



National Research  
Council Canada

Conseil national  
de recherches Canada

Institute for  
Research in  
Construction

Institut de  
recherche en  
construction

CCMC 13246-R

**CCMC**

EVALUATION  
REPORT

DIVISION 06171

Issued 2006-06-13

Re-evaluation due 2009-06-13

## *Prokit KI I-Joist Series*

PROKIT Structural Inc.  
900, rue Thomas  
Saint-Jean-sur-Richelieu (Québec)  
J2X 5E7

Tel.: (450) 347-3999  
Fax: (450) 347-3940

Plant: Saint-Jean-sur-Richelieu, QC

### **1. Purpose of Evaluation**

The proponent sought confirmation from the Canadian Construction Materials Centre (CCMC) that the "Prokit KI I-Joist Series" complies with the intent of the National Building Code of Canada (NBC) 1995 for use as floor joists.

### **2. Opinion**

Subject to the limitations and conditions stated in this report, test results and assessments provided by the proponent show that "Prokit KI I-Joist Series" complies with CCMC's Technical Guide for Prefabricated Wood I-Joists, Masterformat number 06171, dated 02-09-12, and provides a level of performance equivalent to that required for structural floor joists in:

- NBC 1995, Subsection 4.1., Article 4.3.1.1., and Subsection 9.23.9.

Materials used in the joists comply with:

- Oriented strandboard (OSB) web: CAN/CSA-O325.0-92, "Construction Sheathing;" and PS2 Exposure 1,

*This Report is provided without representation, warranty, or guarantee of any kind, expressed or implied, and the National Research Council of Canada (NRC) provides no endorsement for any evaluated material, product, system or service described herein.*

*NRC has evaluated the material, product, system or service described herein only for those characteristics stated herein. The information and opinions in this Report are directed to those who have the appropriate degree of experience to use and apply its contents.*

*NRC accepts no responsibility whatsoever arising in any way from any and all use or reliance on the information contained in this Report. NRC is not undertaking to render professional or other services for or on behalf of any person or entity nor to perform any duty owed by any person or entity to another person or entity.*

- Adhesives: CSA O112.7-M1977(R2001), “Resorcinol and Phenol-Resorcinol Resin Adhesives for Wood (Room- and Intermediate-Temperature Curing).”

Prokit Series Model	Depth (mm)	Flange
KI30-912	240	S-P-F # 2
KI35-1178	302	MSR 2100F-1.8E

Canada Mortgage and Housing Corporation permits the use of this product in construction financed or insured under the *National Housing Act*.

The web-flange connection is made by inserting the profiled OSB web into a tapered groove in the centre of the wide face of the flange. The OSB web segments are joined with a custom web joint. All joints are bonded with a phenol-resorcinol adhesive.

**3. Description**

“Prokit KI I-Joist Series” are prefabricated wood I-joists. The flanges are 38 mm deep x 63.5 mm wide with either S-P-F # 2 or better visually graded lumber and MSR 2100F-1.8E (solid sawn) flanges, glued to a 10-mm-thick OSB web.

Intertek Testing Services (ITS) conducts regular audits of the manufacturing plant and the quality assurance program as part of the product’s certification.

The “Prokit KI I-Joist Series” comprises the following two product designations:

The engineering properties of “Prokit KI I-Joist Series” are listed in Table 1.

**Table 1. Factored<sup>(1)</sup> Resistances of “Prokit KI I-Joist Series”<sup>(2)</sup>**

Joist Series	Joist Depth mm (in.)	Bending Moment Resistance (Factored)  N-m (lbs-ft.)	EI x 10 <sup>6</sup>  kN·mm <sup>2</sup> (lbs·in. <sup>2</sup> )	K x 10 <sup>6</sup>  N (lbs)	Shear Resistance (Factored)  N (lbs)	Max. Factored End Reaction 38 mm (1-1/2 in.) Minimum Bearing Length N (lbs)	
						w/o stiff.	With stiff.
KI30-912	241 (9-1/2)	8 850 (6 522)	556 (193)	12.99 (2.92)	7 690 (1 729)	5 822 (1 309)	6 307 (1 418)
KI35-1178	302 (11-7/8)	14 280 (10 535)	1 083 (375)	17.74 (3.99)	9 114 (2 049)	8 811 (1 981)	10 315 (2 319)

**Notes to Table 1:**

- <sup>(1)</sup> The  $\phi = 0.9$  resistance factor has been applied as per CAN/CSA-O86-01, “Engineering Design in Wood.”
- <sup>(2)</sup> Additional engineering data and load/span tables are provided by the manufacturer.

**4. Usage and Limitations**

“Prokit KI I-Joist Series” are intended for structural applications, such as floor joists, roof joists, blocking panels and rim joists. All prefabricated I-joists are intended for “dry service” use<sup>(1)</sup> applications only.

are intended to demonstrate compliance to Part 9 of the NBC 1995 for acceptance by the local authority having jurisdiction. The pre-engineering was provided to CCMC by PROKIT Structural Inc. and was carried out in accordance with Part 4 of the NBC 1995 for anticipated loads in small buildings falling within the scope of Part 9 of the NBC 1995, and sealed by a professional engineer. Articles 4(iii) and 4(iv)

The following published documents and outlined pre-engineering in 4(i) and 4(ii) below

---

outline when further engineering is required and whether the manufacturer provides engineering support for installation of the prefabricated I-joist framing system.

i) PROKIT Structural Inc.'s Pre-engineered Floor Span Charts

When "Prokit KI I-Joist Series" are used as floor joists in simple (single) span applications supporting uniform loads only, the installation must be in accordance with the vibration controlled floor span tables (including the NBC 1995 Code-specified vibration criteria\*) found in:

- Application and Installation Guides using "Prokit KI I-Joist Series" Engineered Wood I-joist, dated 06-03-01.

They shall be installed in accordance with PROKIT Structural Inc.'s installation guidelines noted in these documents for those applications falling within the scope of the document. Applications outside the scope of these installation guidelines shall require engineering on a case-by-case basis.

*\*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. PROKIT Structural Inc. should therefore be consulted for span adjustments, if necessary, in these types of installations.*

ii) PROKIT Structural Inc.'s Pre-engineered Installation Details

PROKIT Structural Inc.'s pre-engineered details within the above-mentioned document in 4(i) is limited in scope to building designs where the anticipated loads on the following structural details are not exceeded:

- Web hole sizes and spacing (page 2, #2)
- Rimboard, maximum load (page 2, #1)

- Maximum load per squash block (page 4, #6)
- Cantilever, 600 mm, max. load (page 4, #5)
- Blocking detail (page 3, #3)
- Span tables: 40-10-5 and 40-25-5 PSF (page 6)

iii) Engineering Required

For structural applications beyond the scope/limitations of the above-referenced PROKIT Structural Inc. publication or when required by the authority having jurisdiction, the drawings or related documents shall 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 4(i) and 4(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
- high wind and seismic areas
- stair openings
- I-joists as rim joists
- cantilever maximum load
- roof installation
- design of supporting wall studs/beams when total load exceeds the NBC 1995 pre-engineered floor/roof joist tables
- design of supporting foundation footings when total load exceeds the NBC 1995 pre-engineered floor/roof joist tables.

The engineer shall design in accordance with CAN/CSA-O86-01, "Engineering Design in Wood," and may use, as a guide, the *Engineering Guide for Wood Frame Construction* published by the Canadian Wood Council.

---

iv) Engineering Support Provided by Manufacturer

PROKIT Structural Inc. provides engineering services and shall be consulted in the use of this proprietary prefabricated I-joist.

Technical help tel.: (450) 347-3999  
Toll-free: 1-800-663-3999

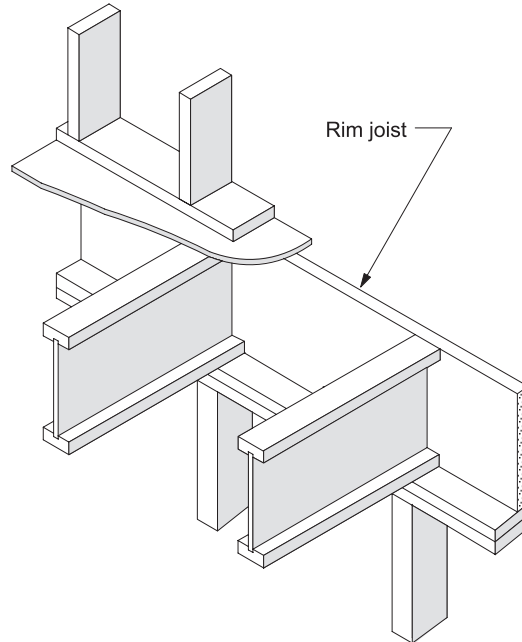
This product must be identified with the phrase "CCMC # 13246-R" along the side of the flange. This CCMC number is only valid when it appears in conjunction with the WHI Certification Mark of Intertek Testing.

Damaged or defective joists shall not be used, unless repaired in accordance with written instructions from the manufacturer.

<sup>(1)</sup> All lumber, wood-based panels and proprietary engineered wood products are intended for "dry service conditions." "Dry service" is defined as

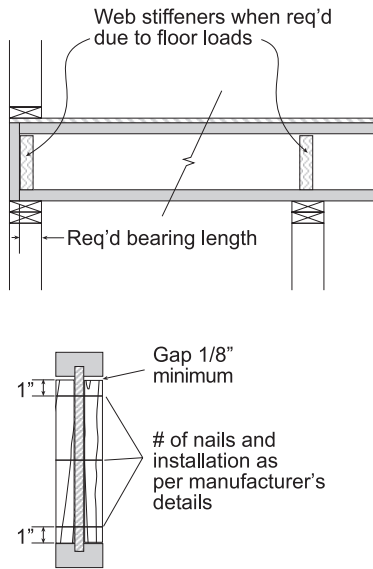
*the in-service environment under which the equilibrium moisture content (MC) of lumber is 15% or less over a year and does not exceed 19% at any time. Wood contained within the interior of dry, heated or unheated buildings has generally been found to have a MC between 6% and 14% according to season 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 the NBC 1995, Article 9.3.2.5.*

Figures 1 to 4 show generalized details in a prefabricated I-joist floor framing system. The construction, including accessories such as rim joists, squash blocks and web stiffeners, must be installed in accordance with the manufacturer's detailed instructions for the specific loading condition.



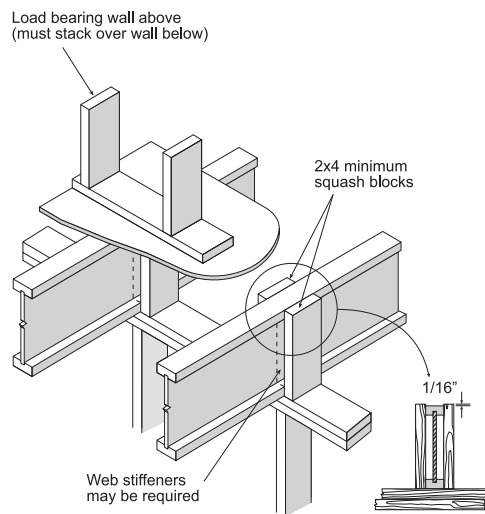
**Figure 1. Rim joists**

*Note: Proper framing involves the installation of an adequate rim joist to transfer gravity loads from the loadbearing exterior walls above, and to provide and ensure adequate floor diaphragm performance.*



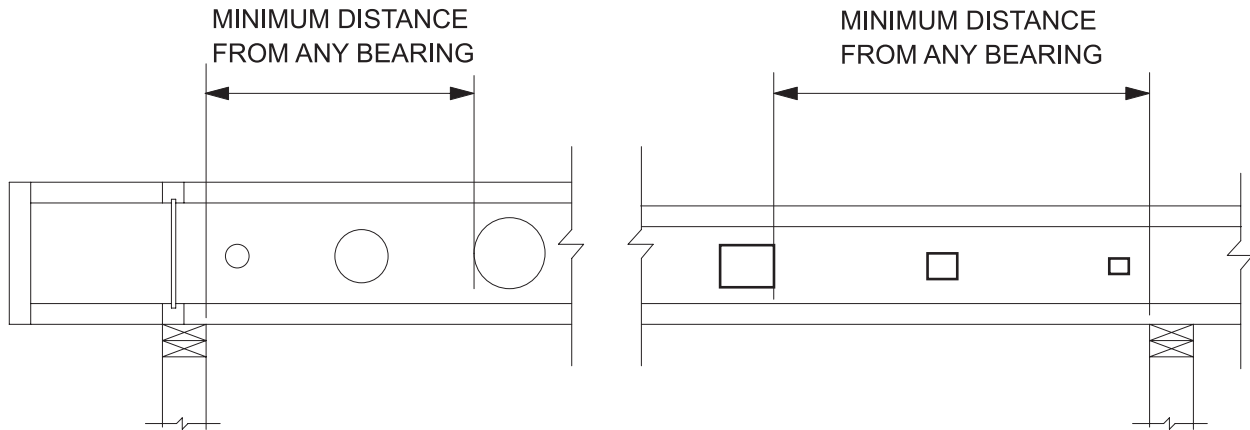
**Figure 2. Web stiffeners**

*Note: Web stiffeners are installed when the floor loads are such that the web must be reinforced with web stiffeners to transfer the floor loads successfully through to the bearing support. When web stiffeners are to be installed, the manufacturer's stiffener construction details, stiffener size and nailing schedule must be followed.*



**Figure 3. Squash blocks**

*Note: Squash blocks are installed beneath interior loadbearing walls to transfer vertical gravity loads to beams or loadbearing walls below. Some rim joist details may also prescribe that squash blocks be installed in conjunction with the rim joist beneath exterior loadbearing walls.*



**Figure 4. Permitted web openings**

*Note: See manufacturer's proprietary permitted web opening chart for permitted sizes and minimum distances to the support.*

## 5. Performance

Structural testing of the "Prokit KI I-Joist Series" was witnessed by an independent certification and testing agency recognized by CCMC. The tests were in accordance with ASTM D 5055-02, "Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists." Results of the tests are summarized below.

### **Moment Capacity**

The moment capacity qualification was carried out using the empirical method in accordance with ASTM D 5055-02. Fifty-four (54) specimens of each joist depth were tested to verify the actual capacity versus the design capacity. Qualification tests 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, "Engineering Design in Wood," was used to determine the specified strength.

### **Shear Capacity**

The shear capacity of the "Prokit KI I-Joist Series" was established by computing the shear capacity of ten (10) specimens for each depth separately, as per ASTM D 5055-02. Qualification 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,

"Engineering Design in Wood," was used to determine the specified strength.

### **Stiffness**

The bending specimens were used to confirm the stiffness capacity. The following formula should be used to predict mid-span deflection:

$$\Delta \text{ deflection} = \frac{5wL^4}{384EI} + \frac{wL^2}{K}$$

where L = design span (mm), w = load (kN/mm), EI = from Table 1 (kN·mm<sup>2</sup>), K = from Table 1.

No adjustments to this equation were required as per ASTM D 5055-02, since the accuracy of the formula was confirmed. In all cases the actual deflection was less than the calculated one.

### **Creep**

Two (2) joist specimens from each joist series were tested for creep performance as per ASTM D 5055-02. The specimens were loaded to 1.5 times the maximum resistive moment (design) and the average deflection recovery had to exceed 90% of the basic dead load deflection. The tested specimens met the criteria.

### **Bearing Length and Maximum Reaction**

Tests were conducted to qualify a minimum bearing of 38 mm as part of the shear test qualification. Qualification tests 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, "Engineering Design in Wood," was used to determine the specified strength.

***Manufacturing Quality Assurance***

The manufacturing quality assurance program has been adapted to include requirements specified in ASTM D 5055-02 and is verified by ITS as part of the plant qualification.

For more information contact:

Bruno Di Lenardo, P.Eng.  
(613) 993-7769

*Issued by the Institute for Research in Construction  
under the authority of the National Research Council*

John Flack, Ph.D.  
Manager, CCMC

*Note: Readers are asked to refer to limitations imposed by NRC on the interpretation and use of this report. These limitations are included in the introduction to CCMC's Registry of Product Evaluations, of which this report is part.*

*Readers are advised to confirm that this report has not been withdrawn or superseded by a later issue by referring to <http://irc.nrc.gc.ca/ccmc>, or contacting the Canadian Construction Materials Centre, Institute for Research in Construction, National Research Council of Canada, Montreal Road, Ottawa, Ontario, K1A 0R6; Telephone (613) 993-6189, Fax (613) 952-0268.*