



Evaluation Report CCMC 12412-R

LP[®] SolidStart I-Joists: LPI[®] 18, LPI[®] 20Plus, LPI[®] 32Plus, LPI[®] 36, LPI[®] 42Plus, LPI[®] 52Plus, LPI[®] 56, LPI[®] 450 and LPI[®] 530

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1. Opinion

It is the opinion of the Canadian Construction Materials Centre (CCMC) that “LP[®] SolidStart I-Joists: LPI[®] 18, LPI[®] 20Plus, LPI[®] 32Plus, LPI[®] 36, LPI[®] 42Plus, LPI[®] 52Plus, LPI[®] 56, LPI[®] 450 and LPI[®] 530,” when used as joists in floor and roof applications in accordance with the conditions and limitations stated in Section 3 of this Report, complies with the National Building Code (NBC) of Canada 2015:

- Clause 1.2.1.1.(1)(a), Division A, using the following acceptable solutions from Division B:
 - Sentence 4.3.1.1.(1), Design Basis for Wood (CAN/CSA-O86-14, “Engineering Design in Wood,” for I-joist qualification)
- Clause 1.2.1.1.(1)(b), Division A, as an alternative solution that achieves at least the minimum level of performance required by Division B in the areas defined by the objectives and functional statements attributed to the following applicable acceptable solutions:
 - Sentence 9.23.4.2.(2), Spans for Joists, Rafters and Beams

This opinion is based on the CCMC evaluation of the technical evidence in Section 4 provided by the Report Holder.

Ruling No. 05-08-132 (12412-R) authorizing the use of this product in Ontario, subject to the terms and conditions contained in the Ruling, was made by the Minister of Municipal Affairs and Housing on 2005-05-13 pursuant to s.29 of the *Building Code Act*, 1992 (see Ruling for terms and conditions). This Ruling is subject to periodic revisions and updates.

2. Description

The products are prefabricated wood I-joists consisting of two continuous sawn lumber flanges or two structural composite lumber (SCL) flanges glued to one of the two thicknesses of an oriented strandboard (OSB) web (9.5 mm or 11.1 mm). The OSB web is manufactured specifically for Louisiana-Pacific Corporation and conforms to CSA O325, “Construction Sheathing,” Product Standard PS 2, and the LP proprietary web specifications. The dimensions of each product are listed in Table 2.1.

The web-flange connection is made by inserting a beveled OSB web into a machined groove in the center of the flange. Web segments are end-jointed together to form a continuous web. The web-flange connection and the web segment end joints are glued with a phenol-resorcinol adhesive (see CCMC 13054-L and 13291-L). Fingerjoints are glued using either phenol-resorcinol adhesives (see CCMC 12917-L) or a water-based melamine resin (see CCMC 13307-L).

Table 2.1 Dimensions of the Products

Product	Flange Size Width x Thickness, mm (in.)	Web Thickness mm (in.)	Range of Joist Depths mm (in.)
Sawn Lumber Flanges			
LPI® 18	63.5 × 38 (2½ × 1½)	9.5 (¾)	200 to 356 (7⅞ to 16)
LPI® 20Plus	63.5 × 38 (2½ × 1½)	9.5 (¾)	200 to 406 (7⅞ to 16)
LPI® 32Plus	63.5 × 38 (2½ × 1½)	9.5 (¾)	200 to 406 (7⅞ to 16)
LPI® 42Plus	89 × 38 (3½ × 1½)	9.5 (¾)	200 to 406 (7⅞ to 16)
LPI® 42Plus	89 × 38 (3½ × 1½)	11.1 (7/16)	457 to 610 (18 to 24)
LPI® 52Plus	89 × 38 (3½ × 1½)	11.1 (7/16)	235 to 610 (9¼ to 24)
LVL Flanges			
LPI® 36	57 × 38 (2¼ × 1½)	9.5 (¾)	301 to 610 (11⅞ to 24)
LPI® 56	89 × 38 (3½ × 1½)	11.1 (7/16)	301 to 610 (11⅞ to 24)
LPI® 450	45 × 33 (1¾ × 1-5/16)	9.5 (¾)	241 to 406 (9½ to 16)
LPI® 530	53 × 33 (2-1/16 × 1-5/16)	9.5 (¾)	241 to 406 (9½ to 16)

3. Conditions and Limitations

The CCMC compliance opinion in Section 1 is bound by the “LP® SolidStart I-Joists: LPI® 18, LPI® 20Plus, LPI® 32Plus, LPI® 36, LPI® 42Plus, LPI® 52Plus, LPI® 56, LPI® 450 and LPI® 530” being used in accordance with the conditions and limitations set out below:

- The products are intended for use in structural applications such as floor, ceiling or roof joists, and are intended for dry service use¹ applications only.
- The pre-engineering tables in the literature listed below have been provided to CCMC by the manufacturer to demonstrate compliance to Part 9, Housing and Small Buildings, of the NBC 2015 for acceptance by the local authority having jurisdiction (AHJ):

i. Louisiana-Pacific Corporation Pre-engineered Tables

When the products are used to support uniform loads only, the installation must be in accordance with the span tables (including vibration criteria² found in the documents entitled:

- a. “Technical Guide for Residential Construction LPI® 18, 20Plus, 32Plus, 36, 42Plus, 52Plus, and 56 Series” for Canada – Limit States Design,” October 2014; and
- b. “Technical Guide for Light-Frame Commercial and Multifamily Construction LPI® 20Plus, 32Plus, 36, 42Plus, 52Plus and 56 Series I-Joists and 2900F_b – 2.0E LVL” for Canada – Limit States Design,” September 2014.

The product must be installed in accordance with the manufacturer’s installation guidelines noted in the documents listed in 3(i) for those applications falling within the scope of the documents. Applications outside the scope of these installation guidelines require engineering on a case-by-case basis.

ii. Louisiana-Pacific Corporation Pre-engineered Installation Details

The manufacturer’s pre-engineered details within documents (a) and (b) outlined in 3(i) are limited in scope to building designs where the anticipated loads on the following structural details are not exceeded:

1. All lumber, wood-based panels and proprietary engineered wood products are intended for dry service conditions. “Dry service” is defined as the in-service environment under which the equilibrium moisture content (MC) of lumber is 15% or less over a year and does not exceed 19% at any time. Wood contained within the interior of dry, heated or unheated buildings has generally been found to have a MC between 6% and 14% according to season and location. During construction, all wood-based products should be protected from the weather to ensure that the 19% MC is not exceeded in accordance with Article 9.3.2.5., Moisture Content, of Division B of the NBC 2015.
2. In cases where concrete topping is applied or bridging/blocking is used and joists are installed at the maximum spans, the current vibration criteria may not address all occupant performance expectations. Therefore, the manufacturer should be consulted for span adjustments, if necessary, in these types of installations.

- rim joist resistance, pages 5 and 30 of (a) and pages 5 and 44 of (b);
- web stiffener requirements, page 5 of (a) and page 22 of (b);
- uniform floor load tables, pages 10-11 of (a);
- loadbearing cantilever tables, pages 18-21 of (a);
- brick ledge cantilever, pages 22-23 of (a);
- web hole tables, pages 24-25 of (a) and pages 20-21 of (b);
- floor span tables, pages 6-9 of (a) and pages 6-15 of (b);
- roof span tables, pages 14-17 of (a) and pages 16-19 of (b); and
- uniform roof load tables, pages 12-13 of (a).

iii. Engineering Required

For structural applications beyond the scope/limitations of the above-referenced publications or when required by the AHJ, the drawings or related documents must bear the authorized seal of a professional engineer skilled in wood design and licensed to practice under the appropriate provincial or territorial legislation.

Installations beyond the scope/limitations of 3(i) and 3(ii) imply, but are not limited to, the following:

- higher loads/longer spans than the manufacturer's pre-engineered details;
- concentrated loads;
- offset bearing walls;
- areas of high wind and seismicity;
- stair openings;
- design of supporting wall studs/beams when total load exceeds the NBC 2015 pre-engineered floor/roof joist tables;
- design of supporting foundation footings when total load exceeds the NBC 2015 pre-engineered floor/roof joist tables; and
- fire resistance (see applicable fire-resistance assembly listings for specific joist and adhesives used).

The engineer must design in accordance with CAN/CSA-O86, and may use as a guide the *Engineering Guide for Wood-Frame Construction*, published by the Canadian Wood Council.

The factored resistance and engineering properties for the products must not exceed the values set forth in Table 4.1.1.

The ends of all I-joist members used as joists, rafters and beams must be restrained to prevent rollover. This is normally achieved by attaching a diaphragm sheathing to the top or to the compression edge, and to an end wall or shear transfer panel capable of transferring a minimum unfactored uniform load of 730 N/m or the required shear forces due to wind or seismic conditions. Blocking or cross-bracing with equivalent strength may be used.

The compression edges of all the products' members used as joists and rafters must be laterally supported at least every 610 mm, except where design is done in accordance with CAN/CSA-O86.

Nailing of the products must be in accordance with the manufacturer's engineering details provided on a case-by-case basis.

iv. Engineering Support Provided by Manufacturer

Louisiana-Pacific Corp. provides engineering support through either their local distributor or a professional engineer skilled in wood design and licensed to practice under the appropriate provincial or territorial legislation. Louisiana-Pacific Corp. may also be consulted in the use of the product.

- Louisiana-Pacific Corp. (technical support): 1-888-820-0325; e-mail: customer.support@lpcorp.com.
- Damaged or defective products must not be used, unless *repaired* in accordance with written instructions from the manufacturer.
- This product must be identified with the phrase "CCMC 12412-R" along the side of the product. This CCMC number is only valid when it appears in conjunction with the certification mark of APA-EWS.

4. Technical Evidence

The Report Holder has submitted technical documentation for the CCMC evaluation. Testing was conducted at laboratories recognized by CCMC. The corresponding technical evidence for this product is summarized below.

Additional engineering data and load/span tables are available from the manufacturer as outlined in 3(i) above.

4.1 Design Requirements

Table 4.1.1 Engineering Properties of the Products

Joist Series	Joist Depth	Factored Resistance		EI x 10 ⁶	K x 10 ⁶
		Moment ¹	Shear		
	mm (in.)	N-m (lb-ft)	N (lb)	kN-mm ² (lb-in. ²)	N (lb-ft/in.)
Sawn Lumber Flanges					
LPI [®] 18	200 (7 ⁷ / ₈)	4 305 (3 175)	6 605 (1 485)	198 (69)	16.12 (0.302)
	225 (8 ⁷ / ₈)	4 867 (3 590)	7 406 (1 665)	264 (92)	17.83 (0.334)
	235 (9 ¹ / ₄)	5 003 (3 690)	7 717 (1 735)	327 (114)	18.52 (0.347)
	241 (9 ¹ / ₂)	5 098 (3 760)	7 940 (1 785)	407 (142)	18.95 (0.355)
	286 (11 ¹ / ₄)	5 762 (4 250)	8 985 (2 020)	654 (228)	22.10 (0.414)
	302 (11 ⁷ / ₈)	6 033 (4 450)	9 363 (2 105)	712 (248)	23.22 (0.435)
	356 (14)	8 385 (6 185)	10 608 (2 385)	1 065 (371)	27.12 (0.508)
	406 (16)	9 538 (7 035)	11 698 (2 630)	1 475 (514)	30.80 (0.577)
LPI [®] 20Plus	200 (7 ⁷ / ₈)	5 037 (3 715)	7 339 (1 650)	336 (117)	16.28 (0.305)
	225 (8 ⁷ / ₈)	5 816 (4 290)	8 251 (1 855)	451 (157)	17.99 (0.337)
	235 (9 ¹ / ₄)	6 108 (4 505)	8 607 (1 935)	496 (173)	18.68 (0.35)
	241 (9 ¹ / ₂)	6 331 (4 670)	8 852 (1 990)	531 (185)	19.11 (0.358)
	286 (11 ¹ / ₄)	7 687 (5 670)	10 008 (2 250)	804 (280)	22.26 (0.417)
	302 (11 ⁷ / ₈)	8 473 (6 250)	10 431 (2 345)	913 (318)	23.38 (0.438)
	356 (14)	9 924 (7 320)	11 787 (2 650)	1 360 (474)	27.33 (0.512)
	406 (16)	11 388 (8 400)	13 122 (2 950)	1 871 (652)	31.06 (0.582)

Joist Series	Joist Depth	Factored Resistance		EI x 10 ⁶	K x 10 ⁶
		Moment ¹	Shear		
	mm (in.)	N-m (lb-ft)	N (lb)	kN-mm ² (lb-in. ²)	N (lb-ft/in.)
LPI [®] 32Plus	200 (7 ⁷ / ₈)	6 026 (4 445)	7 339 (1 650)	405 (141)	16.28 (0.305)
	225 (8 ⁷ / ₈)	6 962 (5 135)	8 251 (1 855)	531 (185)	17.99 (0.337)
	235 (9 ¹ / ₄)	7 314 (5 395)	8 607 (1 935)	594 (207)	18.68 (0.35)
	241 (9 ¹ / ₂)	7 552 (5 570)	8 852 (1 990)	634 (221)	19.11 (0.358)
	286 (11 ¹ / ₄)	9 192 (6 780)	10 008 (2 250)	950 (331)	22.26 (0.417)
	302 (11 ⁷ / ₈)	9 775 (7 210)	10 431 (2 345)	1 076 (375)	23.38 (0.438)
	356 (14)	11 768 (8 680)	11 787 (2 650)	1 575 (549)	27.33 (0.512)
	406 (16)	13 646 (10 065)	13 122 (2 950)	2 132 (743)	31.06 (0.582)
LPI [®] 42Plus	200 (7 ⁷ / ₈)	9 667 (7 130)	8 029 (1 805)	585 (204)	18.20 (0.341)
	225 (8 ⁷ / ₈)	11 151 (8 225)	8 874 (1 995)	781 (272)	20.55 (0.385)
	235 (9 ¹ / ₄)	11 741 (8 660)	9 207 (2 070)	864 (301)	21.40 (0.401)
	241 (9 ¹ / ₂)	12 120 (8 940)	9 408 (2 115)	921 (321)	21.99 (0.412)
	286 (11 ¹ / ₄)	14 764 (10 890)	10 875 (2 445)	1 377 (480)	26.05 (0.488)
	302 (11 ⁷ / ₈)	15 706 (11 585)	11 409 (2 565)	1 570 (547)	27.49 (0.515)
	356 (14)	18 913 (13 950)	13 166 (2 960)	2 301 (802)	32.40 (0.607)
	406 (16)	21 936 (16 180)	14 856 (3 340)	3 134 (1 092)	36.99 (0.693)
	457 (18)	24 797 (18 290)	17 948 (4 035)	3 825 (1 333)	51.24 (0.96)
	508 (20)	27 447 (20 245)	19 616 (4 410)	4 844 (1 688)	56.95 (1.067)
	559 (22)	30 064 (22 175)	21 284 (4 785)	5 992 (2 088)	62.61 (1.173)
	610 (24)	32 646 (24 080)	22 952 (5 160)	7 272 (2 534)	68.32 (1.28)

Joist Series	Joist Depth	Factored Resistance		EI x 10 ⁶	K x 10 ⁶
		Moment ¹	Shear		
	mm (in.)	N-m (lb-ft)	N (lb)	kN-mm ² (lb-in. ²)	N (lb-ft/in.)
LPI® 52Plus	235 (9¼)	14 303 (10 550)	12 032 (2 705)	958 (334)	26.31 (0.493)
	241 (9½)	14 764 (10 890)	12 254 (2 755)	1 022 (356)	27.06 (0.507)
	286 (11¼)	17 950 (13 240)	13 856 (3 115)	1 518 (529)	32.03 (0.6)
	302 (11⅞)	19 096 (14 085)	14 434 (3 245)	1 722 (600)	33.79 (0.633)
	356 (14)	22 994 (16 960)	16 369 (3 680)	2 508 (874)	39.87 (0.747)
	406 (16)	26 668 (19 670)	18 148 (4 080)	3 395 (1 183)	45.53 (0.853)
	457 (18)	30 145 (22 235)	19 972 (4 490)	4 419 (1 540)	51.24 (0.96)
	508 (20)	33 372 (24 615)	21 795 (4 900)	5 590 (1 948)	56.95 (1.067)
	559 (22)	36 551 (26 960)	23 597 (5 305)	6 910 (2 408)	62.61 (1.173)
	610 (24)	39 696 (29 280)	25 420 (5 715)	8 377 (2 919)	68.32 (1.28)
LVL Flanges					
LPI® 36	302 (11⅞)	14 527 (10 715)	11 342 (2 550)	1 231 (429)	24.98 (0.468)
	356 (14)	17 489 (12 900)	12 855 (2 890)	1 785 (622)	29.36 (0.55)
	406 (16)	20 282 (14 960)	14 189 (3 190)	2 399 (836)	33.36 (0.625)
	457 (18)	22 858 (16 860)	15 346 (3 450)	3 105 (1 082)	37.36 (0.7)
	508 (20)	25 407 (18 740)	16 280 (3 660)	3 903 (1 360)	41.31 (0.774)
	559 (22)	27 942 (20 610)	17 103 (3 845)	4 789 (1 669)	45.37 (0.85)
	610 (24)	30 450 (22 460)	17 725 (3 985)	5 768 (2 010)	49.21 (0.922)
LPI® 56	302 (11⅞)	22 939 (16 920)	14 434 (3 245)	1 917 (668)	29.30 (0.549)
	356 (14)	27 617 (20 370)	16 369 (3 680)	2 778 (968)	34.21 (0.641)
	406 (16)	32 030 (23 625)	18 148 (4 080)	3 733 (1 301)	38.91 (0.729)
	457 (18)	36 104 (26 630)	19 972 (4 490)	4 833 (1 684)	43.61 (0.817)
	508 (20)	40 144 (29 610)	21 795 (4 900)	6 069 (2 115)	48.31 (0.905)
	559 (22)	44 143 (32 560)	23 597 (5 305)	7 453 (2 597)	53.00 (0.993)
	610 (24)	48 116 (35 490)	25 420 (5 715)	8 973 (3 127)	57.70 (1.081)

Joist Series	Joist Depth	Factored Resistance		EI x 10 ⁶	K x 10 ⁶
		Moment ¹	Shear		
	mm (in.)	N-m (lb-ft)	N (lb)	kN-mm ² (lb-in. ²)	N (lb-ft/in.)
LPI [®] 450	241 (9½)	7 552 (5 570)	8 630 (1 940)	488 (170)	25.2 (5.68)
	302 (11⅞)	9 742 (7 185)	10 031 (2 255)	821 (286)	31.2 (7.02)
	356 (14)	11 545 (8 515)	11 276 (2 535)	1 202 (419)	36.6 (8.23)
	406 (16)	13 212 (9 745)	12 455 (2 800)	1 633 (569)	41.7 (9.38)
LPI [®] 530	241 (9½)	9 023 (6 655)	9 408 (2 115)	574 (200)	25.5 (5.74)
	302 (11⅞)	11 613 (8 565)	10 987 (2 470)	967 (337)	31.5 (7.09)
	356 (14)	13 775 (10 160)	12 388 (2 785)	1 412 (492)	37.0 (8.32)
	406 (16)	15 761 (11 625)	13 723 (3 085)	1 911 (666)	42.1 (9.47)

Joist Series	Joist Depth	Factored End Reaction				Factored Intermediate Reaction				Factored Flange Bearing ⁵
		N (lb)								
		38 mm (1½ in.) Bearing Length		102 mm (4 in.) Bearing Length		89 mm (3½ in.) Bearing Length		140 mm (5½ in.) Bearing Length		
	mm (in.)	w/o WS ⁴	WS	w/o WS	WS	w/o WS	WS	w/o WS	WS	N/mm (lb/in.)
Sawn Lumber Flanges										
LPI [®] 18	200 (7⅞)	6 116 (1 375)	6 605 (1 485)	6 605 (1 485)	6 605 (1 485)	13 277 (2 985)	14 278 (3 210)	14 856 (3 340)	15 790 (3 550)	242 (1 380)
	225 (8⅞)	6 116 (1 375)	6 961 (1 565)	6 850 (1 540)	7 406 (1 665)	13 611 (3 060)	14 701 (3 305)	15 190 (3 415)	16 280 (3 660)	
	235 (9¼)	6 116 (1 375)	7 095 (1 595)	6 961 (1 565)	7 717 (1 735)	13 767 (3 095)	14 856 (3 340)	15 368 (3 455)	16 502 (3 710)	
	241 (9½)	6 116 (1 375)	7 206 (1 620)	6 983 (1 570)	7 940 (1 785)	13 856 (3 115)	14 990 (3 370)	15 479 (3 480)	16 636 (3 740)	
	286 (11¼)	6 116 (1 375)	7 784 (1 750)	7 228 (1 625)	8 985 (2 020)	14 500 (3 260)	15 701 (3 530)	16 146 (3 630)	17 547 (3 945)	
	302 (11⅞)	6 116 (1 375)	8 029 (1 805)	7 295 (1 640)	9 363 (2 105)	14 701 (3 305)	15 946 (3 585)	16 391 (3 685)	17 859 (4 015)	
	356 (14)	6 116 (1 375)	8 807 (1 980)	7 584 (1 705)	10 608 (2 385)	15 479 (3 480)	16 813 (3 780)	17 192 (3 865)	18 948 (4 260)	
	406 (16)	6 116 (1 375)	9 519 (2 140)	7 828 (1 760)	11 698 (2 630)	16 213 (3 645)	17 659 (3 970)	18 014 (4 050)	20 038 (4 505)	

Joist Series	Joist Depth	Factored End Reaction				Factored Intermediate Reaction				Factored Flange Bearing ⁵
		N (lb)				N (lb)				
		38 mm (1½ in.) Bearing Length		102 mm (4 in.) Bearing Length		89 mm (3½ in.) Bearing Length		140 mm (5½ in.) Bearing Length		
		mm (in.)	w/o WS ⁴	WS	w/o WS	WS	w/o WS	WS	w/o WS	WS
LPI® 20Plus	200 (7⅞)	6 805 (1 530)	7 339 (1 650)	7 339 (1 650)	7 339 (1 650)	14 745 (3 315)	15 902 (3 575)	16 502 (3 710)	17 547 (3 945)	242 (1 380)
	225 (8⅞)	6 805 (1 530)	7 717 (1 735)	7 628 (1 715)	8 251 (1 855)	15 168 (3 410)	16 369 (3 680)	16 925 (3 805)	18 103 (4 070)	
	235 (9¼)	6 805 (1 530)	7 895 (1 775)	7 717 (1 735)	8 607 (1 935)	15 301 (3 440)	16 524 (3 715)	17 103 (3 845)	18 370 (4 130)	
	241 (9½)	6 805 (1 530)	8 006 (1 800)	7 784 (1 750)	8 852 (1 990)	15 412 (3 465)	16 680 (3 750)	17 192 (3 865)	18 504 (4 160)	
	286 (11¼)	6 805 (1 530)	8 674 (1 950)	8 029 (1 805)	10 008 (2 250)	16 102 (3 620)	17 436 (3 920)	17 970 (4 040)	19 527 (4 390)	
	302 (11⅞)	6 805 (1 530)	8 940 (2 010)	8 140 (1 830)	10 431 (2 345)	16 369 (3 680)	17 725 (3 985)	18 215 (4 095)	19 860 (4 465)	
	356 (14)	6 805 (1 530)	9 786 (2 200)	8 429 (1 895)	11 787 (2 650)	17 236 (3 875)	18 704 (4 205)	19 126 (4 300)	21 106 (4 745)	
	406 (16)	6 805 (1 530)	10 608 (2 385)	8 696 (1 955)	13 122 (2 950)	18 037 (4 055)	19 616 (4 410)	20 016 (4 500)	22 284 (5 010)	
LPI® 32Plus	200 (7⅞)	6 805 (1 530)	7 339 (1 650)	7 339 (1 650)	7 339 (1 650)	14 745 (3 315)	15 902 (3 575)	16 502 (3 710)	17 547 (3 945)	297 (1 695)
	225 (8⅞)	6 805 (1 530)	7 717 (1 735)	7 628 (1 715)	8 251 (1 855)	15 168 (3 410)	16 369 (3 680)	16 925 (3 805)	18 103 (4 070)	
	235 (9¼)	6 805 (1 530)	7 895 (1 775)	7 717 (1 735)	8 607 (1 935)	15 301 (3 440)	16 524 (3 715)	17 103 (3 845)	18 370 (4 130)	
	241 (9½)	6 805 (1 530)	8 006 (1 800)	7 784 (1 750)	8 852 (1 990)	15 412 (3 465)	16 680 (3 750)	17 192 (3 865)	18 504 (4 160)	
	286 (11¼)	6 805 (1 530)	8 674 (1 950)	8 029 (1 805)	10 008 (2 250)	16 102 (3 620)	17 436 (3 920)	17 970 (4 040)	19 527 (4 390)	
	302 (11⅞)	6 805 (1 530)	8 940 (2 010)	8 140 (1 830)	10 431 (2 345)	16 369 (3 680)	17 725 (3 985)	18 215 (4 095)	19 860 (4 465)	
	356 (14)	6 805 (1 530)	9 786 (2 200)	8 429 (1 895)	11 787 (2 650)	17 236 (3 875)	18 704 (4 205)	19 126 (4 300)	21 106 (4 745)	
	406 (16)	6 805 (1 530)	10 608 (2 385)	8 696 (1 955)	13 122 (2 950)	18 037 (4 055)	19 616 (4 410)	20 016 (4 500)	22 284 (5 010)	

LPI® 42Plus	200 (7 ⁷ / ₈)	8 029 (1 805)	8 029 (1 805)	8 029 (1 805)	8 029 (1 805)	19 771 (4 445)	20 483 (4 605)	19 771 (4 445)	20 861 (4 690)	429 (2 450)
	225 (8 ⁷ / ₈)	8 207 (1 845)	8 874 (1 995)	8 696 (1 955)	8 874 (1 995)	20 149 (4 530)	21 217 (4 770)	20 283 (4 560)	21 795 (4 900)	
	235 (9 ¹ / ₄)	8 296 (1 865)	9 207 (2 070)	8 985 (2 020)	9 207 (2 070)	20 283 (4 560)	21 506 (4 835)	20 505 (4 610)	22 196 (4 990)	
	241 (9 ¹ / ₂)	8 318 (1 870)	9 408 (2 115)	9 163 (2 060)	9 408 (2 115)	20 350 (4 575)	21 728 (4 885)	20 639 (4 640)	22 440 (5 045)	
	286 (11 ¹ / ₄)	8 629 (1 940)	10 275 (2 310)	10 631 (2 390)	10 875 (2 445)	21 017 (4 725)	22 952 (5 160)	21 595 (4 855)	24 086 (5 415)	
	302 (11 ⁷ / ₈)	8 740 (1 965)	10 608 (2 385)	11 209 (2 520)	11 409 (2 565)	21 239 (4 775)	23 441 (5 270)	21 906 (4 925)	24 686 (5 550)	
	356 (14)	9 118 (2 050)	11 654 (2 620)	11 209 (2 520)	13 166 (2 960)	22 040 (4 955)	25 020 (5 625)	23 018 (5 175)	26 710 (6 005)	
	406 (16)	9 474 (2 130)	12 632 (2 840)	11 209 (2 520)	14 856 (3 340)	22 774 (5 120)	26 510 (5 960)	24 108 (5 420)	28 645 (6 440)	
	457 (18)	10 542 ² (2 370 ²)	16 191 ² (3 640 ²)	11 876 (2 670)	17 948 (4 035)	24 219 (5 445)	30 091 (6 765)	27 022 (6 075)	32 470 (7 300)	
	508 (20)	10 542 ² (2 370 ²)	17 192 ² (3 865 ²)	11 876 (2 670)	19 616 (4 410)	24 219 (5 445)	30 958 (6 960)	27 022 (6 075)	33 938 (7 630)	
	559 (22)	10 542 ² (2 370 ²)	18 215 ² (4 095 ²)	11 876 (2 670)	21 284 (4 785)	24 219 (5 445)	31 803 (7 150)	27 022 (6 075)	35 317 (7 940)	
	610 (24)	10 542 ² (2 370 ²)	18 993 ² (4 270 ²)	11 876 (2 670)	22 952 (5 160)	24 219 (5 445)	32 582 (7 325)	27 022 (6 075)	36 585 (8 225)	
LPI® 52Plus	235 (9 ¹ / ₄)	9 341 (2 100)	11 454 (2 575)	11 164 (2 510)	12 032 (2 705)	23 864 (5 365)	25 843 (5 810)	24 575 (5 525)	26 688 (6 000)	429 (2 450)
	241 (9 ¹ / ₂)	9 363 (2 105)	11 587 (2 605)	11 231 (2 525)	12 254 (2 755)	23 864 (5 365)	26 043 (5 855)	24 686 (5 550)	26 955 (6 060)	
	286 (11 ¹ / ₄)	9 541 (2 145)	12 454 (2 800)	11 698 (2 630)	13 856 (3 115)	23 975 (5 390)	27 555 (6 195)	25 309 (5 690)	28 845 (6 485)	
	302 (11 ⁷ / ₈)	9 608 (2 160)	12 788 (2 875)	11 876 (2 670)	14 434 (3 245)	24 019 (5 400)	28 089 (6 315)	25 532 (5 740)	29 557 (6 645)	
	356 (14)	9 719 (2 185)	13 833 (3 110)	12 944 (2 910)	16 369 (3 680)	24 108 (5 420)	29 913 (6 725)	26 288 (5 910)	31 870 (7 165)	
	406 (16)	9 830 (2 210)	14 812 (3 330)	13 944 (3 135)	18 148 (4 080)	24 219 (5 445)	31 625 (7 110)	27 022 (6 075)	34 094 (7 665)	
	457 (18)	11 943 ² (2 685 ²)	17 481 ² (3 930 ²)	14 945 (3 360)	19 972 (4 490)	24 219 (5 445)	33 338 (7 495)	27 022 (6 075)	36 273 (8 155)	
	508 (20)	11 943 ² (2 685 ²)	18 771 ² (4 220 ²)	14 945 (3 360)	21 795 (4 900)	24 219 (5 445)	35 028 (7 875)	27 022 (6 075)	38 431 (8 640)	
	559 (22)	11 943 ² (2 685 ²)	20 105 ² (4 520 ²)	14 945 (3 360)	23 597 (5 305)	24 219 (5 445)	36 763 (8 265)	27 022 (6 075)	40 655 (9 140)	
	610 (24)	11 943 ² (2 685 ²)	21 439 ² (4 820 ²)	14 945 (3 360)	25 420 (5 715)	24 219 (5 445)	38 164 (8 580)	27 022 (6 075)	42 834 (9 630)	

LVL Flanges										
LPI® 36	302 (11⅞)	7 205 (1 620)	10 540 (2 370)	9 030 (2 030)	11 345 (2 550)	17 525 (3 940)	21 795 (4 900)	19 905 (4 475)	24 355 (5 475)	301 (1 720)
	356 (14)	7 205 (1 620)	10 630 (2 390)	9 295 (2 090)	12 855 (2 890)	17 525 (3 940)	22 510 (5 060)	19 905 (4 475)	25 020 (5 625)	
	406 (16)	7 205 (1 620)	10 700 (2 405)	9 540 (2 145)	14 190 (3 190)	17 525 (3 940)	23 195 (5 215)	19 905 (4 475)	25 665 (5 770)	
	457 (18)	8 250 ² (1 855 ²)	12 635 ² (2 840 ²)	9 785 (2 200)	15 345 (3 450)	17 525 (3 940)	23 910 (5 375)	19 905 (4 475)	26 335 (5 920)	
	508 (20)	8 320 ² (1 870 ²)	13 055 ² (2 935 ²)	10 030 (2 255)	16 280 (3 660)	17 525 (3 940)	24 575 (5 525)	19 905 (4 475)	26 955 (6 060)	
	559 (22)	8 430 ² (1 895 ²)	13 455 ² (3 025 ²)	10 275 (2 310)	17 105 (3 845)	17 525 (3 940)	25 265 (5 680)	19 905 (4 475)	27 600 (6 205)	
	610 (24)	8 540 ² (1 920 ²)	13 765 ² (3 095 ²)	10 540 (2 370)	17 725 (3 985)	17 525 (3 940)	25 975 (5 840)	19 905 (4 475)	28 270 (6 355)	
LPI® 56	302 (11⅞)	8 030 (1 805)	11 655 (2 620)	10 630 (2 390)	14 435 (3 245)	21 975 (4 940)	27 090 (6 090)	25 775 (5795)	28 515 (6 410)	476 (2 720)
	356 (14)	8 030 (1 805)	12 320 (2 770)	10 785 (2 425)	16 370 (3 680)	21 975 (4 940)	28 470 (6 400)	25 775 (5795)	30 180 (6 785)	
	406 (16)	8 030 (1 805)	12 945 (2 910)	10 920 (2 455)	18 150 (4 080)	21 975 (4 940)	29 805 (6 700)	25 775 (5795)	31 760 (7 140)	
	457 (18)	9 230 ² (2 075 ²)	16 145 ² (3 630 ²)	11 055 (2 485)	19 970 (4 490)	21 975 (4 940)	31 135 (7 000)	25 775 (5795)	33 340 (7 495)	
	508 (20)	9 295 ² (2 090 ²)	17 235 ² (3 875 ²)	11 210 (2 520)	21 795 (4 900)	21 975 (4 940)	32 425 (7 290)	25 775 (5795)	34 940 (7 855)	
	559 (22)	9 365 ² (2 105 ²)	18 325 ² (4 120 ²)	11 345 (2 550)	23 600 (5 305)	21 975 (4 940)	33 760 (7 590)	25 775 (5795)	36 520 (8 210)	
	610 (24)	9 410 ² (2 115 ²)	19 440 ² (4 370 ²)	11 475 (2 580)	25 420 (5 715)	21 975 (4 940)	35 095 (7 890)	25 775 (5795)	38 120 (8 570)	
LPI® 450	241 (9½)	5 894 (1 325)	7 718 (1 735)	7 295 1640	8 630 1940	13 033 (2 930)	14 635 (3 290)	15 413 (3 465)	16 948 (3 810)	231 (1 321)
	302 (11⅞)	5 894 (1 325)	8 496 (1 910)	7 517 1690	10 031 (2 255)	13 478 (3 030)	15 658 (3 520)	15 836 (3 560)	17 615 (3 960)	
	356 (14)	5 894 (1 325)	9 163 (2 060)	7 718 1735	11 276 (2 535)	13 945 (3 135)	16 570 (3 725)	16 191 (3 640)	18 215 (4 095)	
	406 (16)	5 894 (1 325)	9 786 (2 200)	7 896 1775	12 455 (2 800)	14 368 (3 230)	17 437 (3 920)	16 570 (3 725)	18 816 (4 230)	
LPI® 530	241 (9½)	6 183 (1 390)	7 896 (1 775)	7 695 1730	9 408 (2 115)	14 501 (3 260)	16 147 (3 630)	15 902 (3 575)	17 548 (3 945)	275 (1 572)
	302 (11⅞)	6 183 (1 390)	8 741 (1 965)	7 873 1770	10 987 (2 470)	14 879 (3 345)	17 437 (3 920)	16 859 (3 790)	19 194 (4 315)	
	356 (14)	6 183 (1 390)	9 475 (2 130)	8 029 1805	12 388 (2 785)	15 191 (3 415)	18 638 (4 190)	17 726 (3 985)	20 684 (4 650)	
	406 (16)	6 183 (1 390)	10 186 (2 290)	8 185 1840	13 723 (3 085)	15 524 (3 490)	19 728 (4 435)	18 527 (4 165)	22 041 (4 955)	

Notes to Table 4.1.1:

1. The factored moment resistances listed in Table 4.1.1 must not be increased by any Code allowed repetitive member system factor.
 2. Factored end reaction for 64 mm (2½ in.) bearing length.
 3. For all depths of 241 mm (9½ in.) and greater, the factored intermediate reaction with a minimum bearing length of 76 mm (3 in.) shall be permitted to be determined by prorating based on the intermediate reaction values with a bearing length of 89 mm (3½ in.) and 140 mm (5½ in.).
 4. WS: web stiffeners; w/o WS: without web stiffeners.
 5. The factored compression perpendicular to the grain of the flange per mm (in.) of bearing length.
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Report Holder

Louisiana-Pacific Corporation
414 Union Street, Suite 2000
Nashville, TN 37219
USA

Telephone: 615-986-5600

Fax: 615-986-5666

Plants

Red Bluff, CA, USA
Larouche, QC
St-Prime, QC

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Appendix A

The design values obtained from testing to ASTM D5055-08a, “Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists,” as specified in CAN/CSA-O86-09, “Engineering Design in Wood,” and in previous editions as summarized below. The manufacturer’s published pre-engineered joist spans were designed in accordance with CAN/CSA-O86-09.

Table A1 Additional Test Information for the Products

Property	Test Information
Shear capacity	The shear capacity was established for each depth separately, as per ASTM D5055-04. Data from quality control (QC) tests have been used to establish the applicable coefficient of variation, CV_w , and the reliability normalization factor from Table 13.2.3.2 of CAN/CSA-O86-01 was used to determine the specified strength. The shear capacity was revised to meet the requirements of ASTM D5055-08 and CAN/CSA-O86-01.
Moment capacity	The moment capacity qualification was carried out using the analytical method based on the characteristics of the flange material, and with confirmatory testing done in accordance with ASTM D5055-04. Data from QC tests have been used to establish the applicable coefficient of variation, CV_w , and the reliability normalization factor from Table 13.2.3.2 of CAN/CSA-O86-01 was used to determine the specified strength. Moment capacities for LPI® 18, 20Plus, 32Plus, 42Plus and 52Plus were revised to meet the requirements of ASTM D5055-08a and CAN/CSA-O86-09.
Stiffness	An appropriate test program was used to confirm the stiffness capacity. The following formula was used to predict mid-span deflection: $deflection = \frac{5wL^4}{384EI} + \frac{wL^2}{K}$ <p>where: w = load (kN/m), L = span (mm), EI and K are taken from Table 4.1.1</p>
End joints	Flange tension tests were conducted in accordance with ASTM D5055-04, Section 6.3.1.3. The tensile capacity was determined in accordance with ASTM D5055-04, Section 6.3.1.4.
Creep	Specimens were tested for creep performance in accordance with ASTM D5055-04. The specimens recovered more than 90% of the basic dead load deflection.
Bearing length	Qualification tests were conducted to qualify minimum bearing lengths. The I-joist design properties on end reaction and intermediate reaction for LPI® 18, 20Plus, 32Plus, 42Plus and 52Plus were analyzed using ASTM D5055-08, whereby design values were based on linear interpolation within the tested bounds of depth and bearing length (4-corner method). Qualification tests for the reaction values were used to establish the applicable coefficient of variation, CV_w , and the reliability normalization factor from Table 13.2.3.2 of CAN/CSA-O86-01 was used to determine the specified strength. Extrapolation of reaction properties in Table 4.1.1 is not allowed. LPI® 36 and LPI® 56 reaction properties shown in Table 4.1.1 are specific to the bearing lengths shown and are based on a rational bearing analysis methodology. Data submitted confirm satisfactory performance to the rational methodology. Qualification test data for the reaction values were used to establish the applicable coefficient of variation, CV_w , and the reliability normalization factor from Table 14.2.3.2 of CSA O86-09 was used to determine the specified strength.
Adhesive qualification	The adhesive used complies with CSA O112.7-M1977, “Resorcinol and Phenol-Resorcinol Resin Adhesives for Wood (Room- and Intermediate-Temperature Curing)” (see CCMC 12917-L, 13054-L and 13291-L). An alternate water-based melamine adhesive for flange fingerjoints complies with CSA O112.9-04, “Evaluation of Adhesives for Structural Wood Products (Exterior Exposure)” (see CCMC 13307-L).
Web stock	The web stock complies with CSA O325.0-92 (R2003), “Construction Sheathing.”