



Polyiso Sheathing Products in Type V Construction

DRR No. 1404-02

Polyisocyanurate Insulation Producing FSC Members

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Atlas Roofing Corporation – atlasroofing.com

Dow Building Solutions – building.dow.com

GAF – gaf.com

Hunter Panels – hpanels.com

Johns Manville – johnsmanville.com

Rmax Operating, L.L.C. – rmaxinc.com

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 Evaluated¹

1.1.1. Polyisocyanurate Products (polyiso) – Type 1², ASTM C1289

1.1.1.1. Atlas Roofing Corporation – “RBoard® Pro”, “Energy Shield® Pro” and “Energy Shield® Pro2”

1.1.1.2. 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™” and “TUFF-R™ C”

1.1.1.3. GAF – “EnergyGuard™”

1.1.1.4. Hunter – “Xci Class A”, “Xci 286”, “Xci Foil”, “Xci CG”, “Xci Ply” and “Xci NB”

1.1.1.5. Johns Manville – “JM AP™ Foil-Faced” and “JM CI Max®”

1.1.1.6. Rmax Operating, LLC – “Durasheath®”, “ECOMAXci® Ply”, “ECOMAXci® Wall Solution”, “R-Matte® Plus-3”,

¹ FPIS Types listed in this research report are minimums. Substitution of products with equal or greater performance shall be permitted in accordance with [Section 4](#).

² As defined in ASTM C1289, Type 1 products are those that are faced with aluminum foil on both major surfaces of the core foam.

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“THERMABASEci™”, “Thermasheath®”, “Thermasheath®-SI”, “Thermasheath®-XP”, “TSA-FA-3”, “TSP-3”, “ECOMAXci® FR”, “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.

2. Applicable Codes and Standards:³

- 2.1. 2009, 2012 and 2015 International Building Code (IBC)
- 2.2. 2009, 2012 and 2015 International Residential Code (IRC)

3. Evaluation Scope:

- 3.1. This research report covers the use of polyiso products when used as exterior wall sheathing or in exterior walls in Type V construction as defined by the IBC and detailed in [Table 503](#).
 - 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 polyiso products in exterior walls in or on exterior walls in Types I, II, III or IV construction as defined by the IBC are covered in separate research reports.⁴
- 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 certified 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.

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 last sentence.

[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,

³ 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 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.

⁴ [DRR No. 1404-03: Polyiso Sheathing in Type I, II, and IV Construction](#) and [DRR No. 1404-01: NFPA 285 Tested Assemblies Using Polyiso Sheathing Products](#)

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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.

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 polyiso products from [Section 1](#) that meet all the requirements in [IBC Section 2603.2](#), [Section 2603.3](#) and [Section 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 ,	Y	Y	N	N
	ThermalStar LCi®	ULEX.R16529	Y	Y	N	N
	ThermalStar Chrome®	ULEX.R16529	Y	Y	N	N
	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
	TUFF-R™ C		Y	Y	Y	N
TUFF-R™ C	Y		Y	Y	N	

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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
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
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
	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

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 polyiso products used in or on exterior walls in Type V construction.

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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: <ul style="list-style-type: none"> • Flame spread index of not more than 75 • Smoke-developed index of not more than 450 • Tested in accordance with <i>ASTM E84</i> or <i>UL 723</i> Greater than 4" thickness: <ul style="list-style-type: none"> • Exception 4 – see Section 2603.10 below⁵
2603.4	Thermal barrier	Installation: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 1½"-thick (38 mm) mineral fiber insulation • ¼"-thick (6.4 mm) wood structural panel, particleboard or hardboard • ⅜" (9.5 mm) gypsum wallboard • Corrosion-resistant steel having a base metal thickness of 0.016" (0.4 mm) • <i>IBC 2015</i> only- 1 ½-inch-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.
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: <ol style="list-style-type: none"> 1. The maximum thickness of the foam plastic shall be 3¼ 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 <i>ASTM E84</i> or <i>UL 723</i>.
2603.10 ⁶	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 (<i>NFPA 286</i> , <i>FM 4880</i> , <i>UL 1040</i> or <i>UL 1715</i>) that relates to the actual end-use configuration using the maximum thickness intended for use. <i>IBC 2015</i> 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, <i>NFPA 286</i> (with the acceptance criteria of Section 803.2), <i>FM 4880</i> , <i>UL 1040</i> or <i>UL 1715</i> . 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 [2015 IBC Section 2603.9](#)

⁶ [2015 IBC Section 2603.9](#)

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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. 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 [IRC Chapter 5](#) and [Chapter 6](#).
- 7.2. Additionally, the products listed herein meet the requirements of the *IBC* for use in buildings of Type V construction in accordance with [Section 2603](#).
- 7.3. [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*.⁷

8. Conditions of Use:

- 8.1. 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.
- 8.2. The products covered by this research report shall be installed in accordance with this report and the manufacturer's installation instructions.
- 8.3. Design
 - 8.3.1. Building Designer Responsibility
 - 8.3.1.1. 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](#).
 - 8.3.1.2. 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](#).

⁷ The last sentence is adopted language in the 2015 codes.

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8.3.2. Construction Documents

8.3.2.1. 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.

8.4. Responsibilities

- 8.4.1. 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.
- 8.4.2. DrJ research reports provide an assessment of only those attributes specifically addressed in the Products Evaluated or Code Compliance Process Evaluated section.
- 8.4.3. The engineering evaluation was performed on the dates provided in this research report, within DrJ's professional scope of work.
- 8.4.4. This product is manufactured under a third-party quality control program in accordance with [/RC Section R104.4](#) and [R109.2](#) and [/BC Section 104.4](#) and [110.4](#).
- 8.4.5. 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.
- 8.4.6. 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.

9. Identification:

- 9.1. 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
- 9.2. Additional technical information and related research reports can be found at the company websites listed on [Page 1](#) and from [DrJ Engineering](#).

10. Review Schedule:

- 10.1. This research report is subject to periodic review and revision. For the most recent version of this report, visit drjengineering.org.
- 10.2. For information on the current status of this report, contact [DrJ Engineering](#).