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Code Compliance Research Report CCRR-1022

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DIVISION 07 00 00 – THERMAL AND MOISTURE PROTECTION

Section: 07 21 00 – Thermal Insulation

Section: 07 25 00 – Water Resistive Barriers/Weather Barriers

REPORT HOLDER:

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REPORT SUBJECT:

GreenGuard® Fanfold and Insulating Sheathing

1.0 SCOPE OF EVALUATION

This Research Report addresses compliance with the following Codes:

- 2015, 2012, and 2009 *International Building Code®* (IBC)
- 2015, 2012, and 2009 *International Residential Code®* (IRC)
- 2015, 2012, and 2009 *International Energy Conservation Code®* (IECC)
- 2014 *Florida Building Codes* (see Section 8.0)

The insulation boards described in this report have been evaluated for the following properties:

- Surface-burning characteristics
- Thermal resistance (R-Value)
- Water Resistive Barrier

See Table 1 for applicable Code sections related to these properties.

2.0 USES

The GreenGuard® Fanfold and Insulating Sheathing products described in this report are non-structural thermal insulation boards used in interior applications, exterior walls and as components of non-classified (nonrated) roof covering systems. The insulation boards may also be used as an alternative to the water-resistive barrier requirements of IBC Sections 1404.2 and 2510.6, and IRC Section R703, when installed on exterior walls as described in Section 4.3.2 of this report.

3.0 DESCRIPTION

3.1 GreenGuard® Products:

The GreenGuard® Fanfold and Insulating Sheathings consist of an extruded polystyrene foam plastic core with or without facers. Various combinations of facers are recognized, as described in Table 2. The insulations are available in semi-rigid boards or "fanfolded" bundles. Product thicknesses and board sizes are described in Table 2.

3.1.1 GreenGuard® Fanfold Siding Underlayments: Fanfold underlayment provides a continuous layer of thermal and air infiltration protection providing a smooth, straight surface for the application of siding.

3.1.2 GreenGuard® Insulating Sheathings and Insulation Board: Insulation boards provide a smooth, rigid surface for the installation of replacement siding.

3.1.3 GreenGuard® Roofing Recovery Boards: Roofing recovery boards provide a smooth surface for the placement of roofing membranes.

3.2 Joint Sealing Tapes:

Joint sealing tapes are used in conjunction with fanfold and sheathing products to seal joints between edges when the products are installed as alternate water-resistive barriers. The sealing tape products are described in Table 4.

3.3 Surface-Burning Characteristics:

The insulation products described in this report have a flame-spread index of 25 or less and a smoke-developed index of 450 or less, when tested in accordance with ASTM E84.

3.4 Thermal Resistance:

GreenGuard® Fanfold and Insulating Sheathing products have a thermal resistance (R-Value) as shown in Table 3.

4.0 INSTALLATION

4.1 General:

The extruded polystyrene foam plastic insulation boards must be installed in accordance with the manufacturer's published installation instructions, the applicable Code, and this Research Report. The manufacturer's published installation instructions and this Research Report must be strictly adhered to, and a copy of the instructions must be available on the jobsite during installation.

4.2 Thermal Barrier:

The insulation boards must be covered on the interior of the building with an approved thermal barrier complying with and installed in accordance with IBC Section 2603.4 or IRC Section 316.4.

4.3 Exterior of Building Application:

4.3.1 General: The insulation boards must not be used as a nailing base for exterior siding. Nailing of exterior siding must penetrate through the boards into the wall framing or structural sheathing. The insulation boards must not be used structurally to resist transverse, vertical or in-plane loads.

Wall bracing must be provided in accordance with the applicable Code.

The use of the insulation boards in areas of "very heavy" termite probability must comply with IBC Section 2603.8 [2012 - 2603.9] or IRC Section R318.4 [2009 - R316.7].

A water-resistive barrier must be provided in accordance with IBC Section 1404.2 or IRC Section R703.2 unless the insulation board is installed as described in Section 4.3.2.

4.3.2 Water Resistive Barrier: The products described in this report may be used as alternatives to the water-resistive barrier requirements of IBC Section 1404.2 and 2510.6, and IRC Section R703.2 when installed in accordance with one of the methods described in Sections 4.3.2.1, 4.3.2.2, or 4.3.2.3.

4.3.2.1 GreenGuard® PLYGOOD Ultra and Insulation Board: Panels must be installed vertically. Vertical joints must occur over framing members or be backed. Gaps at penetrations must be sealed using a silicone sealant complying with ASTM C920, Type S, Grade NS, Class 25 or using an expanding spray foam sealant complying with AAMA 812. Horizontal and vertical joints of GreenGuard® Insulation Board must be sealed with GreenGuard® Seam Tape (Standard) and horizontal and vertical joints of GreenGuard® PLYGOOD Ultra must be sealed with GreenGuard® Custom Seam Tape.

4.3.2.2 GreenGuard® Fanfold Siding Underlayments using Flanged Windows: The insulation boards must be installed with the long dimension running horizontally. Gaps at penetrations must be sealed using a silicone sealant complying with ASTM C920, Type S, Grade NS, Class 25 or

using an expanding spray foam sealant complying with AAMA 812. Horizontal and vertical insulation board joints must be sealed with GreenGuard® Seam Tape, GreenGuard® Flashing, or by using strips of 16 inch wide GreenGuard® Building Wrap (CCRR-1018) and GreenGuard® Flashing to create a z-furring joint treatment.

4.3.2.3 GreenGuard® Fanfold Siding Underlayment using Non-flanged Windows: The insulation boards must be installed with the long dimension running horizontally. Gaps at penetrations must be sealed using a silicone sealant complying with ASTM C920, Type S, Grade NS, Class 25 or using an expanding spray foam sealant complying with AAMA 812. Horizontal and vertical insulation board joints must be sealed with GreenGuard® Seam Tape, GreenGuard® Flashing, or by using strips of 16 inch wide GreenGuard® Building Wrap (CCRR-1018) and GreenGuard® Flashing to create a z-furring joint treatment. Aluminum brickmold caps must be formed for windows with a minimum 2 inch wide flange. The brickmold sections must be installed shingle fashion and joints must be sealed with silicone sealant complying with ASTM C920, Type S, Grade NS, Class 25. GreenGuard® Flashing or GreenGuard® SuperStretch must be installed with a minimum 4 inch width so that it overlaps the brickmold sections.

4.3.3 Wind Resistance: Recognition as foam sheathing for wind resistance in accordance with 2015 IBC Sections 2603.10 and 2015 and IRC Section R316.8 is outside the scope of this report.

5.0 CONDITIONS OF USE

The GreenGuard® Fanfold and Insulating Sheathing products described in this Research Report comply with, or are suitable alternatives to, what is specified in those Codes listed in Section 1.0 and Table 1 of this report, subject to the following conditions:

5.1 Installation must comply with this Research Report, the manufacturer's published installation instructions and the applicable Code. In the event of a conflict between the manufacturer's instructions and this report, this report governs.

5.2 The insulation boards must be covered with an approved exterior wall covering in accordance with the applicable Code.

5.3 The insulation boards must be covered on the interior of the building with an approved interior 15-minute thermal barrier in accordance with the applicable Code.

5.4 The insulation boards are produced in Winchester, VA under a quality control program with inspections by Intertek (AA-647).

6.0 SUPPORTING EVIDENCE

6.1 Reports of tests in accordance with ASTM E84, ASTM C578, and ASTM C518.

6.2 Data in accordance with the ICC-ES Acceptance Criteria for Foam Plastic Insulation (AC12), dated June 2015 (editorially revised May 2016).

6.3 Data in accordance with the ICC-ES Acceptance Criteria for Foam Plastic Sheathing Panels Used as Water-resistive Barriers (AC71), dated February 2003 (editorially revised January 2016).

6.4 Intertek Listing Report ["Kingspan - Fanfold and Sheathing Products"](#).

7.0 IDENTIFICATION

The GreenGuard® Fanfold and Insulating Sheathing products described in this Research Report are identified by a marking on the product bearing the report holder's name (Kingspan Insulation, LLC), the Intertek Mark, and the Code Compliance Research Report number (CCRR-1022).

8.0 OTHER CODES

8.1 Florida Building Code:

8.1.1 Scope of Evaluation: The GreenGuard® Fanfold and Insulating Sheathing were evaluated for compliance with the 2014 *Florida Building Code – Building*, *Florida Building Code – Residential* and *Florida Building Code – Energy Conservation*.

8.1.2 Conclusion: The GreenGuard® Fanfold and Insulating Sheathing, described in Sections 2.0 through 7.0 of this Research Report, comply with the 2010 Florida Building Code – Building, Florida Building Code – Residential and Florida Building Code – Energy, subject to the following conditions:

- Use of the insulation boards for compliance with the High-Velocity Hurricane Zone provisions of the 2014 *Florida Building Code – Building* and the *Florida Building Code – Residential* has not been evaluated, and is outside the scope of this Research Report.
- The foam plastic shall be installed in accordance with FBC – Building Section 2603.8 and FBC – Residential Section R318.5.
- Intertek is a quality assurance entity approved by the Florida Building Commission.

9.0 CODE COMPLIANCE RESEARCH REPORT USE

9.1 Approval of building products and/or materials can only be granted by a building official having legal authority in the specific jurisdiction where approval is sought.

9.2 Code Compliance Research Reports shall not be used in any manner that implies an endorsement of the product by Intertek.

9.3 Reference to the <https://bpdirectory.intertek.com> is recommended to ascertain the current version and status of this report.

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TABLE 1A – PROPERTIES EVALUATED – 2015 I-Codes and 2014 Florida Building Code

PROPERTY	IBC	FBC – BUILDING	IRC	FBC – RESIDENTIAL	IECC	FBC - ENERGY
Physical properties	Not required	Not required	Not required	Not required	Not required	Not required
Surface-burning characteristics	2603.3	2603.3	R316.3	R316.3	Not applicable	Not applicable
Thermal resistance	1301	1301	N1101.10	See FBC - Energy	C303.1.1, C303.1.4, R303.1.1.1, R303.1.1.4	C303.1.1, C303.1.4, R303.1.1.1, R303.1.1.1.2
Water-resistive barrier	1404.2	1404.2	R703.2	R703.2	Not applicable	Not applicable
Air permeability	1203.3, 1301	1301	R806.5	R806.5	C402.4.1.2.1, R402.4 Table R 402.4.1.1	C402.4.1.2.1, R402.4 Table R402.4.1.1

TABLE 1B – PROPERTIES EVALUATED – 2012 and 2009 I-Codes

PROPERTY	IBC Building Section ¹	IRC Residential Section ¹	IECC Energy Code Section ¹
Physical properties	Not required	Not required	Not required
Water-resistive barrier	1404.2 and 2510.6	R703	Not applicable
Surface-burning characteristics	2603.3	R316.3	Not applicable
Thermal resistance	1301	N1101.12 N1102	C303.1.1 C303.1.4 R303.1.1 R30301.4

¹Section numbers apply to the 2012 and 2009 IBC and IRC.

TABLE 2 – GREENGUARD® PRODUCT DESCRIPTIONS

Product Name	Nominal Product Thickness(in.)	Brief Description	Primary Applications
Kingspan GreenGuard® S14	1/4	Extruded Polystyrene foam core with clear, perforated, plastic facers on both sides. Available in bundles measuring 4' x 50'.	Siding Underlayment
Kingspan GreenGuard® Q250	1/4	Extruded polystyrene foam core with clear, perforated plastic facers on both sides. Available in bundles measuring 4' x 48'	Siding Underlayment
Kingspan GreenGuard® FQ250	1/4	Extruded polystyrene foam core with a clear, perforated plastic facer on one side and an additional metallized facer on the other side. Available in bundles measuring 4' x 50'.	Siding Underlayment
Kingspan GreenGuard® P1450	1/4	Extruded polystyrene foam core with clear, perforated plastic facers on both sides. Available in bundles measuring 4' x 50'.	Siding Underlayment
Kingspan GreenGuard® FP1450	1/4	Extruded polystyrene foam core with a clear, perforated plastic facer on one side and an additional metallized facer on the other side. Available in bundles measuring 4' x 50'.	Siding Underlayment
Kingspan GreenGuard® XP14	1/4	Extruded polystyrene foam core with clear, perforated, flexible plastic facers on both sides, and a "cut & fold" hinge design. Available in bundles measuring 4' x 50'.	Siding Underlayment
Kingspan GreenGuard® XFP14	1/4	Extruded polystyrene foam core with clear, perforated, flexible plastic facers on both sides with an additional perforated, metallized facer on one side. Product has a "cut & fold" hinge design. Available in bundles measuring 4' x 50'.	Siding Underlayment
Royal DuraPlank	1/4	Extruded polystyrene foam that is contoured to fit behind vinyl siding. Available in parts measuring 7" x 4".	Siding Underlayment

TABLE 2 – GREENGUARD® PRODUCT DESCRIPTIONS - *CONTINUED*

Product Name	Nominal Product Thickness(in.)	Brief Description	Primary Applications
Kingspan GreenGuard® DC14	1/4	Extruded polystyrene foam that is contoured to allow for drainage of water behind siding. Available in bundles measuring 4' x 48'.	Siding Underlayment
Kingspan GreenGuard® PB4	1/4	Extruded polystyrene foam core with clear, non-perforated plastic facers on both sides. Available in bundles measuring 4' x 50'.	Waterproofing Protection Board
Kingspan GreenGuard® PB4	1/4	Extruded polystyrene foam core with clear, non-perforated plastic facers on both sides. Available in bundles measuring 4' x 50'.	Waterproofing Protection Board
Kingspan GreenGuard® PLYGOOD PG28	1/4	Extruded polystyrene foam core with clear, non-perforated plastic facers on both sides. Available in sheets measuring 4' x 8'.	Exterior Sheathing for Manufactured
Kingspan GreenGuard® PLYGOOD PGF28	1/4	Extruded polystyrene foam core with clear, non-perforated plastic facers on both sides with an additional metallized facer on one side. Available in sheets measuring 4' x 8'.	Exterior Sheathing for Manufactured Housing
Kingspan GreenGuard® CB4	1/4	Extruded polystyrene foam core with clear, non-perforated plastic facers on both sides with an additional white, non-perforated facer on the non-printed side. Available in bundles measuring 4' x 50'.	Condensation Board for Post-Frame Buildings
Kingspan GreenGuard® Q350	3/8	Extruded polystyrene foam core with clear, perforated, flexible plastic facers on both sides. Product has a "cut & fold" hinge design. Available in bundles measuring 4' x 50'.	Residing Underlayment
Kingspan GreenGuard® FQ350	3/8	Extruded polystyrene foam core with clear, perforated, flexible plastic facers on both sides with an additional perforated, metallized facer on one side. Product has a "cut & fold" hinge design. Available in bundles measuring 4' x 50'.	Residing Underlayment
Kingspan GreenGuard® XP38	3/8	Extruded polystyrene foam core with clear, perforated, flexible plastic facers on both sides, printed with grid lines. Product has a "cut & fold" hinge design. Available in bundles measuring 4' x 50'.	Residing Underlayment
Kingspan GreenGuard® XFP38	3/8	Extruded polystyrene foam core with clear, perforated, flexible plastic facers on both sides, with an additional perforated, metallized facer on one side (non-reflective side is printed with grid lines). Product has a "cut & fold" hinge design. Available in bundles measuring 4' x 50'.	Residing Underlayment
Kingspan GreenGuard® PB6, PB38	3/8	Extruded polystyrene foam core with clear, non-perforated, flexible plastic facers on both sides. Product has a "cut & fold" hinge design. Available in bundles measuring 4' x 50' (1.2m x 15.2m) (PB6) and sheets measuring 4' x 8' (PB38).	Roofing Recovery Board

TABLE 2 – GREENGUARD® PRODUCT DESCRIPTIONS - *CONTINUED*

Product Name	Nominal Product Thickness(in.)	Brief Description	Primary Applications
Kingspan GreenGuard® PB6W, Duro- Guard XPS (white facers on both sides)	3/8	Extruded polystyrene foam core with clear, non-perforated, flexible plastic facers on both sides with an additional white, non-perforated facer on one side. Product has a "cut & fold" hinge design. Available in bundles measuring 4' x 50'.	Roofing Recovery Board
Kingspan GreenGuard® PB6 PLUS	3/8	Extruded polystyrene foam core with clear, non-perforated, flexible plastic facers on both sides with an additional clear, non-perforated facer on both sides. Product has a "cut & fold" hinge design. Available in bundles measuring 4' x 50'.	Roofing Recovery Board
Kingspan GreenGuard® PB6FA, PB38FA	3/8	Extruded polystyrene foam core with clear, non-perforated, flexible plastic facers on both sides with an additional white, non-perforated facer on one side. Product has a "creased" hinge design. Available in bundles measuring 4' x 50'. Available as PB38FA in 4' x 8' (1.2m x 2.4m).	Roofing Recovery Board
Kingspan GreenGuard® PLYGOOD PG38, PG39	3/8	Extruded polystyrene foam core with clear, perforated, flexible plastic facers on both sides. Available in sheets measuring 4' x 8' (1.2m x 2.4m) (PG38) and 4' x 9' (PG39).	Roofing Recovery Board and Exterior Sheathing
Kingspan GreenGuard® PLYGOOD PG48, PG49	7/16	Extruded polystyrene foam core with clear, perforated, flexible plastic facers on both sides. Available in sheets measuring 4' x 8' (PG48) and 4' x 9' (PG49).	Exterior Sheathing
Kingspan GreenGuard® PLYGOOD Ultra PGU38, PGU39	3/8	Extruded polystyrene foam core with a clear, non-perforated plastic facer on one side and a reinforcing scrim on the printed side. Available in sheets measuring 4' x 8' (PGU38) and 4' x 9' (PGU39).	Exterior Sheathing
Kingspan GreenGuard® PLYGOOD Ultra PGU48, PGU49	7/16	Extruded polystyrene foam core with a clear, non-perforated plastic facer on one side and a reinforcing scrim on the printed side. Available in sheets measuring 4' x 8' (PGU48) and 4' x 9' (PGU49).	Exterior Sheathing
Kingspan GreenGuard® CM Type IV, 25PSI	1/2 – 3/4	Extruded polystyrene insulation board. Available in sheets measuring 2' x 8', 4' x 8' (1.2m x 2.4m), and 4' x 9'.	Residential & Commercial Construction
Kingspan GreenGuard® SL Type IV, 25PSI	1/2 – 3/4	Extruded polystyrene insulation board with shiplap edges. Available in sheets measuring 2' x 8', and 4' x 8'.	Residential & Commercial Construction
Kingspan GreenGuard® SLX Type IV, 25PSI	1/2 – 3/4	Extruded polystyrene insulation board with a clear plastic facer on both sides and shiplap edges. Available in sheets measuring 4' x 8', and 4' x 9'.	Exterior Sheathing

TABLE 3 – THERMAL RESISTANCE (R-VALUE)

PRODUCT	THICKNESS (in.)	R-VALUE
Fanfold	¼	1.0
Fanfold	5/16	1.0
Fanfold	3/8	1.5
Fanfold	7/16	1.8
GreenGuard CM	½ - ¾	3.0 - 3.8
GreenGuard SL	½ - ¾	3.0 - 3.8
GreenGuard SLX	½ - ¾	3.0 - 3.8

TABLE 4 – GREENGUARD® SEAM TAPES (STANDARD AND CUSTOMER)

Product Name	Common Roll Sizes (W x L)	Backing Material/Adhesive	Product Description
GreenGuard® Seam Tape (Custom)	3" x 55'	Polypropylene/Acrylic	The self-adhering tape consists of a polypropylene backing with an enhanced acrylic adhesive
GreenGuard® Seam Tape (Standard)	1-7/8" x 55' (Custom Product)	Polypropylene/Acrylic	The self-adhering tape consists of a polypropylene backing with an acrylic adhesive
Lowe's Housewrap Tape (Similar to Standard GreenGuard® Seam Tape)	1-7/8" x 55' (Custom Product)	Polypropylene/Acrylic	The self-adhering tape consists of a polypropylene backing with an acrylic adhesive