



DrJ Research Report

DRR 1410-05

Foam Plastic Insulating Sheathing
Products & Accessories Used as a
Code Compliant Water-Resistive Barrier
(WRB) System

Foam Sheathing Committee (FSC) Members

Product:

**Foam Plastic Insulating
Sheathing (FPIS) Products
approved for use as a water-
resistive barrier (WRB)**

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October 19, 2020



REPORT HOLDER
INFORMATION:

Foam Sheathing Committee (FSC) Members

fsc.americanchemistry.com/Members

continuousinsulation.org

DIVISION: 06 00 00 - WOOD, PLASTICS AND COMPOSITES

SECTION: 06 16 00 - Sheathing

SECTION: 06 16 13 - Insulated Sheathing

DIVISION: 07 00 00 - THERMAL AND MOISTURE PROTECTION

SECTION: 07 21 00 - Thermal Insulation

1 PRODUCTS EVALUATED¹

1.1 Foam Plastic Insulating Sheathing (FPIS) Products approved for use as a water-resistive barrier (WRB)

- 1.1.1 Atlas Roofing Corporation
- 1.1.2 BASF Corporation
- 1.1.3 DuPont de Nemours, Inc.
- 1.1.4 Hunter Panels
- 1.1.5 Kingspan Insulation, LLC
- 1.1.6 Rmax

2 APPLICABLE CODES AND STANDARDS^{2,3}

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 C1289: Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board*
- 2.2.2 *ASTM C209: Standard Test Methods for Cellulosic Fiber Insulating Board*
- 2.2.3 *ASTM C578: Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation*
- 2.2.4 *ASTM D226: Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing*

¹ Building codes require data from valid [research reports](#) be obtained from [approved sources](#). Work of licensed [registered design professionals](#) (RDPs) meets the [code requirements](#) for approval by the [building official](#).

Building official approval of a licensed 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 DRR 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 drjengineering.org or call us at 608-310-6748.

² Unless otherwise noted, all references in this DRR 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.

³ All terms defined in the applicable building codes are italicized.



- 2.2.5 *ASTM E2556: Standard Specification for Vapor Permeable Flexible Sheet Water-Resistive Barriers Intended for Mechanical Attachment*
- 2.2.6 *ASTM E331: Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference*

3 EVALUATION SCOPE

- 3.1 This research report provides a central location for the identification of products that have been approved for use as a WRB.
 - 3.1.1 The products listed in this report are those that have been identified in the individual code evaluation reports held by the manufacturers of the products as approved for use as a WRB.
- 3.2 This research report is a code compliance evaluation report that is intended to supplement existing product certifications and is intended only to provide information on the products approved for the manufacturers listed in Section 1. For the purposes of this report, DrJ is not certifying the products, but rather is providing the user with direction on where they can obtain specific information for the products shown. For specific details on the products found in Table 1, see the manufacturer's code evaluation reports or listings.
- 3.3 Any code compliance issues not specifically addressed in this section are outside the scope of this DRR.
- 3.4 Any engineering evaluation conducted for this DRR was performed on the dates provided in this DRR and within DrJ's professional scope of work.

4 APPLICATIONS

- 4.1 *Code Requirements for the Use of Foam Plastic Insulation as a WRB.*
 - 4.1.1 Requirements for the use of foam plastic insulation as a WRB are given in [IBC Section 1403.2](#)⁴ and [Section 2510.6](#). For the *IRC*, the provisions are found in [Section R703.2](#) and [Section R703.7.3](#).⁵
 - 4.1.2 It is the responsibility of the user to apply the requirements of the specific edition of the building code used in the jurisdiction where the structure is to be built.
 - 4.1.3 It is also the responsibility of the user to verify the certifications listed in code evaluation reports along with the details found therein for compliance with that listing.
- 4.2 *Product Code Compliance*
 - 4.2.1 Table 1 shows the FPIS products from the manufacturers listed in Section 1 that indicate they have met the requirements for use as a WRB.
 - 4.2.1.1 Consult the manufacturer's installation instructions and associated evaluation report for details specific to the intended application.
 - 4.2.1.1.1 The code evaluation reports or manufacturer installation instructions generally provide details on the use of joint sealing tapes, flashing materials and sealants that are approved for use with the product to achieve performance as a WRB.
 - 4.2.1.1.2 See Section 5 for general industry good practice for the installation of FPIS used as a WRB.
- 4.3 FPIS products are not required to be detailed for use as a WRB in the following applications:
 - 4.3.1 Not required for detached accessory buildings per 2012 and 2015 [IRC Section R703.2](#)⁶
 - 4.3.2 Not required when installed over concrete or masonry in accordance with [IBC Section 1402.2](#) Exception 1⁷ and [IRC Section R703.1.1](#) Exception 1

⁴ [2015 IBC Section 1404.2](#)

⁵ [2012 IRC Section R703.6.3](#)

⁶ This exception has been removed from the 2018 IRC.

⁷ [2015 IBC Section 1403.2](#)



- 4.3.3 Not required for EIFS complying with IBC Section 1407.4.1⁸ in accordance with IBC Section 1402.2 Exception 3⁹
- 4.3.4 Where the application exceeds the limitations set forth herein, design shall be permitted in accordance with accepted engineering procedures, experience, and good technical judgment.
- 4.4 Test methods shall be as specified in this code or by other recognized test standards. In the absence of recognized and accepted test methods, the building official shall approve the testing procedures. Tests shall be performed by an approved agency. Reports of such tests shall be retained by the building official for the period required for retention of public records.
- 4.5 Where the application exceeds the limitations set forth herein, design shall be permitted in accordance with accepted engineering procedures, experience, and technical judgment.

⁸ 2015 IBC Section 1408.4.1

⁹ 2015 IBC Section 1403.2



TABLE 1. FOAM SHEATHING PRODUCT CODE COMPLIANCE

Manufacturer	Research Report Number	Product(s)	Type of Application			
			IBC 1403.2 ¹⁰	IBC 2510.6	IRC R703.2	IRC R703.7.3 ¹¹
Atlas Roofing Corporation	ESR-1375	Energy Shield®, Energy Shield® Pro, Energy Shield® Pro2, Energy Shield® CGF, Stucco Shield®	Y	Y	Y	Y
	UL ER16529-01	ThermalStar LCi	Y	Y	Y	Y
	TER 1311-02	LCi-SS	Y	Y	Y	Y
BASF Corporation	ESR-4431 ULEX.R5817-02	Neopor®	Y	N	Y	N
DuPont de Nemours, Inc.	ESR-1659	Thermax™ Sheathing, Thermax™ Light Duty, Thermax™ Heavy Duty, Thermax™ Heavy Duty Plus, Thermax™ Metal Building, Thermax™ White Finish, Thermax™ ci Exterior Board	Y	Y	Y	Y
	ESR-2142	Styrofoam™ Duramate™ Plus, Styrofoam™ Residential Sheathing, Styrofoam™ Residing Board, Styrofoam™ Utilityfit, Styrofoam™ SCOREBOARD, Styrofoam™ Sheathing Material, Styrofoam™ Ship Lap, Styrofoam™ Square Edge, Styrofoam™ Tongue and Groove, Styrofoam™ Cavitymate™ Ultra, Styrofoam™ Ultra SL, Styrofoam™ XPS Insulation, DuPont High Performance, Underlayment, BLUECOR™, DuPont Protection Board III	Y	Y	Y	Y
	ESR-3089	Tuff-R™, Tuff-R™ C, Super Tuff-R™, Super Tuff-R™ C, ISOCAST™ R	Y	Y	Y	Y
Hunter Panels	TER 1402-01	Xci Foil (Class A)	Y	Y	Y	Y
Kingspan	TER 1011-01	GreenGuard® Insulation Board CM, GreenGuard® Insulation Board SL, GreenGuard® Insulation Board SLX, GreenGuard® PLYGOOD	Y	Y	Y	Y
Rmax	TER 1212-03	ECOMAXci® Wall Solution	Y	Y	Y	Y
	TER 1207-01	Thermasheath®-SI, Thermasheath®	Y	Y	Y	Y
	TER 1309-03	Thermasheath®, Thermasheath®-XP, ECOMAXci® FR, ECOMAXci® FR White, TSX-8500, TSX-8510	Y	Y	Y	Y
<p>1. IBC Section 1403.2¹⁰ applies to use of an FPIS WRB, as required, with all claddings and wall assemblies in accordance with IBC Chapter 14 and also IBC Section 2510 (Portland cement stucco) where the stucco and WRB are not installed over wood-based sheathing (refer to note 2 below). The basis of equivalency for WRB performance is "No. 15 asphalt felt, complying with ASTM D226 for Type 1 felt or other approved materials" attached to studs or sheathing. Where indicated under "type of application" the listed research report provides test documentation for code approval purposes.</p> <p>2. IBC Section 2510.6 applies to use with Portland cement stucco installed over wood-based sheathing. The basis of equivalency for the FPIS WRB performance is "a water resistance equal to or greater than that of a water-resistive barrier complying with ASTM E2556, Type II" (see exception statement in 2510.6, which applies to non-vapor-permeable WRB materials). Furthermore, the FPIS WRB material "is separated from the stucco by an intervening substantially non-water-absorbing layer or drainage space" intended to provide a bond break and interstitial drainage plane at least equal to that of a traditional double-layer Grade D paper installation used with Portland cement stucco.</p> <p>3. Refer to note 1 above for IBC (similar basis for equivalency).</p> <p>4. Refer to note 2 above for IBC (similar, but IRC does not refer to ASTM E2556 and instead still retains the reference to 60-minute grade D paper in the exception statement, which is applicable to foam sheathing (a non-vapor permeable WRB).</p>						

¹⁰ [2015 IBC Section 1404.2](#)

¹¹ [2012 IRC Section R703.6.3](#)



5 INSTALLATION

- 5.1 The products listed in this research report shall be used in accordance with the manufacturer's installation instructions and the referenced research reports in Table 1. Areas of consideration required for a complete WRB system include but are not limited to the following:
 - 5.1.1 Board orientation
 - 5.1.2 Fastener selection and spacing
 - 5.1.3 Joint and corner treatment (tapes, flashings, etc.)
 - 5.1.4 Penetrations
 - 5.1.5 Integration of fenestration products
 - 5.1.6 General flashing
- 5.2 For applications outside the scope of this research report or the referenced research reports, an alternate means of code compliance is required.

6 TEST ENGINEERING SUBSTANTIATING DATA

- 6.1 Manufacturer research reports as listed in Table 1
- 6.2 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.
- 6.3 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.

7 FINDINGS

- 7.1 When used in accordance with this research report and the manufacturer's installation instructions, the products listed in this report are a suitable alternative to the requirements of IBC Section 1403.2¹² and Section 2510.6 and IRC Section R703.2 and Section R703.7.3.¹³
- 7.2 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*.
- 7.3 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 evaluation, they are listed here.

¹² 2015 IBC Section 1404.2

¹³ 2012 IRC Section R703.6.3



7.3.1 No known variations

8 REFERENCES

- 8.1 The Foam Sheathing Committee (FSC) of the American Chemistry Council sponsors research and tools to support the reliable, efficient, and economic design and installation of foam sheathing. This report is developed by DrJ from a grant provided by FSC. Learn more about foam sheathing at continuousinsulation.org.

9 CONDITIONS OF USE

- 9.1 The products covered by this research report shall be installed in accordance with this report and the manufacturer's installation instructions.
- 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 DRR 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 DRR 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 5 of this DRR.
- 9.6 These products are manufactured under a third-party quality control program in accordance with *IBC Section 104.4* and *110.4* and *JRC Section R104.4* and *R109.2*.
- 9.7 The actual design, suitability, and use of this DRR, for any particular building, is the responsibility of the *owner* or the owner's authorized agent. Therefore, the DRR shall be reviewed for code compliance by the *building official* for acceptance.

10 IDENTIFICATION

- 10.1 The foam sheathing described in this research report 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 the respective FSC member websites found at fsc.americanchemistry.com/Members.

11 REVIEW SCHEDULE

- 11.1 For the most recent version or current status of this DRR, visit drjengineering.org or contact [DrJ Engineering](https://drjengineering.org).