

<p style="text-align: center;">DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT Housing - Federal Housing Commissioner</p> <p>TO: DIRECTORS, SINGLE FAMILY HOCs DIRECTORS, MULTIFAMILY HUBs</p>	<p>Series and Series Number: MATERIALS RELEASE NO: 1214f (Supersedes issue dated May 11, 2004)</p>
	<p>ISSUE DATE September 14, 2007</p>
	<p>REVIEW DATE September 14, 2010</p>
<p>SUBJECT: 1. Product LP SolidStart® Laminated Veneer Lumber (LVL) and LP SolidStart® Oriented Strand Lumber (OSL)</p> <p>2. Name and address of Manufacturer Louisiana-Pacific Corporation 2706 Highway 421 North Wilmington, NC 28401</p>	

Data on the nonstandard product described herein have been reviewed by the Department of Housing and Urban Development (HUD) and determination has been made that it is considered suitable from a technical standpoint for the use indicated herein. This Release does not purport to establish a comparative quality or value rating for this product as compared to standard products normally used in the same manner.

This Materials Release cannot be used as an indication of endorsement or approval by HUD of the described product, and any statement or representation, however made, indicating such approval or endorsement by HUD is unauthorized. See Code 18, U.S.C. 709.

Any reproduction of this Release must be in its entirety.

USE:

LP SolidStart® and LP SolidStart® OSL are intended for structural applications such as beams, headers, joists, rafters, columns, studs and rim board. They can also be used as components in built-up structural members such as flanges for I-joists, chords for trusses and laminations for glue-laminated members.

DESCRIPTION:

LP SolidStart® LVL is a laminated veneer lumber that is made up of layers of wood veneers laminated together using a waterproof structural adhesive. The manufacturing process consists of rotary peeling a log into veneers that are then dried and graded for strength and stiffness. After the graded veneers are coated with adhesive they are laid-up into a billet that is then fed into a hot press that cures the adhesive under heat and pressure. The cured and compressed billet then leaves the hot press and is ripped into boards, which completes the LVL manufacturing process.

LP SolidStart® OSL is an oriented strand lumber that is made up of wood wafers bonded together using a waterproof structural adhesive. The manufacturing process consists of flaking a log into wafers that are then dried. After the dried wafers are coated with adhesive they are formed into a mat that is then fed into a hot press that cures the adhesive under heat and pressure. The cured and compressed mat then leaves the hot press and is ripped into boards, which completes the OSL manufacturing process.

REQUIREMENTS:

The wood veneer/wafer properties and species, adhesive, manufacturing parameters, and finished product thickness, width and length shall meet the requirements noted in the approved quality control manual that contains the manufacturing standard.

DESIGN:

Design shall be in accordance with the AFPA (formerly NFPA) National Design Specification for Wood Construction. The allowable design values shall not exceed those listed in Tables 1 and 2.

TABLE 1 – ALLOWABLE DESIGN VALUES^{6,7}

Grade	Bending F_b (psi)		Tensile Parallel to Grain F_t (psi)	Compression Parallel to Grain $F_{c//}$ (psi)	Compression Perpendicular to Grain $F_{c\perp}$ (psi)		Shear Parallel to Grain F_v (psi)		Modulus of Elasticity ($\times 10^6$ psi)	
	Beam	Plank			Beam	Plank	Beam	Plank	Beam	Plank
LP SolidStart® OSL										
1750F _b -1.3E	1750 ¹	2650	1450 ⁴	1940	1675	520	430	135	1.30	1.55
LP SolidStart® LVL										
1400F _b -1.1E	1400 ²	1400	1200 ⁵	1700	680	450	250	95	1.10	1.00
1650F _b -1.3E	1650 ²	1650	1200 ⁵	1700	680	450	250	140	1.30	1.30
1750F _b -1.3E	1750 ²	1750	1200 ⁵	1700	680	450	250	140	1.30	1.30
2000F _b -1.3E	2000 ³	2000	1200 ⁵	2350	680	450	250	140	1.30	1.30
2250F _b -1.5E	2250 ³	2200	1350 ⁵	2350	750	450	285	140	1.50	1.40
2400F _b -1.7E	2400 ³	2300	1350 ⁵	2350	750	450	285	140	1.70	1.70
2600F _b -1.7E	2600 ³	2600	1350 ⁵	2350	750	450	285	140	1.70	1.70
2650F _b -1.8E	2650 ³	2600	1600 ⁵	2350	550	450	285	140	1.80	1.80
2750F _b -1.8E	2750 ³	2600	1600 ⁵	2350	750	550	285	140	1.80	1.80
2650F _b -1.9E	2650 ³	2600	1600 ⁵	2350	750	550	285	140	1.90	1.80
2850F _b -2.0E	2850 ³	2850	1800 ⁵	3200	750	550	290	140	2.00	2.00
2950F _b -2.0E	2950 ³	2950	1800 ⁵	3200	750	550	290	140	2.00	2.00
3100F _b -2.0E	3100 ³	3100	1800 ⁵	3200	750	550	290	140	2.00	2.00
3400F _b -2.1E	3400 ³	3400	1800 ⁵	3350	750	550	350	120	2.10	2.10

For **SI**: 1 psi = 6.89 kPa, 1 inch = 25.4 mm.

NOTES:

- The allowable bending strength, F_b , is assigned for a standard depth of 12 inches. For other depths, multiply F_b by $(12/\text{depth})^{0.139}$. For depths less than 2 ½ inches, multiply F_b by 1.243. Note: “depth” is the depth of the member in inches.
- The allowable bending strength, F_b , is assigned for a standard depth of 12 inches. For other depths, multiply F_b as follows:
 - For thicknesses < 1 ¼”: multiply F_b by $(12/\text{depth})^{0.323}$. For depths less than 3 ½ inches, multiply F_b by 1.488.
 - For thicknesses \geq 1 ¼”: multiply F_b by $(12/\text{depth})^{0.261}$. For depths less than 3 ½ inches, multiply F_b by 1.379.
 Note: “depth” is the depth of the member in inches.
- The allowable bending strength, F_b , is assigned for a standard depth of 12 inches. For depths greater than 12 inches, multiply F_b by $(12/\text{depth})^{0.143}$. For depths less than 12 inches, multiply F_b by $(12/\text{depth})^{0.111}$. For depths less than 3 ½ inches, multiply F_b by 1.147. Note: “depth” is the depth of the member in inches.
- The allowable tension strength, F_t , is assigned for a standard length of 4 feet. For lengths other than 4 feet, multiply F_t by $(4/\text{length})^{0.070}$. For lengths less than 2 feet, multiply F_t by 1.050. Note: “length” is the length of the member in feet.
- The allowable tension strength, F_t , is assigned for a standard length of 3 feet. For lengths other than 3 feet, multiply F_t by $(3/\text{length})^{0.111}$. For lengths less than 3 feet, use the design tension stresses in the table above, unadjusted.
- Allowable design stresses in the above table are for normal load duration and shall be adjusted (with the exception of modulus of elasticity and compressive strength perpendicular to grain) using the load duration factors found in the *NDS*.
- Allowable design stresses in the above table shall apply to dry, well ventilated interior applications in which the equivalent moisture content of lumber would not exceed 16 percent.

TABLE 2 – ALLOWABLE DESIGN VALUES FOR LP SOLIDSTART® RIM BOARD^{1,2,3}

Grade	Thickness (in.)	Product	Lateral Load Capacity ⁴ (lb./ft)	Vertical Uniform Load Capacity ⁵ (lb./ft)		Vertical Concentrated Load Capacity (lbs.)	Cross-Ply
				d ≤ 16"	16" < d ≤ 24"	d ≤ 24"	
1750Fb-1.3E	1-1/4 and 1-1/2	OSL	215	9750	4650	5160	NA
1400Fb-1.1E	1-1/4	LVL	250	8000	5070	4210	Yes
1650Fb-1.3E	1 and 1-1/8	LVL	190	7210	4990	3870	Yes
1750Fb-1.3E	1-1/4	LVL	250	9350	5070	4210	Yes
2000Fb-1.3E and Better	1-1/2	LVL	250	4000	2500	2700	No
	1-3/4	LVL	250	4500	3450	3200	No

For SI: 1 inch = 25.4 mm, 1 lb. = 4.45 N, 1 lb./ft = 14.6 N/m.

NOTES:

1. Toe-nailed connections are limited by the 150 plf lateral load capacity noted for Seismic Design Categories D, E and F in Section 2305.1.4 of the IBC or seismic Zones 3 and 4 in Section 2318.3.1 of the UBC.
2. Allowable design loads in the above table cannot be increased for load duration.
3. See Tables 4 and 5 for minimum nail spacing requirements.
4. The nailing schedule for sheathing to rim and rim board to sill plate (toe-nailed) is based on 8d box nails at 6 inches on center (refer to AC124 for full details). Commercial framing connectors may be used to achieve lateral load capacities exceeding the values in this table. Calculations shall be based on the equivalent specific gravity listed in Table 2 and shall not exceed the nail spacing requirements of Table 4 (LVL) or Table 5 (OSL).
5. The allowable Vertical Uniform Load Capacity is based on the strength of the rim board and may need to be reduced based on the bearing capacity of the supporting wall plate. For example, bearing capacity for an SPF plate is limited to 5100 lb./ft for 1-inch-thick rim board (425 psi x 12 in. x 1 in.), 5700 lb./ft for 1 1/8-inch-thick rim board (425 psi x 12 in. x 1-1/8 in.), and 6350 lb./ft for 1 1/4-inch-thick rim board (425 psi x 12 in. x 1-1/4 in.). The 425 psi compression perpendicular to grain design value for SPF is found in Table 4A of the *NDS Supplement*.

CONNECTIONS:

The design of connection for LP SolidStart® and LP SolidStart® OSL shall be in accordance with the AFPA National Design Specification for Wood Construction for a solid wood species with an equivalent specific gravity. The equivalent specific gravity characteristics for nail and bolt design for dry-use conditions are found in Table 3. The nail spacing requirements are found in Tables 4 and 5.

The nailing requirements for LP SolidStart® LVL studs are shown in Figure 1.

TABLE 3 – EQUIVALENT SPECIFIC GRAVITY FOR FASTENER DESIGN^{1,2}

Product	Equivalent Specific Gravity					
	Nails				Bolts Installed in Face ³	
	Withdrawal Load		Lateral Load		Lateral Load	
	Installed in Edge	Installed in Face	Installed in Edge	Installed in Face	Load Applied // to Grain	Load Applied ⊥ to Grain
1.3E LP SolidStart® OSL ⁴	0.42	0.46	0.51	0.62	0.54	0.54
1.1E LP SolidStart® LVL Rim ⁵ 1.3E LP SolidStart® LVL	0.42	0.48	0.49	0.50	0.41	0.48
1.3E LP SolidStart® LVL Rim ^{5,6} 1.5E – 2.2E LP SolidStart® LVL	0.46	0.50	0.50	0.50	0.46	0.50

For **SI**: 1 psi = 6.89 kPa, 1 in. = 25.4 mm.

NOTES:

- Fastener sizes and orientation not specifically described above are beyond the scope of this report.
- Fastener values based on the equivalent specific gravities in the above table are for normal load duration and shall be adjusted using the load duration factors found in the *NDS*.
- The bolt edge distance, when a bolt is loaded parallel and perpendicular to the grain, shall be a minimum of four times the bolt diameter.
- For the LP SolidStart® OSL, the lateral capacity of ½-inch lag screws installed into the face is 500 lbs. for 1 ¼-inch thickness and greater, based on a 1 ½-inch-thick side member with full penetration of the lag screw.
- For LP SolidStart® LVL Rim, the lateral capacity of ½-inch lag screws installed into face is as follows:
 - For 1-inch thickness: 350 pounds.
 - For 1 1/8-inch thickness: 400 pounds.
 - For thickness ≥ 1 ¼ inches: 450 pounds.
 Note: Values are based on 1½-inch-thick side member with full penetration of the lag screw.
- Equivalent specific gravities for fastener design for LP SolidStart® LVL manufactured with Aspen and Yellow Poplar species veneers shall be as follows.

Veneer Species	Equivalent Specific Gravity					
	Nails				Bolts Installed in Face ³	
	Withdrawal Load		Lateral Load		Lateral Load	Lateral Load
	Installed in Edge	Installed in Face	Installed in Edge	Installed in Face	Load Applied // to Grain	Load Applied ⊥ to Grain
Aspen	0.43	0.43	0.42	0.43	0.41	0.43
Yellow Poplar	0.46	0.46	0.50	0.50	0.42	0.55

TABLE 4 - Nail Spacing Requirements for LP SolidStart® LVL

Thickness (inches)	Orientation	Fastener	Closest End Distance (inches)	Closest On-Center Spacing (inches)
< 1 ½	Edge	8d & smaller	2 ½	4
		10d & 12d	2 ½	4
		16d	3 ½	5
	Face ¹	8d & smaller	1 ½	3
		10d & 12d	1 ½	3
		16d	1 ½	5
≥ 1 ½	Edge	8d & smaller	2 ½	3
		10d & 12d	2 ½	4
		16d	3 ½	5
	Face ¹	8d & smaller	1 ½	3
		10d & 12d	1 ½	3
		16d	1 ½	5

For **SI**: 1 inch = 25.4 mm.

NOTES:

1. Tabulated closest on-center spacing for face orientation is applicable to nails that are installed in rows that are parallel to the direction of the grain (length) of the LVL. For nails that are installed in rows that are perpendicular to the direction of the grain (width/depth) of the LVL, the closest on-center spacing for face orientation shall be sufficient to prevent splitting in the wood.
2. Fastener sizes and closest spacing not specifically described above are beyond the scope of this report.
3. Fasteners are common wire or box nails.
4. Edge distance shall be sufficient to prevent splitting.
5. Nail penetration for edge nailing shall not exceed 2 inches for 16d nails and 2 ½ inches for 10d and 12d nails.
6. 16d sinkers (3 ¼" x 0.148") may be spaced the same as a 12d common wire nail.
7. For multiple rows of nails, the rows must be offset ½ inch or more from each other, and staggered.
8. For multiple rows of nails, rows must be equally spaced from the centerline of the product edge or face (whichever applies).

TABLE 5 - Nail Spacing Requirements for LP SolidStart® OSL

Thickness (in.)	Orientation	Fastener	Closest End Distance (inches)	Closest On-Center Spacing (inches)
< 1 ½	Edge	8d & smaller	2	3
		10d & 12d	2	3 ½
		16d	2 ½	3 ½
	Face ¹	8d & smaller	7/8	1
		10d & 12d	7/8	1
		16d	7/8	1 ½
≥ 1 ½	Edge	8d & smaller	2	3
		10d & 12d	2	3
		16d	2 ½	3
	Face ¹	8d & smaller	7/8	1
		10d & 12d	7/8	1
		16d	7/8	1 ½

For **SI**: 1 inch = 25.4 mm.

NOTES:

1. Tabulated closest on-center spacing for face orientation is applicable to nails that are installed in rows that are parallel to the direction of the grain (length) of the OSL. For nails that are installed in rows that are perpendicular to the direction of the grain (width/depth) of the OSL, the closest on-center spacing for face orientation shall be sufficient to prevent splitting of the wood.
2. Fastener sizes and closest spacings not specifically described above are beyond the scope of this report.
3. Fasteners are common wire or box nails.
4. Edge distance shall be sufficient to prevent splitting.
5. Nail penetration for edge nailing shall not exceed 2 inches for 16d nails and 2 ½ inches for 10d and 12d nails.
6. 16d sinkers (3 ¼" x 0.148") may be spaced the same as a 12d common wire nail.
7. For multiple rows of nails, the rows must be offset ½ inch or more from each other, and staggered.
8. For multiple rows of nails, rows must be equally spaced from the centerline of the product edge or face (whichever applies).

INSTALLATION AND LIMITATIONS:

Installation shall be in strict accordance with HUD Minimum Property Standards (MPS) and local codes for solid lumber.

LP SolidStart® and LP SolidStart® OSL shall be installed in conditions of use that are dry, well ventilated and covered. Dry conditions are product installation conditions where ambient moisture content is 16% or less.

A licensed professional engineer shall approve all designs having cut, notched or drilled LP SolidStart® or LP SolidStart® OSL.

QUALITY CONTROL:

The quality control manuals for LP SolidStart® and LP SolidStart® OSL are on file with the HUD office and test data shall be available for inspection upon request by HUD.

*Louisiana-Pacific Corporation produces LP SolidStart® LVL at their Hines, Oregon; Wilmington, North Carolina; Golden, British Columbia facilities, and Murphy Engineered Wood Division (Listee), Sutherlin, Oregon with independent quality control audits conducted by APA – The Engineered Wood Association.

Louisiana-Pacific Corporation produces LP SolidStart® OSL at their Hayward, Wisconsin facility with independent quality control audits conducted by APA-The Engineered Wood Association.

CERTIFICATION AND IDENTIFICATION:

Louisiana-Pacific Corporation shall certify that each LP SolidStart® or LP SolidStart® OSL conforms to the requirements of this MR. APA - The Engineered Wood Association shall validate the manufacturer's certification that the LP SolidStart® LVL and LP SolidStart® OSL meet the requirements of this MR. Each certified LP SolidStart® or LP SolidStart® OSL shall be marked with the following information:

1. Manufacturer's name and / or trademark
2. Plant number
3. Product designation
4. Grade
5. Evaluation report number (HUD MR 1214f)
6. Quality control agency name and / or trademark

SAMPLE STAMP

LP LVL

MADE IN U.S.A.
WILMINGTON, N.C.

2950Fb-2.0E

APA EWS
MILL 1071
HUD MR 1214f

WARRANTY:

Louisiana-Pacific Corporation warrants the LP SolidStart[®] and LP SolidStart[®] OSL against faulty performance resulting from faulty materials or workmanship in the manufacturing process for a period of 20 years from the date of installation. For information concerning warranty for LP SolidStart[®] LVL and LP SolidStart[®] OSL, contact Louisiana-Pacific Corporation corporate office at 414 Union Street, Suite 1910, Nashville, TN 37219 (phone: 615-986-5600).

The manufacturer's warranty does not, in any way, relieve the builder of responsibility under the terms of the Builder's Warranty required by the National Housing Act or under any provisions applicable to any other housing program. A copy of the manufacturer's warranty shall be furnished by the builder to the owner upon completion of the installation.

MANUFACTURER'S RESPONSIBILITIES:

Issuance of this Materials Release (MR) commits the manufacturer to fulfill, as a minimum, the following:

1. Produce, label and certify the material, product or system in strict accordance with the terms of this MR.
2. Provide necessary corrective action in a timely manner for all cases of justified complaint, poor performance or failure reported by HUD.
3. When requested, provide the FHA Standards, Office of Manufactured Housing Programs, HUD Headquarters, with a representative list of properties in which the material, product or system has been used, including complete addresses or descriptions of locations and dates of installation.
4. Inform HUD in advance of changes in production facilities, methods, design of the product, company name, ownership or mailing address.

EVALUATION:

This MR shall be valid for a period of three years from the date of initial issuance or most recent renewal or revision, whichever is later. The holder of this MR shall apply for a renewal or revision 90 days prior to the review date printed on this MR. Submittals for renewal or revision shall be sent to:

U. S. Department of Housing and Urban Development
FHA Standards, Office of Manufactured Housing Programs
451 7th Street, SW, Room 9168
Washington, DC 20410-8000

Appropriate User Fee shall be sent to:

U. S. Department of Housing and Urban Development
Miscellaneous Income - Technical Suitability of Products Program
Bank of America
P. O. Box 198762
Atlanta, GA 30384-8762

The holder of this MR may apply for revision at any time prior to the review date. Minor revisions may be in the form of a supplement to the MR.

If the Department determines that a proposed renewal or supplement constitutes a revision, the appropriate User Fee for a revision will need to be submitted in accordance with Code of Federal Regulations 24 CFR 200.934, "User Fee System for the Technical Suitability of Products Program", and current User Fee Schedule.

CANCELLATION:

Failure to apply for a renewal or revision shall constitute a basis for cancellation of the MR. HUD will notify the manufacturer that the MR may be cancelled when:

1. conditions under which the document was issued have changed so as to affect production of, or to compromise the integrity of the accepted materials, product, or system,
2. the manufacturer has changed its organizational form without notifying HUD, or
3. the manufacturer has not complied with responsibilities it assumed as a condition of HUD's acceptance.

However, before cancellation, HUD will give the manufacturer a written notice of the specific reasons for cancellation, and the opportunity to present views on why the MR should not be cancelled. No refund of fees will be made on a canceled document.

 This Materials Release is issued solely for the captioned firm and is not transferable to any person or successor entity.
