STEICO Laminated Veneer Lumber (LVL)

STEICO SE

Initial Acceptance: 05 March 2021 **Expiration:** 08 March 2026

Revision: 08 March 2024

TYPE OF ACCEPTANCE

Product Material — Wood, Plastics and Composites
CSI Specification Division: 06 00 00 and Section: 06 17 13 (Laminated Veneer Lumber)

MANUFACTURER IDENTIFICATION

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DESCRIPTION OF THE PRODUCT EVALUATED

STEICO LVL R 2.0E and STEICO LVL R 2.1E described in this Report are used as an alternative to sawn lumber in structural applications for floor, wall, and roof structures. Structural applications include use as beams, joists, rafters, headers, stair headers, girders, truss chords, planks, and columns.

STEICO LVL R 2.0E and STEICO LVL R 2.1E **is** laminated veneer lumber (LVL) manufactured in accordance with ASTM D5456, with in-plant manufacturing processes approved by PFS TECO. The veneers are laminated together using an exterior-type structural adhesive that complies with ASTM D2559 and CSA 0112.9. All veneers are oriented with the wood grain parallel to the length of the member. The wood species (Scots Pine / Pinus sylvestris), properties, adhesives, and finished product tolerances are as specified in the manufacturer's approved quality control manual.

STEICO LVL R 2.0E and STEICO LVL R 2.1E can be produced in thicknesses up to 3.5 in. (up to 90 mm), depths up to 24 in. (up to 610 mm), and lengths up to 59 ft. (up to 18 m).

CODES AND STANDARDS APPLICABLE TO PRODUCT

- 2009, 2012, 2015, and 2018 International Building Code® (IBC®)
- 2009, 2012, 2015, and 2018 International Residential Code® (IRC®)
- 2015, 2018 ANSI/AWC National Design Specification® (NDS®) for Wood Construction
- ICC 700-2020 National Green Building Standard
- ASTM D5456, *Standard Specification for Evaluation of Structural Composite Lumber Products*
- 2020, 2023 Florida Building Code (FBC)

PROPERTIES REVIEWED

Testing of the **STEICO LVL R 2.0E** and STEICO LVL R 2.1E was conducted in accordance with the applicable Codes and Standards. The evaluation of the testing and analysis verified that the **STEICO LVL R 2.0E and STEICO LVL R 2.1 E** described in Tables 1, 2, and 3 complies with the requirements of ASTM D5456. Specific design properties and capacities are provided in Table 1 through Table 3 of this Report.

1. **Properties:**

   (a) Design using **STEICO LVL R 2.0E and STEICO LVL R 2.1 E** described in this Report must be in accordance with the applicable code(s) and the NDS, including duration of load applications. Table 1 in this Report provides **STEICO LVL R 2.0E and STEICO LVL R 2.1 E** design properties to be used when designing in accordance with the NDS. Fig. 1 illustrates member orientation with respect to load for joist/beam and plank applications, while Fig. 2 illustrates wide face, end face, and edge face orientation.

   (b) Bending strength depth adjustment factors for the **STEICO LVL R 2.0E and STEICO LVL R 2.1 E** product can be found in Table 2.

   (c) The attributes of **STEICO LVL 2.0E and STEICO LVL R 2.1 E** have been verified as conforming to the provisions of ICC 700-2020 Sections 608.1(2) and 11.608.1(2) for resource-efficient materials. Note that decisions on the compliance for those areas rest with the user of this Report. The user is advised to the project-specific provisions that may be contingent upon meeting specific conditions, and the verification of those conditions is outside the scope of this Report. These codes or standards often provide supplemental information as guidance.

2. **Connections:**

   Mechanical connections for **STEICO LVL R 2.0E and STEICO LVL R 2.1 E** must be in accordance with the NDS. Table 3 in this Report specifies requirements for equivalent specific gravity for nails, bolts, screws, and lag screws to be used when designing in accordance with the NDS.

3. **Fire Resistance:**

   Fire resistance of **STEICO LVL R 2.0E and STEICO LVL R 2.1 E** must be calculated in accordance with Chapter 16 of the NDS (2018 edition).

LIMITATIONS OF ACCEPTANCE

STEICO LVL R 2.0E and STEICO LVL R 2.1 E described in this Report complies with or is a suitable alternative to what is specified for solid sawn lumber in those codes listed in the 'Codes and Standards Applicable to Product' section of this Report, subject to the following conditions:

1. The **STEICO LVL R 2.0E and STEICO LVL R 2.1 E** described in this Report are limited to dry service conditions where the in-service equilibrium moisture content is less than 16 percent.
2. Design calculations and details must be furnished to the building official or authority having jurisdiction, verifying that **STEICO LVL R 2.0E and STEICO LVL R 2.1 E** are used in compliance with this Report. The calculations must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is constructed.
3. **STEICO LVL R 2.0E and STEICO LVL R 2.1 E** may be cut to depth and length for the required application; thickness of members must not be altered (except when lightly sanded to suit an application).
4. Use of **STEICO LVL R 2.0E and STEICO LVL R 2.1 E** with notches and bored holes, or as preservative treated LVL, has not been reviewed and is not included in the scope of this Report.
5. Use of **STEICO LVL R 2.0E and STEICO LVL R 2.1 E** for wall studs in fire-resistant construction or braced wall applications has not been reviewed and is not included in the scope of this Report.
6. **STEICO LVL R 2.0E and STEICO LVL R 2.1 E** is manufactured at the STEICO manufacturing facility located in Czarna Woda, Poland. Quality control inspections are conducted by PFS TECO or an authorized representative.

DOCUMENTATION SUBMITTED

Submitted data was provided in accordance with PFS TECO 1601 (Quality control manual, Specifications, Manufacturer's installation instructions, Test data and Descriptive information). The product has been evaluated for compliance with ASTM D5456 and ICC-ES *Acceptance Criteria for Structural Wood Based Products* (AC47).

This Report was formerly published as PFS TECO Research Report 0122 (RR 0122).

PRODUCT IDENTIFCATION

The **STEICO LVL R 2.0E and STEICO LVL R 2.1 E** described in this Report is identified by a stamp bearing the product name, product grade, means for establishing the production date, PFS TECO plant number (867), the PFS TECO Building Product Evaluation Report number including the name from PFS TECO ('PFS TECO BPER 0122'). Alternatively, or in addition to "PFS TECO," the product may be marked with the PFS TECO certification mark (see Fig. 3).

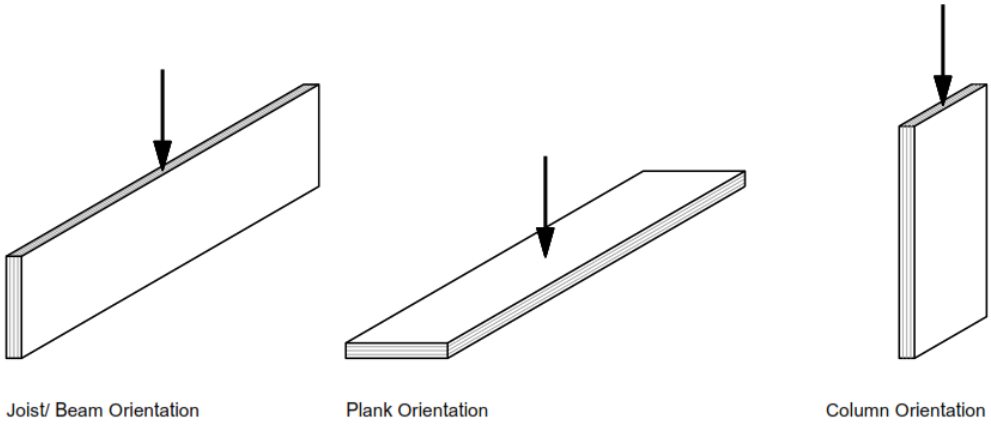

Fig. 1. Illustration of LVL in joist/beam, plank, and column orientations

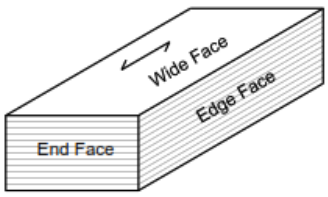

Fig. 2. Illustration of wide, end, and edge face orientations

Fig. 3. Image of PFS TECO certification mark with United States country identifier

Table 1: Reference Design Values for STEICO LVL (1)(2)

Orientation	Property		2.0E Design Values (3)		2.1E Design Values (3)	
			(psi)	(MPa)	(psi)	(MPa)
Axial	Compression, F_c		3,000	20.68	3,000	20.68
	Tension, F_t (4)		2,100	14.47	2,100	14.47
Joist / Beam	Bending, F_b (5)		3,000	20.68	3,000	20.68
	Modulus of Elasticity	True MOE (6)	2.0×10^6	13,789	2.1×10^6	14,479
		Apparent MOE (7)	1.9×10^6	13,100	1.9×10^6	13,100
		Minimum MOE (8)	1.1×10^6	7,584	1.1×10^6	7,584
	Compression Perpendicular-to-Grain, $F_{c\text{-perp}}$		950	6.55	950	6.55
	Shear, F_v		320	2.20	320	2.20
Plank	Bending, F_b		3,200	22.06	3,200	22.06
	Modulus of Elasticity	True MOE (6)	2.0×10^6	13,789	2.1×10^6	14,479
		Apparent MOE (7)	1.9×10^6	13,100	1.9×10^6	13,100
		Minimum MOE (8)	1.0×10^6	6,894	1.0×10^6	6,894
	Compression Perpendicular-to-Grain, $F_{c\text{-perp}}$		650	4.48	650	4.48
	Shear, F_v		190	1.31	190	1.31

(1) Values are based on dry service conditions where the in-service equilibrium moisture content is less than 16 percent.

(2) Values may be adjusted in accordance with Section 8.3 of the NDS (2018 edition).

(3) Metric values are converted from imperial units, where 1,000 psi = 6.89 MPa.

(4) Reference tension design value is for 6-ft (1.8 m) gage length. For other lengths, adjust the value by a factor $(6/L)^{0.09}$ where L is the length in ft.

(5) Reference bending design value must be adjusted by a factor $(12/d)^{0.15}$ where d is in inches. Refer to Table 2.

(6) Calculated deflection of bending members must account for both bending and shear deflection. The total deflection of a uniformly loaded simple span beam is calculated as follows:

$$\Delta_{total} = \frac{270\, w\, L^4}{E_{true}\, b\, d^3} + \frac{28.8\, w\, L^2}{E_{true}\, b\, d}$$

where Δ_{total} = Deflection, in.; w = Uniform load, lbf/ft.; b = Beam width, in.; E_{true} = True (shear-free) modulus of elasticity, psi; d = Beam depth, in.; L = Span, ft.

(7) The MOE listed is the apparent modulus of elasticity and includes the effects of shear deformation.

(8) The MOE listed is the reference for column stability calculations in accordance with the NDS.

Table 2: Bending Strength Depth Adjustment Factor

Joist / Beam Depth	inches	1.75	3.5	5.5	9.25	12	14	16	20	24
	mm	45	89	140	235	305	356	406	508	610
Multiplier		**1.33**	**1.20**	**1.12**	**1.04**	**1.00**	**0.98**	**0.96**	**0.93**	**0.90**

Table 3: Fastener Design Values (Equivalent Specific Gravity) for STEICO LVL R 2.0E and 2.1E (1)(2)(3)

Type	**Orientation**		**Equivalent Specific Gravity**
Nail and Screws	Withdrawal	Installed in wide face	0.50
		Installed in edge face	0.43
	Dowel bearing	Installed in wide face	0.56
		Installed in edge face	0.51
Bolt and Lag Screws	Dowel bearing (installed in wide face)	Loaded parallel to grain	0.51
		Loaded perpendicular to grain	

(1) Connection design values must be calculated in accordance with Chapters 11 and 12 of the NDS (2018 edition) and must be adjusted by the applicable factors specified in the NDS.

(2) Minimum spacing, end and edge distances for bolts and lag screws must be as specified in the NDS.

(3) Bolts and lag screws are limited to installation in the wide face.