Listing and Technical Evaluation Report™

A Duly Authenticated Report from an Approved Agency

Report No: 1011-01

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Wind Pressure Performance of Kingspan® GreenGuard® XPS Insulation Board Used in Exterior Wall Covering Assemblies

Trade Secret Report Holder:

Kingspan® Insulation, LLC

Phone: 678-589-4656 Website: www.kingspan.com Email: info@kingspanpanels.us

CSI Designations:

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

1 Innovative Products Evaluated[1]

1.1 GreenGuard XPS Insulation Board:

1.1.1 GreenGuard CM

1.1.2 GreenGuard LG CM

1.1.3 GreenGuard SL

1.1.4 GreenGuard LG SL

1.1.5 GreenGuard SLX

1.1.6 GreenGuard LG SLX

1.1.7 GreenGuard PGU

2 Product Description and Materials

2.1 These innovative products, when used in accordance with this report, shall comply with the following material standards:

2.1.1 XPS manufactured in compliance with ASTM C578, Type IV

2.2 GreenGuard XPS Insulation Board products are produced under a proprietary manufacturing process and formed into rigid insulation panels.

2.3 GreenGuard XPS Insulation Board products are manufactured with or without edge treatments and facers as follows:

2.3.1 *CM:* square edges

2.3.2 *SL:* shiplap edges

2.3.3 *SLX:* shiplap edges and clear plastic facers on both sides

2.3.4 *PGU:* $^{7}/_{16}$" XPS with a reinforcing polyolefin fabric on one side, and a clear plastic facer on the other.

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2.4 Kingspan GreenGuard LG XPS has the same physical properties as GreenGuard XPS, except it is produced with a lower GWP (Global Warming Potential) blowing agent formulation. All references in this report to GreenGuard XPS Insulation Board includes both the GreenGuard XPS and the GreenGuard LG XPS insulation board products.

2.5 GreenGuard XPS Insulation Board products are manufactured in 4 x 8 sheets in 1/2", 3/4", 1", 1 1/2", 2" and 3" thicknesses.

2.6 As needed, review material properties for design in **Section 6** and the regulatory evaluation in **Section 8**.

3 Definitions[2]

3.1 New Materials[3] are defined as building materials, equipment, appliances, systems, or methods of construction, not provided for by prescriptive and/or legislatively adopted regulations, known as alternative materials.[4] The design strength and permissible stresses shall be established by tests[5] and/or engineering analysis.[6]

3.2 Duly authenticated reports[7] and research reports[8] are test reports and related engineering evaluations that are written by an approved agency[9] and/or an approved source.[10]

3.2.1 This report utilizes intellectual property and/or trade secrets to create public domain material properties for commercial end-use.

3.2.1.1 This report protects confidential Intellectual Property and trade secrets under the regulation, 18.US.Code.90, also known as Defend Trade Secrets Act of 2016 (DTSA).[11]

3.3 An approved agency is *"approved"* when it is ANAB ISO/IEC 17065 accredited. DrJ Engineering, LLC (DrJ) is accredited and listed in the ANAB directory.

3.4 An approved source is *"approved"* when a professional engineer (i.e., Registered Design Professional, hereinafter RDP) is properly licensed to transact engineering commerce. The regulatory authority governing approved sources is the state legislature via its professional engineering regulations.[12]

3.5 Testing and/or inspections conducted for this duly authenticated report were performed by an ISO/IEC 17025 accredited testing laboratory, an ISO/IEC 17020 accredited inspection body, and/or a licensed RDP.

3.5.1 The Center for Building Innovation (CBI) is ANAB[13] ISO/IEC 17025 and ISO/IEC 17020 accredited.

3.6 The regulatory authority shall enforce[14] the specific provisions of each legislatively adopted regulation. If there is a non-conformance, the specific regulatory section and language of the non-conformance shall be provided in writing[15] stating the nonconformance and the path to its cure.

3.7 The regulatory authority shall accept duly authenticated reports from an approved agency and/or an approved source with respect to the quality and manner of use of new materials or assemblies as provided for in regulations regarding the use of alternative materials, designs, or methods of construction.[16]

3.8 ANAB is an International Accreditation Forum (IAF) Multilateral Recognition Arrangement (MLA) signatory. Therefore, recognition of certificates and validation statements issued by conformity assessment bodies accredited by all other signatories of the IAF MLA with the appropriate scope shall be approved.[17] Thus, all ANAB ISO/IEC 17065 duly authenticated reports are approval equivalent,[18] and can be used in any country that is an MLA signatory found at this link: https://iaf.nu/en/recognised-abs/

3.9 Approval equity is a fundamental commercial and legal principle.[19]

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4 Applicable Local, State, and Federal Approvals; Standards; Regulations[20]

4.1 *Local, State, and Federal*

4.1.1 Approved in all local jurisdictions pursuant to ISO/IEC 17065 duly authenticated report use, which includes, but is not limited to, the following featured local jurisdictions: Austin, Baltimore, Broward County, Chicago, Clark County, Dade County, Dallas, Detroit, Denver, DuPage County, Fort Worth, Houston, Kansas City, King County, Knoxville, Las Vegas, Los Angeles City, Los Angeles County, Miami, Nashville, New York City, Omaha, Philadelphia, Phoenix, Portland, San Antonio, San Diego, San Jose, San Francisco, Seattle, Sioux Falls, South Holland, St. Louis County, Texas Department of Insurance, and Wichita.[21]

4.1.2 Approved in all state jurisdictions pursuant to ISO/IEC 17065 duly authenticated report use, which includes, but is not limited to, the following featured states: California, Florida, New Jersey, Oregon, New York, Texas, Washington, and Wisconsin.[22]

4.1.3 Approved by the Code of Federal Regulations Manufactured Home Construction: Pursuant to Title 24, Subtitle B, Chapter XX, Part 3282.14[23] and Part 3280[24] pursuant to the use of ISO/IEC 17065 duly authenticated reports.

4.1.4 Approved means complying with the requirements of local, state, or federal legislation.

4.2 *Regulations*

4.2.1 *IBC – 18, 21, 24: International Building Code®*

4.2.2 *IRC – 18, 21, 24: International Residential Code®*

4.3 *Standards*

4.3.1 *ABTG ANSI/FS 100: Standard Requirements for Wind Pressure Resistance of Foam Plastic Insulating Sheathing Used in Exterior Wall Covering Assemblies*[25]

4.3.2 *ANSI/AWC NDS: National Design Specification® (NDS) for Wood Construction*

4.3.3 *ASCE/SEI 7: Minimum Design Loads and Associated Criteria for Buildings and Other Structures*

4.3.4 *ASTM C578: Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation*

4.3.5 *ASTM E330: Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference*

4.3.6 *ASTM E331: Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference*

4.3.7 *ASTM E2178: Standard Test Method for Air Permeance of Building Materials*

5 Listed[26]

5.1 Equipment, materials, products, or services included in a List published by a nationally recognized testing laboratory (e.g., CBI), an approved agency (e.g., CBI and DrJ), and/or an approved source (e.g., DrJ), or other organization(s) concerned with product evaluation (e.g., DrJ), that maintains periodic inspection (e.g., CBI) of production of listed equipment or materials, and whose listing states either that the equipment or material meets nationally recognized standards or has been tested and found suitable for use in a specified manner.

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6 Tabulated Properties Generated from Nationally Recognized Standards

6.1 *General Requirements*

6.1.1 The following are minimum installation requirements for GreenGuard XPS Insulation Board when applied to light-frame wall framing members:

6.1.1.1 Light-frame wood framing members supporting GreenGuard XPS Insulation Board shall have a nominal thickness of not less than 2" ($1^1/_2$" actual).

6.1.1.2 Light-frame steel framing members shall have a flange width of not less than $1^1/_2$" (including bend radius at web and lip).

6.1.1.3 Framing members shall be spaced a maximum of 24" on center (o.c.).

6.1.1.3.1 GreenGuard XPS Insulation Board shall be attached to the wall framing in accordance with the manufacturer installation instructions and this report.

6.1.1.3.2 All sheathing edges shall be supported by wall framing or blocking.

6.2 *Wind Pressure Requirements*

6.2.1 *General:*

6.2.1.1 When fastened directly to light-frame wall members (e.g., studs), GreenGuard XPS Insulation Board products shall comply with the requirements of **Section 6.1**, in accordance with IBC Section 104.2.3,[27] IRC Section R104.2.2,[28] and ASTM C578, as applicable.

6.2.1.2 When installed as oversheathing, GreenGuard XPS Insulation Board products are exempt from the requirements of this report.

6.2.2 *Specific Requirements:*

6.2.2.1 When using ASCE 7-16, as referenced by the 2018 IBC for the conditions listed in this section, the wind pressures listed in ASCE 7 shall be multiplied by a factor of 0.6 to convert them to ASD level loads and then compared to the values outlined in **Table 1**.

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Table 1. Allowable Wind Pressure Resistance Values (psf) for GreenGuard XPS Insulation Board Used in Exterior Wall Covering Assemblies1,2,5

Kingspan XPS Products	Sheathing Thickness (in)	Allowable (ASD) Components and Cladding Design Wind Pressure (psf)	
		16" o.c. Framing	24" o.c. Framing
GreenGuard XPS Insulation Board	1/2	19.5	NP[6]
	3/4	25.9	20.5
	1	38.4[3]	30.6
	1 1/2	72.8	41.3
	2	122	53.7[3]
	3[4]	260	139.4
GreenGuard® Plygood® Ultra Sheathing (PGU)	7/16	78.6	61.4

SI: 1 in = 25.4 mm, 1 pound per square foot (psf) = 0.0479 kPa.

1. Linear interpolation prohibited.
2. Table 1 shall be used in accordance with the general requirements of Section 6.1. Allowable design wind pressure ratings are based on ASTM E330 testing in accordance with IBC Section 1609 and IRC Section R301.2. These values were determined in accordance with ANSI/ATBG FS100 for a fully-blocked condition (i.e., all horizontal and vertical sheathing joints supported on blocking or framing members) using a Pressure Equalization Factor (PEF) of 1.0.
3. Based on yield load in accordance with ANSI/ATBG FS100.
4. Table values for the 3" GreenGuard XPS Insulation Board products are limited to sheathing panels installed with the length dimension parallel to the framing.
5. Design values are applicable to the bending strength of the product only. Fastening to resist wind loads must be achieved by separate specification for attachment of the foam and/or the cladding system over the foam sheathing in addition to the manufacturer minimum attachment requirements.
6. NP = not permitted

6.2.2.2 The minimum thickness of GreenGuard XPS Insulation Board products shall comply with **Table 1**, for one of the following two conditions:

6.2.2.2.1 Where GreenGuard XPS Insulation Board products are directly constrained by a code-compliant cladding material (i.e., no gap between the cladding and GreenGuard XPS Insulation Board product, as shown in **Figure 1**), the components and cladding design wind pressure determined in accordance with IRC Section R301.2 or IBC Section 1609.1 shall be within the allowable wind pressure value of the FPIS product per **Table 1**.

6.2.2.2.2 Where a code-compliant cladding system is installed over, but not directly on the surface of the GreenGuard XPS Insulation Board products so that there is a space between the sheathing and the cladding (i.e., furring is used over the GreenGuard XPS Insulation Board product as shown in **Figure 2**), the components and cladding design wind pressure determined in accordance with IRC Section R301.2 or IBC Section 1609.1, shall be within the allowable wind pressure value of the GreenGuard XPS Insulation Board product, per **Table 1**.

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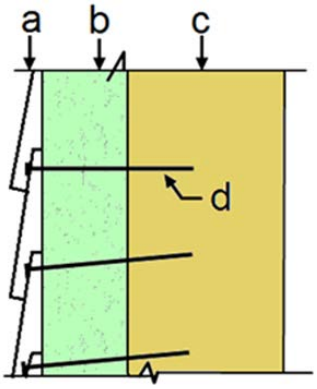
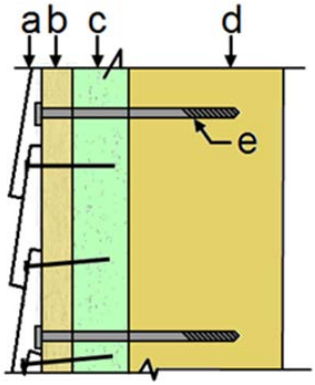


a. Cladding material and fasteners
b. GreenGuard Insulation Board
c. Wall Framing per Code (e.g., wood or steel studs)
d. Cladding fastener per code and of minimum size to support cladding weight

Figure 1. Exterior Wall Covering Assembly with Cladding Installed Directly Over GreenGuard XPS Insulation Board



a. Cladding material and fasteners
b. Wood or steel furring (which battens the foam sheathing to the wall framing and creates an airspace between the foam sheathing and the cladding)
c. GreenGuard Insulation Board
d. Wall Framing per Code (e.g., wood or steel studs)
e. Furring fastener per design and with minimum size to support cladding weight

Figure 2. Exterior Wall Covering Assembly with Cladding and Furring Installed Over GreenGuard XPS Insulation Board

6.2.2.3 The basic wind speed for GreenGuard XPS Insulation Board products shall be within the tabulated values in **Table 2**.

Table 2. Basic Wind Speed Values (mph) for GreenGuard XPS Insulation Board Used in Exterior Wall Covering Assemblies Based on ASCE 7-10 Three-Second Gust[1]

Kingspan XPS Products	Sheathing Thickness (in)	Components and Cladding Basic Wind Speed (mph)	
		16" o.c. Framing	24" o.c. Framing
GreenGuard XPS Insulation Board	1/2	115	NP
	3/4	130	115
	1	160	140
	1 1/2	200	160
	2	200	180
	3	200	200
Green Plygood Ultra Sheathing (PGU)	7/16	200	190

SI: 1 in = 25.4 mm, 1 mph = 1.61 km/h

1. Allowable wind speeds are based on the following: Mean roof height – 30', Exposure B, 10 sq. ft. effective wind area.

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6.2.2.4 Except as noted in **Table 1**, footnote 4, GreenGuard XPS 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 104.2.3,[29] IRC Section R104.2.2,[30] and ASTM C578, as applicable.

6.3 *Water Resistive Barrier (WRB)*

6.3.1 GreenGuard Insulation products (*Note:* Applies to both XPS Insulation Boards and PGU) may be used as a WRB as prescribed in IBC Section 1403.2 and IRC Section R703.2, when installed on exterior walls as described in this section.

6.3.2 GreenGuard Insulation products shall be installed with board joints placed directly over exterior framing spaced a maximum of 24" (610 mm) o.c. The fasteners used to attach the board shall be installed in accordance with **Section 9**.

6.3.3 All seams and joints between boards shall be butt jointed and sealed with an approved construction tape in accordance with **Section 9**. Approved construction tapes include 1 7/8" GreenGuard® Seam Tape or equivalent, except:

6.3.3.1 7/16" PGU approved construction tape shall be a minimum 3" GreenGuard Seam Tape or equivalent.

6.3.4 A separate WRB may also be provided. If a separate WRB method is used, taping of the sheathing joints is not required.

6.3.5 Flashing must be installed at all sheathing penetrations and shall comply with all applicable code sections.

6.4 *Air Barrier*

6.4.1 GreenGuard XPS Insulation Board products are an air-impermeable insulation and an air barrier material meeting the requirements of IRC Section N1101.10.5, IECC Section R303.1.5, and IECC Section C402.6.2.3.1[31] for use as part of an air barrier assembly when installed in accordance with the manufacturer installation instructions and this report.

6.4.2 When used as part of a continuous air barrier as prescribed in IRC Section N1102.5.1.1,[32] IECC Section C402.6.1.1,[33] and IECC Section R402.5.1.1,[34] GreenGuard XPS Insulation Board products shall be installed as follows:

6.4.2.1 All sheathing panel edges at the top and bottom of the wall assemblies, and all butted joints between sheathing panels, shall be sealed with an approved seam tape, self-adhering flashing, or sealant.

6.5 Alternative techniques shall be permitted in accordance with accepted engineering practice and experience. These provisions for the use of alternative materials, designs, and methods of construction are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed herein. This includes, but is not limited to, the following areas of engineering: mechanics of materials, structures, building science, and fire science.

7 Certified Performance[35]

7.1 All construction methods shall conform to accepted engineering practices to ensure durable, livable, and safe construction and shall demonstrate acceptable workmanship reflecting journeyman quality of work of the various trades.[36]

7.2 The strength and rigidity of the component parts and/or the integrated structure shall be determined by engineering analysis or by suitable load tests to simulate the actual loads and conditions of application that occur.[37]

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8 Regulatory Evaluation and Accepted Engineering Practice

8.1 GreenGuard XPS Insulation Board products comply with the following legislatively adopted regulations and/or accepted engineering practice for the following reasons:

8.1.1 The wind pressure resistance performance of GreenGuard XPS Insulation Board products was evaluated for use as part of an exterior wall covering assembly in accordance with the following code sections:

8.1.1.1 IBC Section 104.2.3[38] and IBC Section 1404.9[39]

8.1.1.2 IRC Section R104.2.2,[40] IRC Section R703.1.2, IRC Section R703.3, and IRC Table R703.3(1)

8.1.2 This report evaluates the wind pressure resistance performance of GreenGuard XPS Insulation Board products for use as exterior wall sheathing in compliance with the building codes listed in **Section 4**.

8.1.2.1 When used as over-sheathing[41] on light-frame masonry or concrete exterior walls, GreenGuard XPS Insulation Board products are not required to meet the wind pressure requirements of this report.

8.1.2.2 This report does not address wind pressure resistance requirements for GreenGuard XPS Insulation Board products used as part of an Exterior Insulation Finish System (EIFS). Refer to the EIFS manufacturer installation instructions for building code compliance.

8.1.3 GreenGuard XPS Insulation Board products shall comply with the material standard listed in **Section 2**, and shall be applied to exterior wall construction in accordance with the general requirements of **Section 6.1**, as well as the prescriptive wind pressure resistance requirements of **Section 6.2**.

8.1.4 GreenGuard XPS Insulation Board products used in accordance with this report, and that are required to resist wind pressure in exterior wall covering assemblies, shall also comply with the product marking requirements of **Section 13** and the conditions of use listed in **Section 12**.

8.1.5 GreenGuard XPS Insulation Board products were also evaluated for the following:

8.1.5.1 Use as an air barrier material in accordance with IRC Section N1102.5.1.1,[42] IECC Section C402.6.1.1,[43] and IECC Section R402.5.1.1.[44]

8.1.5.2 Use as a WRB in accordance with IBC Section 1403.2 and IRC Section R703.2.

8.1.6 Only products listed in this report, with thicknesses ranging from 1" to 3", are certified for wind pressure resistance. Results of testing for other thicknesses are provided for informational purposes only.

8.1.6.1 For the scope of this report, only products with thicknesses ranging from 1" to 3" are subject to an ongoing quality control program for performance to meet wind requirements in accordance with ANSI/ABTG FS100.

8.2 Any building code, regulation and/or accepted engineering evaluations (e.g., research reports, duly authenticated reports, etc.) that are conducted for this Listing were performed by DrJ, which is an ISO/IEC 17065 accredited certification body and a professional engineering company operated by RDP or approved sources. DrJ is qualified[45] to practice product and regulatory compliance services within its scope of accreditation and engineering expertise,[46] respectively.

8.3 Engineering evaluations are conducted with DrJ's ANAB accredited ICS code scope of expertise, which is also its areas of professional engineering competence.

9 Installation

9.1 Installation shall comply with the approved construction documents, the manufacturer installation instructions, this report, and the applicable building code.

9.2 In the event of a conflict between the manufacturer installation instructions and this report, contact the manufacturer for counsel on the proper installation method.

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9.3 *GreenGuard XPS Insulation Board Installation*

9.3.1 Refer to the manufacturer installation instructions, in addition to this report, for complete details and requirements.

9.3.2 All required wall bracing should be installed prior to GreenGuard XPS Insulation Board installation.

9.3.3 The insulation boards should be oriented with the printed side facing the exterior side of the building.

9.3.3.1 Except as noted in **Table 1**, footnote 4, GreenGuard XPS Insulation Board products 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 104.2.3,[47] IRC Section R104.2.2,[48] and ASTM C578, as applicable.

9.3.4 Secure the sheathing to framing members with fasteners capable of resisting the imposed loads in accordance with the NDS. Fasteners will vary, depending on the substrate and cladding materials.

9.3.4.1 Fastener heads shall be a minimum of $^3/_8$" diameter. Do not allow the fastener head to penetrate the sheathing facer. Use of washers at the fastener head is recommended.

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

9.3.4.3 Minimum penetration of the fasteners into the substrate is $^3/_4$".

9.4 *Cladding Installation*

9.4.1 Wind pressure rating adjustments for vinyl siding installed directly over GreenGuard XPS Insulation Board products shall comply with IRC Section R703.11.2 for buildings constructed under the IRC or IBC.

9.4.2 Cladding installation and fastening through foam sheathing shall comply with the applicable building code and the cladding manufacturer installation instructions. The minimum fastener size shall be capable of supporting the cladding weight when cantilevering through the GreenGuard XPS Insulation Board product.

9.4.3 Wall assemblies that include GreenGuard XPS Insulation Board products, and that are intended to serve as part of the lateral force resisting system of a structure, shall be braced to resist the in-plane shear force in accordance with IRC Section R602.10, IBC Section 2308.10,[49] or a design in accordance with IRC Section R301 or IBC Section 2305, as applicable.

9.4.4 Wall assemblies with GreenGuard XPS Insulation Board products attached to gravity load supporting members (e.g., studs) that require buckling restraint in a direction parallel to the plane of the wall shall have such restraint provided by other suitable materials. Wall assemblies shall be designed with an effective buckling length equal to the length of the member between points of lateral support provided by attachment to other building assemblies.

10 Substantiating Data

10.1 Testing has been performed under the supervision of a professional engineer and/or under the requirements of ISO/IEC 17025 as follows:

10.1.1 Air barrier material testing in accordance with ASTM E2178

10.1.2 Water-resistive barrier testing in accordance with ASTM E331

10.1.3 Wind pressure resistance testing in accordance with ABTG ANSI/FS 100

10.2 Attaching Exterior Wall Coverings through Foam Sheathing to Wood or Steel Wall Framing, FSC Tech Matters.

10.3 Information contained herein may include the result of testing and/or data analysis by sources that are approved agencies, approved sources, and/or an RDP. Accuracy of external test data and resulting analysis is relied upon.

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10.4 Where applicable, testing and/or engineering analysis are based upon provisions that have been codified into law through state or local adoption of regulations and standards. The developers of these regulations and standards are responsible for the reliability of published content. DrJ's engineering practice may use a regulation-adopted provision as the control. A regulation-endorsed control versus a simulation of the conditions of application to occur establishes a new material as being equivalent to the regulatory provision in terms of quality, strength, effectiveness, fire resistance, durability, and safety.

10.5 The accuracy of the provisions provided herein may be reliant upon the published properties of raw materials, which are defined by the grade mark, grade stamp, mill certificate, or duly authenticated reports from approved agencies and/or approved sources provided by the supplier. These are presumed to be minimum properties and relied upon to be accurate. The reliability of DrJ's engineering practice, as contained in this duly authenticated report, may be dependent upon published design properties by others.

10.6 *Testing and Engineering Analysis*

10.6.1 The strength, rigidity, and/or general performance of component parts and/or the integrated structure are determined by suitable tests that simulate the actual conditions of application that occur and/or by accepted engineering practice and experience.[50]

10.7 Where additional condition of use and/or regulatory compliance information is required, please search for GreenGuard XPS Insulation Board on the DrJ Certification website.

11 Findings

11.1 As outlined in **Section 6**, GreenGuard XPS Insulation Board products have performance characteristics that were tested and/or meet applicable regulations. In addition, they are suitable for use pursuant to its specified purpose.

11.2 When used and installed in accordance with this duly authenticated report and the manufacturer installation instructions, GreenGuard XPS Insulation Board products shall be approved for the following applications:

11.2.1 Performance for use as a WRB in accordance with IBC Section 1403.2 and IRC Section R703.2.

11.2.2 Performance for use as an air barrier in accordance with IRC Section N1102.5.1.1,[51] IECC Section C402.6.1.1,[52] and IECC Section R402.5.1.1.[53]

11.2.3 Transverse load resistance due to components and cladding pressures on building surfaces as defined in **Section 6**.

11.3 Unless exempt by state statute, when GreenGuard XPS Insulation Board products are to be used as a structural and/or building envelope component in the design of a specific building, the design shall be performed by an RDP.

11.4 Any application specific issues not addressed herein can be engineered by an RDP. Assistance with engineering is available from Kingspan Insulation, LLC.

11.5 IBC Section 104.2.3[54] (IRC Section R104.2.2[55] and IFC Section 104.2.3[56] are similar) in pertinent part state:

> 104.2.3 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 is not specifically prohibited by this code and has been approved.

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11.6 **Approved:**[57] Building regulations require that the building official shall accept duly authenticated reports.[58]

11.6.1 An approved agency is *"approved"* when it is ANAB ISO/IEC 17065 accredited.

11.6.2 An approved source is *"approved"* when an RDP is properly licensed to transact engineering commerce.

11.6.3 Federal law, Title 18 US Code Section 242, requires that, where the alternative product, material, service, design, assembly, and/or method of construction is not approved, the building official shall respond in writing, stating the reasons why the alternative was not approved. Denial without written reason deprives a protected right to free and fair competition in the marketplace.

11.7 DrJ is a licensed engineering company, employs licensed RDPs and is an ANAB Accredited Product Certification Body – Accreditation #1131.

11.8 Through the IAF Multilateral Arrangement (MLA), this duly authenticated report can be used to obtain product approval in any jurisdiction or country because all ANAB ISO/IEC 17065 duly authenticated reports are equivalent.[59]

12 Conditions of Use

12.1 As defined in **Section 6**, where material and/or engineering mechanics properties are created for load resisting design purposes, the resistance to the applied load shall not exceed the ability of the defined properties to resist those loads using the principles of accepted engineering practice.

12.2 As listed herein, GreenGuard XPS Insulation Board products shall be:

12.2.1 Installed in compliance with the manufacturer instructions, the applicable building code, and this report.

12.2.2 The manufacturer shall provide the building official and purchaser with evidence of code compliance for matters beyond the wind pressure resistance scope of this report.

12.3 When required by adopted legislation and enforced by the building official, also known as the Authority Having Jurisdiction (AHJ) in which the project is to be constructed:

12.3.1 Any calculations incorporated into the construction documents shall conform to accepted engineering practice and, when prepared by an approved source, shall be approved when signed and sealed.

12.3.2 This report and the installation instructions shall be submitted at the time of permit application.

12.3.3 At a minimum, these innovative products shall be installed per **Section 9**.

12.3.4 The review of this report by the AHJ shall comply with IBC Section 104.2.3.2 and IBC Section 105.3.1.

12.3.5 These innovative products have an internal quality control program and a third party quality assurance program in accordance with IBC Section 104.7.2, IBC Section 110.4, IBC Section 1703, IRC Section R104.7.2, and IRC Section R109.2.

12.3.6 The application of these innovative products in the context of this report is dependent upon the accuracy of the construction documents, implementation of installation instructions, inspection as required by IBC Section 110.3, IRC Section R109.2, and any other regulatory requirements that may apply.

12.4 The approval of this report by the AHJ shall comply with IBC Section 1707.1, where legislation states in part, *"the building official shall make, or cause to be made, the necessary tests and investigations; or the building official shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in Section 104.2.3"*, all of IBC Section 104, and IBC Section 105.3.

12.5 Design loads shall be determined in accordance with the regulations adopted by the jurisdiction in which the project is to be constructed and/or by the building designer (i.e., owner or RDP).

12.6 The actual design, suitability, and use of this report for any particular building, is the responsibility of the owner or the authorized agent of the owner.

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13 Identification

13.1 GreenGuard XPS Insulation Board products, as listed in **Section 1.1**, are identified by a label on the board or packaging material bearing the manufacturer name, product name, this report number, and other information to confirm code compliance.

13.2 Additional technical information can be found at www.kingspan.com.

14 Review Schedule

14.1 This report is subject to periodic review and revision. For the latest version, visit www.drjcertification.org.

14.2 For information on the status of this report, please contact DrJ Certification.

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Notes

1 For more information, visit drjcertification.org or call us at 608-310-6748.

2 Capitalized terms and responsibilities are defined pursuant to the applicable building code, applicable reference standards, the latest edition of TPI 1, the NDS, AISI S202, US professional engineering law, Canadian building code, Canada professional engineering law, Qualtim External Appendix A: Definitions/Commentary, Qualtim External Appendix B: Project/Deliverables, Qualtim External Appendix C: Intellectual Property and Trade Secrets, definitions created within Design Drawings and/or definitions within Reference Sheets. Beyond this, terms not defined shall have ordinarily accepted meanings as the context implies. Words used in the present tense include the future; words stated in the masculine gender include the feminine and neuter; the singular number includes the plural and the plural, the singular.

3 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1702

4 Alternative Materials, Design and Methods of Construction and Equipment: The provisions of any regulation code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by a regulation. Please review https://www.justice.gov/atr/mission and https://up.codes/viewer/mississippi/ibc-2024/chapter/1/scope-and-administration#104.2.3

5 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1706.2:~:text=the%20design%20strengths%20and%20permissible%20stresses%20shall%20be%20established%20by%20tests

6 The design strengths and permissible stresses of any structural material shall conform to the specifications and methods of design of accepted engineering practice. https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1706.1:~:text=Conformance%20to%20Standards-,The%20design%20strengths%20and%20permissible%20stresses,-of%20any%20structural

7 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1707.1:~:text=the%20building%20official%20shall%20make%2C%20or%20cause%20to%20be%20made%2C%20the%20necessary%20tests%20and%20investigations%3B%20or%20the%20building%20official%20shall%20accept%20duly%20authenticated%20reports%20from%20approved%20agencies%20in%20respect%20to%20the%20quality%20and%20manner%20of%20use%20of%20new%20materials%20or%20assemblies%20as%20provided%20for%20in%20Section%20104.2.3.

8 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1703.4.2

9 https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#approved_agency

10 https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#approved_source

11 https://www.law.cornell.edu/uscode/text/18/1832 (b) Any organization that commits any offense described in subsection (a) shall be fined not more than the greater of $5,000,000 or 3 times the value of the stolen trade secret to the organization, including expenses for research and design and other costs of reproducing the trade secret that the organization has thereby avoided. The federal government and each state have a public records act. To follow DTSA and comply state public records and trade secret legislation requires approval through ANAB ISO/IEC 17065 accredited certification bodies or approved sources. For more information, please review this website: Intellectual Property and Trade Secrets.

12 https://www.nspe.org/resources/issues-and-advocacy/professional-policies-and-position-statements/regulation-professional AND https://apassociation.org/list-of-engineering-boards-in-each-state-archive/

13 https://www.cbitest.com/accreditation/

14 https://up.codes/viewer/mississippi/ibc-2024/chapter/1/scope-and-administration#104.1:~:text=directed%20to%20enforce%20the%20provisions%20of%20this%20code

15 https://up.codes/viewer/mississippi/ibc-2024/chapter/1/scope-and-administration#104.2.3 AND https://up.codes/viewer/mississippi/ibc-2024/chapter/1/scope-and-administration#105.3.1

16 https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1707.1

17 https://iaf.nu/en/about-iaf-mla/#:~:text=Once%20an%20accreditation%20body%20is%20a%20signatory%20of%20the%20IAF%20MLA%2C%20it%20is%20required%20to%20recognise%20certificates%20and%20validation%20and%20verification%20statements%20issued%20by%20conformity%20assessment%20bodies%20accredited%20by%20all%20other%20signatories%20of%20the%20IAF%20MLA%2C%20with%20the%20appropriate%20scope

18 True for all ANAB accredited product evaluation agencies and all International Trade Agreements.

19 https://www.justice.gov/crt/deprivation-rights-under-color-law AND https://www.justice.gov/atr/mission

20 Unless otherwise noted, the links referenced herein use un-amended versions of the 2024 International Code Council (ICC) 2024 International Code Council (ICC) model codes as foundation references. Mississippi versions of the IBC 2024 and the IRC 2024 are un-amended. This material, product, design, service and/or method of construction also complies with the 2000-2012 versions of the referenced codes and the standards referenced therein. As pertinent to this technical and code compliance evaluation, CBI and/or DrJ staff have reviewed any state or local regulatory amendments to assure this report is in compliance.

21 See Adoptions by Publisher for the latest adoption of a non-amended or amended model code by the local jurisdiction. https://up.codes/codes/general

22 See Adoptions by Publisher for the latest adoption of a non-amended or amended model code by state. https://up.codes/codes/general

23 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3282/subpart-A/section-3282.14

24 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280

25 Formerly SBCA ANSI/FS 100

26 https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#p-3280.2(Listed%20or%20certified); https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#listed AND https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#labeled

27 2021 IBC Section 104.11

28 2021 IRC Section R104.11

29 2021 IBC Section 104.11

30 2021 IRC Section R104.11

31 2021 IECC Section C402.5.1.3 AND 2018 IECC Section C402.5.1.2.1

32 2021 IRC Section N1102.4.1.1

33 2021 IECC Section C402.5.1.1

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[34] 2021 IECC Section R402.4.1.1

[35] https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1703.4

[36] https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#:~:text=All%20construction%20methods%20shall%20be%20in%20conformance%20with%20accepted%20engineering%20practices%20to%20insure%20durable%2C%20livable%2C%20and%20safe%20housing%20and%20shall%20demonstrate%20acceptable%20workmanship%20reflecting%20journeyman%20quality%20of%20work%20of%20the%20various%20trades

[37] https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280#:~:text=The%20strength%20and%20rigidity%20of%20the%20component%20parts%20and/or%20the%20integrated%20structure%20shall%20be%20determined%20by%20engineering%20analysis%20or%20by%20suitable%20load%20tests%20to%20simulate%20the%20actual%20loads%20and%20conditions%20of%20application%20that%20occur

[38] 2021 IBC Section 104.11

[39] 2021 IBC Section 1404.8

[40] 2021 IRC Section R104.11

[41] Over-sheathing definition: As used in this report, over-sheathing refers to the application of foam sheathing over and directly on the surface of wall sheathing material or solid wall construction, such as masonry or concrete, whereby the substrate is capable of resisting the full design transverse wind load required by the applicable building code or latest edition of ASCE 7. In addition, cladding is separately installed over foam sheathing in accordance with Section 6.2. An over-sheathing application of foam sheathing does not require that the foam sheathing resist wind pressure in accordance with this report.

[42] 2021 IRC Section N1102.4.1.1

[43] 2021 IECC Section C402.5.1.1

[44] 2021 IECC Section R402.4.1.1

[45] Qualification is performed by a legislatively defined Accreditation Body. ANSI National Accreditation Board (ANAB) is the largest independent accreditation body in North America and provides services in more than 75 countries. DrJ is an ANAB accredited product certification body.

[46] https://anabpd.ansi.org/Accreditation/product-certification/AllDirectoryDetails?prgID=1&orgID=2125&statusID=4#:~:text=Bill%20Payment%20Date-,Accredited%20Scopes,-13%20ENVIRONMENT.%20HEALTH

[47] 2021 IBC Section 104.11

[48] 2021 IRC Section R104.11

[49] 2021 IBC Section 2308.6

[50] See Code of Federal Regulations (CFR) Title 24 Subtitle B Chapter XX Part 3280 for definition: https://www.ecfr.gov/current/title-24/subtitle-B/chapter-XX/part-3280

[51] 2021 IRC Section N1102.4.1.1

[52] 2021 IECC Section C402.5.1.1

[53] 2021 IECC Section R402.4.1.1

[54] 2021 IBC Section 104.11

[55] 2021 IRC Section R104.11

[56] 2018: https://up.codes/viewer/wyoming/ifc-2018/chapter/1/scope-and-administration#104.9 AND 2021: https://up.codes/viewer/wyoming/ibc-2021/chapter/1/scope-and-administration#104.11

[57] Approved is an adjective that modifies the noun after it. For example, Approved Agency means that the Agency is accepted officially as being suitable in a particular situation. This example conforms to IBC/IRC/IFC Section 201.4 (https://up.codes/viewer/mississippi/ibc-2024/chapter/2/definitions#201.4) where the building code authorizes sentences to have an ordinarily accepted meaning such as the context implies.

[58] https://up.codes/viewer/mississippi/ibc-2024/chapter/17/special-inspections-and-tests#1707.1

[59] Multilateral approval is true for all ANAB accredited product evaluation agencies and all International Trade Agreements.

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