Code Compliance Research Report
CCRR-0232

Issue Date: 01-06-2017
Renewal Date: 01-06-2018
Revision Date: 03-29-2017

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DIVISION: 06 17 00 – WOOD, PLASTICS & COMPOSITES
Section: 06 17 33 – Wood I - Joists

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BlueLinx Corporation
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REPORT SUBJECT:
International Beams Inc.
IB Series I-Joists IB400, IB600, IB800, IB900

BlueLinx Corporation
BLI Joists BLI 40, BLI 60, BLI 80, BLI 90

1.0 SCOPE OF EVALUATION

The research report addresses compliance with the following Codes:

2015 International Building Code (IBC)
2015 International Residential Code (IRC)

2012 International Building Code (IBC)
2012 International Residential Code (IRC)

2009 International Building Code (IBC)
2009 International Residential Code (IRC)

2006 International Building Code (IBC)
2006 International Residential Code (IRC)

I-Joists have been evaluated for the following properties:

Structural Performance

2.0 USES

2.1. I-Joists are prefabricated structural framing load carrying members used in lieu of sawn lumber joists and rafters for commercial and residential construction in place of conventional sawn lumber using traditional framing tools and fasteners. I-joists described in this report comply with IBC Section 2303.1.2 and IRC Section R502.1.4 (Section R502.1.2 for 2015 IRC) for allowable stress design.

3.0 DESCRIPTION

3.1. The structural framing I-joists are made with sawn lumber flanges and OSB webs in depths from 9-1/4 inches to 24 inches and lengths up to 52 feet. See Table 2 and Figure 1 for dimensional descriptions of the I-Joists.

3.2. Flanges are formed from proprietary re-graded spruce-pine-fir (SPF) materials. The grading rules for the re-graded flange materials are detailed in the manufacturer's in-plant Manufacturing Standard.

3.3. Web material is oriented strand board, OSB, material classified for Exposure 1 per APA PRP-108 Quality Assurance Policies for Structural-Use Panels. The web material is of 24/0 OSB, in thicknesses of 7/16 inch for the IB900 I-Joists and 3/8 inch for all other I-Joists.

3.4. Adhesives used for flange-to-flange, flange-to-web and web-to-web joints meet the heat durability performance requirements of ICC-ES AC14 and comply with ASTM D2559 and ASTM D5055.

4.0 PERFORMANCE CHARACTERISTICS

4.1. Reference Design Values for Bending Stiffness, Allowable Moments, Shear (with and without bearing stiffeners, Shear Deflection Factor and Vertical Load Capacity are shown in Table 3. See Tables 4 and 5 for End Reaction and Interior Reaction Capacities. These values must be adjusted, as applicable, in accordance with American Wood Council, National Design Specification (NDS) for Wood Construction. Moment capacity shall not be increased by any repetitive member use factor.

4.2. Reference International Beam Design Manual, for Web Stiffener requirements (pages 26-27), Web Hole guidelines (pages 28-30), Floor Span tables (pages 17-21), and Roof Span tables (pages 22-24).

4.3. International Beam IB Series joists meet the requirements for use in fire-resistance rated assemblies when installed and labeled as described in the Intertek Warnock Hersey listing number 27316.

5.0 INSTALLATION

5.1. I-Joists must be installed in accordance with the manufacturer's published installation instructions, the applicable Code and this Research Report. The manufacturer's published installation instructions and this Research Report must be strictly adhered to, and a copy of the instructions must be available on the jobsite during installation.

5.2. For I-Joists installed over and beneath perpendicular load bearing walls, use full depth blocking panels, rimboard or lumber cripple members (vertical blocking) to transfer gravity loads through the floor system to the wall or foundation below. Due to shrinkage, common framing lumber may never be used as blocking or rimboards. I-Joist blocking panels or other engineered wood products, such as rimboard must be cut to fit between the IB I-Joists, and an IB I-Joist compatible depth selected.

5.3. Continuous lateral support of the compression flange must be provided per the manufacturer's installation instructions. Provide permanent lateral support of the bottom flange of all I-Joists at interior supports of multiple span joists. Similarly, support the bottom flange of all cantilevered I-Joists at the end support next to the cantilever extension. Restrain ends of floor joists to prevent rollover. Bridging between supports is not required for floor and roof IB I-joist applications unless specified by the design professional.

5.4. Duration of Load Adjustments to Allowable Loads for loading I-Joists are to be made in accordance with Section 7.3 and 2.3.2 of American Wood Council, National Design Specification (NDS) for Wood Construction.

5.5. I-Joists may only be installed where the in-service moisture content of the wood does not exceed 16 percent. Never install I-Joists where they will be permanently exposed to weather, or where they will remain in direct contact with concrete or masonry.

5.6. The use of a Repetitive-Member Use Factor applicable to the Reference Design Allowable Moment values in Table 3 is not permitted. Therefore, this term is limited to 1.0.

5.7. I-Joist span must be determined in accordance with Section 3.2.1 of the NDS, and the applicable Code. Shear calculations must include all loads within the design span.

5.8. Maximum allowable deflections under design loads shall not exceed the maximum allowable deflections specified in Section 1604.3 of the IBC or Section R301.7 of the IRC. Values calculated per the following formulae. The following formulae shall be used for the conditions specified.

Simple span deflection with point load at centerline:

$$\Delta = PL^3/48EI + 2PL/K$$

Simple span deflection with full uniform loading:

$$\Delta = 5wL^4/384EI + wL^2/K$$

Where:

- Δ = calculated deflection (inches)
- P = concentrated point load (lbf)
- L = I-joist span (center line bearing to center line bearing) (inches)
- EI = Bending Stiffness (in^2-lbf)
- K = Coefficient of shear deflection (lbf)

5.9. Holes in webs of the I-Joists are permitted to be installed per the Web Hole Guidelines of the I-Joist Design Manual. Conditions outside of those specified in the above documents are outside the scope of this report, and must be evaluated.

5.10. Space fasteners installed into the top flange face in accordance with applicable Building Codes. Consult IB I-Joist Installation Guide for additional information. Engineered design for fasteners shall be based on the specific gravity of the flanges in Table 2.

6.0 SUPPORTING EVIDENCE

6.1. Manufacturer's drawings and installation instructions dated September 2014.

6.2. The International Beams I-Joist Design Manual, dated January 2016.

6.3. The I-joists listed in this report have met the requirements of ICC-ES Acceptance Criteria AC14 for Prefabricated Wood I-Joists, revised June 2016.

6.4. The reports of testing and engineering analysis demonstrating compliance with the requirements of ASTM D 5055-13, Standard Specification for Establishing and Monitoring Structural Capacities of

Prefabricated Wood I-Joists for compliance with 2015 IBC. Report also deemed to comply with ASTM D 5055-09, -05, and -04 for compliance with 2012 IBC, 2009 IBC, and 2006 IBC, respectively.

6.5. Documentation of an Intertek approved quality control system for the manufacturing of products recognized in this report,with compliance to Appendices B and C of AC14 – Acceptance Criteria for Prefabricated Wood I-Joists, revised June 2016.

7.0 CONDITION OF USE

The I-Joists described in this Research Report comply with, or are a suitable alternative to, what is specified in those Codes listed in Sections 1.0 of this report, subject to the following conditions:

7.1. Installation must comply with this Research Report, the manufacturer's published installation instructions and the applicable Code. In the event of a conflict between the manufacturer's instructions and this report, this report governs.

7.2. Where required by the Building Code Official, design calculations and details verifying compliance with this Code Compliance Research Report must be submitted to the code official for approval. The Design calculations and details are to be prepared by a registered Design Professional when required by the authority having jurisdiction in which the project is to be constructed.

7.3. Spans shall be permitted in accordance with International Beams Allowable Stress Design Manual for I-Joists. For other span conditions, contact International Beams.

7.4. Except for cutting to length, never cut, drill or notch I-Joist flanges.

7.5. The I-Joists are limited to use in combustible construction.

7.6. Fire protection of floor assemblies shall be provided in accordance with 2012 IRC Section R501.3 (2015 IRC Section R302.13).

7.7. I-Joists identified in this report are manufactured at the manufacturing facilities recognized in Table 1 in accordance with the manufacturer's approved quality control system with inspections by APA (IAS AA-649).

8.0 IDENTIFICATION

The I-Joists described in this Research Report are identified by an I-Joist stamp bearing the report holder's name (International Beams Inc.) or the Listee's name (BlueLinx Corporation), Date code indicating date of production, Depth and Grade of I-Joist, APA marks, "Made in Canada", Intertek designation and number ("Intertek CCRR-0232").



9.0 CODE COMPLIANCE RESEARCH REPORT

9.1. Approval of building products and/or materials can only be granted by a building official having legal authority in the specific jurisdiction where approval is sought.

9.2. Code Compliance Research Reports shall not be used in any manner that implies an endorsement of the product by Intertek.

9.3. Reference to the Intertek website address: whdirectory.intertek.com is recommended to ascertain the current version and status of this report.

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TABLE 1 – MANUFACTURING LOCATIONS

	Pohenegamook, Quebec, Canada	Tillsonburg, Ontario, Canada
International Beams Products	IB400, IB600, IB800, IB900	IB400, IB600
BlueLinx Products	BLI 40, BLI 60, BLI 80, BLI 90	BLI 40, BLI 60

TABLE 2 – I-JOIST DIMENSIONAL INFORMATION[1]

Joist Series	Joist Depths (in)	Flanges				Web	
		Material	G[2]	Dimension		Material	Thickness (in)
				Depth (in)	Width (in)		
IB400	9-1/4 9-1/2 11-1/4 11-7/8 14 16	Proprietary SPF	0.42	1 1/2	2 1/2	OSB	3 / 8
IB600	9-1/4 9-1/2 11-1/4 11-7/8 14 16 18 20	MSR	0.46	1 1/2	2 1/2	OSB	3 / 8
IB800	9-1/4 9-1/2 11-1/4 11-7/8 14 16 18 20	MSR	0.46	1 1/2	3 1/2	OSB	3 / 8
IB900	11-7/8 14 16 18 20 22 24	MSR	0.50	1 1/2	3 1/2	OSB	7 / 16

[1] Referenced dimensions are nominal.
[2] Specific gravity of flanges for fasteners based on oven-dry weight and oven-dry volume.

TABLE 3 – REFERENCE DESIGN VALUES[1]

Series	Depth (in.)	Bending Stiffness EI joist ($x10^6$ lbf-in^2)	Allowable Moment, M[2] (lbf-ft)	Shear, V[3] (lbf)	Shear Deflection Factor K ($x10^6$ lbf)	Vertical Load Capacity [5] (plf)
IB400	9 1/4	185	2,715	1,155	4.81	2,000
	9 1/2	198	2,800	1,185	4.94	
	11 1/4	296	3,410	1,405	5.85	
	11 7/8	336	3,630	1,480	6.18	
	14	494	4,370	1,750	7.28	
	16	673	5,065	2,000	8.32	
IB600	9 1/4	220	3,740	1,350	4.81	2,000
	9 1/2	235	3,860	1,370	4.94	
	11 1/4	356	4,700	1,515	5.85	
	11 7/8	399	5,000	1,570	6.18	
	14	585	6,020	1,750	7.28	
	16	799	6,980	2,000	8.32	
	18	1,046	7,895	2,250	9.36	1,750
	20	1,304	8,735	2,500	10.40	1,500
IB800	9 1/4	307	5,295	1,390	4.81	2,000
	9 1/2	326	5,465	1,405	4.94	
	11 1/4	493	6,655	1,540	5.85	
	11 7/8	552	7,080	1,585	6.18	
	14	807	8,530	1,750	7.28	
	16	1,094	9,890	2,000	8.32	
	18	1,445	11,135	2,300	9.36	1,810
	20	1,799	12,380	2,600	10.40	1,625
IB900	11 7/8	604	8,825	1,925	6.18	2,000
	14	884	10,630	2,125	7.28	
	16	1,199	12,635	2,330	8.32	
	18	1,565	14,285	2,510	11.52	1,810
	20	1,984	15,810	2,695	12.80	1,625
	22	2,457	17,320	2,875	14.08	1,250
	24	2,985	18,810	3,060	15.36	1,250

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

[2] Moment capacity (M) shall NOT be increased by any repetitive member use factor.

[3] Shear capacity (V) of the I-joist with a minimum end bearing of 4 inches.

[4] I-joist deflection must be calculated in accordance with Section 5.8.

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

TABLE 4 – END REACTION CAPACITIES

Series	Depth (inches)	End Reaction Capacities (pounds)									
		1 1/2" Bearing		1 3/4" Bearing		2 3/4" Bearing		3 1/2" Bearing		>=4" Bearing	
		A[3]	B[4]	A[3]	B[4]	A[3]	B[4]	A[3]	B[4]	A[3]	B[4]
IB400	9 1/4	1,110	1,155	1,115	1,155	1,155	1,155	1,155	1,155	1,155	1,155
	9 1/2	1,120	1,185	1,130	1,185	1,185	1,185	1,185	1,185	1,185	1,185
	11 1/4	1,175	1,355	1,205	1,360	1,340	1,405	1,405	1,405	1,405	1,405
	11 7/8	1,200	1,420	1,230	1,430	1,370	1,480	1,465	1,480	1,480	1,480
	14	1,260	1,630	1,295	1,645	1,455	1,750	1,550	1,750	1,550	1,750
	16	1,325	1,825	1,355	1,845	1,455	2,000	1,550	2,000	1,550	2,000
IB600	9 1/4	1,110	1,155	1,130	1,350	1,155	1,350	1,155	1,350	1,155	1,350
	9 1/2	1,120	1,185	1,140	1,370	1,185	1,370	1,185	1,370	1,185	1,370
	11 1/4	1,175	1,355	1,215	1,515	1,340	1,515	1,405	1,515	1,405	1,515
	11 7/8	1,200	1,420	1,240	1,570	1,370	1,570	1,465	1,570	1,480	1,570
	14	1,260	1,630	1,335	1,750	1,460	1,750	1,550	1,750	1,550	1,750
	16	1,325	1,825	1,420	1,925	1,495	1,970	1,550	2,000	1,550	2,000
	18	N/A	N/A	1,505	2,095	1,530	2,185	1,550	2,250	1,550	2,250
	20	N/A	N/A	1,550	2,260	1,550	2,395	1,550	2,500	1,550	2,500
IB800	9 1/4	1,110	1,155	1,130	1,380	1,155	1,380	1,155	1,380	1,155	1,390
	9 1/2	1,120	1,185	1,140	1,405	1,185	1,405	1,185	1,405	1,185	1,405
	11 1/4	1,175	1,355	1,215	1,540	1,340	1,540	1,405	1,540	1,405	1,540
	11 7/8	1,200	1,420	1,285	1,585	1,370	1,585	1,465	1,585	1,480	1,585
	14	1,260	1,630	1,335	1,750	1,460	1,750	1,550	1,750	1,550	1,750
	16	1,325	1,825	1,420	2,000	1,495	2,000	1,550	2,000	1,550	2,000
	18	N/A	N/A	1,505	2,270	1,530	2,285	1,550	2,300	1,600	2,300
	20	N/A	N/A	1,550	2,460	1,550	2,540	1,550	2,600	1,650	2,600
IB900	11 7/8	1,200	1,420	1,400	1,585	1,630	1,710	1,805	1,805	1,885	1,925
	14	1,260	1,630	1,400	1,750	1,630	1,870	1,805	1,960	1,885	2,125
	16	1,325	1,825	1,420	2,000	1,640	2,190	1,805	2,330	1,885	2,330
	18	N/A	N/A	1,505	2,270	1,600	2,405	1,675	2,510	1,885	2,510
	20	N/A	N/A	1,550	2,470	1,620	2,590	1,675	2,680	1,885	2,695
	22	N/A	N/A	1,470	2,595	1,585	2,725	1,675	2,820	1,885	2,875
	24	N/A	N/A	1,470	2,880	1,585	2,925	1,675	2,960	1,885	3,060

[1] Reference design reactions must be adjusted, as applicable, in accordance with Section 7.3 of the NDS. Adjusted reaction values must not exceed $F_{perpendicular}$ of the bearing plate X bearing length X flange width.

[2] Interpolation of the end reaction capacities between tabulated values shall be permitted.

[3] A = No Stiffeners

[4] B = Stiffeners

TABLE 5 – INTERIOR REACTION CAPACITIES

Series	Depth (inches)	Interior Reaction Capacities (pounds)			
		3 1/2" Bearing		5 1/2" Bearing	
		A[3]	B[4]	A[3]	B[4]
IB400	9 1/4	2,160	2,310	2,310	2,310
	9 1/2	2,160	2,370	2,370	2,370
	11 1/4	2,500	2,795	2,810	2,810
	11 7/8	2,500	2,795	2,810	2,960
	14	2,500	2,795	3,100	3,455
	16	2,500	2,795	3,100	3,650
IB600	9 1/4	2,160	2,700	2,310	2,700
	9 1/2	2,160	2,740	2,370	2,740
	11 1/4	2,500	3,030	2,810	3,030
	11 7/8	2,500	3,075	2,810	3,140
	14	2,500	3,215	3,100	3,455
	16	2,500	3,350	3,100	3,650
	18	2,500	3,425	3,100	3,735
	20	2,500	3,450	3,100	3,820
IB800	9 1/4	2,310	2,700	2,310	2,700
	9 1/2	2,470	2,740	2,470	2,740
	11 1/4	2,810	3,030	2,810	3,030
	11 7/8	2,810	3,140	2,810	3,140
	14	3,020	3,500	3,100	3,500
	16	3,100	4,000	3,100	4,000
	18	3,100	4,225	3,100	4,225
	20	3,100	4,350	3,100	4,350
IB900	11 7/8	3,355	3,355	3,355	3,355
	14	3,355	3,530	3,355	3,660
	16	3,355	3,920	3,355	4,090
	18	3,355	4,270	3,355	4,640
	20	3,355	4,600	3,355	5,000
	22	3,355	4,950	3,355	5,075
	24	3,355	5,150	3,355	5,150

[1] Reference design reactions must be adjusted, as applicable, in accordance with Section 7.3 of the NDS. Adjusted reaction values must not exceed $F_{perpendicular}$ of the bearing plate X bearing length X flange width.

[2] Interpolation of the interior reaction capacities between tabulated values shall be permitted.

[3] A = No Stiffeners

[4] B = Stiffener

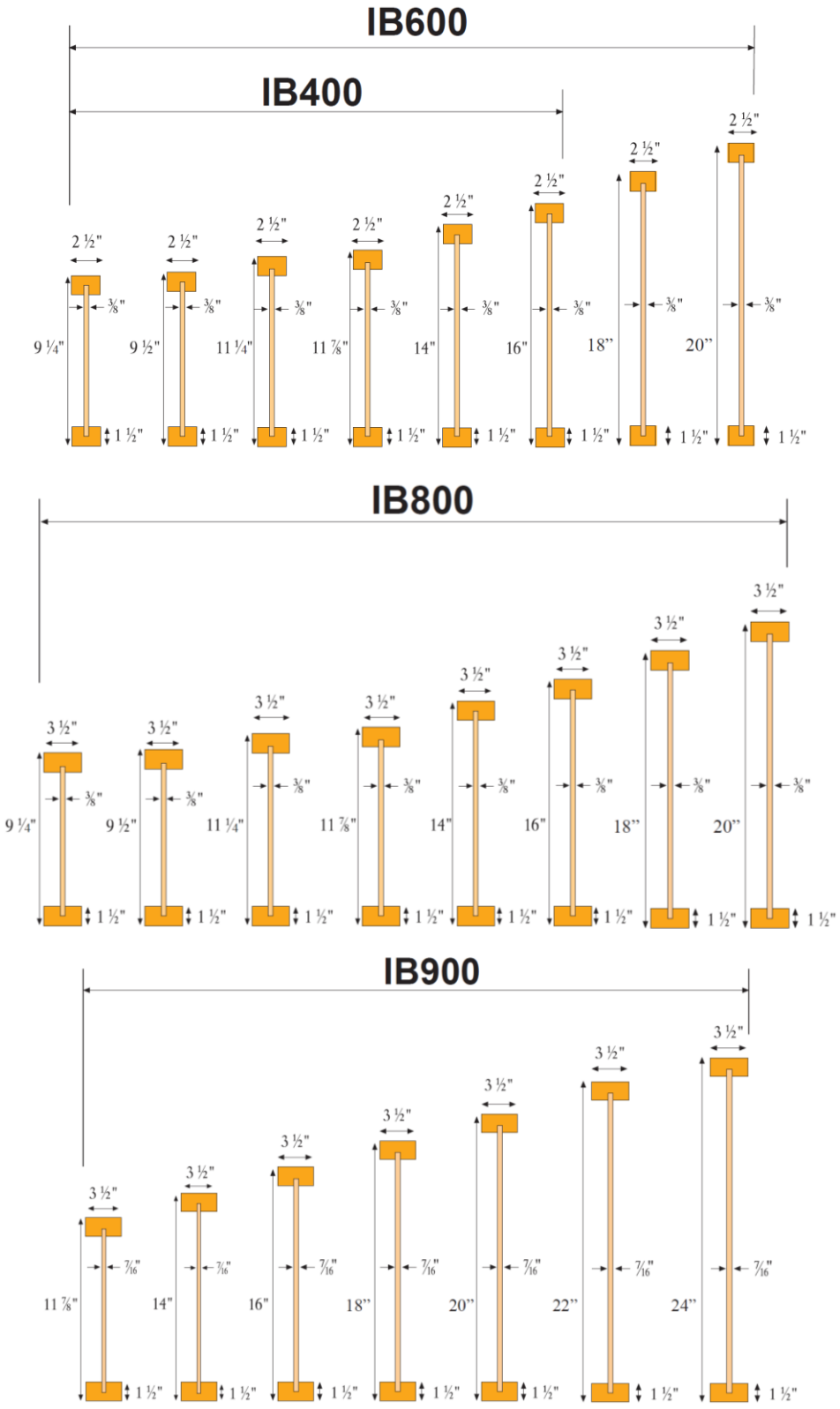


FIGURE 1 – I-JOIST ILLUSTRATIONS