Research Report

Foam Plastic Insulating Sheathing Products in Exterior Walls of Type V Construction

DRR No. 1202-03

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Foam Sheathing Committee (FSC) Members

DIVISION: 07 00 00 – THERMAL AND MOISTURE PROTECTION
Section: 07 20 00 – Thermal Protection
Section: 07 21 00 – Thermal Insulation
Section: 07 21 13 – Board Insulation
Section: 07 24 00 – Exterior Insulation and Finish Systems
Section: 07 25 00 – Water-Resistive Barriers/Weather Barriers
Section: 07 27 00 – Air Barriers

1. Product Lines Evaluated:

1.1. Foam Plastic Insulation Products Evaluated

1.1.1. Atlas Roofing Corporation – "Stucco Shield®", "RBoard®", "RBoard® Pro", "Energy Shield®", "Energy Shield® Pro", "EnergyShield® Pro2", "Integrity®", "ThermalStar LCi®", "ThermalStar Chrome®", "ThermalStar CTR® T&G" and "ThermalStar LCi-SS"

1.1.2. Dow Building Solutions – "THERMAX™ ci Exterior", "THERMAX™ Heavy Duty", "THERMAX™ Heavy Duty Plus", "THERMAX™ Light Duty", "THERMAX™ Metal Building Board", "THERMAX™", "THERMAX™ White Finish", "ISOCAST™ R", "Super TUFF-R™", "Super TUFF-R™ C", "TUFF-R™", "TUFF-R™ C" and "STYROFOAM™"

1.1.3. GAF – "EnergyGuard™"

1.1.4. Hunter Panels – "Xci Class A", "Xci 286", "Xci Foil", "Xci CG", "Xci Ply" and "Xci NB"

1.1.5. Johns Manville – "JM AP™ Foil-Faced" and "JM CI Max®"

1.1.6. Kingspan Insulation, LLC – "GreenGuard® Insulation Boards: CM, SL, SLX, PLYGOOD and Fanfold Products"

1.1.7. Rmax – "Durasheath®", "ECOMAXci® Ply", "ECOMAXci® Wall Solution", "R-Matte® Plus-3", "THERMABASEci™", "Thermasheath®", "Thermasheath®-SI", "Thermasheath®-XP", "TSA-FA-3", "TSP-3", "ECOMAXci® FR", and "ECOMAXci® FR White".

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.

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)*

3. Evaluation Scope:

3.1. This research report covers the use of foam plastic insulating sheathing (FPIS) when used as exterior wall sheathing or in exterior walls in Type V construction as defined by the *IBC* and detailed in *IBC* Section 504 and 506[2].

3.1.1. Type VA and VB construction is acceptable for almost all occupancy groups (VB is not permitted for H-1 and I-2).

3.1.1.1. Type VA requires a 1-hour fire-resistance rating for exterior bearing walls.

3.1.1.2. Type VB requires no fire-resistance rating (see *IBC* Table 601 and Table 602).

> **602.1.1 Minimum requirements.** A building or portion thereof shall not be required to conform to the details of a type of construction higher than that type which meets the minimum requirements based on occupancy even though certain features of such a building actually conform to a higher type of construction.

3.2. The use of FPIS in exterior walls in or on exterior walls in Type I, II, III or IV construction as defined by the *IBC* are covered in separate research reports.[3]

3.3. The use of FPIS as a water-resistive barrier (WRB) or air barrier as defined by the *IBC* is outside the scope of this research report.

3.4. Products approved for use in Type V construction are included in Table 1.

3.5. 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 of this report. 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 specific details on the products found in Table 1, see the manufacturer's code evaluation reports or listings.

3.6. Any code compliance issues not specifically addressed in this section are outside the scope of this evaluation.

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[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] The information in *2015 IBC* Section 504 and 506 is found in *2012 IBC* Table 503.

[3] DRR No. 1202-04: *Foam Plastic Insulating Sheathing in Type I, II, II, and IV Construction* and DRR No. 1202-01: *NFPA 285 Tested Assemblies Using Foam Plastic Insulating Sheathing Products*

4. Applications:

4.1. Code Requirements for Foam Plastic Insulation when Used in or on Exterior Walls in Type V Construction

4.1.1. The requirements are similar in all four versions of the *IBC*.

4.1.1.1. It is the responsibility of the user to apply the requirements of the specific edition used in the jurisdiction where the structure is to be built.

4.1.1.2. It is also the responsibility of the user to verify the certifications listed in code evaluation reports.

4.1.2. Requirements for foam plastic insulation in or on exterior walls of buildings of any height are given in *IBC* Section 2603.5.

4.1.2.1. The requirements for use in Type V construction are given in the second to last sentence (emphasis added).

> **2603.5 Exterior walls of buildings of any height.** Exterior walls of buildings of Type I, II, III or IV construction of any height shall comply with Sections 2603.5.1 through 2603.5.7. Exterior walls of cold storage buildings required to be constructed of noncombustible materials, where the building is more than one story in height, shall also comply with the provisions of Sections 2603.5.1 through 2603.5.7. Exterior walls of buildings of Type V construction shall comply with Sections 2603.2, 2603.3 and 2603.4. Fireblocking shall be in accordance with Section 718.2.

4.2. Product Code Compliance

4.2.1. The referenced code sections require specific labeling and physical properties.

4.2.2. Table 1 shows the FPIS products from Section 1 that meet all the requirements in *IBC* Section 2603.2, 2603.3 and 2603.4 for use in Type V construction.

4.2.2.1. The specific requirements of these sections are found in Section 4.3.

4.2.2.2. Consult the manufacturer's installation instructions and associated evaluation report for details specific to the intended application.

Product Code Compliance						
Manufacturer	Polyiso Product	Code Evaluation Report	2603.2	2603.3	2603.4	2603.4.1.6
			Labeling	FSI / SDI[1]	Thermal Barrier Required[4]	Ignition Barrier Required
Atlas	Stucco Shield®	ESR 1375	Y	Y	Y	Y
	RBoard®	ESR 1375 Intertek Warnock Hersey Directory	Y	Y	Y	N
	RBoard® Pro	TER No. 1306-03 UL BRYX. 13089	Y	Y	Y	Y
	Energy Shield®	ESR 1375, Intertek Warnock Hersey Directory	Y	Y	Y	N
	Energy Shield® Pro	TER No. 1306-03 ESR 1375 UL BRYX.13089, Intertek Warnock Hersey Directory	Y	Y	Y	Y
	Energy Shield® Pro2	TER No. 1306-03 UL BRYX.13089, Intertek Warnock Hersey Directory	Y	Y	N	N
	Integrity®	ESR 1962, ULEX.R16529	Y	Y	N	N
	ThermalStar LCi®		Y	Y	N	N
	ThermalStar Chrome®	ULEX.R16529	Y	Y	N	N

Product Code Compliance						
Manufacturer	Polyiso Product	Code Evaluation Report	2603.2 Labeling	2603.3 FSI / SDI[1]	2603.4 Thermal Barrier Required[4]	2603.4.1.6 Ignition Barrier Required
	ThermalStar XTR® T&G	ESR 1962, ULEX.R16529	Y	Y	N	N
	ThermalStar LCi-SS	TER No. 1311-02, ULEX.R16529	Y	Y	Y	N
Dow	THERMAX™ ci Exterior	ESR 1659	Y	Y	N	N
	THERMAX™ Heavy Duty		Y	Y	N	N
	THERMAX™ Heavy Duty Plus		Y	Y	N	N
	THERMAX™ Light Duty		Y	Y	N	N
	THERMAX™ Metal Building Board		Y	Y	N	N
	THERMAX™		Y	Y	N	N
	THERMAX™ White Finish		Y	Y	N	N
	ISOCAST™ R	ESR 3089	Y	Y	Y	N
	Super TUFF-R™		Y	Y	Y	N
	Super TUFF-R™ C		Y	Y	Y	N
	TUFF-R™		Y	Y	Y	N
Dow	TUFF-R™ C	ESR 3089	Y	Y	Y	N
	STYROFOAM™	ESR 2142	Y	Y	N	N
GAF	EnergyGuard™	ESR 3571/ CCRR-0197 GAF	Y	Y	Y	Y
Hunter	Xci Class A	TER No. 1402-01	Y	Y	Y	N
	Xci 286		Y	Y	Y	N
	Xci Foil	TER No. 1402-02	Y	Y	Y	N
	Xci CG		Y	Y	Y	N
	Xci Ply		Y	Y	N	N
	Xci NB	ESR 3174	Y	Y	Y/N[3]	N
Johns Manville	JM AP™ Foil-Faced	ESR 3398	Y	Y	Y	Y
	JM CI Max®		Y	Y	Y	Y
Kingspan	GreenGuard® CM	TER No. 1407-03	Y	Y	Y[4]	Y[4]
	GreenGuard® SL		Y	Y	Y[4]	Y[4]
	GreenGuard® SLX		Y	Y	Y[4]	Y[4]
	GreenGuard® PLYGOOD		Y	Y	Y[4]	Y[4]
	GreenGuard® Fanfold		Y	Y	Y[4]	Y[4]
Rmax	Thermasheath®	TER No. 1309-03 ESR-1864	Y	Y	Y	Y
	ECOMAXci® Ply	TER No. 1504-04	Y	Y	Y	Y
	ECOMAXci® Wall Solution	TER No. 1212-03 Intertek Warnock Hersey Directory	Y	Y	Y	Y
	Durasheath®, R-Matte® Plus-3, TSA-FA-3, TSP-3	Intertek Warnock Hersey Directory	Y	Y	Y	Y
	THERMABASEci™	TER No. 1504-05	Y	Y	Y	Y
	Thermasheath®-SI	TER No. 1207-01	Y	Y	N	N

Product Code Compliance						
Manufacturer	Polyiso Product	Code Evaluation Report	2603.2	2603.3	2603.4	2603.4.1.6
			Labeling	FSI / SDI[1]	Thermal Barrier Required[4]	Ignition Barrier Required
	Thermasheath®-XP ECOMAXci® FR ECOMAXci® FR White	TER No. 1309-03 ESR-1864	Y	Y	N	N

1. Flame Spread Index / Smoke Developed Index.
2. The evaluation reports listed reference specific codes and versions of those codes. Consult the evaluation report for use with specific code versions.
3. To meet required 15-minute thermal barrier, sheathing must be $^{19}/_{32}$" or thicker *IBC* Table 722.6.2(1).
4. Where a product is noted as approved for use without a thermal barrier, consult the manufacturer's code approval report to restrictions or appropriate uses without a thermal barrier
5. Thermal or ignition barrier not required in attics and crawl spaces in accordance with *IBC* Section 2603.4.1.6

Table 1: Product Code Compliance

4.3. Code Requirements

4.3.1. Not all of *IBC* Section 2603.2, 2603.3 and 2603.4 are applicable to exterior walls. Table 2 summarizes the code requirements for FPIS used in or on exterior walls in Type V construction.

Code Requirements		
Code Section	**Section Title**	**Summary of Requirements**
2603.2	Labeling and identification	Packaging or components requires label of an approved agency
2603.3	Surface-burning characteristics	To 4" thickness: • Flame spread index of not more than 75 • Smoke-developed index of not more than 450 • Tested in accordance with *ASTM E84* or *UL 723* Greater than 4" thickness: • Exception 4 – see Section 2603.10[4] below
2603.4	Thermal barrier	Installation: • Separation from interior of building by approved thermal barrier (i.e., ½" gypsum wallboard)
2603.4.1	Thermal barrier not required	The thermal barrier specified in Section 2603.4 is not required under the conditions set forth in Sections 2603.4.1.1 through 2603.4.1.14.
2603.4.1.4	One-story buildings	Installation: • Separation from interior of building by ignition barrier • Flame spread index of not more than 25 • Smoke-developed index of not more than 450 Less than 4" thickness: • Covered by aluminum or steel of required thickness • Building sprinklered per 903.3.1.1
2603.4.1.6	Attics and crawl spaces	Within an attic or crawl space where entry is made only for service of utilities, foam plastic insulation shall be protected against ignition by: • $1^1/_2$"-thick (38 mm) mineral fiber insulation • $^1/_4$"-thick (6.4 mm) wood structural panel, particleboard or hardboard • $^3/_8$" (9.5 mm) gypsum wallboard • Corrosion-resistant steel having a base metal thickness of 0.016" (0.4 mm) • (*IBC* 2015 and 2018 only) 1 ½"-thick (38 mm) self-supported spray applied cellulose insulation in attic spaces only • Other approved material installed in such a manner that the foam plastic insulation is not exposed. • The protective covering shall be consistent with the requirements for the type of construction.

[4] *2012 IBC* Section 2603.9

Code Requirements		
Code Section	**Section Title**	**Summary of Requirements**
2603.4.4.13	Type V Construction	Foam plastic spray applied to a sill plate and header of Type V construction is subject to all of the following: 1. The maximum thickness of the foam plastic shall be 31/4 inches (82.6 mm). 2. The density of the foam plastic shall be in the range of 1.5 to 2.0 pcf (24 to 32 kg/m3). 3. The foam plastic shall have a flame spread index of 25 or less and an accompanying smoke-developed index of 450 or less when tested in accordance with *ASTM E84* or *UL 723*.
2603.9[5]	Special approval	• Compliance with requirements of Sections 2303.4 through 2303.8 are not required where the product has been specifically approved based on large-scale testing (*NFPA 286*, *FM 4880*, *UL 1040* or *UL 1715*) that relates to the actual end-use configuration using the maximum thickness intended for use. • (*IBC* 2015 and 2018 only) Foam plastic shall not be required to comply with the requirements of Sections 2603.4 or those of Section 2603.6 where specifically approved based on large-scale tests such as, but not limited to, *NFPA 286* (with the acceptance criteria of Section 803.2), *FM 4880*, *UL 1040* or *UL 1715*. Such testing shall be related to the actual end-use configuration and be performed on the finished manufactured foam plastic assembly in the maximum thickness intended for use.

Table 2: Code Requirements

5. Installation:

5.1. The products listed in this report shall be used in accordance with the manufacturer's installation instructions.

5.2. For applications outside the scope of this research report, an engineered design is required.

6. Test and Engineering Substantiating Data:

6.1. Manufacturer reports as listed in Table 1.

6.2. Manufacturer DrJ Technical Evaluation Reports as listed in Table 1.

6.3. Manufacturer UL Evaluation Reports and Classification Listings as listed in Table 1.

6.4. Manufacturer Intertek Classification Listings as listed in Table 1.

6.5. 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.

6.6. 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.

6.7. DrJ's responsibility for data provided by approved sources is in accordance with professional engineering law.

6.8. 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. The products listed herein meet the requirements of the *IBC* for use in buildings of Type V construction in accordance with Section 2603.

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

[5] *2012 IBC* Section 2603.10

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

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

9.4.4. This product is manufactured under a third-party quality control program in accordance with *IRC* Section R104.4 and R109.2 and *IBC* Section 104.4 and 110.4.

9.4.5. The actual design, suitability and use of this research report for any particular building is the responsibility of the Owner or the Owner's authorized agent, and the report shall be reviewed for code compliance by the Building Official.

9.4.6. The use of this research report is dependent on the manufacturer's in-plant QC, the ISO/IEC 17020 third-party inspection process, proper installation per the manufacturer's instructions, the Building Official's inspection and any other code requirements that may apply to assure accurate compliance with the applicable building code.

10. Identification:

10.1. The products listed in Section 1 in this research report are 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 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.