



**SOLIDSTART**<sup>®</sup>  
ENGINEERED WOOD PRODUCTS



U.S. Technical Guide



U.S. TECHNICAL GUIDE

LP<sup>®</sup> SolidStart<sup>®</sup> LSL and  
LP<sup>®</sup> FlameBlock<sup>®</sup> I-Joists

# Ready-to-Frame Solutions for the Fire Protection of Floors

LP Corp. |

**BUILD WITH US<sup>®</sup>**

Please verify availability with the LP SolidStart Engineered Wood Products distributor in your area prior to specifying these products.

## Two Ready-to-Frame Solutions for the Fire Protection of Floors

### LP<sup>®</sup> FlameBlock<sup>®</sup> I-Joists

*Coated with FlameBlock<sup>®</sup>, a proven, patented product that slows the effects of heat and flames.*

- A direct replacement for LP I-Joist counterparts that have the same design specifications
- Can be installed with either flange up.
- Heavy duty components provide a solid feel compared to the same floor framed with standard I-joists of the same depth and flange.
- I-joist webs permit larger holes than solid rectangular shaped products. No treatment for cut areas required.
- 2½-inch or 3½-inch-wide flanges make handling easier. More surface for nailing and gluing.

### LP<sup>®</sup> SolidStart<sup>®</sup> LSL

*Meets IRC Code provisions\* and provides enhanced floor performance.*

- Manufactured to a consistent, low-moisture content. Less twisting, warping, or shrinking.
- Dimensionally stable and straighter than solid sawn lumber. Fewer squeaks and pops reduce call backs.
- Readily available up to 16" deep.
- LP LSL provides a solid feeling floor.

\*LP FlameBlock I-Joists and LP SolidStart LSL meet the provisions of Section R501.3 of the 2012 IRC (Section R302.13 in the 2015 IRC) without the need for attaching a gypsum ceiling or installing sprinklers.



# Build Floors with LP's Ready-to-Frame Products *and* Meet the IRC Provisions for the Fire Protection of Floors

As more states adopt and enforce the 2012 and 2015 International Residential Code (IRC), builders need options to make the best decisions for their customers.

LP has responded with two solutions to meet the fire protection of floors provision. No need for automatic sprinkler systems or gypsum wallboard on the underside of first floor framing.

Builders can directly swap LP® FlameBlock® I-Joists for the comparable LP® SolidStart® I-Joists, or frame with LP® SolidStart® LSL.

Both products offer an innovative solution to the IRC while providing the consistent quality and performance you've come to expect from LP.

*Light-framed wood floor assemblies not protected with gypsum wallboard or by an automatic sprinkler system in single-family and two-family homes must otherwise meet the IRC 2x10 fire performance equivalence.*

## MEET THE FIRE PROTECTION OF FLOORS PROVISION\* WITH TWO LP ENGINEERED WOOD PRODUCTS

PRODUCT ADVANTAGES	LP SolidStart LSL	LP FlameBlock I-Joist
• Meets 2012/2015 IRC Provision for the Fire Protection of Floors	✓	✓
• No need to install gypsum wallboard or sprinklers when using these products	✓	✓
• Dimensionally stable for predictable floor performance	✓	✓
• Heavy duty products provide solid feeling floors	✓	✓
• Available in a wide range of lengths	✓	✓
• Available in standards depths up to 14" and 16" deep	✓	✓
• Allows for cutting large holes		✓
• Swaps out as a direct substitute for the same depth and "series" of I-Joist		✓
• Price stability versus commodity lumber allows for predictable costs/margins	✓	✓
• Backed by LP SolidStart Lifetime Limited Warranty	✓	✓
• Backed by LP Technical and Engineering Support	✓	✓

\* LP FlameBlock I-Joists and LP SolidStart LSL meet the provisions of Section R501.3 of the 2012 IRC (Section R302.13 in the 2015 IRC) *without the need for attaching a gypsum ceiling or installing sprinklers.*

# LP® SolidStart® LSL and LP® FlameBlock® I-Joist Floor Joist Span Tables and Design Values

SIMPLE SPANS: 40 psf Live Load, 10 or 15 psf Dead Load										CONTINUOUS SPANS: 40 psf Live Load, 10 or 15 psf Dead Load							
Depth	Thickness x Grade or Series	L/480				L/360				L/480							
		12" oc	16" oc	19.2" oc	24" oc	12" oc	16" oc	19.2" oc	24" oc	12" oc	16" oc	19.2" oc	24" oc				
9-1/2"	1-1/2"x 1.35E LSL	14'-8"	13'-4"	12'-6"	11'-6"	16'-3"	14'-8"	13'-10"	12'-9"	Use the LP SolidStart Design software for multi-spans							
	1-1/2"x 1.55E LSL	15'-5"	13'-11"	13'-1"	12'-1"	17'-0"	15'-5"	14'-6"	13'-5"								
	1-3/4"x 1.55E LSL	16'-3"	14'-9"	13'-10"	12'-9"	17'-11"	16'-3"	15'-3"	14'-2"								
	LPI 20FB	17'-9"	16'-2"	15'-3"	14'-2"	19'-7"	17'-4"	15'-10"	14'-2"					19'-4"	17'-3"	15'-9"	14'-1"
	LPI 42FB	20'-10"	19'-0"	17'-11"	16'-8"	23'-1"	21'-1"	19'-11"	18'-6"	22'-9"	20'-8"	19'-6"	18'-1"				
11-7/8"	1-1/2"x 1.35E LSL	18'-5"	16'-8"	15'-8"	14'-6"	20'-4"	18'-5"	17'-3"	16'-0"	Use the LP SolidStart Design software for multi-spans							
	1-1/2"x 1.55E LSL	19'-4"	17'-6"	16'-5"	15'-2"	21'-4"	19'-4"	18'-2"	16'-9"								
	1-3/4"x 1.55E LSL	20'-4"	18'-5"	17'-4"	16'-0"	22'-6"	20'-4"	19'-1"	17'-8"								
	LPI 20FB	21'-2"	19'-4"	18'-3"	16'-4"	23'-2"	20'-1"	18'-4"	16'-4"					23'-1"	20'-0"	18'-3"	16'-3"
	LPI 42FB	24'-11"	22'-8"	21'-4"	19'-10"	27'-6"	25'-1"	23'-8"	22'-0"	27'-1"	24'-8"	23'-3"	21'-7"				
14"	1-1/2"x 1.35E LSL	21'-9"	19'-8"	18'-6"	17'-1"	24'-0"	21'-9"	20'-5"	18'-11"	Use the LP SolidStart Design software for multi-spans							
	1-3/4"x 1.55E LSL	24'-0"	21'-9"	20'-5"	18'-11"	26'-6"	24'-0"	22'-7"	20'-11"								
	LPI 20FB	24'-1"	21'-9"	19'-10"	17'-9"	25'-2"	21'-9"	19'-10"	17'-9"	25'-1"	21'-8"	19'-9"	17'-6"				
	LPI 42FB	28'-3"	25'-9"	24'-3"	22'-6"	31'-3"	28'-6"	26'-10"	23'-10"	30'-10"	28'-0"	26'-5"	22'-6"				
16"	1-3/4"x 1.55E LSL	27'-6"	24'-11"	23'-5"	21'-8"	30'-4"	27'-6"	25'-10"	23'-4"	Use the LP SolidStart Design software for multi-spans							
	LPI 20FB	26'-9"	23'-4"	21'-3"	17'-10"	26'-11"	23'-4"	21'-3"	17'-10"					26'-10"	23'-3"	21'-2"	18'-4"
	LPI 42FB	31'-4"	28'-6"	26'-10"	24'-8"	34'-7"	31'-7"	29'-7"	24'-8"					34'-2"	31'-1"	29'-2"	23'-3"

## DESIGN ASSUMPTIONS FOR FLOOR SPANS:

- The spans listed are the clear distance between supports. Continuous spans are based on the longest span. The shortest span shall not be less than 50% of the longest span.
- The spans are based on uniform floor loads only as listed at the top of the table.
- These tables reflect the additional stiffness provided by 48/24 APA RATED SHEATHING or 24 oc APA RATED STURD-I-FLOOR, or equal, glued and nailed to the top flange.
- Live Load deflection is limited to L/480 or L/360 as indicated, and L/480 only for continuous spans. Total Load deflection is limited to L/240.
- The spans are based on an end bearing length of at least 1-3/4" and an interior bearing length of at least 3-1/2", and are limited to the bearing capacity for an SPF wall plate (F<sub>cperp</sub> = 425 psi).

- Web stiffeners are not required for the span in these tables.
- Web fillers are required for I-Joists seated in hangers that do not laterally support the top flange.
- L/360 represents the maximum deflection allowed per code and may not provide suitable floor performance. L/480 or better is recommended for most applications.
- LSL spans have been adjusted to allow limited holes. Refer to the attached Allowable Holes in LP-LSL Floor Joists diagram and notes for details.
- For conditions not shown, use LP's design software or contact your LP SolidStart Engineered Wood Products distributor for assistance.

## Reference Design Values for LP SolidStart LSL and FlameBlock I-Joists

Depth	Thickness, Grade/Series	EI (x10 <sup>6</sup> ) (lb-in <sup>2</sup> )	K (x10 <sup>6</sup> ) (lb-ft/in)	Moment (lb-ft)	Shear (lbs)	Reaction (lbs)		Weight (plf)
						1-3/4" End Bearing	3-1/2" Int. Bearing	
9-1/2"	1-1/2"x 1.35E	144	0.668	3363	3895	1115	2230	4.4
	1-1/2"x 1.55E	166	0.767	4588	3895	1115	2230	4.6
	1-3/4"x 1.55E	194	0.895	5353	4544	1300	2600	5.3
	LPI 20FB	185	0.358	2810	1260	1152	2375	4.4
	LPI 42FB	321	0.412	5375	1340	1340	3095	5.2
11-7/8"	1-1/2"x 1.35E	282	0.835	5090	4869	1115	2230	5.4
	1-1/2"x 1.55E	324	0.959	6944	4869	1115	2230	5.7
	1-3/4"x 1.55E	378	1.118	8101	5680	1300	2600	7.5
	LPI 20FB	318	0.438	3755	1485	1296	2525	5.3
	LPI 42FB	547	0.515	6965	1625	1522	3340	5.9
14"	1-1/2"x 1.35E	463	0.984	6910	5740	1115	2230	6.4
	1-3/4"x 1.55E	620	1.319	10998	6697	1300	2600	7.8
	LPI 20FB	474	0.512	4400	1680	1424	2665	6.2
	LPI 42FB	802	0.607	8390	1875	1682	3565	6.9
16"	1-3/4"x 1.55E	925	1.507	14093	7653	1300	2600	8.9
	LPI 20FB	652	0.582	5050	1870	1546	2795	7
	LPI 42FB	1092	0.693	9725	2115	1832	3775	7.7

## Notes:

- Reaction capacities are for normal load duration. LPI reaction capacities can be adjusted for duration of load. LSL reaction capacities may not be adjusted for duration of load. LSL reaction capacities have been limited by the bearing capacity of an SPF wall plate (425 psi).
- Moment and Shear are for normal load duration and shall be adjusted according to code.
- LP-LSL moment can be increased for repetitive member use, 4%, where appropriate. LPI moment capacity shall not be increased for repetitive member use.

4. Deflection calculations shall not be adjusted for duration of load.

- Deflection calculations shall include both bending and shear deformations. Deflection for a simple span, uniform load: Equations for other conditions can be found in engineering references.

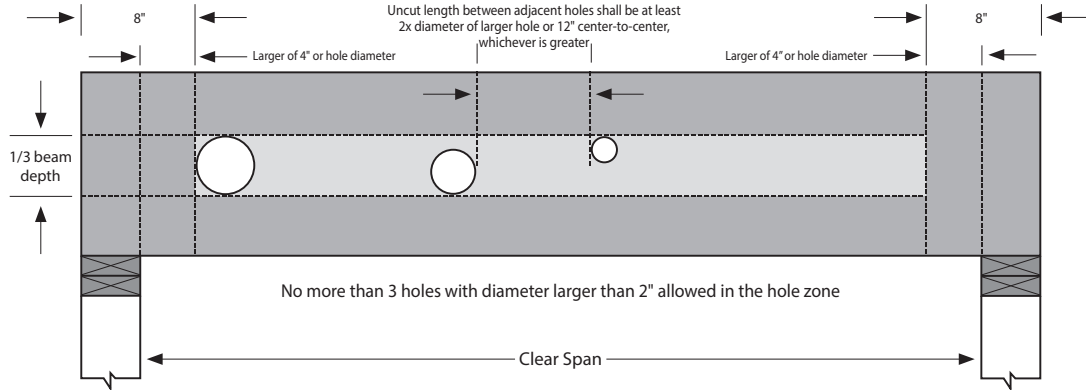
$$\Delta = \frac{22.5wL^4}{EI} + \frac{wL^2}{K}$$

Where:  $\Delta$  = deflection (in)  
 $w$  = uniform load (plf)  
 $L$  = design span (ft)  
 $EI$  = bending stiffness (from table)  
 $K$  = shear stiffness (from table)

- LP SolidStart LSL and I-Joists shall be designed for dry-use conditions only. Dry-use applies to products installed in dry, covered and well ventilated interior conditions in which the equivalent moisture content in lumber will not exceed 16%.

# LP® SolidStart® LSL and LP® FlameBlock® I-Joist Allowable Hole Diagrams and Tables

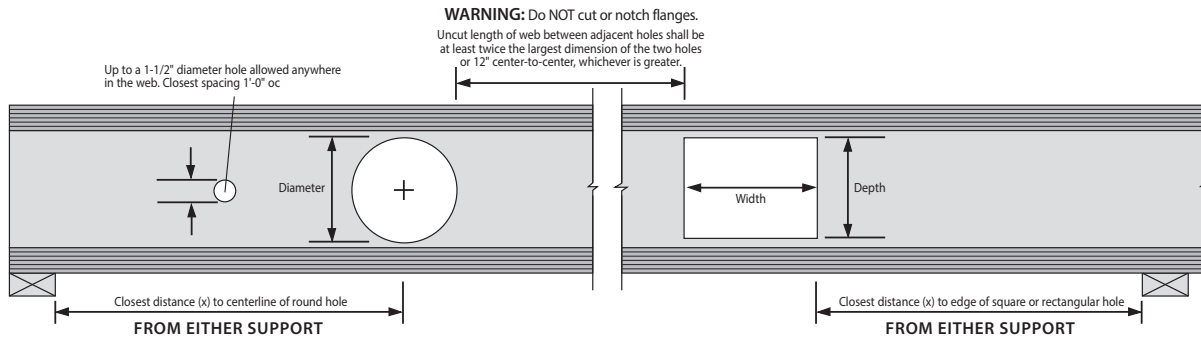
## Allowable Holes in LP LSL Floor Joists as specified in the floor joist span table



### Notes:

1. Large circular holes are permitted to be full depth of the Hole Zone for the simple spans, uniform loads and LP LSL grades and sizes specified in the table below.
2. The Hole Zone is the middle 1/3 of the joist depth, rounded up to the next 1/16" as follows: 3-1/8" for 9-1/4", 3-3/16" for 9-1/2", 3-3/4" for 11-1/4", 4" for 11-7/8", 4-11/16" for 14", and 5-3/8" for 16".
3. The Hole Zone begins at least 8" from the end of member, and the larger of 4" or one hole diameter from the inside face of the support.
4. Up to five total holes are allowed; no more than 3 holes may have a diameter larger than 2".
5. Multiple holes shall have a clear separation along the length of the joist of at least twice the diameter of the larger hole.
6. Rectangular holes are NOT allowed.
7. Protect plumbing holes from moisture.
8. Other hole sizes and configurations MAY be possible with further engineering analysis. Use LP's design software or contact your LP SolidStart Engineered Wood Products distributor for assistance.

## Allowable Holes in LPI 20FB and 42FB I-Joists



Series	Depth	Circular Hole Diameter								Series	Depth	Rectangular Hole Maximum Dimension: Depth or Width							
		2"	3"	4"	5"	6"	7"	8"	10"			2"	3"	4"	5"	6"	7"	8"	10"
LPI 20FB	9-1/2"	1'-0"	1'-0"	1'-5"	2'-0"	2'-8"	-	-	-	LPI 20FB	9-1/2"	2'-10"	3'-4"	3'-10"	4'-7"	5'-9"	6'-2"	6'-8"	7'-8"
	11-7/8"	1'-0"	1'-4"	1'-11"	2'-5"	2'-11"	3'-6"	4'-0"	-		11-7/8"	3'-9"	4'-2"	4'-9"	5'-5"	6'-5"	7'-9"	9'-8"	11'-0"
	14"	1'-3"	1'-8"	2'-2"	2'-7"	3'-1"	3'-6"	4'-0"	5'-1"		14"	1'-2"	1'-10"	2'-6"	3'-2"	3'-11"	4'-8"	5'-7"	9'-0"
	16"	1'-8"	2'-1"	2'-6"	2'-11"	3'-4"	3'-9"	4'-3"	5'-1"		16"	1'-7"	2'-3"	2'-11"	3'-7"	4'-3"	4'-11"	5'-8"	8'-2"
LPI 42FB	11-7/8"	3'-2"	3'-10"	4'-7"	5'-3"	6'-0"	6'-9"	7'-8"	-	LPI 42FB	11-7/8"	7'-2"	8'-0"	9'-0"	10'-0"	10'-11"	12'-1"	13'-8"	14'-11"
	14"	4'-5"	5'-0"	5'-7"	6'-1"	6'-8"	7'-3"	8'-0"	9'-11"		14"	4'-4"	5'-2"	6'-0"	6'-10"	7'-10"	9'-1"	10'-10"	14'-7"
	16"	5'-4"	5'-10"	6'-4"	6'-10"	7'-4"	7'-10"	8'-6"	10'-10"		16"	5'-3"	6'-0"	6'-9"	7'-7"	8'-6"	9'-8"	11'-2"	15'-1"

### Notes:

1. CUT HOLES CAREFULLY! DO NOT OVERCUT HOLES! DO NOT CUT JOIST FLANGES!
2. Holes may be placed anywhere within the depth of the web. A minimum 1/4" clear distance from the flanges is recommended so as not to cut a flange.
3. Round holes up to 1-1/2" diameter may be placed anywhere in the web.
4. Perforated "knockouts" may be neglected when locating web holes.
5. Holes larger than 1-1/2" are not permitted in cantilevers without special engineering.
6. Multiple holes shall have a clear separation along the length of the joist of at least twice the larger dimension of the larger adjacent hole, or a minimum of 12" center-to-center, whichever is greater.
7. Multiple holes may be spaced closer provided they fit within the boundary of an acceptable larger hole. Example: two 3" round holes aligned parallel to the joist length may be spaced 2" apart (clear distance) provided that a 3" high by 8" long rectangle or an 8" diameter round hole are acceptable for the joist depth at that location and completely encompass the holes.
8. These web hole tables are valid for simple and continuous span I-Joists with uniform loads only, as sized from the tables contained in LP's current I-Joist product guides. Larger holes, non-uniform loading conditions and/or closer proximity to supports may be possible, but require further analysis using LP's design software. Please contact your local LP SolidStart Engineered Wood Products distributor for more details.
9. The maximum hole depth is the I-Joist Depth less 4", except the maximum hole depth is 6" for 9-1/2" LP I-Joists, and 8" for 11-7/8" LP I-Joists. Where the Maximum Hole Dimension exceeds the hole depth, the dimension refers to hole width and the depth of the hole is assumed to be the maximum for that joist depth. The maximum hole width is 18", regardless of I-Joist Depth.

# Handling and Storage Guidelines and Warnings

**WARNING:** Failure to follow proper procedures for handling, storage and installation could result in unsatisfactory performance, unsafe structures and possible collapse.

Keep LP SolidStart Engineered Wood Products dry. These products are intended to resist the effects of moisture on structural performance from normal construction delays but are not intended for permanent exposure to the weather.

Unload products carefully, by lifting. Support the bundles to reduce excessive bowing. Individual products shall be handled in a manner which prevents physical damage during measuring, cutting, erection, etc. I-Joists shall be handled vertically and not flatwise.

Keep products stored in wrapped and strapped bundles, stacked no more than 10' high. Support and separate bundles with 2x4 (or larger) stickers spaced no more than 10' apart. Keep stickers in line vertically.

Product must not be stored in contact with the ground, or have prolonged exposure to the weather.

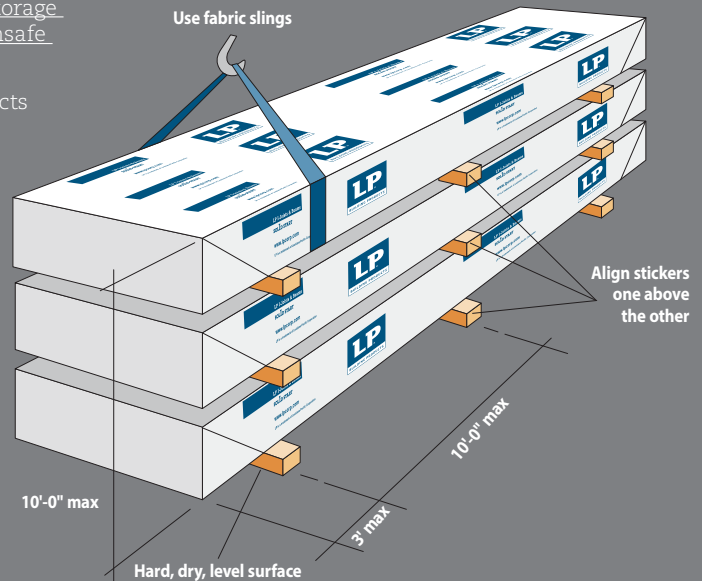
Use forklifts and cranes carefully to avoid damaging product.

Do not use a visually damaged product. Call your local LP SolidStart Engineered Wood Products distributor for assistance when damaged products are encountered.

For satisfactory performance, LP SolidStart Engineered Wood Products must be used under dry, covered and well-ventilated interior conditions in which the equivalent moisture content in lumber will not exceed 16%.

For built-up members, LP SolidStart I-Joists, LSL and LVL shall be dry before nailing or bolting to avoid trapping moisture.

LP SolidStart I-Joists, LSL and LVL shall not be used for unintended purposes such as ramps and planks.



## LPI 20FB

Width: 2-1/2"  
 Depths: 9-1/2", 11-7/8", 14", 16"  
 Flange Material: Solid Sawn  
 Flange Depth: 1-1/2"  
 Lengths: Up to 48'

## LPI 42FB

Width: 3-1/2"  
 Depths: 11-7/8", 14", 16"  
 Flange Material: Solid Sawn  
 Flange Depth: 1-1/2"  
 Lengths: Up to 48'

## LP LSL

**1730F<sub>b</sub> -1.35E, 2360F<sub>b</sub> -1.55E**  
 Standard Thickness of 1-1/2" and 1-3/4"  
 Standard Depths of 9-1/2", 11-7/8", 14" and 16"  
 (16" deep LSL joists must be 1-3/4" thick)  
 Lengths up to 48'

## CODE EVALUATION

Code evaluation reports can be obtained at [www.lpcorp.com](http://www.lpcorp.com)

**LP I-Joists** ICC ESR 1305  
 APA PR-L238  
 Florida FL15401  
 LADBS RR-25099

**LP LSL** ICC-ES ESR-2403  
 APA PR-L280  
 Florida FL15228  
 LP City RR-25783



For more information on the full line of LP SolidStart Engineered Wood Products or the nearest distributor, visit our web site at [LPCorp.com](http://LPCorp.com).

Phone: 1-888-820-0325  
 E-mail: [customer.support@LPCorp.com](mailto:customer.support@LPCorp.com).

LP SolidStart Engineered Wood Products are manufactured at different locations in the United States and Canada. Please verify availability with the LP SolidStart Engineered Wood Products distributor in your area before specifying these products.

### Cal. Prop 65 Warning:

**WARNING:** Drilling, sawing, sanding or machining wood products can expose you to wood dust, a substance known to the State of California to cause cancer. Avoid inhaling wood dust or use a dust mask or other safeguards for personal protection. For more information go to [www.P65Warnings.ca.gov/wood](http://www.P65Warnings.ca.gov/wood).

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