APA PRODUCT REPORT®

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LP® SolidStart® I-Joists
Louisiana-Pacific Corporation

PR-L238

Revised November 21, 2011

Products: LP® SolidStart® I-Joists (LPI® series)
LP Building Products, Louisiana-Pacific Corporation, 414 Union Street, Suite 2000, Nashville, Tennessee 37219
(615) 986-5600
www.lpcorp.com

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 D5055-05 and D5055-04 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-03, T2006M-07, T2008P-42, T2008P-45, T2008P-69, T2008P-97, T2008P-111, T2009P-03, T2009P-14, T2009P-21, T2009P-38, T2009P-47, T2009P-60, T2009P-61, T2009P-82, T2010P-36, T2010P-39, T2010P-52A, T2010P-58, T2010P-59, T2011P-08, T2011P-53, T2011P-61, and other qualification data

2. Product description:
   LPI 18, 20Plus, 32Plus, 42Plus, and 52Plus series I-joists are made with lumber flanges and OSB webs in accordance with the in-plant manufacturing standard approved by APA. LPI 36, 56, 53, and 70 series I-joists are made with laminated veneer lumber (LVL) 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 LP SolidStart I-joists covered by this report. The allowable spans for LPI 53 and 70 series I-joists shall be in accordance with the recommendations provided by the manufacturer (contact the manufacturer for information). The allowable spans for the other LP SolidStart I-joists covered in this report shall be in accordance with the recommendations provided by the manufacturer as published in the *Technical Guide for Residential Construction*, Lit. Item LPEW0324, *Technical Guide for Light-Frame Commercial and Multifamily Construction,* Lit. Item LPEW0325 (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 LP SolidStart I-joists covered by this report shall be installed in accordance with the recommendations provided by the manufacturer, 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. I-joists listed in this report may be used in the fire rated assemblies described in the 2012 IBC Table 702.1(3), Items 21, and 23 through 28.

6. Limitations:
   a) LP SolidStart I-joists shall be designed in accordance with the code using the design properties specified in this report.
   b) LP SolidStart I-joists are limited to dry service conditions where the average equilibrium moisture content of solid-sawn lumber is less than 16 percent.
   c) LP SolidStart I-joists are produced at Red Bluff, California, Larouche, Quebec, and St. Prime, Quebec under a quality assurance program audited by APA. A list of I-joists manufactured at different LP facilities is documented and audited by APA.
   d) This report is subject to re-examination in one year.

7. Identification:
   The LP SolidStart 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 LP SolidStart I-Joists[a]

Joist Series Designation	Joist Depth (in.)	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	940	1,900	0.302
	8-7/8	92	2,205	1,055	1,900	0.334
	9-1/4	114	2,315	1,100	1,900	0.347
	9-1/2	142	2,365	1,130	1,900	0.355
	11-1/4	228	2,915	1,280	1,760	0.414
	11-7/8	248	3,100	1,335	1,760	0.435
	14	371	3,720	1,510	1,600	0.508
	16	514	4,230	1,680	1,200	0.577
LPI 20Plus	7-7/8	117	2,235	1,045	1,900	0.305
	8-7/8	157	2,580	1,175	1,900	0.337
	9-1/4	173	2,710	1,225	1,900	0.350
	9-1/2	185	2,810	1,260	1,900	0.358
	11-1/4	280	3,410	1,425	1,760	0.417
	11-7/8	318	3,755	1,485	1,760	0.438
	14	474	4,400	1,680	1,600	0.512
	16	652	5,050	1,870	1,500	0.582
LPI 32Plus	7-7/8	152	2,890	1,045	2,200	0.200
	8-7/8	203	3,340	1,175	2,200	0.201
	9-1/4	228	3,510	1,225	2,200	0.208
	9-1/2	243	3,620	1,260	2,200	0.213
	11-1/4	359	4,410	1,425	2,200	0.252
	11-7/8	406	4,690	1,485	2,200	0.267
	14	589	5,645	1,680	1,600	0.313
	16	791	6,545	1,870	1,500	0.358
LPI 42Plus	7-7/8	204	4,290	1,145	2,200	0.341
	8-7/8	272	4,955	1,265	2,200	0.385
	9-1/4	301	5,210	1,310	2,200	0.401
	9-1/2	321	5,375	1,340	2,200	0.412
	11-1/4	480	6,550	1,550	2,200	0.488
	11-7/8[g]	547	6,965	1,625	2,200	0.515
	14[g]	802	8,390	1,875	2,000	0.607
	16[g]	1,092	9,725	2,115	2,000	0.693
	18	1,333	11,000	2,555	1,700	0.960
	20	1,688	12,170	2,795	1,580	1.067
	22	2,088	13,335	3,030	1,300	1.173
	24	2,534	14,480	3,270	1,100	1.280
LPI 52Plus	9-1/4	334	6,340	1,715	2,400	0.493
	9-1/2	356	6,540	1,745	2,400	0.507
	11-1/4	529	7,965	1,975	2,400	0.600
	11-7/8	600	8,475	2,055	2,400	0.633
	14	874	10,205	2,330	2,200	0.747
	16	1,183	11,835	2,585	1,900	0.853
	18	1,540	13,380	2,845	1,700	0.960
	20	1,948	14,810	3,105	1,580	1.067
	22	2,408	16,220	3,360	1,300	1.173
	24	2,919	17,615	3,620	1,100	1.280

(Footnotes on following page)

Table 1. Design Properties (Allowable Stress Design) for LP SolidStart I-Joists[a] (Continued)

Joist Series Designation	Joist Depth (in.)	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 36	11-7/8	429	6,445	1,615	1,800	0.468
	14	622	7,755	1,830	1,800	0.550
	16	836	8,995	2,020	1,800	0.625
	18	1,082	10,135	2,185	1,300	0.700
	20	1,360	11,270	2,320	1,300	0.774
	22	1,669	12,390	2,435	1,200	0.850
	24	2,010	13,505	2,525	1,100	0.922
LPI 56	11-7/8	668	10,170	2,055	2,400	0.549
	14	968	12,250	2,330	2,200	0.641
	16	1,301	14,205	2,585	1,900	0.729
	18	1,684	16,010	2,845	1,700	0.817
	20	2,115	17,800	3,105	1,580	0.905
	22	2,597	19,575	3,360	1,300	0.993
	24	3,127	21,340	3,620	1,100	1.081
LPI 53	7-7/8	128	3,210	1,045	2,000	0.402
	8-7/8	170	3,690	1,175	2,000	0.448
	9-1/4	188	3,880	1,225	2,000	0.466
	9-1/2	200	4,000	1,260	2,000	0.478
	11-1/4	297	4,850	1,425	2,000	0.561
	11-7/8	337	5,150	1,485	2,000	0.591
	14	492	6,110	1,680	1,100	0.693
	16	666	6,990	1,870	1,100	0.789
LPI 70	7-7/8	172	4,340	1,045	2,000	0.410
	8-7/8	227	4,990	1,175	2,000	0.455
	9-1/4	251	5,250	1,225	2,000	0.474
	9-1/2	268	5,410	1,260	2,000	0.486
	11-1/4	396	6,560	1,425	2,000	0.569
	11-7/8	448	6,980	1,485	2,000	0.599
	14	652	8,280	1,680	1,100	0.703
	16	881	9,480	1,870	1,100	0.800

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, VLC, and K, shall be permitted to be adjusted for other load durations in accordance with 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_{rh}) is calculated using Eq. 1 for all depths of the LPI 18, LPI 53, and LPI 70 series and depths of 7-7/8 inches through 9-1/4 inches for other LP SolidStart I-joist series. For other depths, V_{rh} shall be in accordance with the recommendations provided by the manufacturer.

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

[e] Uniform 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:
$$\delta = \frac{P\ell^3}{48EI} + \frac{2P\ell}{K} \quad [3]$$

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).

[g] Also recognized as PRI-80 series I-joists.

Table 2. Reaction Capacities (Allowable Stress Design) for LP SolidStart I-Joists[a,b,c,d]

Joist Series Designation	Depth (in.)	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	1,890	2,035	2,115	2,250	870	940	940	940	955
	8-7/8	1,940	2,095	2,165	2,320	870	990	975	1,055	
	9-1/4	1,960	2,115	2,190	2,350	870	1,010	990	1,100	
	9-1/2	1,975	2,135	2,205	2,370	870	1,025	995	1,130	
	11-1/4	2,065	2,235	2,300	2,500	870	1,110	1,030	1,280	
	11-7/8	2,095	2,270	2,335	2,545	870	1,145	1,040	1,335	
	14	2,205	2,395	2,450	2,700	870	1,255	1,080	1,510	
	16	2,310	2,515	2,565	2,855	870	1,355	1,115	1,680	
LPI 20Plus	7-7/8	2,100	2,265	2,350	2,500	970	1,045	1,045	1,045	955
	8-7/8	2,160	2,330	2,410	2,580	970	1,100	1,085	1,175	
	9-1/4	2,180	2,355	2,435	2,615	970	1,125	1,100	1,225	
	9-1/2	2,195	2,375	2,450	2,635	970	1,140	1,110	1,260	
	11-1/4	2,295	2,485	2,560	2,780	970	1,235	1,145	1,425	
	11-7/8	2,330	2,525	2,595	2,830	970	1,275	1,160	1,485	
	14	2,455	2,665	2,725	3,005	970	1,395	1,200	1,680	
	16	2,570	2,795	2,850	3,175	970	1,510	1,240	1,870	
LPI 32Plus	7-7/8	2,100	2,265	2,350	2,500	970	1,045	1,045	1,045	1,180
	8-7/8	2,160	2,330	2,410	2,580	970	1,100	1,085	1,175	
	9-1/4	2,180	2,355	2,435	2,615	970	1,125	1,100	1,225	
	9-1/2	2,195	2,375	2,450	2,635	970	1,140	1,110	1,260	
	11-1/4	2,295	2,485	2,560	2,780	970	1,235	1,145	1,425	
	11-7/8	2,330	2,525	2,595	2,830	970	1,275	1,160	1,485	
	14	2,455	2,665	2,725	3,005	970	1,395	1,200	1,680	
	16	2,570	2,795	2,850	3,175	970	1,510	1,240	1,870	
LPI 42Plus	7-7/8	2,815	2,920	2,815	2,970	1,145	1,145	1,145	1,145	1,705
	8-7/8	2,870	3,025	2,890	3,105	1,170	1,265	1,240	1,265	
	9-1/4	2,890	3,065	2,920	3,160	1,180	1,310	1,280	1,310	
	9-1/2	2,900	3,095	2,940	3,195	1,185	1,340	1,305	1,340	
	11-1/4	2,995	3,270	3,075	3,430	1,230	1,465	1,515	1,550	
	11-7/8[e]	3,025	3,340	3,120	3,515	1,245	1,510	1,595	1,625	
	14[e]	3,140	3,565	3,280	3,805	1,300	1,660	1,595	1,875	
	16[e]	3,245	3,775	3,435	4,080	1,350	1,800	1,595	2,115	
	18	3,450	4,285	3,850	4,625	1,500 (2-1/2)	2,305 (2-1/2)	1,690	2,555	
	20	3,450	4,410	3,850	4,835	1,500 (2-1/2)	2,450 (2-1/2)	1,690	2,795	
	22	3,450	4,530	3,850	5,030	1,500 (2-1/2)	2,595 (2-1/2)	1,690	3,030	
	24	3,450	4,640	3,850	5,210	1,500 (2-1/2)	2,705 (2-1/2)	1,690	3,270	

(Footnotes on following page)

Table 2. Reaction Capacities (Allowable Stress Design) for LP SolidStart I-Joists[a,b,c,d] (Continued)

Joist Series Designation	Depth (in.)	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 52Plus	9-1/4	3,400	3,680	3,500	3,800	1,330	1,630	1,590	1,715	1,995
	9-1/2	3,400	3,710	3,515	3,840	1,335	1,650	1,600	1,745	
	11-1/4	3,415	3,925	3,605	4,110	1,360	1,775	1,665	1,975	
	11-7/8	3,420	4,000	3,635	4,210	1,370	1,820	1,690	2,055	
	14	3,435	4,260	3,745	4,540	1,385	1,970	1,845	2,330	
	16	3,450	4,505	3,850	4,855	1,400	2,110	1,985	2,585	
	18	3,450	4,750	3,850	5,165	1,700 (2-1/2)	2,490 (2-1/2)	2,130	2,845	
	20	3,450	4,990	3,850	5,475	1,700 (2-1/2)	2,675 (2-1/2)	2,130	3,105	
	22	3,450	5,235	3,850	5,790	1,700 (2-1/2)	2,865 (2-1/2)	2,130	3,360	
	24	3,450	5,480	3,850	6,100	1,700 (2-1/2)	3,055 (2-1/2)	2,130	3,620	
LPI 36	11-7/8	2,800	3,500	2,800	3,500	1,200 (1-3/4)	1,510 (1-3/4)	1,200	1,510	1,180
	14	2,800	3,500	2,800	3,500	1,200 (1-3/4)	1,510 (1-3/4)	1,200	1,510	
	16	2,800	3,500	2,800	3,500	1,200 (1-3/4)	1,510 (1-3/4)	1,200	1,510	
	18	2,800	3,500	2,800	3,500	1,200 (2-1/2)	1,799 (2-1/2)	1,200	1,800	
	20	2,800	3,500	2,800	3,500	1,200 (2-1/2)	1,857 (2-1/2)	1,200	1,855	
	22	2,800	3,500	2,800	3,500	1,200 (2-1/2)	1,906 (2-1/2)	1,200	1,905	
	24	2,800	3,500	2,800	3,500	1,200 (2-1/2)	1,945 (2-1/2)	1,200	1,945	
LPI 56	11-7/8	3,800	4,000	3,800	4,000	1,400 (1-3/4)	1,840 (1-3/4)	1,400	1,840	1,870
	14	3,800	4,000	3,800	4,000	1,400 (1-3/4)	1,840 (1-3/4)	1,400	1,840	
	16	3,800	4,000	3,800	4,000	1,400 (1-3/4)	1,840 (1-3/4)	1,400	1,840	
	18	3,800	5,000	3,800	5,000	1,700 (2-1/2)	2,303 (2-1/2)	1,700	2,305	
	20	3,800	5,000	3,800	5,000	1,700 (2-1/2)	2,449 (2-1/2)	1,700	2,450	
	22	3,800	5,000	3,800	5,000	1,700 (2-1/2)	2,595 (2-1/2)	1,700	2,595	
	24	3,800	5,000	3,800	5,000	1,700 (2-1/2)	2,704 (2-1/2)	1,700	2,705	
LPI 53	7-7/8	2,030	2,170	2,170	2,340	880	1,045	1,045	1,045	1,095
	8-7/8	2,050	2,240	2,230	2,425	880	1,095	1,060	1,175	
	9-1/4	2,060	2,265	2,250	2,460	880	1,115	1,065	1,225	
	9-1/2	2,065	2,280	2,265	2,480	880	1,125	1,070	1,260	
	11-1/4	2,105	2,405	2,365	2,635	880	1,215	1,095	1,425	
	11-7/8	2,120	2,445	2,400	2,690	880	1,245	1,100	1,485	
	14	2,165	2,590	2,525	2,875	880	1,350	1,130	1,680	
	16	2,210	2,730	2,640	3,050	880	1,450	1,160	1,870	

(Footnotes on following page)

Table 2. Reaction Capacities (Allowable Stress Design) for LP SolidStart I-Joists[a,b,c,d] (Continued)

Joist Series Designation	Depth (in.)	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 70	7-7/8	2,100	2,300	2,250	2,420	900	1,045	1,045	1,045	1,095
	8-7/8	2,150	2,360	2,325	2,515	900	1,100	1,070	1,175	
	9-1/4	2,170	2,385	2,350	2,550	900	1,125	1,080	1,225	
	9-1/2	2,180	2,400	2,370	2,570	900	1,140	1,085	1,260	
	11-1/4	2,265	2,510	2,500	2,735	900	1,240	1,125	1,425	
	11-7/8	2,295	2,545	2,545	2,790	900	1,275	1,140	1,485	
	14	2,400	2,675	2,700	2,990	900	1,395	1,190	1,680	
	16	2,500	2,800	2,850	3,175	900	1,510	1,240	1,870	

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 the 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.

(e) Also recognized as PRI-80 series I-joists.

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).

APA – THE ENGINEERED WOOD ASSOCIATION
HEADQUARTERS
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