



**CERTIFICATION**



**Approved. Sealed. Code Compliant.**

## **Technical Evaluation Report**

**TER 1407-04**

Use of Kingspan® GreenGuard®  
Insulation Board in Basement  
Applications

**Kingspan® Insulation LLC**

### **Product:**

**Kingspan® Insulation LLC –  
Kingspan® GreenGuard®  
Insulation Board**

Issue Date:

November 1, 2014

Revision Date:

October 14, 2020

Subject to Renewal:

October 1, 2021



COMPANY  
INFORMATION:

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Kingspan® Insulation LLC

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DIVISION: 06 00 00 - WOOD, PLASTICS AND COMPOSITES

SECTION: 06 16 00 - Sheathing

DIVISION: 07 00 00 - THERMAL AND MOISTURE PROTECTION

SECTION: 07 21 00 - Thermal Insulation

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## 1 PRODUCT EVALUATED<sup>1</sup>

- 1.1 Kingspan® Insulation LLC – Kingspan® GreenGuard® Insulation Board

## 2 APPLICABLE CODES AND STANDARDS<sup>2,3</sup>

### 2.1 Codes

- 2.1.1 *IBC—12, 15, 18: International Building Code®*
- 2.1.2 *IRC—12, 15, 18: International Residential Code®*

### 2.2 Standards and Referenced Documents

- 2.2.1 *ASTM C578: Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation*
- 2.2.2 *ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials*
- 2.2.3 *NFPA 285: Standard Fire Test Method for the Evaluation of Fire Propagation Characteristics of Exterior Nonload-bearing Wall Assemblies Containing Combustible Components*
- 2.2.4 *NFPA 286: Standard Methods of Fire Test for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*

## 3 PERFORMANCE EVALUATION

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<sup>1</sup> Building codes require data from valid [research reports](#) be obtained from [approved sources](#). Agencies who are accredited through ISO/IEC 17065 have met the [code requirements](#) for approval by the [building official](#). DrJ is an ISO/IEC 17065 ANAB-Accredited Product Certification Body – [Accreditation #1131](#).

Through ANAB accreditation and the [IAF MLA](#), DrJ certification can be used to obtain product approval in any [jurisdiction](#) or country that has [IAF MLA Members & Signatories](#) to meet the [Purpose of the MLA](#) – “certified once, accepted everywhere.”

Building official approval of a licensed [registered design professional](#) (RDP) is performed by verifying the RDP and/or their business entity complies with all professional engineering laws of the relevant [jurisdiction](#). Therefore, the work of licensed RDPs is accepted by [building officials](#), except when plan (i.e., peer) review finds an error with respect to a specific section of the code. Where this TER is not approved, the [building official](#) responds in writing stating the reasons for [disapproval](#).

For more information on any of these topics or our mission, product evaluation policies, product approval process, and engineering law, visit [drjcertification.org](#) or call us at 608-310-6748.

<sup>2</sup> Unless otherwise noted, all references in this TER are from the 2018 version of the codes and the standards referenced therein (e.g., *ASCE 7*, *NDS*, *ASTM*). This material, design, or method of construction also complies with the 2000-2015 versions of the referenced codes and the standards referenced therein.

<sup>3</sup> All terms defined in the applicable building codes are italicized.



- 3.1 The performance of GreenGuard® Insulation Board in basements was evaluated for thermal barrier requirements in accordance with IRC Section R316.4<sup>4</sup> and IBC Section 2603.4.
- 3.2 Any code compliance issues not specifically addressed in this section are outside the scope of this TER.
- 3.3 Any engineering evaluation conducted for this TER was performed on the dates provided in this TER and within DrJ's professional scope of work.

#### 4 PRODUCT DESCRIPTION AND MATERIALS

- 4.1 GreenGuard® Insulation Board used in accordance with this TER shall comply with the following material standards:
  - 4.1.1 GreenGuard® Extruded Polystyrene (XPS) Insulation Boards manufactured in compliance with *ASTM C578*, Type IV.
- 4.2 GreenGuard® Insulation Boards are produced under a proprietary manufacturing process and formed into rigid insulation panels.
  - 4.2.1 GreenGuard® Insulation Board is manufactured with or without edge treatments and facers as follows:
    - 4.2.1.1 GreenGuard® CM – square edges (1/2" – 2")
    - 4.2.1.2 GreenGuard® SL – shiplap edges (1/2" – 2")
    - 4.2.1.3 GreenGuard® SB – score lines (1" – 2")

#### 5 APPLICATIONS

- 5.1 *General Requirements*
  - 5.1.1 The following are minimum requirements for GreenGuard® Insulation Boards for use in unfinished basements:
    - 5.1.1.1 Light-frame wood framing members supporting the GreenGuard® Insulation Boards shall have a maximum thickness of 2".
    - 5.1.1.2 Light-frame steel framing members shall have a flange width of not less than 1 1/2" (including bend radius at web and lip).
    - 5.1.1.3 Framing members shall be spaced a maximum of 24" o.c.
      - 5.1.1.3.1 GreenGuard® Insulation Board shall be attached to the wall framing in accordance with the manufacturer's installation instructions and this TER.
      - 5.1.1.3.2 All sheathing edges shall be supported by wall framing or blocking.
- 5.2 *Thermal Barrier Requirements – Basement Applications*
  - 5.2.1 Insulation shall be fully protected from the interior of the building by an approved thermal barrier as required by IRC Section R316.4 and IBC Section 2603.4, except as follows:
    - 5.2.1.1 When installed in an unfinished basement not used as habitable space, GreenGuard® Insulation Board is approved for use without an approved thermal barrier or ignition barrier.
- 5.3 Where the application exceeds the limitations set forth herein, design shall be permitted in accordance with accepted engineering procedures, experience, and technical judgment.

<sup>4</sup> 2015 and 2018 IRC Section R316.4 includes 23/32" (18.2 mm) wood structural panel



## 6 INSTALLATION

6.1 Installation shall comply with the manufacturer's installation instructions and this TER. In the event of a conflict between the manufacturer's installation instructions and this TER, the more restrictive shall govern.

### 6.2 Installation Procedure

6.2.1 All required wall bracing shall be installed prior to insulation board installation.

6.2.2 The insulation boards should be oriented with the printed side facing the interior side of the building.

6.2.2.1 Kingspan® GreenGuard® Insulation Board can be oriented with the length dimension parallel or perpendicular to the wall framing members. When perpendicular to framing members, horizontal joints shall be supported by blocking, unless use of unblocked joints qualifies in accordance with IBC Section 104.11, IRC Section R104.11 and ASTM C578, as applicable.

6.2.2.2 Fastener heads shall be a minimum of  $\frac{3}{8}$ " diameter. Do not allow the fastener head to penetrate the sheathing facer. Use of washers at the fastener head is recommended.

6.2.2.3 Space fasteners 12" o.c. in both the field and perimeter.

6.2.2.4 Minimum penetration of the fasteners into the substrate is  $\frac{3}{4}$ ".

## 7 TEST ENGINEERING SUBSTANTIATING DATA

7.1 Test reports and data supporting the following material properties:

7.1.1 Surface burning characteristics evaluated in accordance with *ASTM E84* by Underwriters Laboratories, Inc., File R11183, Project No. 09CA46361

7.1.2 Southwest Research Institute, Final Report No. 01.06440.01.001

7.1.3 Underwriters Laboratories, Inc., Final Report No. 05CA2541, NC2650

7.1.4 Southwest Research Institute, Final Report No. 01.13537.01.106

7.1.5 Hughes Associates, Engineering Evaluation for Comparative Fire Properties Relating to *NFPA 285*, HAI Project No. 5242-005

7.1.6 Hughes Associates, Engineering Evaluation for Comparative Fire Properties Relating to *NFPA 286*, HAI Project No. 1JJB05192.001

7.1.7 Hughes Associates, Engineering Evaluation for Comparative Fire Properties Relating to *NFPA 285*, HAI Project No. 1JJB00060.001

7.2 Some information contained herein is the result of testing and/or data analysis by other sources which conform to IBC Section 1703 and relevant professional engineering law. DrJ relies on accurate data from these sources to perform engineering analysis. DrJ has reviewed and found the data provided by other professional sources to be credible.

7.3 Where appropriate, DrJ's analysis is based on design values that have been codified into law through codes and standards (e.g., *IBC*, *IRC*, *NDS*®, and *SDPWS*). This includes review of code provisions and any related test data that aids in comparative analysis or provides support for equivalency to an intended end-use application. Where the accuracy of design values provided herein is reliant upon the published properties of commodity materials (e.g., lumber, steel, and concrete), DrJ relies upon the grade mark, stamp, and/or design values provided by raw material suppliers to be accurate and conforming to the mechanical properties defined in the relevant material standard.



## 8 FINDINGS

- 8.1 When used and installed in accordance with this TER and the manufacturer's installation instructions, the product(s) listed in Section 1.1 are approved for the following:
- 8.1.1 GreenGuard® Insulation Board may be used in unfinished basements without an approved thermal barrier subject to the limitations stated in Section 5.2.
- 8.2 IBC Section 104.11 (IRC Section R104.11 and IFC Section 104.9 are similar) states:
- 104.11 Alternative materials, design and methods of construction and equipment.** The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. An alternative material, design or method of construction shall be *approved* where the *building official* finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, not less than the equivalent of that prescribed in this code...Where the alternative material, design or method of construction is not *approved*, the *building official* shall respond in writing, stating the reasons the alternative was not *approved*.
- 8.3 This product has been evaluated in the context of the codes listed in Section 2 and is compliant with all known state and local building codes. Where there are known variations in state or local codes applicable to this TER, they are listed here.
- 8.3.1 No known variations

## 9 CONDITIONS OF USE

- 9.1 Use of GreenGuard® Insulation Board in basements without a thermal barrier is limited to the following conditions
- 9.1.1 GreenGuard® Insulation Board having a maximum thickness of 2"
- 9.1.2 Entry into the space is made only for the service of utilities
- 9.1.3 The area cannot be used as a habitable space
- 9.1.4 The area cannot be used as a storage space
- 9.2 Where required by the building official, also known as the authority having jurisdiction (AHJ) in which the project is to be constructed, this TER and the installation instructions shall be submitted at the time of permit application.
- 9.3 Any generally accepted engineering calculations needed to show compliance with this TER shall be submitted to the AHJ for review and approval.
- 9.4 Design loads shall be determined in accordance with the building code adopted by the jurisdiction in which the project is to be constructed and/or by the Building Designer (e.g., owner or registered design professional).
- 9.5 At a minimum, this product shall be installed per Section 0 of this TER.
- 9.6 This product is manufactured under a third-party quality control program in accordance with IBC Section 104.4 and 110.4 and IRC Section R104.4 and R109.2.
- 9.7 The actual design, suitability, and use of this TER, for any particular building, is the responsibility of the owner or the owner's authorized agent. Therefore, the TER shall be reviewed for code compliance by the building official for acceptance.
- 9.8 The use of this TER is dependent on the manufacturer's in-plant QC, the ISO/IEC 17020 third-party quality assurance program and procedures, proper installation per the manufacturer's instructions, the building official's inspection, and any other code requirements that may apply to demonstrate and verify compliance with the applicable building code.



## 10 IDENTIFICATION

10.1 The product(s) listed in Section 1.1 are identified by a label on the board or packaging material bearing the manufacturer's name, product name, TER number, and other information to confirm code compliance.

10.2 Additional technical information can be found at [www.kingspaninsulation.us](http://www.kingspaninsulation.us).

## 11 REVIEW SCHEDULE

11.1 This TER is subject to periodic review and revision. For the most recent version of this TER, visit [drjcertification.org](http://drjcertification.org).

11.2 For information on the current status of this TER, contact [DrJ Certification](#).