

ICC-ES Evaluation Report

ESR-1290

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DIVISION: 06 00 00—WOOD, PLASTICS AND
COMPOSITES

Section: 06 17 33—Wood I-joists

REPORT HOLDER:

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EVALUATION SUBJECT:

IB-400, IB-600, IB-800, IB-900 I-JOISTS

ADDITIONAL LISTEE:

BLUELINX CORPORATION
4300 WILDWOOD PARKWAY
ATLANTA, GEORGIA 30339**PRODUCT NAMES:** *BLI 40, BLI 60, BLI 80, BLI 90 I-JOISTS (Equivalent to IB-400, IB-600, IB-800 and IB-900, respectively)*

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2009 *International Building Code*® (IBC)
- 2009 *International Residential Code*® (IRC)
- Other Codes (see Section 8.0)

Property evaluated:

Structural

2.0 USES

IB-400, IB-600, IB-800, IB-900 I-joists are prefabricated wood I-joists used as floor joists, roof rafters, and blocking panels to support code-required loads. Prefabricated wood I-joists described in this report comply with Section 2303.1.2 of the IBC, for allowable stress design and Section R502.1.4 of the IRC.

3.0 DESCRIPTION

3.1 General:

IB I-joists are prefabricated wood I-joists with solid sawn lumber flanges and oriented strand board (OSB) webs. The top and bottom flanges are parallel, creating constant-depth joists. The web-to-web and web-to-flange connections are proprietary tongue-and-groove glued

joists. The joists are manufactured in depths ranging from 9¹/₄ inches (235 mm) to 24 inches (610 mm) and in lengths up to 52 feet (15 850 mm). See Table 1 for joist dimensions.

3.2 Material Specifications:

3.2.1 Flanges: The flange lumber is spruce-pine-fir (SPF), complying with the specifications given in the I-joist manufacturer's quality control documentation. The specifications are an in-house upgrade of the grading standard, resulting in an enhanced grade. See Table 1 for flange lumber grades and dimensions

3.2.2 Webs: Web material for IB I-joists is Exposure 1 grade OSB as described in DOC PS2 and complying with the I-joist manufacturer's quality control documentation. See Table 1 for OSB thickness.

3.2.3 Adhesive: Adhesives used in the fabrication of the IB I-joists are exterior-type, heat-durable adhesives, complying with ASTM D 2559 and ASTM D 5055, and are specified in the I-joist manufacturer's quality control manual and manufacturing standards

4.0 INSTALLATION

4.1 General:

Design and installation of IB I-joists must comply with Sections 4.2 through 4.12 of this report, the manufacturer's published installation instructions, and the applicable code. The manufacturer's published installation instructions are to be available at the jobsite at all times during installation.

4.2 Structural Capacity:

Table 2 specifies the reference design moments, vertical shear forces, bending stiffness (EI), shear deflection coefficients (K) and vertical load capacities for the I-joists. End and interior reaction capacities are shown in Table 3.

4.3 Fasteners:

Allowable capacities and required spacing of fasteners installed in the flanges are to be determined in accordance with the applicable code for fasteners installed in sawn lumber with a maximum specific gravity of 0.42 for IB-400, 0.46 for IB-600 and IB-800, and 0.50 for IB-900.

4.4 Web Stiffeners:

Web stiffeners are required at bearings in all engineered applications with design reactions greater than the reference end or interior reactions without bearing stiffeners as indicated in Table 3. Web stiffeners are required at concentrated loads between supports (or between the cantilever bearing and cantilever tip) when the concentrated load is greater than 1500 pounds. Typical

web stiffener details and installation instructions are included in the web stiffener requirements shown in the International Beams Installation Guide, dated January 2010.

4.5 Lateral Support:

The compression flange of the joists must have continuous lateral support. The joists must be restrained at ends and bearing locations to prevent rollover. Code-prescribed methods of lateral restraint specified for sawn lumber are acceptable. Bridging is not required for floor and roof IB I-joist applications unless specified by the design professional.

4.6 Holes:

Holes in joist webs are permitted for the conditions specified in the web hole guidelines included in the International Beam Installation Guide, dated January 2010. Sizes, locations, and other criteria for holes in joist webs not specified in the web hole guidelines have not been evaluated and are outside the scope of this report.

4.7 Duration of Load:

Adjustments to the allowable loads for IB I-joists for duration of load are to be made in accordance with Section 2.3.2 of the AF&PA National Design Specification for Wood Construction.

4.8 In-service Moisture Conditions:

IB I-joists may only be installed where the in-service moisture content of the wood does not exceed 16 percent.

4.9 Repetitive-member Use:

The repetitive-member use factors applicable to the allowable moment capacities listed in Table 2 are limited to 1.0.

4.10 Member Spans:

Allowable shear values are to be compared to calculated shear loads which include all loads between support faces. Allowable moment and deflection values are to be compared to calculated moments and deflections based on the joist span from centerline of support to centerline of support.

4.11 Deflection:

Deflection of joists under design loads is not to exceed the maximum allowable deflection specified in the applicable code.

Deflection of joists is to be calculated using the following formulae:

$$\Delta_{Total} = \Delta_{Bending} + \Delta_{Shear}$$

where:

$\Delta_{Bending}$ = Deflection due to bending using standard engineering formulae [inches (mm)].

Δ_{Shear} = $(8M)/K$.

where:

M = Design moment [inch-lbf (mm-N)].

K = Shear deflection factor from Table 2 [lbf (N)].

Deflection of a uniformly loaded, simple-span I-joist is to be determined using the following formula:

$$\Delta_{Total} = \frac{5wL^4}{384EI} + \frac{wL^2}{K}$$

Deflection of a simple-span I-joist with a concentrated load at mid-span is to be determined using the following formula:

$$\Delta_{Total} = \frac{PL^3}{48EI} + \frac{2PL}{K}$$

where:

Δ_{Total} = Total I-joist deflection [inches (mm)].

w = Applied uniform loads [lbf/inch (N/mm)].

P = Applied concentrated load (lbf (N)).

L = I-joist span [inches (mm)].

EI = I-joist bending stiffness from Table 2 [$\text{in}^2\text{-lbf}$ ($\text{mm}^2\text{-N}$)].

K = Shear deflection factor from Table 2 [lbf (N)].

4.12 Blocking Panels:

Bearing walls perpendicular to and supported by IB joists at the end or intermediate supports, or both, require full-depth blocking. IB I-joists, when used as blocking panels, have maximum vertical load transfer capacities as indicated in Table 2.

5.0 CONDITIONS OF USE

The IB-400, IB-600, IB-800, and IB-900 I-joists described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 IB I-joists must be designed and installed in accordance with this report and the manufacturer's published installation instructions, dated January 2010. In the event of a conflict, this report governs.

5.2 Drawings and design details verifying compliance with this report must be submitted to the code official for approval. The drawings and calculations are to be prepared by a registered design professional when required by the statutes of the jurisdiction in which the project is to be constructed.

5.3 Cutting and notching of IB I-joist flanges is not permitted, except for cutting to proper length for installation.

5.4 IB I-joists are manufactured in Pohenegamook, Quebec, Canada, under a quality control program with inspections conducted by APA—The Engineered Wood Association (AA-649).

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Prefabricated Wood I-Joists (AC14), dated October 2007 (editorially revised February 2010).

7.0 IDENTIFICATION

IB I-joists are stamped with the manufacturer's name (International Beams, Inc.) or the listee's name (BlueLinX Corporation), the joist series, the mill number, a date code, the name of the inspection agency (APA), and the evaluation report number (ESR-1290).

8.0 OTHER CODES

8.1 Evaluation Scope:

In addition to the codes referenced in Section 1.0, the products covered in this report were also evaluated for compliance with the requirements of the following codes:

- 2006 *International Building Code*®
- 2006 *International Residential Code*®

8.2 Uses:

See Section 2.0.

8.3 Description:

See Section 3.0.

8.4 Installation:

See Section 4.0.

8.5 Conditions of Use:

See Section 5.0.

8.6 Evidence Submitted:

See Section 6.0.

8.7 Identification:

See Section 7.0.

TABLE 1—DESCRIPTION OF IB I-JOISTS

SERIES	DEPTH (in.)	FLANGE			WEB THICKNESS (in.)
		Width (in.)	Thickness (in.)	Grade ¹	
IB-400	9 ¹ / ₄	2 ¹ / ₂	1 ¹ / ₂	#2 & better or MSR 1650F _b -1.5E	3 ³ / ₈
	9 ¹ / ₂				
	11 ¹ / ₄				
	11 ⁷ / ₈				
	14				
	16				
IB-600	9 ¹ / ₄	2 ¹ / ₂	1 ¹ / ₂	MSR 2100F _b -1.8E	3 ³ / ₈
	9 ¹ / ₂				
	11 ¹ / ₄				
	11 ⁷ / ₈				
	14				
	16				
	18				
	20				
IB-800	9 ¹ / ₄	3 ¹ / ₂	1 ¹ / ₂	MSR 2100F _b -1.8E	3 ³ / ₈
	9 ¹ / ₂				
	11 ¹ / ₄				
	11 ⁷ / ₈				
	14				
	16				
	18				
	20				
IB-900	11 ⁷ / ₈	3 ¹ / ₂	1 ¹ / ₂	MSR 2400F _b -2.0E	7 ⁷ / ₁₆
	14				
	16				
	18				
	20				
	22				
	24				

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

¹These grades are enhanced in accordance with the manufacturer's quality control documentation.

TABLE 2 REFERENCE DESIGN VALUES¹

SERIES	DEPTH (in.)	BENDING STIFFNESS, EI ×10 ⁶ (lbf-in ²)	ALLOWABLE MOMENT, M ² (lbf-ft)	SHEAR, V ³ (lbf)		SHEAR DEFLECTION FACTOR K ⁴ ×10 ⁶ (lbf)	VERTICAL LOAD CAPACITY ⁵ (plf)
				Without bearing Stiffeners	With bearing stiffeners		
IB-400	9 ¹ / ₄	185	2,715	1,155	1,155	4.81	2,000
	9 ¹ / ₂	198	2,800	1,185	1,185	4.94	
	11 ¹ / ₄	296	3,410	1,405	1,405	5.85	
	11 ⁷ / ₈	336	3,630	1,480	1,480	6.18	
	14	494	4,370	1,550	1,750	7.28	
	16	673	5,065	1,550	2,000	8.32	
IB-600	9 ¹ / ₄	220	3,740	1,155	1,350	4.81	
	9 ¹ / ₂	235	3,860	1,185	1,370	4.94	
	11 ¹ / ₄	356	4,700	1,405	1,515	5.85	
	11 ⁷ / ₈	399	5,000	1,480	1,570	6.18	
	14	585	6,020	1,550	1,750	7.28	
	16	799	6,980	1,550	2,000	8.32	
	18	1,046	7,895	1,550	2,250	9.36	1,750
20	1,304	8,735	1,550	2,500	10.40	1,500	
IB-800	9 ¹ / ₄	307	5,295	1,155	1,390	4.81	2,000
	9 ¹ / ₂	326	5,465	1,185	1,405	4.94	
	11 ¹ / ₄	493	6,655	1,405	1,540	5.85	
	11 ⁷ / ₈	552	7,080	1,480	1,585	6.18	
	14	807	8,530	1,550	1,750	7.28	
	16	1,094	9,890	1,550	2,000	8.32	
	18	1,445	11,135	1,600	2,300	9.36	
	20	1,799	12,380	1,650	2,600	10.40	1,625
IB-900	11 ⁷ / ₈	604	8,825	1,885	1,925	6.18	2,000
	14	884	10,630	1,885	2,125	7.28	
	16	1,199	12,635	1,885	2,330	8.32	
	18	1,565	14,285	1,885	2,510	11.52	1,810
	20	1,984	15,810	1,885	2,695	12.80	1,625
	22	2,457	17,320	1,885	2,875	14.08	1,250
	24	2,985	18,810	1,885	3,060	15.36	1,250

For SI: 1 inch = 25.4 mm; 1 lbf. = 4.45N; 1 lbf.-in.² = 2.87 kN-mm²; 1 lbf.-ft. = 1.345 N-m.

¹Reference design values must be adjusted, as applicable, in accordance with Section 7.3 of the NDS.

²Moment capacity (M) of the IB-joist is not permitted to be increased by any repetitive member use factor, C_r.

³Shear capacity with a minimum bearing length of 4 inches.

⁴I-joist deflections must be calculated in accordance with Section 4.11.

⁵Vertical load capacity for I-joist used as a blocking panel.

Table 3—REFERENCE DESIGN REACTIONS⁴

Series	Depth (inches)	End Reaction Capacities ² (pounds)						Interior Reaction Capacities ³ (pounds)			
		1 3/4" Bearing		3 1/2" Bearing		4" or Larger Bearing		3 1/2" Bearing		5 1/2" Bearing	
		No stiffeners	Stiffeners	No stiffeners	Stiffeners	No stiffeners	Stiffeners	No stiffeners	Stiffeners	No stiffeners	Stiffeners
IB400	9 1/4	1,080	1,080	1,135	1,135	1,155	1,155	2,160	2,310	2,310	2,310
	9 1/2	1,080	1,080	1,160	1,160	1,185	1,185	2,160	2,370	2,370	2,370
	11 1/4	1,200	1,200	1,355	1,355	1,405	1,405	2,500	2,795	2,810	2,810
	11 7/8	1,200	1,200	1,415	1,415	1,480	1,480	2,500	2,795	2,810	2,960
	14	1,200	1,200	1,550	1,550	1,550	1,750	2,500	2,795	3,100	3,455
	16	1,200	1,200	1,550	1,550	1,550	2,000	2,500	2,795	3,100	3,650
IB600	9 1/4	1,080	1,350	1,135	1,350	1,155	1,350	2,160	2,700	2,310	2,700
	9 1/2	1,080	1,370	1,160	1,370	1,185	1,370	2,160	2,740	2,370	2,740
	11 1/4	1,200	1,515	1,355	1,515	1,405	1,515	2,500	3,030	2,810	3,030
	11 7/8	1,200	1,570	1,415	1,570	1,480	1,570	2,500	3,075	2,810	3,140
	14	1,290	1,725	1,550	1,750	1,550	1,750	2,500	3,215	3,100	3,455
	16	1,375	1,725	1,550	2,000	1,550	2,000	2,500	3,350	3,100	3,650
	18	1,465	1,725	1,550	2,250	1,550	2,250	2,500	3,425	3,100	3,735
	20	1,550	1,725	1,550	2,500	1,550	2,500	2,500	3,450	3,100	3,820
IB800	9 1/4	1,080	1,380	1,135	1,380	1,155	1,390	2,310	2,700	2,310	2,700
	9 1/2	1,080	1,405	1,160	1,405	1,185	1,405	2,370	2,740	2,370	2,740
	11 1/4	1,200	1,540	1,355	1,540	1,405	1,540	2,810	3,030	2,810	3,030
	11 7/8	1,280	1,585	1,415	1,585	1,480	1,585	2,810	3,140	2,810	3,140
	14	1,290	1,750	1,550	1,750	1,550	1,750	3,020	3,500	3,100	3,500
	16	1,375	2,000	1,550	2,000	1,550	2,000	3,100	4,000	3,100	4,000
	18	1,465	2,270	1,550	2,300	1,600	2,300	3,100	4,225	3,100	4,225
	20	1,550	2,460	1,550	2,600	1,650	2,600	3,100	4,350	3,100	4,350
IB900	11 7/8	1,400	1,585	1,805	1,805	1,885	1,925	3,355	3,355	3,355	3,355
	14	1,400	1,750	1,805	1,960	1,885	2,125	3,355	3,530	3,355	3,660
	16	1,400	2,000	1,805	2,330	1,885	2,330	3,355	3,920	3,355	4,090
	18	1,465	2,270	1,675	2,510	1,885	2,510	3,355	4,270	3,355	4,640
	20	1,550	2,470	1,675	2,680	1,885	2,695	3,355	4,600	3,355	5,000
	22	1,470	2,595	1,675	2,820	1,885	2,875	3,355	4,950	3,355	5,075
	24	1,470	2,880	1,675	2,960	1,885	3,060	3,355	5,150	3,355	5,150

For SI: 1 inch = 25.4 mm; 1 lbf = 4.448N; 1 psi = 2.87 kN-mm²

Notes

- ¹ Reference design reactions must be adjusted, as applicable, in accordance with Section 7.3 of the NDS. Adjusted reaction values must not exceed $E_{\text{perpendicular}}$ of the bearing plate X bearing length X flange width.
- ² Interpolation of the factored end reaction resistances between 1 3/4 inches and 3 1/2 inches is permitted.
- ³ Interpolation of the factored interior reaction resistances between 3 1/2 inches and 5 1/2 inches is permitted.