



## **DrJ Research Report**

### **DRR 1410-06**

Foam Plastic Insulating Sheathing Used  
as an Air Barrier Material in an Air  
Barrier Assembly

### **Foam Sheathing Committee (FSC) Members**

#### **Products:**

**Foam plastic insulating  
sheathing (FPIS) products**

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December 2, 2014

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July 1, 2020



REPORT HOLDER  
INFORMATION:

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Foam Sheathing Committee (FSC) Members

[fsc.americanchemistry.com/Members](http://fsc.americanchemistry.com/Members)

[continuousinsulation.org](http://continuousinsulation.org)

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DIVISION: 07 00 00 - THERMAL AND MOISTURE PROTECTION

SECTION: 07 21 00 - Thermal Insulation

SECTION: 07 27 00 - Air Barriers

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## 1 PRODUCTS EVALUATED<sup>1</sup>

1.1 Foam plastic insulating sheathing (FPIS) products from the following manufacturers are recognized in this report.

- 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<sup>2,3</sup>

### 2.1 Codes

- 2.1.1 *IBC—12, 15, 18: International Building Code®*
- 2.1.2 *IRC—12, 15, 18: International Residential Code®*
- 2.1.3 *IECC—12, 15, 18: International Energy Conservation 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 C578: Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation*
- 2.2.3 *ASTM E1677: Standard Specification for Air Barrier (AB) Material or Assemblies for Low-Rise Framed Building Walls*

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<sup>1</sup> 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](http://drjengineering.org) or call us at 608-310-6748.

<sup>2</sup> 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.

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



- 2.2.4 *ASTM E2178: Standard Test Method for Air Permeance of Building Materials*
- 2.2.5 *ASTM E2357: Standard Test Method for Determining Air Leakage Rate of Air Barrier Assemblies*
- 2.2.6 *ASTM E283: Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen*

### 3 EVALUATION SCOPE

- 3.1 This research report provides a central location for the identification of products that have been approved for use as an air barrier material in an air barrier assembly.
  - 3.1.1 The products listed in this report have been identified in the individual code evaluation reports held by the manufacturers of the products as approved for use as an air barrier material or as a component of an air barrier assembly.
- 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 to obtain specific information for the products shown. For details on the products found in Table 1, see a 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 an Air Barrier Material*
  - 4.1.1 Requirements for the use of foam plastic insulation as an air barrier material are given in [IECC Section R402.4 \(IRC Section N1102.4\)](#) and [IECC Section C402.5](#).<sup>4</sup>
  - 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 have met the requirements for use as continuous air barriers for the opaque building envelope, provided they are installed as air barriers, in accordance with the manufacturer's installation instructions as required in [IECC Section C402.5.1.2.1](#).<sup>5</sup>
    - 4.2.1.1 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 an air barrier assembly.
  - 4.2.2 Where the application exceeds the limitations set forth herein, design shall be permitted in accordance with accepted engineering procedures, experience, and technical judgment.

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<sup>4</sup> [2012 IECC Section C402.4](#)

<sup>5</sup> [2012 IECC Section C402.4.1.2.1](#)





TABLE 1. FOAM SHEATHING PRODUCT CODE COMPLIANCE AS AN AIR BARRIER MATERIAL

Manufacturer	Report Number	Product(s)	Type of Application	
			IECC C402.5	IECC R402.4 / IRC N1102.4
Atlas Roofing Corporation	Footnote 1	Energy Shield®, Energy Shield® Pro, Energy Shield® Pro2, Energy Shield® CGF, Stucco Shield®	Y	Y
	<a href="#">UL ER16529-01</a>	ThermalStar® LCI	Y	Y
	<a href="#">TER 1311-02</a>	LCi-SS	Y	Y
BASF Corporation	<a href="#">ESR-4431</a>	Neopor® ThermaPlus WRB <sup>ci</sup>	Y	Y
DuPont de Nemours, Inc.	<a href="#">ESR-1659</a>	Thermax™ Sheathing, Thermax™ Light Duty, Thermax™ Heavy Duty, Thermax™ Heavy Duty Plus, Thermax™ Metal Building, Thermax™ White Finish, Thermax™ ci Exterior Board	Y	Y
	<a href="#">ESR-2142</a>	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
	<a href="#">ESR-3089</a>	Tuff-R™, Tuff-R™ C, Super Tuff-R™, Super Tuff-R™ C, ISOCAST™ R	Y	Y
Hunter Panels	<a href="#">TER 1402-01</a>	Xci Foil (Class A), Xci 286	Y	Y
Kingspan	<a href="#">TER 1011-01</a>	GreenGuard® Insulation Board CM, GreenGuard® Insulation Board SL, GreenGuard® Insulation Board SLX, GreenGuard® PLYGOOD	Y	Y
Rmax	<a href="#">TER 1212-03</a>	ECOMAXci® Wall Solution	Y	Y
	<a href="#">TER 1207-01</a>	Thermasheath®-SI, Thermasheath®	Y	Y
	<a href="#">TER 1309-03</a>	Thermasheath®, Thermasheath®-XP, ECOMAXci® FR, ECOMAXci® FR White, TSX-8500, TSX-8510	Y	Y
	<a href="#">TER 1504-04</a>	ECOMAXci® Ply	Y	Y
	<a href="#">TER 1811-02</a>	ECOMAXci® FR Ply	Y	Y
	Footnote 1	Durasheath®, THERMABASEci™, R-Matte® Plus-3	Y	Y

1. ½" minimum thickness XPS or Polyiso are deemed to comply as air barrier materials in accordance with [IECC Section C402.5.1.2.1](#),<sup>6</sup> provided joints are sealed and materials are installed as air barriers in accordance with the manufacturer's instructions.
2. Products listed qualify based on Footnote 1 or are tested as air barrier materials in accordance with *ASTM E2178* or are tested as part of an air barrier assembly in accordance with *ASTM E2357*, *ASTM E1677*, or *ASTM E283*.
3. The *IRC* and residential sections of the *IECC* do not provide specific requirements for air barrier materials. Blower door tests on the completed building are required. The products listed as compliant here are based on their approval as continuous air barriers in accordance with deemed to comply provisions of [IECC Section C402.5](#)<sup>7</sup> or testing completed in accordance with *ASTM E2178*, *ASTM E2357*, *ASTM E1677*, or *ASTM E283*.

<sup>6</sup> 2012 *IECC* Section C402.4.1.2.1

<sup>7</sup> 2012 *IECC* Section C402.4





## 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 air barrier 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.
- 5.3 Installation shall comply with the manufacturer's installation instructions and this DRR. In the event of a conflict between the manufacturer's installation instructions and this DRR, the more restrictive shall govern.

## 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 comply with the requirements of IECC Section C402.5 and Section R402.4 and IRC Section N1102.4, as described in the individual research reports listed in Table 1.
- 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.

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](http://continuousinsulation.org).

## 9 CONDITIONS OF USE

9.1 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.

9.2 Any generally accepted engineering calculations needed to show compliance with this DRR shall be submitted to the AHJ for review and approval.

9.3 *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*).

9.4 At a minimum, this product shall be installed per Section 5 of this DRR.

9.5 These products are manufactured under a third-party quality control program in accordance with *IBC Section 104.4* and *110.4* and *IRC Section R104.4* and *R109.2*.

9.6 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](http://fsc.americanchemistry.com/Members).

## 11 REVIEW SCHEDULE

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