



Research Report

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

DRR No. 1410-06

Foam Sheathing Committee (FSC) Members

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DIVISION: 07 00 00 – THERMAL AND MOISTURE PROTECTION

Section: 07 21 00 – Thermal Insulation

Section: 07 27 00 – Air Barriers

1. Products Evaluated:

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. Dow Building Solutions

1.1.3. GAF

1.1.4. Hunter Panels

1.1.5. Johns Manville

1.1.6. Kingspan Insulation, LLC

1.1.7. Rmax

1.2. For the most recent version of this report, visit drjengineering.org. For more detailed state professional engineering and code compliance legal requirements and references, visit drjengineering.org/statelaw. DrJ is fully compliant with all state professional engineering and code compliance laws.

1.3. This code compliance report can be used to obtain product approval in any country that is an IAF MLA Signatory (all countries found [here](#)) and covered by an [IAF MLA Evaluation](#) per the Purpose of the MLA (as an example, see [letter to ANSI](#) from the Standards Council of Canada). Manufacturers can go to jurisdictions in the U.S., Canada and other [IAF MLA Signatory Countries](#) and have their products readily approved by authorities having jurisdiction.

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 www.continuousinsulation.org. DrJ is a [professional engineering company](#), an [approved source](#) as defined in [Chapter 2](#), an [independent](#) as defined in [Chapter 17](#) of the IBC and an [ANSI accredited 17065 certification body](#).

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- 1.4. Building code regulations require that evaluation reports are provided by an approved agency meeting specific requirements. Any agency accredited in accordance with ANSI ISO/IEC 17065 meets this requirement within ANSI's scope of accreditation. For a list of accredited agencies, visit ANSI's [website](#). For more information, see [drjcertification.org](#).
- 1.5. Requiring an evaluation report from a specific organization (ICC-ES, IAPAMO, CCMC, DrJ, etc.) can be viewed as discriminatory and is a violation of international, federal, state, provincial and local anti-trust and free trade regulations.
- 1.6. Where assistance is needed with any aspect of the foregoing information please contact DrJ at [email DrJ](#) or 608-310-6748. For further support information please visit [DrJ's ANSI accreditation](#) or [drjengineering.org](#).

2. Applicable Codes and Standards:¹

- 2.1. *2012, 2015, and 2018 International Building Code (IBC)*
- 2.2. *2012, 2015, and 2018 International Residential Code (IRC)*
- 2.3. *2012, 2015, and 2018 International Energy Conservation Code (IECC)*
- 2.4. *ASTM C578 – Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation*
- 2.5. *ASTM C1289 – Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board*
- 2.6. *ASTM E2178 – Standard Test Method for Air Permeance of Building Materials*
- 2.7. *ASTM E2357 – Standard Test Method for Determining Air Leakage of Air Barrier Assemblies*
- 2.8. *ASTM E1677 – Standard Specification for Air Barrier (AB) Material or System for Low-Rise Framed Building Walls*
- 2.9. *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 evaluation.

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 \(2012 IECC C402.4\)](#).
- 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

¹ Unless otherwise noted, all references in this research report are from the 2012 version of the codes and the standards referenced therein, including, but not limited to, ASCE 7, SDPWS and WFCM. This product also complies with the 2000-2009 and 2015 versions of the IBC and IRC and the standards referenced therein. As required by law, where this research report is not approved, the building official shall respond in writing, stating the reasons this research report was not approved.

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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 C402.4.1.2.1](#).

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.

Foam Sheathing Product Code Compliance as an Air Barrier Material				
Manufacturer	Research Report Number	Product(s)	Type of Application	
			IECC C402.5 ¹	IECC R402.4/ IRC N1102.4 ³
Atlas	Footnote 1	Energy Shield®, Energy Shield® Plus, Energy Shield® Pro, Energy Shield® Pro2, RBoard®, Stucco Shield®	Y	Y
	UL ER16529-01	THERMALSTAR LCi	Y	Y
	TER No. 1311-02	LCi-SS	Y	Y
Dow	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
	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, Dow High Performance Underlayment, BLUECOR™, DOW Protection Board III	Y	Y
	ESR-3089	TUFF-R™, TUFF-R™ C, Super TUFF-R™, Super TUFF-R™ C, ISOCAST™ R	Y	Y
Hunter Panels	TER No. 1402-01	Xci Class A, Xci 286	Y	Y
Johns Manville	ESR-3398	AP™ Foil Faced	Y	Y
Kingspan	TER No. 1011-01	GreenGuard® Insulation Board CM GreenGuard® Insulation Board SL GreenGuard® Insulation Board SLX GreenGuard® PLYGOOD	Y	Y
Rmax	TER No. 1212-03	ECOMAXci® Wall Solution	Y	Y
	TER No. 1207-01	Thermasheath®-SI, Thermasheath®	Y	Y

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Foam Sheathing Product Code Compliance as an Air Barrier Material				
Manufacturer	Research Report Number	Product(s)	Type of Application	
			IECC C402.5 ¹	IECC R402.4/ IRC N1102.4 ³
	TER No. 1309-03	Thermasheath®, Thermasheath®-XP, ECOMAXci® FR, ECOMAXci® FR White,	Y	Y
	TER No. 1504-04	ECOMAXci® Ply	Y	Y
	Footnote 1	Durasheath®, THERMABASEci™, TSP-3, R-Matte® Plus-3, TSA-FA-3	Y	Y
<p>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 (2012 IECC Section C402.4.1.2.1), provided joints are sealed and materials are installed as air barriers in accordance with the manufacturer's instructions.</p> <p>2. Products listed qualify based on footnote 1, or are tested as air barrier materials in accordance with <i>ASTM E2178</i>, or are tested as part of an air barrier assembly in accordance with <i>ASTM E2357</i>, <i>ASTM E1677</i> or <i>ASTM E283</i>.</p> <p>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 or testing completed in accordance with <i>ASTM E2178</i>, <i>ASTM E2357</i>, <i>ASTM E1677</i> or <i>ASTM E283</i>.</p>				

Table 1: Foam Sheathing Product Code Compliance as an Air Barrier Material

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:
 - 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 and 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 DrJ relies on to be accurate as it undertakes its engineering analysis.
- 6.3. DrJ has reviewed and found the data provided by other professional sources are credible. This information has been approved in accordance with DrJ's procedure for acceptance of data from approved sources.
- 6.4. DrJ's responsibility for data provided by approved sources is in accordance with professional engineering law.
- 6.5. Where appropriate, DrJ relies on the derivation of design values, which have been codified into law through codes and standards (e.g., *IRC*, *WFCM*, *IBC*, *SDPWS*, etc.). This includes review of code provisions and any related test data that helps with comparative analysis or provides support for equivalency to an intended end-use application.

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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 [R402.4](#) and [IRC Section N1102.4](#), as described in the individual research reports listed in [Table 1](#).

7.2. [IBC Section 104.11](#) and [IRC Section R104.11](#) ([IFC Section 104.9](#) is similar) state:

104.11 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. An alternative material, design or method of construction shall be *approved* where the *building official* finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code. ... Where the alternative material, design or method of construction is not *approved*, the *building official* shall respond in writing, stating the reasons the alternative was not *approved*.

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 www.continuousinsulation.org. DrJ is a [professional engineering company](#), an [independent approved source](#) and [an ANSI accredited 17065 certification body](#).

9. Conditions of Use:

9.1. Where required by the authority having jurisdiction (AHJ) in which the project is to be constructed, this report and the installation instructions shall be submitted at the time of permit application.

9.2. The products covered by this research report shall be installed in accordance with this report, the manufacturer's code evaluation report and the manufacturer's installation instructions.

9.3. Design

9.3.1. Building Designer Responsibility

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

9.3.1.2. The Construction Documents shall be accurate and reliable and shall provide the location, direction and magnitude of all applied loads and shall be in accordance with [IRC Section R301](#) and [IBC Section 1603](#).

9.3.2. Construction Documents

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

9.4. Responsibilities

9.4.1. The information contained herein is a product, engineering or building code compliance research report performed in accordance with the referenced building codes, testing and/or analysis through the use of accepted engineering procedures, experience and good technical judgment.

9.4.2. Product, design and code compliance quality control are the responsibility of the referenced company. Consult the referenced company for the proper detailing and application for the intended purpose. Consult your local jurisdiction or design professional to assure compliance with the local building code.

9.4.3. DrJ research reports provide an assessment of only those attributes specifically addressed in the Products Evaluated or Code Compliance Process Evaluated section.

9.4.4. The engineering evaluation was performed on the dates provided in this research report, within DrJ's professional scope of work.

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9.4.5. The actual design, suitability and use of this research report for any particular building is the responsibility of the Owner, the Owner's authorized agent or the Building Designer.

10. Identification:

10.1. The product labelling shall include the company name and address, inspection agency (if applicable), and any applicable code compliance report numbers.

10.1.1. Additional technical information and related research reports can be found at the company websites listed on [Page 1](#) and from [DrJ Engineering](#).

11. Review Schedule:

11.1. This research report is subject to periodic review and revision. For the most recent version of this report, visit drjengineering.org.

11.2. For information on the current status of this report, contact [DrJ Engineering](#).