or service meets recognized standards or has been tested and found suitable for a specified purpose. This report meets the legislative intent and definition of being acceptable to the AHJ.



Appendix A

1 Legislation that Authorizes AHJ Approval

- 1.1 **Fair Competition:** State legislatures have adopted Federal regulations for the examination and approval of building code 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 **Adopted Legislation:** The following local, state, and federal regulations affirmatively authorize this innovative product to be approved by AHJs, delegates of building departments, and/or delegates of an agency of the federal government:
 - 1.2.1 Interstate commerce is governed by the Federal Department of Justice to encourage the use of innovative products, materials, designs, services, assemblies, and/or methods of construction. The goal is to “*protect economic freedom and opportunity by promoting free and fair competition in the marketplace.*”
 - 1.2.2 Title 18 US Code Section 242 affirms and regulates the right of individuals and businesses to freely and fairly have new products, materials, designs, services, assemblies, and/or methods of construction approved for use in commerce. Disapproval of alternatives shall be based upon non-conformance with respect to specific provisions of adopted legislation and shall be provided in writing stating the reasons why the alternative was not approved, with reference to the specific legislation violated.
 - 1.2.3 The federal government and each state have a public records act. In addition, each state also has legislation that mimics the federal Defend Trade Secrets Act 2016 (DTSA),^{xxxv} where providing test reports, engineering analysis and/or other related IP/TS is subject to prison of not more than ten years^{xxxvi} and/or a \$5,000,000 fine or 3 times the value of^{xxxvii} the Intellectual Property (IP) and Trade Secrets (TS).
 - 1.2.3.1 Compliance with public records and trade secret legislation requires approval through the use of Listings, certified reports, Technical Evaluation Reports, Duly Authenticated Reports, and/or research reports prepared by approved agencies and/or approved sources.
 - 1.2.4 For new materials^{xxxviii} that are not specifically provided for in any regulation, the design strengths and permissible stresses shall be established by tests, where suitable load tests simulate the actual loads and conditions of application that occur.
 - 1.2.5 The design strengths and permissible stresses of any structural material shall conform to the specifications and methods of design using accepted engineering practice.^{xxxix}
 - 1.2.6 The commerce of approved sources (i.e., registered PEs) is regulated by professional engineering legislation. Professional engineering commerce shall always be approved by AHJs, except where there is evidence provided in writing, that specific legislation have been violated by an individual registered PE.
 - 1.2.7 The AHJ shall accept Duly Authenticated Reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in IBC Section 104.11.^{xl}



- 1.3 **Approved^{xli} by Los Angeles:** The Los Angeles Municipal Code (LAMC) states in pertinent part that the provisions of LAMC are not intended to prevent the use of any material, device, or method of construction not specifically prescribed by LAMC. The Department shall use Part III, Recognized Standards in addition to Part II, Uniform Building Code Standards of Division 35, Article 1, Chapter IX of the LAMC in evaluation of products for approval where such standard exists for the product or the material and may use other approved standards that apply. Whenever tests or certificates of any material or fabricated assembly are required by Chapter IX of the LAMC, such tests or certification shall be made by a testing agency approved by the Superintendent of Building to conduct such tests or provide such certifications. The testing agency shall publish the scope and limitation(s) of the listed material or fabricated assembly.^{xlii} The Superintendent of Building Approved Testing Agency Roster is provided by the Los Angeles Department of Building and Safety (LADBS). The Center for Building Innovation (CBI) Certificate of Approval License is TA24945. Tests and certifications found in a DrJ Listing are LAMC approved. In addition, the Superintendent of Building shall accept Duly Authenticated Reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in the California Building Code (CBC) Section 1707.1.^{xliii}
- 1.4 **Approved by Chicago:** The Municipal Code of Chicago (MCC) states in pertinent part that an Approved Agency is a Nationally Recognized Testing Laboratory (NRTL) acting within its recognized scope and/or a certification body accredited by the American National Standards Institute (ANSI) acting within its accredited scope. Construction materials and test procedures shall conform to the applicable standards listed in the MCC. Sufficient technical data shall be submitted to the building official to substantiate the proposed use of any product, material, service, design, assembly, and/or method of construction not specifically provided for in the MCC. This technical data shall consist of research reports from approved sources (i.e., MCC defined Approved Agencies).
- 1.5 **Approved by New York City:** The 2022 NYC Building Code (NYCBC) states in part that an approved agency shall be deemed^{xliiv} an approved testing agency via ISO/IEC 17025 accreditation, an approved inspection agency via ISO/IEC 17020 accreditation, and an approved product evaluation agency via ISO/IEC 17065 accreditation. Accrediting agencies, other than federal agencies, must be members of an internationally recognized cooperation of laboratory and inspection accreditation bodies subject to a mutual recognition agreement^{xliiv} (i.e., ANAB, International Accreditation Forum [IAF], etc.).
- 1.6 **Approved by Florida:** Statewide approval of products, methods, or systems of construction shall be approved, without further evaluation by:
- 1.6.1 A certification mark or listing of an approved certification agency,
 - 1.6.2 A test report from an approved testing laboratory,
 - 1.6.3 A product evaluation report based upon testing or comparative or rational analysis, or a combination thereof, from an approved product evaluation entity, or
 - 1.6.4 A product evaluation report based upon testing, comparative or rational analysis, or a combination thereof, developed, signed and sealed by a professional engineer or architect, licensed in Florida.
 - 1.6.5 For local product approval, products or systems of construction shall demonstrate compliance with the structural wind load requirements of the Florida Building Code (FBC) through one of the following methods:
 - 1.6.5.1 A certification mark, listing or label from a commission-approved certification agency indicating that the product complies with the code,
 - 1.6.5.2 A test report from a commission-approved testing laboratory indicating that the product tested complies with the code,
 - 1.6.5.3 A product-evaluation report based upon testing, comparative or rational analysis, or a combination thereof, from a commission-approved product evaluation entity which indicates that the product evaluated complies with the code,



- 1.6.5.4 A product-evaluation report or certification based upon testing or comparative or rational analysis, or a combination thereof, developed and signed and sealed by a Florida professional engineer or Florida registered architect, which indicates that the product complies with the code, or
- 1.6.5.5 A statewide product approval issued by the Florida Building Commission.
- 1.6.6 The [Florida Department of Business and Professional Regulation \(DBPR\)](#) website provides a listing of companies certified as a [Product Evaluation Agency](#) (i.e., EVLMiami 13692), a [Product Certification Agency](#) (i.e., CER10642), and as a [Florida Registered Engineer](#) (i.e., ANE13741).
- 1.7 **Approved by Miami-Dade County (i.e., Notice of Acceptance [NOA]):** A Florida statewide approval is an NOA. An NOA is a Florida local product approval. By Florida law, Miami-Dade County shall accept the statewide and local Florida Product Approval as provided for in Florida legislation [553.842](#) and [553.8425](#).
- 1.8 **Approved by New Jersey:** Pursuant to the 2018 Building Code of New Jersey in [IBC Section 1707.1 General](#),^{xlvi} it states: “*In the absence of approved rules or other approved standards, the building official shall accept duly authenticated reports from [approved agencies](#) in respect to the quality and manner of use of new materials or assemblies as provided for in the administrative provisions of the Uniform Construction Code (N.J.A.C. 5:23)*”.^{xlvii} Furthermore N.J.A.C 5:23-3.7 states: “*Municipal approvals of alternative materials, equipment, or methods of construction.*”
 - 1.8.1 **Approvals:** Alternative materials, equipment, or methods of construction shall be approved by the appropriate subcode official provided the proposed design is satisfactory and that the materials, equipment, or methods of construction are suitable for the intended use and are at least the equivalent in quality, strength, effectiveness, fire resistance, durability, and safety of those conforming with the requirements of the regulations.
 - 1.8.1.1 A field evaluation label and report or letter issued by a nationally recognized testing laboratory verifying that the specific material, equipment, or method of construction meets the identified standards or has been tested and found to be suitable for the intended use, shall be accepted by the appropriate subcode official as meeting the requirements of the above.
 - 1.8.1.2 Reports of engineering findings issued by nationally recognized evaluation service programs such as but not limited to, the Building Officials and Code Administrators (BOCA), the International Conference of Building Officials (ICBO), the Southern Building Code Congress International (SBCCI), the International Code Council (ICC), and the National Evaluation Service, Inc., shall be accepted by the appropriate subcode official as meeting the requirements of the above.
 - 1.8.2 The [New Jersey Department of Community Affairs](#) has confirmed that technical evaluation reports, from any accredited entity listed by [ANAB](#), meets the requirements of item the previous paragraph, given that the listed entities are no longer in existence and/or do not provide “*reports of engineering findings.*”
- 1.9 **Approved by the Code of Federal Regulations Manufactured Home Construction and Safety Standards:** Pursuant to Title 24, Subtitle B, Chapter XX, [Part 3282.14](#)^{xlviii} and [Part 3280](#),^{xlix} the Department encourages innovation and the use of new technology in manufactured homes. The design and construction of a manufactured home shall conform to the provisions of Part 3282 and Part 3280 where key approval provisions in mandatory language follow:
 - 1.9.1 “*All construction methods shall be in conformance with accepted engineering practices.*”
 - 1.9.2 “*The strength and rigidity of the component parts and/or the integrated structure shall be determined by engineering analysis or by suitable load tests to simulate the actual loads and conditions of application that occur.*”
 - 1.9.3 “*The design stresses of all materials shall conform to accepted engineering practice.*”



- 1.10 **Approval by US, Local and State Jurisdictions in General:** In all other local and state jurisdictions, the adopted building code legislation states in pertinent part that:
- 1.10.1 For new materials that are not specifically provided for in this code, the design strengths and permissible stresses shall be established by tests.ⁱ
 - 1.10.2 For innovative alternatives and/or methods of construction, the building official shall accept Duly Authenticated Reports from approved agencies with respect to the quality and manner of use of new materials or assemblies.ⁱⁱ
 - 1.10.2.1 An approved agency is “approved” when it is ANAB ISO/IEC 17065 accredited. DrJ Engineering, LLC (DrJ) is in the ANAB directory.
 - 1.10.2.2 An approved source is “approved” when an RDP is properly licensed to transact engineering commerce. The regulatory authority governing approved sources is the state legislature via its professional engineering regulations.ⁱⁱⁱ
 - 1.10.3 The design strengths and permissible stresses of any structural material...shall conform to the specifications and methods of design of accepted engineering practice performed by an approved source.ⁱⁱⁱ
- 1.11 **Approval by International Jurisdictions:** The USMCA and GATT agreements provide for approval of innovative materials, designs, services, and/or methods of construction through the Agreement on Technical Barriers to Trade and the IAF Multilateral Recognition Arrangement (MLA), where these agreements:
- 1.11.1 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.
 - 1.11.2 **Approved:** The purpose of the MLA is to ensure mutual recognition of accredited certification and validation/verification statements between signatories to the MLA and subsequently, acceptance of accredited certification and validation/verification statements in many markets based on one accreditation for the timely approval of innovative materials, designs, services, and/or methods of construction.
 - 1.11.3 ANAB is an IAF-MLA signatory where recognition of certificates, validation, and verification statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA, with the appropriate scope, shall be approved.^{iv}
 - 1.11.4 Therefore, all ANAB ISO/IEC 17065 Duly Authenticated Reports are approval equivalent.^{iv}
- 1.12 Approval equity is a fundamental commercial and legal principle.^{vi}



Issue Date: January 7, 2021
Subject to Renewal: April 1, 2025

FBC Supplement to Report Number 1507-01

REPORT HOLDER: Stora Enso Oyj

1 Evaluation Subject

- 1.1 Stora Enso S-LVL™ Laminated Veneer Lumber

2 Purpose and Scope

- 2.1 Purpose
 - 2.1.1 The purpose of this Report Supplement is to show Stora Enso S-LVL, recognized in Report Number 1507-01, has also been evaluated for compliance with the codes listed below as adopted by the Florida Building Commission.
- 2.2 *Applicable Code Editions*
 - 2.2.1 *FBC-B—20, 23: Florida Building Code – Building (FL 29268)*
 - 2.2.2 *FBC-R—20, 23: Florida Building Code – Residential (FL 29268)*

3 Conclusions

- 3.1 Stora Enso S-LVL, described in Report Number 1507-01, complies with the FBC-B and FBC-R and is subject to the conditions of use described in this supplement.
- 3.2 Where there are variations between the IBC and IRC and the FBC-B and FBC-R applicable to this report, they are listed here:
 - 3.2.1 FBC-B Section 104.4, Section 110.4, and Section 2308 are reserved.
 - 3.2.2 FBC-R Section R104 and Section R109 are reserved.
 - 3.2.3 FBC-B Section 2301.2 replaces IBC Section 2302.1.

4 Conditions of Use

- 4.1 Stora Enso S-LVL, described in Report Number 1507-01, must comply with all of the following conditions:
 - 4.1.1 All applicable sections in Report Number 1507-01.
 - 4.1.2 The design, installation, and inspections are in accordance with additional requirements of FBC-B Chapter 16 and Chapter 17, as applicable.



Notes

- i For more information, visit drjcertification.org or call us at 608-310-6748.
- ii <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1702>
- iii Alternative Materials, Design and Methods of Construction and Equipment: The provisions of any regulation code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by a regulation. Please review <https://www.justice.gov/atr/mission> and <https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104.11>
- iv <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706>:-:text=the%20design%20strengths%20and%20permissible%20stresses%20shall%20be%20established%20by%20tests%20as
- v The design strengths and permissible stresses of any structural material shall conform to the specifications and methods of design of accepted engineering practice. <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706>:-:text=shall%20conform%20to%20the%20specifications%20and%20methods%20of%20design%20of%20accepted%20engineering%20practice
- vi <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1707.1>:-:text=the%20building%20official%20shall%20accept%20duly%20authenticated%20reports%20from%20approved%20agencies
- vii <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1703.4.2>
- viii https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#approved_agency
- ix https://up.codes/viewer/wyoming/ibc-2021/chapter/2/definitions#approved_source
- x <https://www.law.cornell.edu/uscode/text/18/1832> (b) Any organization that commits any offense described in subsection (a) shall be fined not more than the greater of \$5,000,000 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. The federal government and each state have a public records act. To follow DTSA and comply state public records and trade secret legislation requires approval through ANAB ISO/IEC 17065 accredited certification bodies or approved sources. For more information, please review this website: [Intellectual Property and Trade Secrets](#).
- xi <https://www.nspe.org/resources/issues-and-advocacy/professional-policies-and-position-statements/regulation-professional> AND <https://apassociation.org/list-of-engineering-boards-in-each-state-archive/>
- xii <https://www.cbiteest.com/accreditation/>
- xiii <https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104.11>:-:text=to%20enforce%20the%20provisions%20of%20this%20code
- xiv <https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#104.11>:-:text=Where%20the%20alternative%20material%20design%20or%20method%20of%20construction%20is%20not%20approved%20the%20building%20official%20shall%20respond%20in%20writing%20stating%20the%20reasons%20why%20the%20alternative%20was%20not%20approved AND <https://up.codes/viewer/colorado/ibc-2021/chapter/1/scope-and-administration#105.3.1>:-:text=If%20the%20application%20or%20the%20construction%20documents%20do%20not%20conform%20to%20the%20requirements%20of%20pertinent%20laws%20the%20building%20official%20shall%20reject%20such%20application%20in%20writing%20stating%20the%20reasons%20therefore
- xv <https://up.codes/viewer/colorado/ibc-2021/chapter/17/special-inspections-and-tests#1707.1>:-:text=the%20building%20official%20shall%20accept%20duly%20authenticated%20reports%20from%20approved%20agencies%20in%20respect%20to%20the%20quality%20and%20manner%20of%20use%20of%20new%20materials%20or%20assemblies%20as%20provided%20for%20in%20Section%20104.11
- xvi <https://iaf.eu/en/about-iaf>:-:text=it%20is%20required%20to%20recognise%20certificates%20and%20validation%20and%20verification%20statements%20issued%20by%20conformity%20assessment%20bodies%20accredited%20by%20all%20other%20signatories%20of%20the%20IAF%20MLA%20with%20the%20appropriate%20scope
- xvii True for all ANAB accredited product evaluation agencies and all International Trade Agreements.
- xviii <https://www.justice.gov/crt/deprivation-rights-under-color-law> AND <https://www.justice.gov/atr/mission>
- xix Unless otherwise noted, all references in this Listing are from the 2021 version of the codes and the standards referenced therein. This material, product, design, service and/or method of construction also complies with the 2000-2021 versions of the referenced codes and the standards referenced therein.
- xx All references to the FBC-B and FBC-R are the same as the 2021 IBC and 2021 IRC unless otherwise noted in the Florida Supplement at the end of this report.
- xxi <https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#p-3280.2>(Listed%20or%20certified); <https://up.codes/viewer/colorado/ibc-2021/chapter/2/definitions#listed> AND <https://up.codes/viewer/colorado/ibc-2021/chapter/2/definitions#labeled>
- xxii 2009 CSA O86 Section 13.3
- xxiii 2015 IBC Section 2301.2
- xxiv 2015 IBC Section 2301.2
- xxv <https://up.codes/viewer/colorado/ibc-2021/chapter/17/special-inspections-and-tests#1703.4>
- xxvi <https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#>:-:text=All%20construction%20methods%20shall%20be%20in%20conformance%20with%20accepted%20engineering%20practices%20to%20insure%20durable%20livable%20and%20safe%20housing%20and%20shall%20demonstrate%20acceptable%20workmanship%20reflecting%20journeyman%20quality%20of%20work%20of%20the%20various%20trades
- xxvii <https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#>:-:text=The%20strength%20and%20rigidity%20of%20the%20component%20parts%20and/or%20the%20integrated%20structure%20shall%20be%20determined%20by%20engineering%20analysis%20or%20by%20suitable%20load%20tests%20to%20simulate%20the%20actual%20loads%20and%20conditions%20of%20application%20that%20occur
- xxviii 2015 IBC Section 2301.2
- xxix Qualification is performed by a legislatively defined Accreditation Body. ANSI National Accreditation Board (ANAB) is the largest independent accreditation body in North America and provides services in more than 75 countries. DrJ is an ANAB accredited product certification body.



- xxx See Code of Federal Regulations (CFR) Title 24 Subtitle B Chapter XX Part 3280 for definition.
- xxxi 2018 IFC Section 104.9
- xxxii Approved is an adjective that modifies the noun after it. For example, Approved Agency means that the Agency is accepted officially as being suitable in a particular situation. This example conforms to IBC/IRC/IFC Section 201.4 where the building code authorizes sentences to have an ordinarily accepted meaning such as the context implies.
- xxxiii <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1707.1>
- xxxiv Multilateral approval is true for all ANAB accredited product evaluation agencies and all International Trade Agreements.
- xxxv <http://www.drjengineering.org/AppendixC> AND <https://www.drjcertification.org/comell-2016-protection-trade-secrets>
- xxxvi <https://www.law.cornell.edu/uscode/text/18/1832#:~:text=imprisoned%20not%20more%20than%2010%20years>
- xxxvii <https://www.law.cornell.edu/uscode/text/18/1832#:~:text=Any%20organization%20that,has%20thereby%20avoided>
- xxxviii <https://up.codes/viewer/wyoming/ibc-2021/chapter/17/special-inspections-and-tests#1706.2>
- xxxix IBC 2021, Section 1706.1 Conformance to Standards
- xl IBC 2021, Section 1707 Alternative Test Procedure, 1707.1 General
- xli See **Section 11** for the distilled building code definition of **Approved**
- xlii Los Angeles Municipal Code, SEC. 98.0503. TESTING AGENCIES
- xliii <https://up.codes/viewer/california/ca-building-code-2022/chapter/17/special-inspections-and-tests#1707.1>
- xliv New York City, The Rules of the City of New York, § 101-07 Approved Agencies
- xlv New York City, The Rules of the City of New York, § 101-07 Approved Agencies
- xlvi <https://up.codes/viewer/new-jersey/ibc-2018/chapter/17/special-inspections-and-tests#1707.1>
- xlvii <https://www.nj.gov/dca/divisions/codes/codreg/ucc.html>
- xlviii <https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3282/subpart-A/section-3282.14>
- xlix <https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280>
- i IBC 2021, Section 1706 Design Strengths of Materials, 1706.2 New Materials. Adopted law pursuant to IBC model code language 1706.2.
- ii IBC 2021, Section 1707 Alternative Test Procedure, 1707.1 General. Adopted law pursuant to IBC model code language 1707.1.
- iii <https://www.nspe.org/resources/issues-and-advocacy/professional-policies-and-position-statements/regulation-professional> AND <https://apassociation.org/list-of-engineering-boards-in-each-state-archive/>
- iiii IBC 2021, Section 1706 Design Strengths of Materials, Section 1706.1 Conformance to Standards Adopted law pursuant to IBC model code language 1706.1.
- lv <https://iaf.nu/en/about-iaf-mia/#:~:text=it%20is%20required%20to%20recognise%20certificates%20and%20validation%20and%20verification%20statements%20issued%20by%20conformity%20assessment%20bodies%20accredited%20by%20all%20other%20signatories%20of%20the%20IAF%20MLA%2C%20with%20the%20appropriate%20scope>
- lv True for all ANAB accredited product evaluation agencies and all International Trade Agreements.
- lvi <https://www.justice.gov/crt/deprivation-rights-under-color-law> AND <https://www.justice.gov/atr/mission>