

LPI[®] 18, 20Plus, 32Plus, 42Plus Series I-Joists PR-L238
Louisiana-Pacific Corporation Revised July 20, 2010

Products: LP[®] SolidStart[®] (LPI[®]) 18, 20Plus, 32Plus, and 42Plus Series I-Joists
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1. Basis of the product report:
 - 2009 and 2006 International Building Code (IBC): Sections 104.11 Alternative Materials and 2303.1.2 Prefabricated wood I-joists
 - 2009 and 2006 International Residential Code (IRC): Sections R104.11 Alternative Materials and R502.1.4 Prefabricated wood I-joists
 - ASTM D 5055-05 and D 5055-04 recognized by the 2009 IBC and IRC, and 2006 IBC and IRC, respectively
 - Intertek LPI 20, LPI 20X1.7 and LPI 32 Test Report, Intertek LPI 20X1.5 Test Report, PFS LPI 23 (a.k.a. LPI 32) Test Report, APA Reports T2005M-21, T2005M-52, T2006M-07, T2008P-42, T2008P-45, T2008P-69, T2008P-97, T2008P-111, T2009P-03, T2009P-14, T2009P-21, T2009P-47, T2009P-82, T2010P-39, and other qualification data
2. Product description:

LPI[®] 18, 20Plus, 32Plus, and 42Plus Series I-joists are made with lumber flanges and OSB webs in accordance with the in-plant manufacturing standard approved by APA.
3. Design properties:

Tables 1 and 2 list the design properties for the LPI[®] Series I-joists covered by this report. The allowable spans for the LPI[®] Series I-joists covered in this report shall be in accordance with the recommendations provided by the manufacturer as published in the *LPI 18 Technical Guide*, Lit. Item LPEW0180, *LPI 20Plus, 32Plus and 42Plus Technical Guide*, Lit. Item LPEW0124 (<http://www.lpcorp.com/resources/literature/>), and with APA Design & Construction Guide, *Performance Rated I-Joists*, Form Z725 (www.apawood.org/publications) for products contained in the PRI Series.
4. Product installation:

The LPI[®] Series I-joists covered by this report shall be installed in accordance with the recommendations provided by the manufacturer (see link above), and APA Design & Construction Guide, *I-Joist Construction Details*, Form D710 (see link above) for products contained in the PRI Series. Permissible web holes and cantilever reinforcements shall be in accordance with the recommendations provided by the manufacturer and with APA D710 for products contained in the PRI Series.
5. Fire-rated assemblies:

Fire-rated assemblies shall be constructed in accordance with the recommendations provided by the manufacturer and with APA Design/Construction Guide: *Fire-Rated Systems*, Form W305 (see link above) for products contained in the PRI Series.
6. Limitations:
 - a) LPI[®] 18, 20Plus, 32Plus, and 42Plus Series I-joists shall be designed in accordance with the code using the design properties specified in this report.
 - b) LPI[®] 18, 20Plus, 32Plus, and 42Plus Series I-joists are limited to dry service conditions where the equilibrium moisture content of sawn lumber is less than 16 percent.

- c) LPI® 18, 20Plus, and 32Plus Series I-joists are produced at the Louisiana-Pacific Corporation facilities in Red Bluff, California, Larouche, Quebec, and St. Prime, Quebec under a quality control program audited by APA except that 7-7/8-inch LPI 18, 20Plus, and 32Plus series I-joists are produced at the Red Bluff plant only, and 8-7/8-inch and 9-1/4-inch LPI 18, 20Plus, and 32Plus series I-joists are produced at the Larouche and Red Bluff plants only.
 - d) LPI® 42Plus Series I-joists are produced at the Louisiana-Pacific Corporation facilities in Red Bluff, California and Larouche, Quebec under a quality assurance program audited by APA, except that 7-7/8-inch LPI 42Plus series I-joists are produced at the Red Bluff plant only.
 - e) This report is subject to re-examination in one year.
7. Identification:
The LPI® Series I-joists described in this report are identified by a label bearing the manufacturer's name (Louisiana-Pacific Corporation or Abitibi – LP Engineered Wood Division) and/or trademark, the APA assigned plant number (1069 for the Red Bluff plant, 1068 for the Larouche plant, and 1077 for the St. Prime plant), the I-joist series designation and depth, the APA logo, the report number PR-L238, and a means of identifying the date of manufacture.

Table 1. Design Properties (Allowable Stress Design) for LPI® 18, 20Plus, 32Plus, and 42Plus Series I-Joists^(a)

Joist Series Designation	Joist Depth (in.)	Also recognized as PRI Series	EI ^(b) (10 ⁶ lbf-in. ²)	M ^(c) (lbf-ft)	V ^(d) (lbf)	VLC ^(e) (lbf/ft)	K ^(f) (10 ⁶ ft-lbf/in.)
LPI 18	7-7/8		69	1,910	945	1,900	0.302
	8-7/8		92	2,204	1,035	1,900	0.334
	9-1/4		114	2,316	1,065	1,900	0.334
	9-1/2		142	2,365	1,120	1,900	0.355
	11-1/4		228	2,914	1,200	1,760	0.414
	11-7/8		248	3,100	1,225	1,760	0.435
	14		371	3,820	1,475	1,600	0.508
	16		514	4,274	1,635	1,500	0.577
LPI 20Plus	7-7/8		117	2,235	1,045	1,900	0.305
	8-7/8		157	2,580	1,130	1,900	0.337
	9-1/4		173	2,710	1,175	1,900	0.350
	9-1/2		185	2,810	1,230	1,900	0.358
	11-1/4		280	3,410	1,320	1,760	0.417
	11-7/8		318	3,755	1,350	1,760	0.438
	14		474	4,400	1,620	1,600	0.512
	16		652	5,050	1,800	1,500	0.582
LPI 32Plus	7-7/8		152	2,890	1,045	2,200	0.200
	8-7/8		203	3,340	1,130	2,200	0.201
	9-1/4		228	3,510	1,175	2,200	0.208
	9-1/2		243	3,620	1,250	2,200	0.213
	11-1/4		359	4,410	1,320	2,200	0.252
	11-7/8		406	4,690	1,350	2,200	0.267
	14		589	5,645	1,620	1,600	0.313
	16		791	6,545	1,800	1,500	0.358
LPI 42Plus	7-7/8		209	4,290	1,145	2,200	0.428
	8-7/8		279	4,955	1,255	2,200	0.473
	9-1/4		308	5,210	1,290	2,200	0.489
	9-1/2		328	5,375	1,305	2,200	0.501
	11-1/4		489	6,550	1,515	2,200	0.583
	11-7/8	PRI-80	555	6,965	1,615	2,200	0.613
	14	PRI-80	810	8,390	1,830	2,000	0.716
	16	PRI-80	1,100	9,725	2,020	2,000	0.813
	18		1,405	11,000	2,920	1,700	0.976
	20		1,779	12,170	3,260	1,580	1.081
	22		2,199	13,335	3,600	1,300	1.186
	24		2,668	14,480	3,855	1,100	1.291

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 lbf = 4.448 N.

- (a) The tabulated values are design values for normal duration of load. All values, except for EI and K, shall be permitted to be adjusted for other load durations as permitted by the code.
 (b) Bending stiffness (EI) of the I-joist.
 (c) Moment capacity (M) of the I-joist, which shall not be increased by any repetitive member factor.
 (d) Shear capacity (V) of the I-joist. The I-joist shear capacity at the location of a circular web hole (V_{th}) is calculated using Eq. 1 for I-joist depths of 7-7/8 inches through 9-1/4 inches. For other depths, V_{th} shall be in accordance with the recommendations provided by the manufacturer.

$$V_{th} = \text{Published Shear Value} \times [(\text{Joist Depth} - \text{Hole Diameter}) / \text{Joist Depth}] \quad [1]$$

- (e) Vertical load capacity of the I-joist.
 (f) Coefficient of shear deflection (K). For calculating uniform load and center-point load deflections of the I-joist in a simple-span application, use Eqs. 2 and 3.

Uniform Load:
$$\delta = \frac{5\omega\ell^4}{384EI} + \frac{\omega\ell^2}{K} \quad [2]$$

Center-Point Load:
$$\delta = \frac{P\ell^3}{48EI} + \frac{2P\ell}{K}$$
 [3]

Where:

- δ = calculated deflection (in.),
- ω = uniform load (lbf/in.),
- ℓ = design span (in.),
- P = concentrated load (lbf),
- EI = bending stiffness of the I-joist (lbf-in.²), and
- K = coefficient of shear deflection (lbf).

Table 2. Reaction Capacities (Allowable Stress Design) for LPI® 18, 20Plus, 32Plus, and 42Plus Series I-Joists^(a,b,c,d)

Joist Series Designation	Depth (in.)	Also recognized as PRI Series	Intermediate Reaction (lbf)				End Reaction (lbf)				Flange Bearing Capacity (lbf/in.)
			3-1/2 in. Brg. Length		5-1/2 in. Brg. Length		1-1/2 in. Brg. Length		4 in. Brg. Length		
			With Brg. Stiffeners		With Brg. Stiffeners		With Brg. Stiffeners		With Brg. Stiffeners		
			No	Yes	No	Yes	No	Yes	No	Yes	
LPI 18	7-7/8		1,755	2,040	2,010	2,245	870	940	945	945	955
	8-7/8		1,820	2,095	2,065	2,320	870	990	980	1,035	
	9-1/4		1,840	2,120	2,085	2,350	870	1,010	990	1,065	
	9-1/2		1,860	2,135	2,100	2,370	870	1,025	995	1,120	
	11-1/4		1,970	2,235	2,190	2,500	870	1,110	1025	1,200	
	11-7/8		2,005	2,270	2,225	2,545	870	1,145	1,035	1,225	
	14		2,140	2,395	2,340	2,705	870	1,250	1,075	1,475	
	16		2,270	2,515	2,450	2,855	870	1,355	1,115	1,635	
LPI 20Plus	7-7/8		1,945	2,265	2,230	2,500	970	1,045	1,045	1,045	955
	8-7/8		2,015	2,330	2,290	2,580	970	1,100	1,095	1,130	
	9-1/4		2,045	2,355	2,315	2,615	970	1,125	1,100	1,175	
	9-1/2		2,065	2,375	2,330	2,635	970	1,140	1,110	1,230	
	11-1/4		2,185	2,485	2,435	2,780	970	1,235	1,145	1,320	
	11-7/8		2,235	2,525	2,475	2,830	970	1,275	1,155	1,350	
	14		2,380	2,665	2,600	3,005	970	1,395	1,200	1,620	
	16		2,525	2,795	2,725	3,175	970	1,510	1,240	1,800	
LPI 32Plus	7-7/8		1,945	2,265	2,230	2,500	970	1,045	1,045	1,045	1,180
	8-7/8		2,015	2,330	2,290	2,580	970	1,100	1,095	1,130	
	9-1/4		2,045	2,355	2,315	2,615	970	1,125	1,100	1,175	
	9-1/2		2,065	2,375	2,330	2,635	970	1,140	1,110	1,250	
	11-1/4		2,185	2,485	2,435	2,780	970	1,235	1,145	1,320	
	11-7/8		2,235	2,525	2,475	2,830	970	1,275	1,155	1,350	
	14		2,380	2,665	2,600	3,005	970	1,395	1,200	1,620	
	16		2,525	2,795	2,725	3,175	970	1,510	1,240	1,800	
LPI 42Plus	7-7/8		2,800	2,920	2,765	2,970	1,120	1,145	1,145	1,145	1,705
	8-7/8		2,845	3,025	2,845	3,105	1,120	1,230	1,165	1,255	
	9-1/4		2,875	3,065	2,875	3,160	1,145	1,275	1,250	1,290	
	9-1/2		2,900	3,095	2,900	3,195	1,160	1,305	1,305	1,305	
	11-1/4		2,990	3,270	3,040	3,430	1,245	1,425	1,410	1,515	
	11-7/8	PRI-80	3,020	3,340	3,090	3,515	1,280	1,550	1,595	1,615	
	14	PRI-80	3,135	3,565	3,265	3,805	1,280	1,620	1,595	1,830	
	16	PRI-80	3,245	3,775	3,435	4,080	1,280	1,800	1,595	2,020	
	18		3,365	4,285	3,630	4,625	1,440 (2.5) ^(d)	2,305 (2.5) ^(d)	1,655	2,920	
	20		3,365	4,410	3,630	4,835	1,440 (2.5) ^(d)	2,450 (2.5) ^(d)	1,655	3,260	
	22		3,365	4,530	3,630	5,030	1,440 (2.5) ^(d)	2,595 (2.5) ^(d)	1,655	3,600	
	24		3,365	4,640	3,630	5,210	1,440 (2.5) ^(d)	2,705 (2.5) ^(d)	1,655	3,855	

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 lbf = 4.448 N.

- (a) Reaction capacity shall be limited by the flange bearing capacity or the bearing capacity of the support material, whichever is less. The flange bearing capacity, per inch of bearing length, is based on the allowable compression perpendicular-to-grain of the I-joist flange, accounting for eased edges, and may be further limited by the bearing strength of the support material.
- (b) Reaction capacity is for normal duration of load and shall be permitted to be adjusted for other load durations provided that the adjusted reaction design value is not greater than the flange bearing capacity or the bearing capacity of the support material. Flange bearing capacity and the bearing capacity of any wood support shall not be adjusted for load duration.
- (c) Reaction capacity and flange bearing capacity may be increased over that tabulated for the minimum bearing length. Linear interpolation of the reaction capacity between the minimum and maximum bearing length is permitted. Bearing lengths longer than the maximum do not further increase reaction capacity. Flange bearing capacity and that of a wood support will increase with additional bearing length.
- (d) The minimum bearing length for end reactions is 1-1/2 inches, unless otherwise noted in parentheses.

APA – The Engineered Wood Association is an accredited certification body under ISO 65 by Standards Council of Canada (SCC) and an accredited inspection agency by the International Code Council (ICC) International Accreditation Service (IAS) under ISO/IEC 17020. APA is also an accredited testing organization recognized by IAS and SCC under ISO/IEC 17025. APA is a recognized testing laboratory by Miami-Dade County, and a Product Testing Laboratory, Product Quality Assurance Entity, and Product Validation Entity by the Florida Department of Community Affairs (DCA).

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