



Research Report

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

DRR No. 1410-05

Foam Sheathing Committee (FSC) Members

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DIVISION: 06 00 00 – WOOD, PLASTICS, AND COMPOSITES

Section: 06 16 00 – Sheathing

Section: 06 16 13 – Insulating Sheathing

DIVISION: 07 00 00 – THERMAL AND MOISTURE PROTECTION

Section: 07 21 00 – Thermal Insulation

1. Product Lines Evaluated:

- 1.1. Foam Plastic Insulating Sheathing (FPIS) products from the following manufacturers are recognized in this report. For specific details on individual products approved for use as a water-resistive barrier (WRB), see [Table 1](#) and the individual manufacturer code evaluation reports, which include additional information on installation and approved accessory products for joint treatments, flashing and sealing of penetrations.
 - 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.

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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DrJ Research Report

- 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.
- 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. *ASTM C209 – Standard Test Methods for Cellulosic Fiber Insulating Board*
- 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 D226 – Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing*
- 2.7. *ASTM E331 – Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference*
- 2.8. *ASTM E2556 – Standard Specification for Vapor Permeable Flexible Sheet Water-Resistive Barriers Intended for Mechanical Attachment*

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 evaluation.

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 1403.2²](#) and [Section 2510.6](#). For the *IRC*, the provisions are found in sections [Section R703.2](#) and [Section R703.7.3³](#).

¹ Unless otherwise noted, all references in this research report are from the 2018 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 2000-2012 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.

² 2015 and 2012 [IBC Section 1404.2](#)

³ 2012 [IRC Section R703.6.3](#)

DrJ Research Report

- 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](#).⁴
- 4.3.2. Not required when installed over concrete or masonry in accordance with [IRC R703.1.1 Exception 1](#) and [IBC 1402.2 Exception 1](#)⁵.
- 4.3.3. Not required for EIFS complying with [IBC Section 1407.4.1](#)⁶ in accordance with [IBC 1402.2 Exception 3](#)⁷.
- 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.
- 4.3.5. The 2018 and 2015 *IBC* 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, not less than the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety. Where the alternative material, design or method of construction is not approved, the building official shall respond in writing, stating the reasons why the alternative was not approved.
- 104.11.1 Research reports.** Supporting data, where necessary to assist in the approval of materials or assemblies not specifically provided for in this code, shall consist of valid research reports from approved sources.
- 104.11.2 Tests.** Whenever there is insufficient evidence of compliance with the provisions of this code, or evidence that a material or method does not conform to the requirements of this code, or in order to substantiate claims for alternative materials or methods, the building official shall have the authority to require tests as evidence of compliance to be made at no expense to the jurisdiction.
- 4.3.6. 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 This exception has been removed from the 2018 IRC

⁵ 2015 and 2012 [IBC Section 1403.2](#)

⁶ 2015 and 2012 [IBC Section 1408.4.1](#)

⁷ 2015 and 2012 [IBC Section 1403.2](#)

DrJ Research Report

Foam Sheathing Product Code Compliance						
Manufacturer	Research Report Number	Product(s)	Type of Application			
			IBC 1404.2 ¹	IBC 2510.6 ²	IRC 703.2 ³	IRC 703.6.3 ⁴
Atlas	ESR-1375	Energy Shield®, Energy Shield® Plus, Energy Shield® Pro, Energy Shield® Pro2, RBoard®, Stucco Shield®	Y	Y	Y	Y
	UL ER16529-01	ThermalStar LCI	Y	Y	Y	Y
	TER No. 1311-02	LCi-SS	Y	Y	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	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	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 No. 1402-01	Xci Class A	Y	Y	Y	Y
Johns Manville	ESR-3398	APT™ Foil Faced	Y	Y	Y	Y
Kingspan	TER No. 1011-01	GreenGuard® Insulation Board CM, GreenGuard® Insulation Board SL, GreenGuard® Insulation Board SLX, GreenGuard® PLYGOOD	Y	Y	Y	Y
Rmax	TER No. 1212-03	ECOMAXci® Wall Solution	Y	Y	Y	Y
	TER No. 1207-01	Thermasheath®-SI Thermasheath®	Y	Y	Y	Y
	TER No. 1309-03	Thermasheath®, Thermasheath®-XP, ECOMAXci® FR, ECOMAXci® FR White	Y	Y	Y	Y

- [IBC Section 1403.2](#) applies to use of an FPIS WRB, as required, with all claddings and wall assemblies in accordance with [IBC Chapter 14](#) and also [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.
- [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.
- Refer to note 1 above for *IBC* (similar basis for equivalency).
- 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)).

Table 1: Code Compliance of Foam Sheathing Materials

DrJ Research Report

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:
 - 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.

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 1403.2](#) and [Section 2510.6](#) and [IRC Section R703.2](#) and [Section R703.7.3](#).

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

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

DrJ Research Report

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](#).