NYC Department of Buildings
280 Broadway, New York, NY 10007
Patricia Lancaster, FAIA, Commissioner
(212) 566-5000, TTY: (212) 566-4769

Report of Materials and Equipment Acceptance Division

Pursuant to Administrative Code Section 27-131, the following equipment or material has been found acceptable for use subject to the terms and conditions contained herein.

MEA 89-96-M Vol. II

Manufacturer: Trus Joist, A Weyerhaeuser Business, P.O. Box 8449, Boise, Idaho, 83707.

Trade Name(s): Trus Joist.

Product: TimberStrand® Laminated Strand Lumber (LSL).

Pertinent Code Section(s): 26-617 through 27-624.

Prescribed Test(s): ASTM D198, Flexure (Allowable bending stress). Allowable tension parallel to grain stress. Allowable compression parallel to grain stress, beam shear, shear block, shear parallel to grain test. Allowable compression perpendicular to grain and perpendicular to wide face of strand, etc.

Laboratory: PFS Corporation and Design Tables were certified by Glyn R. Boone, P.E., New York State License Number 067567.

Test Report(s): Determination of Allowable Compression Perpendicular to Grain Stresses for TimberStrand LSL, by B.A. Craig, dated May 24,1995.

Quality Assurance Data Summary and Analysis, TimberStrand® LSL, Deerwood and East Kentucky Plants, January Through September 2000, Including Derivation of *1.7E* TimberStrand® LSL Truss Chord Design Tension, dated Apri12001.

TimberStrand® LSL Design Stress Derivation, updated December 2004.

East Kentucky Plant Quality Assurance Data for *1-3/8* Inch Through *1-3/4* Inch Thick TimberStrand® LSL Manufactured During October 2003 Through September 2004.

East Kentucky Plant Quality Assurance Data For *2-1/2* Inch Through *3-1/2* Inch Thick TimberStrand® LSL Manufactured During October 2003 Through September 2004.

East Kentucky Plant Quality Assurance Data for *1.6E, 1-3/8* Inch Thick TimberStrand® LSL Manufactured During October 2003 Through September 2004.

Borogard® ZB MSDS.

AWPA P18-04, Nonpressure Preservatives.

AWPA Use Category System, UCS-U1-04, pages 1 through 3.

AWPA N2-04, Standard for the Preservative Treatment of Composite Wood Products by Nonpressure Processes.

Soil Block Decay Testing of Aspen plus Mixed Northern Hardwoods and Yellow Poplar Laminated Strand Lumber with ZB Emulsion or Powder, at Michigan Technological University, dated September 29, 1997.

Soil Block Testing of StrandGuard™ *ZB5/6* (TJ#4), by Michigan Technological University, dated 2 July 2001.

Soil Block Decay Testing of TimberStrand® LSL Mill Produced and Treated with StrandGuard ZB5/6, by Michigan Technological University, dated September 14, 2001.

Structural Properties of TimberStrand® LSL Treated with Zinc Borate, by Dan C. Wainwright and Bruce A. Craig, dated November 25, 1999.

Plank Orientation Compression Perpendicular-to-Grain Performance of I.3E Zinc-Borate Treated TimberStrand® LSL, CRC Experiment Number 1890, dated January 2004.

White Birch/Red Maple/Aspen TimberStrand® LSL Qualification Test Results and Analysis, by Bruce Craig, dated March 1994.

Yellow Poplar TimberStrand® LSL Qualification Test Report, by Bruce Craig, dated September 20, 1994.

Verification for Use of Cucumber Tree in TimberStrand® LSL Manufactured at East Kentucky Plant, by Bruce Craig, dated March 24, 1997.

East Kentucky TimberStrand® LSL Alternate Species Testing Program Phase 1.

Phase II, CRC Experiment Number X-1327, dated September 3, 1996.

East Kentucky TimberStrand® LSL - 1.9E and 2.1E Grade Alternate Species (Red Maple, Sycamore) Verification, by B.A. Craig, dated December 1996.

Evaluation of the Long Term Load Performance of Yellow Poplar TimberStrand® LSL, by Dan C. Wainwright and Bruce A. Craig, dated September 24, 1997.

1-1/4" TimberStrand® LSL Rim Board Qualification East Kentucky and Deerwood Plants, CRC Experiment Numbers 1415 and 1416, dated March 11, 1998, revised April 9, 1998.

1.3E TimberStrand® LSL Rim Board Qualification at the Kenora Plant, by Chris Serbyn, dated December 13, 2002.

1.3E and 1.5E 3-1/2 Inch Thick TimberStrand® LSL Qualification at the Kenora Plant, by Chris Serbyn, dated May 8, 2003.

Qualification of 1-3/4 Inch Thick 1.7E TimberStrand® LSL at the Kenora Plant, by Dan Wallace, dated December 3, 2003.

Qualification of 3.5 Inch Thick 1.7E TimberStrand® LSL at the Kenora Plant, by Dan Wallace, dated April 20, 2004, and follow up 1.7E TimberStrand LSL (3-1/2 Inch Thickness) at the Kenora Plant, by Dan Wallace, dated May 4, 2004.

CRC Experiment Numbers X-1171/X1251, "1.8E WS Microllam® LVL, 2.0E DF Parallam® PSL and 1.5E TimberStrand® LSL Dowel Bearing Strength, dated March 7, 1996." Note: Microllam® LVL and Parallam® PSL data excluded.

Closest on Center Nail Spacing for TimberStrand® LSL Parallel to Wide Face of Strand (WFS), CRC Experiment Numbers: X-1296, dated February 6, 1996; X-1170, dated March 1996; X -1170, dated August 2, 1995; X -1170, dated May 4, 1994.

Letter from Ted Osterberger, P.E. of Trus Joist, to Kurt Stochlia, P.E. of ICC-ES, dated August 21, 2003.

Evaluation of TimberStrand® LSL Nail Withdrawal Performance, Boise Technology Center Reference Number X-1860A, dated August 21, 2003.

Aspen TimberStrand® LSL Nail Withdrawal Regression Analysis, Report Number X-1860B, dated August 21, 2003.

Description –

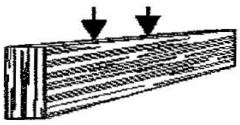
TABLE 1 - TimberStrand® LSL STRUCTURAL FRAMING LUMBER DESIGN STRESSES [1, 2, 3]
(pounds per square inch)

Grade MOE (x 10^6)	Axial		Joist/Beam (Edge Loading)			Plank (Face Loading)		
	Ft[5]	Fc	Fb[6, 7]	Fv	Fc⊥[8]	Fb[4]	Fv	Fc⊥[8]
1.3	1075	1400	1700	400	680	1900	150	435[10]
1.5	1500	1950	2250	400	775	2525	150	475
1.6	1700	2150	2400	400	825	2700	150	490
1.7	1825[9]	2380	2600	400	880	2900	150	510
1.9	2150	2850	3075	400	880	3450	150	510
2.1	2500	3275	3500	400	880	3925	150	510

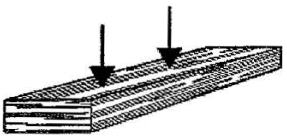
1. See figure below for description of strand orientation.
2. Allowable stresses are based on covered, dry conditions of use, defined as those environmental conditions represented by sawn lumber with equilibrium moisture content less than or equal to 16%.
3. For uniformly loaded simple span beams, deflection is calculated as follows:

$$\Delta = \frac{270WL^4}{Ebd^3} + \frac{28.8WL^2}{Ebd}$$

Where:
Δ = Deflection, inches
L = Span, feet
d = Beam depth, inches
W = Uniform load, plf
b = Beam width, inches
E = Modulus of Elasticity, psi



EDGE LOADING - parallel to wide face of strands (WFS)



FACE LOADING - perpendicular to wide face of strands (WFS)

4. Values shown are for thicknesses up to 3.5 inches.
5. The Ft values in the table are reduced to reflect the volume effects of length, width and thickness for a range of common application conditions. The Ft values for TimberStrand LSL may be higher when approved by Trus Joist for use as a component of engineered products, which are manufactured under a recognized quality control program.
6. For depths other than 12 inches regardless of thickness, table values must be multiplied by $(12/d)^{0.092}$. Adjustments for common depths are shown below. For depths less than 3.5 inches, the factor for the 3.5 inch depth must be used.

Depth (inches)	3.5	5.5	7.25	9.25	12.0	16.0	20.0	24.0
Multiplier	1.12	1.07	1.05	1.02	1.00	0.97	0.95	0.94

7. When structural members qualify as repetitive members in accordance with the applicable code, a four percent increase in accordance with NDS is permitted for Fb, in addition to the increases permitted in Footnote 6, above.
8. Compression perpendicular to grain values (Fc⊥) may not be increased for duration of load.
9. When 1.7E grade TimberStrand LSL is used as truss chords and webs of engineered wood trusses the design axial tension is 2050 psi. This value includes an adjustment for length effect. The TimberStrand LSL material must be marked as "Truss Chord Grade", and the engineered wood trusses must be manufactured under a recognized quality control program. The plate tooth-holding values for TimberStrand LSL web and chord members are as recognized in other evaluation reports.
10. The allowable compression perpendicular-to-grain, plank orientation, for zinc borate (ZB) treated LSL TimberStrand LSL shall be 625 psi, for plate applications.

TABLE 2 - TimberStrand® LSL FASTENER DETAILS

Fastener	Description	Comments
Lateral Nail and Wood Screw Capacity	Edge: Parallel and Perpendicular to grain Face: Parallel and Perpendicular to grain	For all grades 1.3E and higher use specific gravity of 0.50 (Douglas-fir-larch).
Nail Withdrawal Capacity	Edge	For all grades 1.3E and higher use specific gravity of 0.42 (S-P-F). For all grades 1.3E and higher of Yellow Poplar[6] TimberStrand LSL use specific gravity of 0.55 (Southern Pine).
	Face	For all grades 1.3E and higher use specific gravity of 0.50 (Douglas-fir-larch). For all grades 1.3E and higher of Yellow Poplar[6] TimberStrand LSL use specific gravity of 0.55 (Southern Pine).
Bolt Capacity - Bolt parallel to WFS:		Not evaluated
Bolt capacity - Bolt perpendicular to WFS [1]	Load parallel to grain	For all grades 1.3E and higher use specific gravity of 0.50 (Douglas-fir-larch).
	Load perpendicular to grain	For all grades 1.3E and higher use a specific gravity of 0.58 (Red Maple).
Lag bolt capacity- 1/2 inch diameter bolt perpendicular to WFS	Load: Parallel and Perpendicular to grain	400 lbs. [2]
Note: Nail and bolt design values are developed using the specific gravity shown, in accordance with the applicable code.		

Closest On Center Nail Spacing Parallel To WFS Orientation [3, 4, 5] (inches)								
	Member Thickness (inches)							
Common Nail Size	1 1/4	1 1/2 and 1 3/4		2 1/2		3 1/2		
	1 row	1 row	2 rows	1 row	2 rows	1 row	2 rows	3 rows
8d	4	3	3	3	3 1/2	3	3	3
10d	4	4	4	3	3 1/2	3	3	3
16d	6	6	6	3 1/2	3 1/2	3 1/2	3 1/2	—

1. When loading at an angle to grain, the lateral capacity is calculated using the Hankinson formula using an equivalent specific gravity of 0.50 for load parallel to grain and equivalent specific gravity of 0.55 for load perpendicular to grain.
2. 400 pounds is the lateral load permitted for 1/2 inch diameter lag bolt in 1 1/2 inch thick main and side members with full penetration into the main member. Lateral load capacities for other lag bolt sizes and conditions to be evaluated in accordance with the ANSI/AF&PA National Design Specification (NDS), using an equivalent specific gravity of 0.50 for load parallel to grain and equivalent specific gravity of 0.55 for load perpendicular to grain. For capacities at an angle to grain refer to Footnote 1, above. Capacities in withdrawal have not been evaluated.
3. The closest on center spacing for nails perpendicular to WFS is the same as permitted by the code for sawn lumber.
4. Multiple rows to be staggered and the minimum spacing between rows must be 1/2 inch.
5. Multiple rows to be equally spaced from the centerline of the narrow face axis.
6. TimberStrand LSL identified with a circled 45 (plant number) as part of the product label.

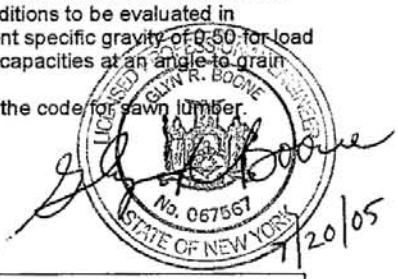


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TABLE 3 - 1.3E TimberStrand® LSL RIM BOARD [1, 2, 3]

Thickness (inches)	Allowable Vertical Load (PLF)[4]	Depth Range (inches)
1.25 [5]	4250	16 and less
1.25 [5]	3450	over 16 up to 20
1.50	4140	up to 24

For **SI:** 1 inch = 25.4 mm 1 plf = 14.59 N/m

1. The allowable shear values in pounds per foot for horizontal wood structural panel diaphragms with framing of nominal 2 inch thick Douglas fir-larch or southern pine are applicable to: (1) 1.25 inch thick TimberStrand LSL Rim Board, unblocked diaphragms only, and (2) 1.50 inch thick TimberStrand LSL Rim Board, unblocked and blocked diaphragms.
2. TimberStrand LSL Rim Board must be laterally supported at the top and continuously supported at the bottom, and the gravity loads must be uniformly applied along the top, in lieu of design by a design professional for other conditions.
3. Fastener capacities for TimberStrand LSL Rim Board are as given in Table 2, except as provided in Footnote 5, below.
4. Compression perpendicular-to-grain capacities of the sill plate and floor sheathing must be checked.
5. The allowable lateral load capacities for 1/4 inch, 3/8 inch and 1/2 inch diameter lag screws installed perpendicular to the wide face of strands, and loaded perpendicular-to-grain are 250 lbs., 400 lbs. and 475 lbs. respectively.

Terms and Conditions: The TimberStand LSL lumber, as described above be accepted on the condition that all uses, locations and installations shall comply with the applicable requirements of the Building Code and on further condition that the design provisions and specifications as listed in the above table shall apply and on further condition that:

1. Structures designed using TimberStrand LSL lumber shall conform to the manufacturer's design specifications except that appropriate design load(s), deflection limitation(s) and other performance standards of the New York City Building Code shall apply.

2. TimberStrand LSL lumber shall be for interior use only and stamped "INTERIOR MEA 89-96-M Vol. II" on each beam.

3. TimberStrand LSL Lumber, when stored out-of-doors, or exposed to wetting weather conditions, during construction shall be inspected by the user for separating and for swelling or warping and replaced if so damaged TimberStrand LSL shall not be used where a maximum moisture content exceeding 19% will result.

4. Beams less than 1-1/2 inch thick shall be fire-stopped every 500 square feet in floor construction.

5. The adhesive used shall not delaminate during a fire.

Final Acceptance 11/9/05

Examined by DONALD GOTTFRIED