



ENGINEERING EVALUATION

REPORT NUMBER: 101764711COQ-003
ORIGINAL ISSUE DATE: December 7th, 2014
REVISION DATE: December 18, 2014

EVALUATION CENTER:

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RENDERED TO

PINKWOOD LTD.
5929-6TH STREET. NE
CALGARY, AB, T2K 5R5
CANADA

PRODUCT EVALUATED: PKI I-Joist Series

EVALUATION PROPERTY: Fire Resistance

Engineering Evaluation of PKI I-Joist Series for compliance with the applicable requirements of the following criteria: ASTM E119-12a *Standard Test Methods for Fire Tests of Building Construction and Materials*, and CAN/ULC S101-07 *Standard Methods for Fire Tests of Building Construction and Materials*.

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2 Introduction

Intertek Testing Services NA Ltd. (Intertek) is conducting an engineering evaluation for Pinkwood Ltd. on their PKI I-Joist Series, to evaluate its fire resistance. The evaluation is being conducted to establish Design Listings that are in compliance with the requirements of ASTM E119-12a *Standard Test Methods for Fire Tests of Building Construction and Materials*, and CAN/ULC S101-07 *Standard Methods for Fire Tests of Building Construction and Materials*.

3 Product and Assembly Description

3.1. Product and/or Assembly Description

PKI I-Joist Series is a pre-fabricated joist consisting of dimensional or finger joint lumber for flanges and OSB web stock. For I-joists with depths ranging from 9 1/2" to 16", 3/8" thick OSB web stock is used and for depths ranging from 18" to 24", 7/16" thick OSB web stock is used. The specific Product Descriptions are presented in the tables below:

Product name*	Depth	Lumber grade
PKI 10	9 1/2"	Enhanced/Ripped 2x6 no. 2 Structural, SPF
	11 7/8"	
	14"	
PKI 20	9 1/2"	Enhanced/Ripped 2x6 2100 MSR 1.8E, SPF
	11 7/8"	
	14"	
PKI 35 Plus	16"	Enhanced/Ripped 2x8 No. 2 structural, SPF
	9 1/2"	
	11 7/8"	
PKI 40	14"	Enhanced 2x4 2100 MSR 1.8E, SPF
	16"	
	18"	
	20"	
	22"	
	24"	
	11 7/8"	
PKI-50	14"	ENHANCED 2X4 2400 MSR 2.0E, SPF
	16"	
	18"	
	20"	
	22"	
	24"	

3.2. Product and/or Assembly Traceability

PKI I-Joist Series Product Name is currently manufactured by Pinkwood Ltd. at 5929 6 St NE Calgary, AB, T2K 5R5 Canada. If further testing is required to conform to the standards referenced above, sampling of

the products shall be done at this manufacturing facility by an accredited agency. An Intertek engineer can perform this task.

3.3. Product and/or Assembly Certification

PKI I-Joist Series (coated with PinkShield PS5005) is currently Listed under Intertek's online directory for Surface Burning Characteristics per CAN/ULC S102. Refer to "Pinkwood Ltd. Fire Rated PKI" (Spec ID 32889) on Intertek's online product directory (<http://whdirectory.intertek.com>). Evaluation of PinkShield intumescent coating is outside the scope of this report. It is not required for the coating to meet the assembly ratings described in Section 5 of this report.

Authorities Having Jurisdiction (AHJ) should be consulted in all cases as to the particular requirements covering the installation and use of Intertek certified products, equipment, systems, devices and materials. The AHJ should be consulted before construction. Fire resistance assemblies and products are developed by the design submitter and have been investigated by Intertek for compliance with specific requirements. The published information (product and design listings) cannot always address every construction nuance encountered in the field. When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the test standard referenced for each Intertek certified product. The test standard includes specifics concerning alternate materials and alternate methods of construction. Only products which bear Intertek's Mark are considered as certified. The appearance of a company's name or product in Intertek Directory of Listed Building Products does not in itself assure that products so identified have been manufactured under Intertek's Follow-Up Service. Only those products bearing the Intertek Mark should be considered to be Listed and covered under Intertek's Follow-Up Service. Always verify the Mark on the product before using it.

4 Reference Documents

As part of this evaluation, Intertek has directly or indirectly used the following referenced documents:

- ASTM E119-12a *Standard Test Methods for Fire Tests of Building Construction and Material*
- CAN/ULC S101-07 *Standard Methods for Fire Tests of Building Construction and Materials*
- 2012 *International Building Code®* (IBC): Table 721.1 (3) and Section 722.6.
- 2010 *National Building Code of Canada* (NBC): Table A-9.10.3.1.B and Appendix D-2.3.
- National Research Council (NRC) "Results of Fire Resistance Tests on Full-Scale Floor Assemblies" IRC-IR-764
- American Wood Council "Fire-Rated Wood-Frame Wall and Floor/Ceiling Assemblies" Copyright 2010
- Intertek Spec ID Number 32889

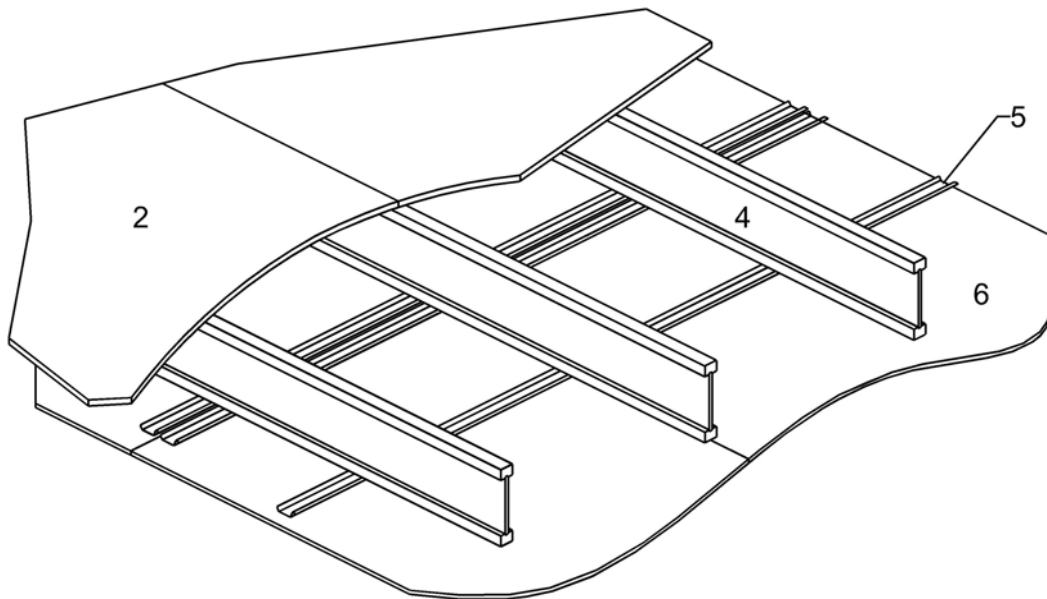
5 Evaluation Method

The purpose of this evaluation is to establish Pinkwood Ltd. PKI I-Joist Series fire-resistance Listings in Intertek's Directory of Listed Products per the requirements of ASTM E119 and CAN/ULC S101

This evaluation is being conducted solely for the above referenced project or use or both. Due to the variables that exist from project to project and the fact that each evaluation requires review of the most current existing data and information, this evaluation is not to be used as justification for any other opinion nor used for any other project, without the express written consent of Intertek. This report should serve as Intertek's opinion regarding the use of the certified product in the conditions described herein. The materials used on the project, which are applied in compliance with Intertek Design Listings, must bear the Intertek listing mark. All certified products must be installed in accordance with the details contained in Intertek's Directory of Listed Building Products.

A majority of the industry run programs on floor/ceiling fire-resistance assemblies utilizing wood framing are now published in the Building Codes for use by all manufacturers, architects and specifiers. The National Building Code of Canada (2010) and the International Building Code (2012) publishes these fire-resistance assemblies in Tables A-9.10.3.1 B and 721.1 (3) respectively. The data shown in the 2010 NBC is based on studies done by the National Research Council. Data shown in the 2012 IBC is based on test reports obtained from various agencies such as Intertek Testing Services and UL and are published by the American Wood Council in their document titled Design for Code Acceptance (DCA) 3 Fire-Rated Wood-Frame Wall and Floor/Ceiling Assemblies.

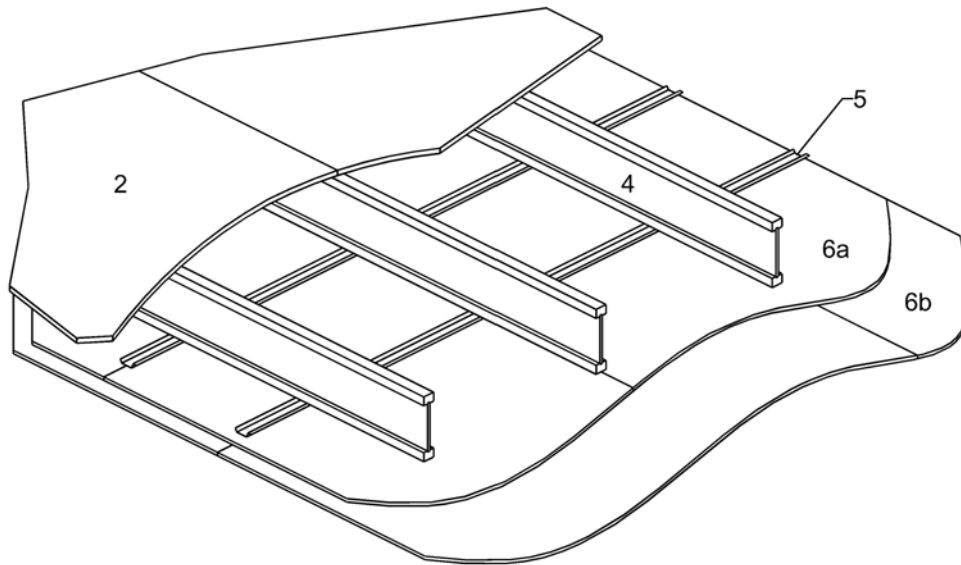
FLOOR/CEILING ASSEMBLY RATING: 45 Minutes



- 1. Floor Topping (optional, not shown):** Gypsum concrete, lightweight or normal concrete topping. When used as a roof assembly, materials for a built-up roof covering that are described in an assembly that provides a Class A, B, or C rating on combustible wood decks may be used.
- 2. Floor Sheathing:** Minimum 5/8 inch thick wood sheathing, designed and installed per code requirements. When used as a roof assembly, minimum 1/2 inch thick wood sheathing may be used, when designed and installed per code requirements.
- 3. Insulation (optional, not shown):** When installed, insulation shall be installed above the joist flanges and supported by stay wires spaced 12 inches on center.
- 4. Structural Members:** 9 1/2" minimum deep joists spaced a maximum of 24 inches on center. Installed in accordance with the Code.
- 5. Resilient Channels:** Minimum 0.019 inch thick galvanized steel resilient channel attached perpendicular to the bottom flange of the joists with one 1-5/8 inch drywall screw. Channels spaced 16 inches on center maximum. Additional channels are required at gypsum board end joints so that each board is attached to a separate channel. These additional channels shall extend to the next joist on each side of the board end joint.
- 6. Gypsum Wallboard:** Minimum 5/8 inch thick Type X gypsum wallboard installed with long dimension perpendicular to resilient channels and fastened to each channel with minimum 1-1/8 inch long Type S drywall screws. Fasteners spaced 12 inches on center in the field of the wallboard, 8 inches on center at wallboard end joints, and 1 1/2 inches from panel edges and ends. Edge joints shall be centered on joists. End joints of wallboard staggered a minimum of one channel spacing.
- 7. Finish System (not shown):** Face layer joints covered with tape and coated with joint compound. Screw heads covered with joint compound.

Rationale: The floor/ceiling assembly discussed in this Design Listing is based on assemblies described in: item F8 (g) of NBC Table A-9.10.3.1.B; Assembly: FF-02A, FF-14, FF-16, and FF-19 of NRC IRC-IR-764.

FLOOR/CEILING ASSEMBLY RATING: 60 Minutes

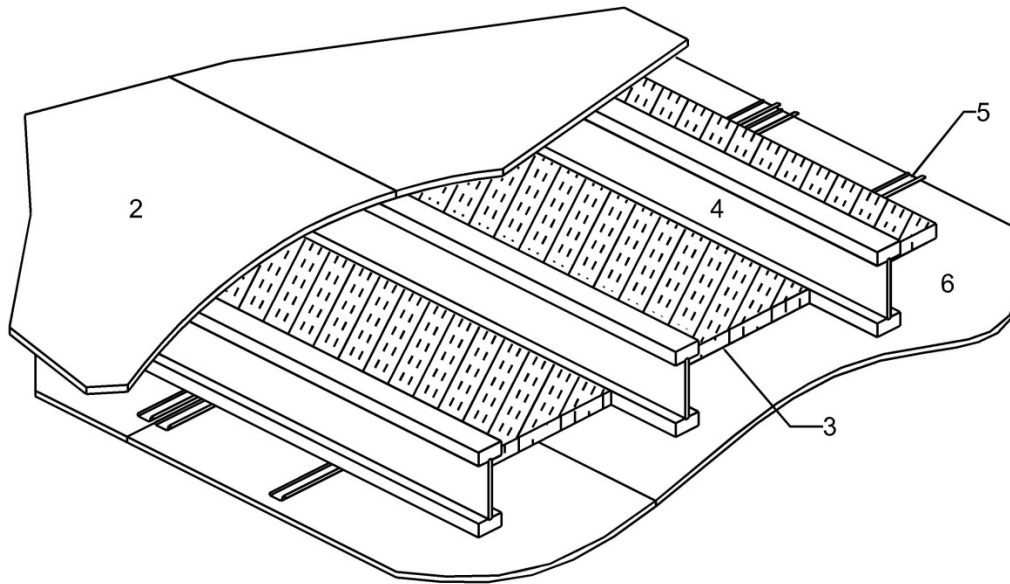


- 1. Floor Topping (optional, not shown):** Gypsum concrete, lightweight or normal concrete topping. When used as a roof assembly, materials for a built-up roof covering that are described in an assembly that provides a Class A, B, or C rating on combustible wood decks may be used.
- 2. Floor Sheathing:** Minimum 5/8 inch thick wood sheathing, designed and installed per code requirements. When used as a roof assembly, minimum 1/2 inch thick wood sheathing may be used, when designed and installed per code requirements.
- 3. Insulation (optional, not shown):** When installed, insulation shall be installed above the joist flanges and supported by stay wires spaced 12 inches on center.
- 4. Structural Members:** 9 1/2" minimum deep joists spaced a maximum of 24 inches on center. Installed in accordance with the Code. The maximum spacing may be increased to 48 inches on-center when the ceiling is applied to stripping spaced a maximum of 24 inches on center. The stripping must be a nominal 2-by-4, construction-grade lumber attached to the joists bottom flange using two 10d nails.
- 5. Resilient Channels (optional):** Minimum 0.019 inch thick galvanized steel resilient channel attached perpendicular to the bottom flange of the joists with one 1-1/4 inch drywall screw. Channels spaced a maximum of 16 inches on center. The maximum channel spacing may be increased to 24 inches on-center when joists are spaced a maximum of 16 inches on center.
- 6. Gypsum Wallboard:** Two layers of minimum 1/2 inch Type X gypsum wallboard attached with the long dimension perpendicular to the resilient channels (or joists) as follows:
 - 6a. Wallboard Base Layer:** Base layer of wallboard attached to resilient channels (or joists) using 1-1/4 inch type S drywall screws at 12 inches on center. When resilient channels are installed, edge joints shall be centered on joists. End joints of wallboard staggered a minimum of one channel (or joist) spacing.
 - 6b. Wallboard Face Layer:** Face layer of wallboard attached to resilient channels (or joists) through base layer using 1-5/8 inch Type S drywall screws spaced 12 inches on center. Edge joints of wallboard face layer offset a distance equal to the joist spacing, from those of base layer. End joints shall be offset from base layer joints by a minimum of one channel (or joist) spacing and shall be centered in-between channel (or joist) spacings. Additionally, wallboard face layer attached to base layer with 1-1/2 inch Type G drywall screws spaced 8 inches on center, placed 1-1/2 inches from face layer end joints.

7. Finish System (not shown): Face layer joints covered with tape and coated with joint compound. Screw heads covered with joint compound.

Rationale: The floor/ceiling assembly discussed in this Design Listing is based on assemblies described in: item 26-1.1 and 27-1.1 of IBC Table 721.1 (3); item F9 (f) of NBC Table A-9.10.3.1.B.

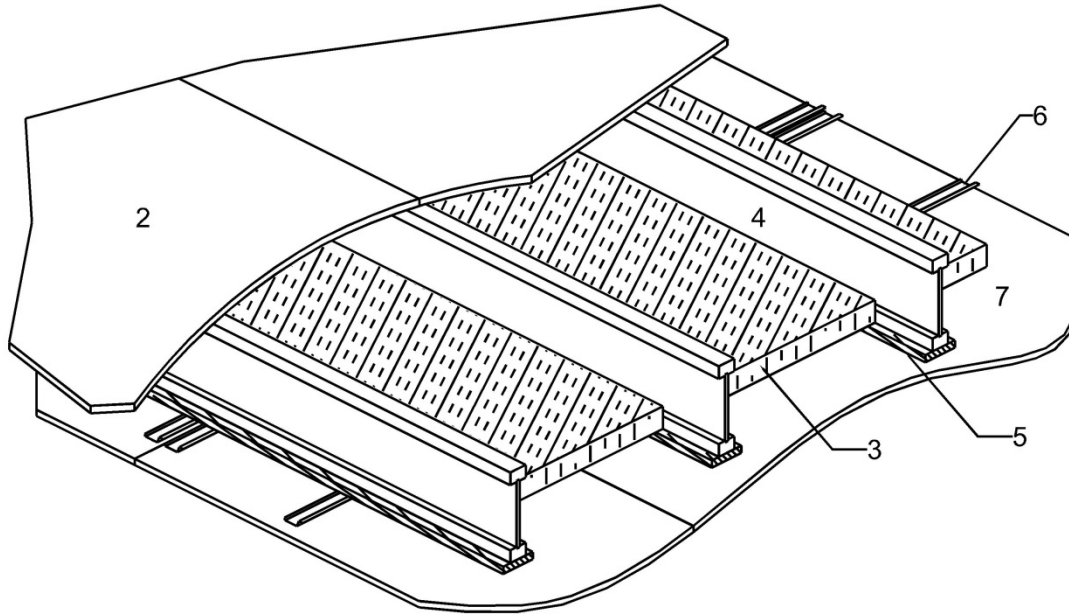
FLOOR/CEILING ASSEMBLY RATING: 60 Minutes



- 1. Floor Topping (optional, not shown):** Gypsum concrete, lightweight or normal concrete topping. When used as a roof assembly, materials for a built-up roof covering that are described in an assembly that provides a Class A, B, or C rating on combustible wood decks may be used.
- 2. Floor Sheathing:** Minimum 5/8 inch thick wood sheathing, designed and installed per code requirements. When used as a roof assembly, minimum 1/2 inch thick wood sheathing may be used, when designed and installed per code requirements.
- 3. Insulation:** Minimum 1-1/2 inch thick mineral wool insulation batts – 2.5 pcf (minimum), friction fitted between the bottom flanges of the joists and supported by resilient channels. Ends of batts shall be centered over resilient channels and tightly butted.
- 4. Structural Members:** 9 1/2" minimum deep joists spaced a maximum of 24 inches on center (Minimum 1 1/2" by 3 1/2" bottom flange dimensions). Installed in accordance with the Code. The maximum spacing may be increased to 48 inches on-center when the ceiling is applied to stripping spaced a maximum of 24 inches on center. The stripping must be a nominal 2-by-4, construction-grade lumber attached to the joists bottom flange using two 10d nails.
- 5. Resilient Channels:** Minimum 0.019 inch thick galvanized steel resilient channels, attached perpendicular to joists using 1-5/8 inch long drywall screws. Resilient channels spaced a maximum of 16 inches on center. Additional channels are required at gypsum board end joints so that each board is attached to a separate channel. These additional channels shall extend to the next joist on each side of the board end joint.
- 6. Gypsum Wallboard:** Minimum 5/8 inch thick Type C gypsum wallboard installed with long dimension perpendicular to resilient channels and fastened to each channel with minimum 1 inch long Type S drywall screws. Fasteners spaced 12 inches on center in the field of the wallboard, 8 inches on center at wallboard end joints, and 1 1/2" inches from panel edges and ends. Edge joints shall be centered between joists. End joints shall be staggered one channel spacing.
- 7. Finish System (not shown):** Face layer joints covered with tape and coated with joint compound. Screw heads covered with joint compound.

Rationale: The floor/ceiling assembly discussed in this Design Listing is based on assemblies described in item 24-1.1 and 25-1.1 of IBC Table 721.1 (3).

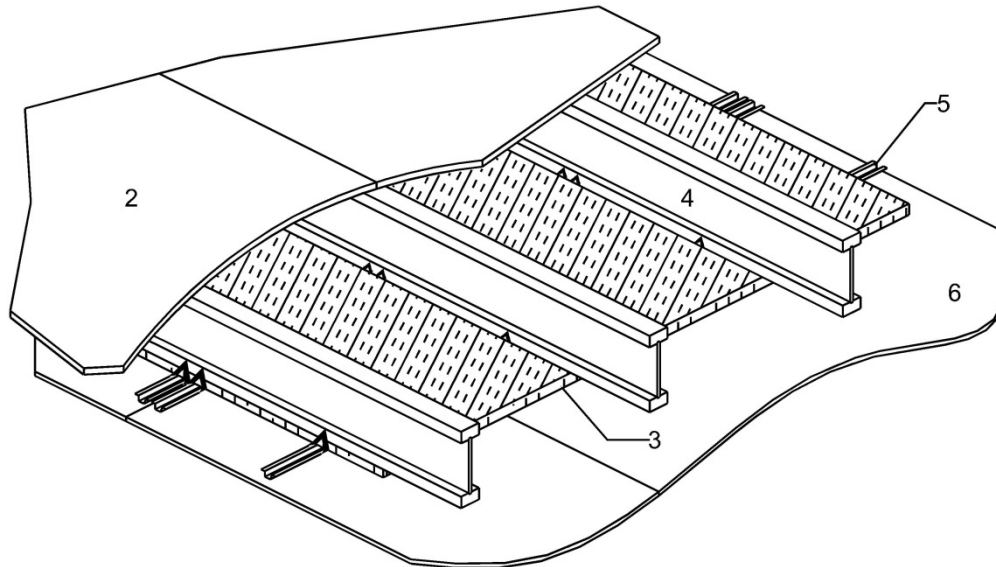
FLOOR/CEILING ASSEMBLY RATING: 60 Minutes



- 1. Floor Topping (optional, not shown):** Gypsum concrete, lightweight or normal concrete topping. When used as a roof assembly, materials for a built-up roof covering that are described in an assembly that provides a Class A, B, or C rating on combustible wood decks may be used.
- 2. Floor Sheathing:** Minimum 5/8 inch thick wood sheathing, designed and installed per code requirements. When used as a roof assembly, minimum 1/2 inch thick wood sheathing may be used, when designed and installed per code requirements.
- 3. Insulation:** Minimum 2 inch thick mineral wool insulation batts – 3.5 pcf (minimum), supported by setting strip edges, friction-fitted between the sides of the joist flanges. Ends of batts shall be centered over resilient channels and tightly butted.
- 4. Structural Members:** 9 1/2" minimum deep joists spaced a maximum of 24 inches on center. Installed in accordance with the Code.
- 5. Setting Strips:** Minimum 1x4 (nominal) wood setting strips attached with 1-1/2 inch long drywall screws at 24 inches on center along the bottom flange of joist creating a ledge to support insulation.
- 6. Resilient Channels:** Minimum 0.019 inch thick galvanized steel resilient channels, attached perpendicular to joists using 1-5/8 inch long drywall screws. Resilient channels spaced 16 inches on center. Additional channels are required at gypsum board end joints so that each board is attached to a separate channel. These additional channels shall extend to the next joist on each side of the board end joint.
- 7. Gypsum Wallboard:** Minimum 5/8 inch thick Type C gypsum wallboard installed with long dimension perpendicular to resilient channels and fastened to each channel with minimum 1-1/8 inch long Type S drywall screws. Fasteners spaced 7 inches on center and 1 1/2" inches from panel edges and ends. Edge joints shall be centered between joists. End joints shall be staggered one channel spacing.
- 8. Finish System (not shown):** Face layer joints covered with tape and coated with joint compound. Screw heads covered with joint compound.

Rationale: The floor/ceiling assembly discussed in this Design Listing is based on the assembly described in item 23-1.1 of IBC Table 721.1 (3).

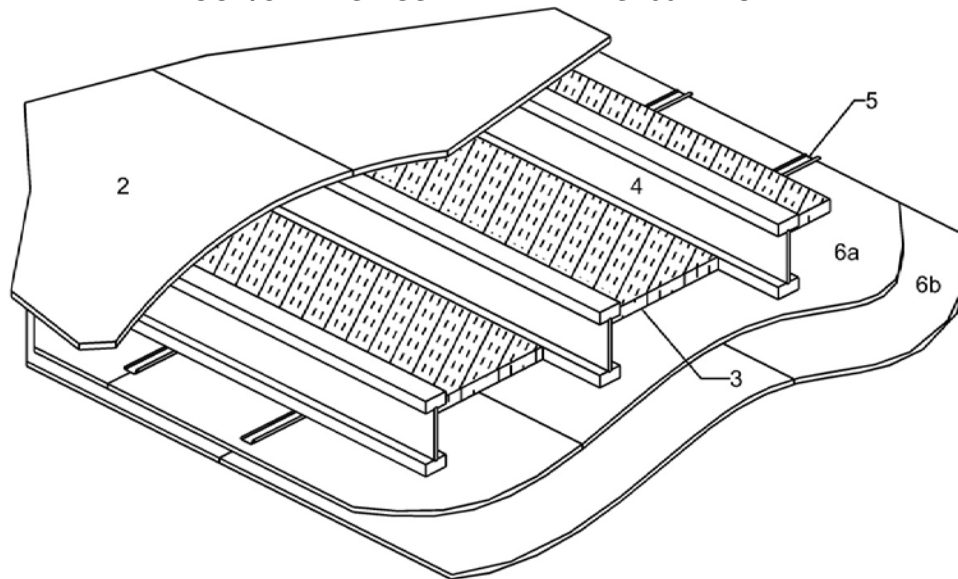
FLOOR/CEILING ASSEMBLY RATING: 60 Minutes



- 1. Floor Topping (optional, not shown):** Gypsum concrete, lightweight or normal concrete topping. When used as a roof assembly, materials for a built-up roof covering that are described in an assembly that provides a Class A, B, or C rating on combustible wood decks may be used.
- 2. Floor Sheathing:** Minimum 23/32 inch thick tongue-and-groove wood sheathing, designed and installed per code requirements. When used as a roof assembly, minimum ½ inch thick wood sheathing may be used, when designed and installed per code requirements.
- 3. Insulation:** Minimum 1 inch thick mineral wool insulation batts – 6 pcf (minimum). Battis installed on top of furring channels and under bottom flange of joists with the sides butted against support clips. The ends of the batts shall be centered over furring channels and tightly butted.
- 4. Structural Members:** 9 ½” minimum deep joists spaced a maximum of 24 inches on center (Minimum 1 ½” by 2 5/16” bottom flange dimensions). Installed in accordance with the Code.
- 5. Furring Channels:** Minimum 0.0179 inch thick galvanized steel hat-shaped furring channels, attached perpendicular to joists spaced 24 inches on center. Channels secured to I-joists with Simpson Type CSC support clips at each intersection with the joists. Clips nailed to the side of joist bottom flange with one 1-1/2 inch long No 11 gage nail. Additional channels are required at gypsum board end joints so that each board is attached to a separate channel. These additional channels shall extend to the next joist on each side of the board end joint.
- 6. Gypsum Wallboard:** Minimum ½ inch thick type C gypsum wallboard. Wallboard installed with long dimension perpendicular to furring channels and fastened to each channel with minimum 1 inch long Type S drywall screws. Fasteners spaced 12 inches on center in the field of the wallboard, 6 inches on center at wallboard end joints, and 1 ½” inches from panel edges and ends. Edge joints shall be centered between joists. End joints shall be staggered one channel spacing and offset from insulation joints by a minimum of one channel spacing.
- 7. Finish System (not shown):** Face layer joints covered with tape and coated with joint compound. Screw heads covered with joint compound.

Rationale: This floor/assembly discussed in this Design Listing is based on the assembly described in WIJ-1.4 in AWC DCA 3.

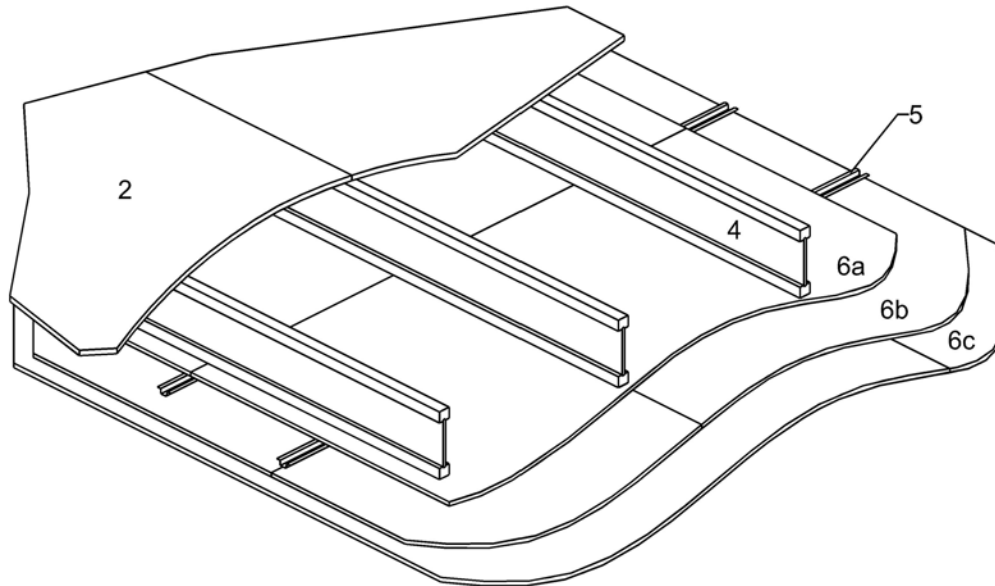
FLOOR/CEILING ASSEMBLY RATING: 90 MINUTE



- 1. Floor Topping (optional, not shown):** Gypsum concrete, lightweight or normal concrete topping. When used as a roof assembly, materials for a built-up roof covering that are described in an assembly that provides a Class A, B, or C rating on combustible wood decks may be used.
- 2. Floor Sheathing:** Minimum 5/8 inch thick wood sheathing, installed per code requirements. When used as a roof assembly, minimum 1/2 inch thick wood sheathing may be used, installed per code requirements.
- 3. Insulation:** Minimum 1 1/2 inch thick mineral wool insulation batts – 2.5 pcf (minimum). Batt s installed on top of resilient channels with the sides butted against the sides of the joists. The ends of the batts shall be centered over resilient channels and tightly butted.
- 4. Structural Members:** 9 1/2" minimum deep joists spaced a maximum of 24 inches on center (Minimum 1 1/2 inch by 2 5/16" flange dimensions). Installed in accordance with the Code.
- 5. Resilient Channels:** Minimum 0.019 inch thick galvanized steel resilient channels, attached perpendicular to joists using 1-5/8 inch long drywall screws. Resilient channels spaced 12 inches on center.
- 6. Gypsum Wallboard:** Two layers of minimum 5/8 inch thick Type C gypsum wallboard as follows:
 - 6a. Wallboard Base Layer:** Base layer of wallboard attached to resilient channels using 1-1/4 inch type S drywall screws at 12 inches on center. Edge joints shall be centered between joists. End joints shall be staggered one channel spacing.
 - 6b. Wallboard Face Layer:** Face layer of wallboard attached to resilient channels through base layer using 1-5/8 inch Type S drywall screws spaced 12 inches on center, 6 inches on center at wallboard end joints, and 1 1/2" inches from panel edges and ends. Edge joints of wallboard face layer offset a distance equal to one joist spacing from those of base layer. End joints shall be offset from base layer joints by a minimum of one channel spacing. Additionally, wallboard face layer attached to base layer with 1-1/2 inch Type G drywall screws spaced 8 inches on center, placed 1-1/2 inches from face layer end joints.
- 7. Finish System (not shown):** Face layer joints covered with tape and coated with joint compound. Screw heads covered with joint compound.

Rationale: The floor/ceiling assembly discussed in this Design Listing is based on assemblies described in: item F9 (g) of NBC Table A-9.10.3.1.B; Assembly: FF-03A and FF-12 of NRC IRC-IR-764.

FLOOR/CEILING ASSEMBLY RATING: 120 MINUTE



- 1. Floor Topping (optional, not shown):** Gypsum concrete, lightweight or normal concrete topping. When used as a roof assembly, materials for a built-up roof covering that are described in an assembly that provides a Class A, B, or C rating on combustible wood decks may be used.
- 2. Floor Sheathing:** Minimum 5/8 inch thick wood sheathing, installed per code requirements. When used as a roof assembly, minimum 1/2 inch thick wood sheathing may be used, installed per code requirements.
- 3. Insulation (optional):** When installed, insulation shall be supported by stay wires spaced 12 inches on center.
- 4. Structural Members:** 9 1/2" minimum deep joists spaced a maximum of 24 inches on center. Installed in accordance with the Code.
- 5. Resilient Channels:** Minimum 0.019 inch thick galvanized steel resilient channels, attached perpendicular to joists using 1-5/8 inch long drywall screws. Resilient channels spaced 16 inches on center (channels installed after the first layer and used to support the second and third layers of gypsum wallboard).
- 6. Gypsum Wallboard:** Three layers of minimum 5/8 inch Type C gypsum wallboard as follows:
 - 6a. Wallboard Base Layer:** Base layer of wallboard installed perpendicular to the joists and directly attached to the bottom flange using 1-5/8 inch Type S drywall screws at 12 inches on center. End joints of wallboard centered on bottom flange and staggered a minimum of one joist spacing.
 - 6b. Wallboard Middle Layer:** Middle layer of wallboard attached to furring channels using 1 inch Type S drywall screws spaced 12 inches on center with the long dimension of wallboard perpendicular to furring channels. Edge joints shall be centered on the joists and offset a minimum of one joist space from base layer end joints. End joints staggered a minimum of one channel spacing and offset from the edge joints in the base layer a minimum of one channel spacing.
 - 6c. Wallboard Face Layer:** Face layer of wallboard attached to channels through middle layer using 1-5/8 inch Type S drywall screws spaced 8 inches on center. Edge joints of face layer of wallboard shall be centered on the joists and offset a minimum distance equal to the joist spacing from those of middle layer. End joints of face layer of wallboard staggered a minimum of one channel spacing with respect to the middle layer end joint and base layer edge joint.

7. Finish System (not shown): Face layer joints covered with tape and coated with joint compound. Screw heads covered with joint compound.

Rationale: The floor/ceiling assembly discussed in this Design Listing is based on assemblies described in item 28-1.1 of IBC Table 721.1 (3).

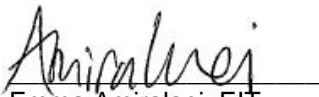
6 Conclusion

Intertek has conducted an engineering evaluation for Pinkwood Ltd. on their PKI I-Joist Series, to evaluate its fire resistance. The purpose of this evaluation is to establish Pinkwood Ltd. PKI I-Joist Series fire-resistance Listings in Intertek's Directory of Listed Products per the requirements of ASTM E119-12a *Standard Test Methods for Fire Tests of Building Construction and Materials*, and CAN/ULC S101-07 *Standard Methods for Fire Tests of Building Construction and Materials*

Based on the information contained and referenced herein, it is Intertek's professional judgment based on sound engineering principles that the following is true:

- PKI I-Joist Series may be used in 45-minute, 60-minute, 90-minute, and 120-minute fire rated assemblies when installed in accordance with the Design Listings outlined in Section 5.0 of this report.

INTERTEK TESTING SERVICES NA LTD.

Reported by: 
Emma Amiralaei, EIT
Engineer, Building Products

Reviewed by: 
Daniel Cheney, P.E
Manager, Code Evaluations

7 LAST PAGE AND REVISION SUMMARY

DATE	SUMMARY
December 7, 2014	Original
December 18, 2014	Updated the product description in Section 3.1. Corrected the I-joint depth throughout Section 5.0