



# Technical Evaluation Report

TO ASSIST WITH CODE COMPLIANCE

## Use of Kingspan GreenGuard® Insulation Board in Basement Applications

TER No. 1407-04

### Kingspan Insulation LLC

2100 RiverEdge Parkway  
Suite 175  
Atlanta, GA 30328  
[www.kingspaninsulation.us](http://www.kingspaninsulation.us)

Issue Date: November 1, 2014  
Subject to Renewal: October 1, 2015

### DIVISION: 06 00 00 – WOOD AND PLASTICS

Section: 06 16 00 – Sheathing

### DIVISION: 07 00 00 – THERMAL AND MOISTURE PROTECTION

Section: 07 21 00 – Thermal Insulation

#### 1. Products Evaluated:

- 1.1. Kingspan Insulation LLC – Kingspan GreenGuard® Insulation Board
- 1.2. For the most recent version of this report, visit [drjengineering.org](http://drjengineering.org). For more detailed state professional engineering and code compliance legal requirements and references, visit [drjengineering.org/statelaw](http://drjengineering.org/statelaw). DrJ is fully compliant with all state professional engineering and code compliance laws.

#### 2. Applicable Codes and Standards:<sup>1</sup>

- 2.1. *International Building Code (IBC)*
- 2.2. *International Residential Code (IRC)*
- 2.3. *ASTM E84/UL 723 – Standard Test Method for Surface Burning Characteristics of Building Materials*
- 2.4. *ICC-ES AC12 – Acceptance Criteria for Foam Plastic Insulation (Appendix D)*

<sup>1</sup> Unless otherwise noted, all references in this code-compliant research report (TER) are from the 2012 version of the codes and the standards referenced therein, including, but not limited to, *ASCE 7*, *SDPWS* and *WFCM*. This product also complies with the 2000-2009 versions of the *IBC* and *IRC* and the standards referenced therein. As required by law, where this research report is not approved, the building official shall respond in writing, stating the reasons this research report was not approved.

## DrJ is a Professional Engineering Approved Source

Learn more about DrJ's Accreditation

### Scope of Responsibility / Work, Operations Policies, and Legal Responsibilities

- [Mission and Scope of Responsibility](#)
- [Product Evaluation Operations Concepts and Policies](#)
- [TERs Are Comparable to, Compatible with, and Equivalent to the Purpose of an ICC-ES ESR, IAPMO ER, Intertek IRR, Architectural Testing CCRR, etc.](#)
- [Legal Aspects of Product Approval](#)

## Technical Evaluation Report (TER)

- 2.5. *NFPA 285 – Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components*
- 2.6. *NFPA 286 – Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*

### 3. Performance Evaluation:

- 3.1. The performance of GreenGuard<sup>®</sup> Insulation Board in basements was evaluated for thermal barrier requirements in accordance with [IRC Section R316.4](#) and [IBC Section 2603.4](#).
- 3.2. Any code compliance issues not specifically addressed in this section are outside the scope of this evaluation.

### 4. Product Description and Materials:

- 4.1. GreenGuard<sup>®</sup> Insulation Board used in accordance with this TER shall comply with the following material standards:
  - 4.1.1. GreenGuard<sup>®</sup> Insulation Boards (XPS) manufactured in compliance with *ASTM C578*, Type IV and *ICC-ES AC12* (Acceptance Criteria for Foam Plastic Insulation).
- 4.2. GreenGuard<sup>®</sup> Insulation Boards are produced under a proprietary manufacturing process and formed into rigid insulation panels.
  - 4.2.1. GreenGuard<sup>®</sup> Insulation Board is manufactured with or without edge treatments and facers as follows:
    - 4.2.1.1. GreenGuard<sup>®</sup> CM – square edges ( $1/2$ " – 2")
    - 4.2.1.2. GreenGuard<sup>®</sup> SL – shiplap edges ( $1/2$ " – 2")
    - 4.2.1.3. Replace – GreenGuard<sup>®</sup> SB – score lines (1" – 2")

### 5. Applications:

#### 5.1. General Requirements

- 5.1.1. The following are minimum requirements for GreenGuard<sup>®</sup> Insulation Boards for use in unfinished basements:
  - 5.1.1.1. Light-frame wood framing members supporting the GreenGuard<sup>®</sup> 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  $1\frac{1}{2}$ " (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<sup>®</sup> Insulation Board shall be attached to the wall framing in accordance with the manufacturer's installation instructions and DrJ Installation Instructions ([II2014-13](#)).
    - 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. Installation shall be fully protected from the interior of the building by an approved 15-minute 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<sup>®</sup> Insulation Board is approved for use without an approved thermal barrier or ignition barrier as a result of showing equivalence to *NFPA 286* testing in accordance with the acceptance criteria of *ICC-ES AC12* Appendix B – Alternative Fire Test Method for Attic and Crawl Spaces.

## Technical Evaluation Report (TER)

### 6. Installation:

#### 6.1. Kingspan GreenGuard® Insulation Board Installation

- 6.1.1. Refer to the manufacturer's installation instructions, in addition to this TER, for complete details and requirements.
- 6.1.2. All required wall bracing shall be installed prior to insulation board installation.
- 6.1.3. The insulation boards should be oriented with the printed side facing the interior side of the building.
  - 6.1.3.1. 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.
  - 6.1.3.2. 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.
  - 6.1.3.3. Space fasteners 12" o.c. in both the field and perimeter.
  - 6.1.3.4. Minimum penetration of the fasteners into the substrate is  $\frac{3}{4}$ ".

### 7. Test and 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/UL723* by Underwriters Laboratories, Inc., File R11183, Project No. 09CA46361, dated February 9, 2010.
  - 7.1.2. Southwest Research Institute, Final Report No. 01.06440.01.001, dated May 2003.
  - 7.1.3. Underwriters Laboratories, Inc., Final Report No. 05CA2541, NC2650, dated January 10, 2005.
  - 7.1.4. Southwest Research Institute, Final Report No. 01.13537.01.106, dated September 26, 2008.
  - 7.1.5. Hughes Associates, Engineering Evaluation for Comparative Fire Properties Relating to *NFPA 285*, HAI Project No. 5242-005, dated April 6, 2005.
  - 7.1.6. Hughes Associates, Engineering Evaluation for Comparative Fire Properties Relating to *NFPA 286*, HAI Project No. 1JJB05192.001, dated April 29, 2013.
  - 7.1.7. Hughes Associates, Engineering Evaluation for Comparative Fire Properties Relating to *NFPA 285*, HAI Project No. 1JJB00060.001, dated April 9, 2014.
- 7.2. Some information contained herein is the result of testing and/or data analysis by other sources, which DrJ relies on to be accurate as it undertakes its engineering analysis.
- 7.3. DrJ has reviewed and found the data provided by other professional sources are credible. This information has been approved in accordance with DrJ's procedure for acceptance of data from approved sources.
- 7.4. DrJ's responsibility for data provided by approved sources is in accordance with professional engineering law.
- 7.5. Where appropriate, DrJ relies on the derivation of design values, which have been codified into law through codes and standards (e.g., *IRC*, *WFCM*, *IBC*, *SDPWS*, etc.). This includes review of code provisions and any related test data that helps with comparative analysis or provides support for equivalency to an intended end-use application.

## Technical Evaluation Report (TER)

### 8. Findings:

- 8.1. 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](#) and [IRC Section R104.11](#) ([IFC Section 104.9](#) is similar) state:

**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, at least 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*.<sup>2</sup>

### 9. Conditions of Use:

- 9.1. Where required by the authority having jurisdiction (AHJ) in which the project is to be constructed, this report and the installation instructions shall be submitted at the time of permit application.
- 9.2. Use of GreenGuard® Insulation Board in basements without a thermal barrier is limited to the following conditions”

- 9.2.1. GreenGuard® Insulation Board having a maximum thickness of 2".
- 9.2.2. Entry into the space is made only for the service of utilities.
- 9.2.3. The area cannot be used as a habitable space.
- 9.2.4. The area cannot be used as a storage space.

#### 9.3. Design

##### 9.3.1. Building Designer Responsibility

9.3.1.1. Unless the AHJ allows otherwise, the Construction Documents shall be prepared by a Building Designer (e.g., Owner, Registered Design Professional, etc.) for the Building and shall be in accordance with [IRC Section R106](#) and [IBC Section 107](#).

9.3.1.2. The Construction Documents shall be accurate and reliable and shall provide the location, direction and magnitude of all applied loads and shall be in accordance with [IRC Section 301](#) and [IBC Section 1603](#).

##### 9.3.2. Construction Documents

9.3.2.1. Construction Documents shall be submitted to the Building Official for approval and shall contain the plans, specifications and details needed for the Building Official to approve such documents.

#### 9.4. Responsibilities

- 9.4.1. The information contained herein is a product, engineering or building code compliance research report performed in accordance with the referenced building codes, testing and/or analysis through the use of accepted engineering procedures, experience and good technical judgment.
- 9.4.2. Product, design and code compliance quality control are the responsibility of the referenced company. Consult the referenced company for the proper detailing and application for the intended purpose. Consult your local jurisdiction or design professional to assure compliance with the local building code.
- 9.4.3. DrJ research reports provide an assessment of only those attributes specifically addressed in the Products Evaluated or Code Compliance Process Evaluated section.
- 9.4.4. The engineering evaluation was performed on the dates provided in this TER, within DrJ's professional scope of work.
- 9.4.5. The actual design, suitability and use of this research report for any particular building is the responsibility of the Owner, the Owner's authorized agent or the Building Designer.

---

<sup>2</sup> The last sentence is adopted language in the 2015 codes.

## Technical Evaluation Report (TER)

### 10. Identification:

- 10.1. GreenGuard® Insulation Board described in this TER is identified by a label on the board or packaging material bearing the manufacturer's name, product name, label of the third-party inspection agency, 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 report, visit [drjengineering.org](http://drjengineering.org).
- 11.2. For information on the current status of this report, contact [DrJ Engineering](#).



#### Scope of Responsibility / Work, Operations Policies, and Legal Responsibilities

- [Mission and Scope of Responsibility](#)
- [Product Evaluation Operations Concepts and Policies](#)
- [TERs Are Comparable to, Compatible with, and Equivalent to the Purpose of an ICC-ES ESR, IAPMO ER, Intertek IRR, Architectural Testing CCRR, etc.](#)
- [Legal Aspects of Product Approval](#)