



DrJ Research Report

DRR 1202-03

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

**Foam Sheathing Committee
(FSC) Members**

Products:

**Foam Plastic Insulation
Products**

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REPORT HOLDER
INFORMATION:

Foam Sheathing Committee (FSC) Members¹

fsc.americanchemistry.com/Members

continuousinsulation.org

DIVISION: 07 00 00 - THERMAL AND MOISTURE PROTECTION

SECTION: 07 20 00 - Thermal Protection

SECTION: 07 21 00 - Thermal Insulation

SECTION: 07 21 13 - Foam 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 PRODUCTS EVALUATED²

1.1 Foam Plastic Insulation Products

- 1.1.1 Atlas Roofing Corporation – Stucco Shield®, Energy Shield® CGF, Energy Shield® CGF Pro, Energy Shield®, Energy Shield® Pro, EnergyShield® Pro2, Integrity®, ThermalStar LCi®, ThermalStar Chrome®, ThermalStar CTR® T&G, and ThermalStar LCi-SS
- 1.1.2 BASF Corporation – Neopor®
- 1.1.3 DuPont de Nemours, Inc. – 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™
- 1.1.4 Hunter Panels – Xci Foil (Class A), Xci CG (Class A), Xci 286, Xci Ply (Class A), Xci Foil, Xci CG, Xci Ply, and Xci NB
- 1.1.5 Kingspan Insulation, LLC – GreenGuard® Insulation Boards: CM, SL, SLX, PLYGOOD, and Fanfold Products
- 1.1.6 Rmax – Durasheath®, ECOMAXci® Ply, ECOMAXci® Wall Solution, R-Matte® Plus-3, THERMABASEci™, Thermasheath®, Thermasheath®-SI, Thermasheath®-XP, TSX-8500, TSX-8510, ECOMAXci® FR, ECOMAXci® FR Ply, and ECOMAXci® FR White

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.

² 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 or call us at 608-310-6748.



2 APPLICABLE CODES AND STANDARDS^{3,4}

2.1 Codes

- 2.1.1 *IBC—12, 15, 18: International Building Code®*
- 2.1.2 *IRC—12, 15, 18: International Residential Code®*

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 [Section 506](#).⁵
 - 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.⁶
- 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 DRR.
- 3.7 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 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.

³ 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.

⁴ All terms defined in the applicable building codes are italicized.

⁵ [2012 IBC Table 503](#)

⁶ [DRR 1202-01](#), [DRR 1202-04](#)



- 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 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, 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.

TABLE 1. PRODUCT CODE COMPLIANCE

Manufacturer	Product	Evaluation Report	2603.2 Labeling	2603.3 FSI / SDI ¹	2603.4 Thermal Barrier Required ^{3,4,5}	2603.4.1.6 Ignition Barrier Required ⁵
Atlas Roofing Corporation	Stucco Shield®	<u>ESR-1375</u>	Y	Y	Y	Y
	Energy Shield® CGF	<u>ESR-1375</u> Intertek Warnock Hersey Directory	Y	Y	Y	N
	Energy Shield® CGF Pro	<u>TER 1306-03</u> <u>UL BRYX. 13089</u>	Y	Y	Y	Y
	Energy Shield®	<u>ESR-1375</u> , Intertek Warnock Hersey Directory	Y	Y	Y	N
	Energy Shield® Pro	<u>TER 1306-03</u> <u>ESR-1375</u> UL BRYX.13089, Intertek Warnock Hersey Directory	Y	Y	Y	Y
	Energy Shield® Pro2	<u>TER 1306-03</u> UL BRYX.13089, Intertek Warnock Hersey Directory	Y	Y	N	N
	Integrity®	<u>ESR-1962</u> ,	Y	Y	N	N
	ThermalStar LCI®	<u>ULEX.R16529</u>	Y	Y	N	N
	ThermalStar Chrome®	ULEX.R16529	Y	Y	N	N
	ThermalStar XTR® T&G	<u>ESR 1962</u> , <u>ULEX.R16529</u>	Y	Y	N	N





Manufacturer	Product	Evaluation Report	2603.2 Labeling	2603.3 FSI / SDI ¹	2603.4 Thermal Barrier Required ^{3,4,5}	2603.4.1.6 Ignition Barrier Required ⁵
	ThermalStar LCi-SS	<u>TER 1311-02, ULEX.R16529</u>	Y	Y	Y	N
BASF Corporation	Neopor®	<u>ESR-4431 ULEX.R5817-02</u>	Y	Y	Y	Y
DuPont de Nemours, Inc.	Thermax™ ci Exterior	<u>ESR-1659</u>	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	<u>ESR-3089</u>	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	<u>ESR-3089</u>	Y	Y	Y	N
	Styrofoam™	<u>ESR-2142</u>	Y	Y	N	N
Hunter Panels	Xci Foil (Class A) Xci CG (Class A)	<u>TER 1402-01</u>	Y	Y	Y	N
	Xci 286 Xci Ply (Class A)		Y	Y	Y	N
	Xci Foil	<u>TER 1402-02</u>	Y	Y	Y	N
	Xci CG		Y	Y	Y	N
	Xci Ply		Y	Y	N	N
	Xci NB	<u>TER 1508-01</u>	Y	Y	Y/N	N
Kingspan	GreenGuard® CM	<u>TER 1407-03</u>	Y	Y	Y	Y
	GreenGuard® SL		Y	Y	Y	Y
	GreenGuard® SLX		Y	Y	Y	Y
	GreenGuard® PLYGOOD		Y	Y	Y	Y
	GreenGuard® Fanfold		Y	Y	Y	Y





Manufacturer	Product	Evaluation Report	2603.2 Labeling	2603.3 FSI / SDI ¹	2603.4 Thermal Barrier Required ^{3,4,5}	2603.4.1.6 Ignition Barrier Required ⁵
Rmax	Thermasheath®	TER 1309-03 ESR-1864	Y	Y	Y	Y
	ECOMAXci® Ply	TER 1504-04	Y	Y	Y	Y
	ECOMAXci® Wall Solution	TER 1212-03 Intertek Warnock Hersey Directory	Y	Y	Y	Y
	Durasheath®, R-Matte® Plus-3	Intertek Warnock Hersey Directory	Y	Y	Y	Y
	THERMABASEci™	TER 1504-05	Y	Y	Y	Y
	Thermasheath®-SI	TER 1207-01	Y	Y	N	N
	Thermasheath®-XP ECOMAXci® FR ECOMAXci® FR White TSX-8500 TSX-8510	TER 1309-03 ESR-1864	Y	Y	N	N
	ECOMAXci® FR Ply	TER 1811-02	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 1-9/32" or thicker per [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](#)

4.3 Code Requirements

4.3.1 Not all of [IBC Section 2603.2](#), [Section 2603.3](#), and [Section 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.

TABLE 2. 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 ASTM E84 or UL 723 Greater than 4" thickness: <ul style="list-style-type: none"> • Exception 4 – see Section 2603.9⁷ below
2603.4	Thermal barrier	Installation: <ul style="list-style-type: none"> • Separation from interior of building by approved thermal barrier (i.e., 1/2" gypsum wallboard)

⁷ [2012 IBC Section 2603.10](#)



Code Section	Section Title	Summary of Requirements
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	<p>Installation:</p> <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 <p>Less than 4" thickness:</p> <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	<p>Within an attic or crawl space where entry is made only for service of utilities, foam plastic insulation shall be protected against ignition by:</p> <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) • (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.
2603.4.1.13	Type V Construction	<p>Foam plastic spray applied to a sill plate and header of Type V construction is subject to all of the following:</p> <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>.
2603.9⁸	Special approval	<ul style="list-style-type: none"> • 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. • (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, <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.

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.

⁸ [2012 IBC Section 2603.10](#)



6 TEST ENGINEERING SUBSTANTIATING DATA

- 6.1 Manufacturer reports as listed in Table 1.
- 6.2 Manufacturer DrJ Technical Evaluation Reports (TER) 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 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.
- 6.6 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 The products listed herein meet the requirements of the *IBC* for use in buildings of Type V construction in accordance with IBC Section 2603.
- 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.

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 This product is 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 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 can be found at the respective FSC member websites found at fsc.americanchemistry.com/Members.

11 REVIEW SCHEDULE

- 11.1 For the most recent version or current status of this DRR, visit drjengineering.org or contact DrJ Engineering.