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XTREME 450, XTREME 1700 AND XTREME 2000 SPRAY FOAM INSULATIONS

CSI Section:
07 21 00 Thermal Insulation

1.0 RECOGNITION

XTREME 450, XTREME 1700 and XTREME 2000 spray foam insulations have been evaluated for use as spray foam insulation complying with IBC Section 2603, IRC Section R316, 2018, 2015 and 2012 IECC Sections C303, C402, R303 and R402. The surface burning, physical properties, thermal resistance and applications in Type V construction and exterior walls of Types I-IV construction of XTREME 450, XTREME 1700 and XTREME 2000 Spray Foam Insulations were evaluated to comply to the intent of the following codes and regulations:

- 2018, 2015 and 2012 International Building Code® (IBC)
- 2018, 2015 and 2012 International Residential Code® (IRC)
- 2018, 2015 and 2012 International Energy Conservation Code® (IECC)

2.0 LIMITATIONS

Use of the XTREME 450, XTREME 1700 and XTREME 2000 spray foam insulations recognized in this report is subject to the following limitations:

2.1 The insulation shall be installed in accordance with the manufacturer’s published installation instructions. They shall also be installed in accordance with this evaluation report and the applicable code, and if there are any conflicts between the manufacturer’s published installation instructions and this report, the more restrictive governs.

2.2 Except as indicated in Section 3.3.3 and Section 3.3.6 of this report or by the applicable code, the insulations shall be separated from the interior of the building by a code approved thermal barrier.

2.3 As noted in Section 3.3.3 and 3.3.6 of this report, the insulations shall not exceed the nominal density and thickness.

2.4 During installation the insulation and the surfaces to which they are applied shall be protected from exposure to weather.

2.5 The contractors that will be installing the insulations shall be approved by Foam Direct LLC or by the Spray Polyurethane Foam Alliance.

2.6 Use of the insulation in areas of “very heavy” termite infestation shall be in accordance with the 2018 and 2015 IBC Section 2603.8, 2012 IBC Section 2603.9 or IRC Section 318.4, as applicable.

2.7 Labeling and jobsite certification of the insulation and coatings shall comply with IBC Section 2603.2, 2018 and 2015 IRC N1101.10 and N1101.10.1.1, 2012 IRC Section N1101.12 and N1101.12.1, and N1101.4.1, IECC Sections C303.1.1 and C303.1.2, as applicable.

2.8 Foam plastic used in plenums as interior finish or interior trim shall comply with Section 2603.7 of the IBC.

2.9 The insulations are produced in Birmingham, Alabama under a quality control program.

3.0 PRODUCT USE

3.1 General: When installed in accordance with Section 3.3 of this report, XTREME 450, XTREME 1700 and XTREME 2000 spray foam insulations can be used in wall cavities, floor assemblies or ceiling assemblies, and in attic and crawl spaces as nonstructural thermal insulation material. The spray-applied foam plastic insulation is used in Type V-B construction under the IBC and in dwellings under the IRC.

XTREME 450, XTREME 1700 and XTREME 2000 spray foam insulations may be used in Construction Types I, II, III or IV when installed in accordance with Section 3.4 of this report.

3.2 Design: XTREME 450, XTREME 1700 and XTREME 2000 spray foam insulations shall comply with requirements in 2018, 2015 and 2012 IECC Sections C402.1 and R402.

3.2.1 Thermal Resistance (R-Values): XTREME 450, XTREME 1700 and XTREME 2000 spray foam insulations have a thermal resistance (R-Value) at a mean temperature of 75°F (24°C) as shown in Table 1 of this report.

The product described in this Uniform Evaluation Service (UES) Report has been evaluated as an alternative material, design or method of construction in order to satisfy and comply with the intent of the provision of the code, as noted in this report, and for at least equivalence to that prescribed in the code in quality, strength, effectiveness, fire resistance, durability and safety, as applicable, in accordance with IBC Section 104.11. This document shall only be reproduced in its entirety.





TABLE 1
Thermal Resistance (R-Value)^{1,2}
(°F·ft²·h/BTU)

Thickness (inch)	R-Value	
	XTREME 450	XTREME 1700 and XTREME 2000
1	3.7	6.5
2	7.0	13
3	11	20
3.5	13	23
4	14	26
5	18	33
5.5	20	36
6	21	39
7	25	46
7.5	27	49
8	29	52
9	32	59
10	36	66
11	39	72
12	43	79
14	50	92
16	57	105
18	64	118

For SI: 1 inch = 25.4 mm, 1°F·ft²·h/Btu = 0.176 110 K·m²/W.

¹ R-Values are calculated based on tested K values at 1-inch and 3.5-inch thicknesses.

² R-Values greater than 10 are rounded to the nearest whole number.

3.2.2 Air Permeance: When tested in accordance with ASTM E2178 at a minimum thickness of 4 inches (102 mm), XTREME 450 spray foam insulation has an air permeability of less than 0.02 L/s·m² at 75 Pa, meeting the definition of air-impermeable insulation in accordance with the IBC and IRC.

3.2.3 Surface Burning Characteristics:

3.2.3.1 XTREME 450: At a maximum thickness of 4 inches (102 mm) and a nominal density of 0.5 pcf (16 kg/m³), the XTREME 450 spray foam insulation has a flame spread index of 25 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E84. Thicknesses are not limited for ceiling cavities and wall cavities when covered by a code complying prescriptive thermal barrier, such as minimum ½-inch (12.7 mm) thick gypsum board.

3.2.3.2 XTREME 1700 and XTREME 2000: At a maximum thickness of 4 inches (102 mm) and a nominal density of 2.1 pcf (16 kg/m³), the XTREME 1700 and XTREME 2000 spray foam insulations have a flame spread index of 25 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E84. Thicknesses are not limited for ceiling cavities and wall cavities when covered by a code complying prescriptive thermal barrier,

such as minimum ½-inch (12.7 mm) thick gypsum board.

3.3 Installation:

3.3.1 Installation General: The manufacturer’s published installation instructions for XTREME 450, XTREME 1700 and XTREME 2000 spray foam insulations and this report shall be available and strictly adhered to at all times on the jobsite during installation.

The spray foam insulations shall be spray-applied on the jobsite using a volumetric positive displacement pump in accordance with the manufacturer’s published installation instructions. The applied insulations shall be sprayed in multiple passes having a maximum thickness of 10 inches (254 mm) per pass up to the maximum insulation thickness specified in this report. The maximum in-service temperature for all areas shall not exceed 180°F (82°C). The spray-applied foam plastic insulation shall not be used in electrical outlets or junction boxes or in continuous contact with rain or water. The spray-applied foam plastic insulations shall be sprayed onto a substrate that is protected and clean from any debris or weather-related conditions during application.

3.3.2 Installation with a Prescriptive Thermal Barrier: XTREME 450, XTREME 1700 and XTREME 2000 spray foam insulations shall be separated from the interior by an approved thermal barrier of minimum ½ -inch thick (12.7 mm) gypsum wallboard or an equivalent thermal barrier. When installed in accordance with this section the spray foam may be any thickness when installed behind a prescriptive thermal barrier. The barrier shall comply with and installed in accordance with IBC Section 2603.4 or IRC Section R316.4, as applicable.

3.3.3 Installation with an Alternative Thermal Barrier Assembly: The thermal barrier required by IBC Section 2603.4 or IRC section R316.4 may be omitted when all of the following apply:

- a. The thickness of the XTREME 450, XTREME 1700 and XTREME 2000 spray foam insulations shall not exceed the values shown in Table 2.
- b. The XTREME 450, XTREME 1700 and XTREME 2000 spray foam insulations are coated with a minimum thickness of intumescent coating as described in Table 2 of this report. The coating shall be applied in accordance with the coating manufacturer’s instructions and this report. Surfaces to be coated shall be dry, clean and free of dirt, loose debris and other contaminants that could impact adhesion of the coating.

3.3.4 Installation for Attics and Crawl Spaces: When used in an attic or crawl space where entry is made only for service of utilities, XTREME 450, XTREME 1700 and XTREME 2000 spray foam insulations shall be installed in accordance with this section. The insulation shall be separated from the interior of the building by an approved thermal barrier as described in Sections 3.3.2 and 3.3.3 of this report, as



applicable. except as noted in Sections 3.3.5 or 3.3.6 of this report.

3.3.5 Installation with a Prescriptive Ignition Barrier:

Where entry is made only for the service of utilities, XTREME 450, XTREME 1700 and XTREME 2000 spray foam insulations may be installed within attics or crawl spaces at a maximum thickness of 4 inches with an ignition barrier in accordance with IBC Section 2603.4.1.6, or IRC Sections R316.5.3 and R316.5.4, as applicable. The ignition barrier shall be installed in a manner such that the foam plastic insulation is not exposed and is consistent with the requirements of the type of construction required by the applicable code.

3.3.6 Installation with an Alternative Ignition Barrier Assembly:

When installation is in accordance this this section, the ignition barrier described in Section 3.3.5 of this report, and as required by Section 2603.4.1.6 of the IBC or Section R316.5.3 and R316.5.4 or the IRC, as applicable may be omitted.

3.3.6.1 General: When XTREME 450, XTREME 1700 and XTREME 2000 spray foam insulations are installed in attics and crawl spaces without a prescriptive ignition barrier, the following conditions apply:

- a. The thickness of the foam plastic insulation applied to the underside of the top of the space shall not exceed values noted in Table 3 or Section 3.6.2 of this report, as applicable.
- b. The thickness of the foam plastic insulation applied to the vertical surfaces shall not exceed values noted in Table 3 or Section 3.6.2 of this report, as applicable.
- c. Entry is only to service utilities in the attic or crawl space and no storage is permitted.
- d. Attic or crawl space areas cannot be interconnected.
- e. Air from the attic or crawl space cannot be circulated to other parts of the building.
- f. In accordance with IBC Section 1203.2 or IRC section R806, as applicable, attic ventilation is provided, as applicable.
- g. In accordance with 2018 IBC Section 1202.3, IBC Section 1203.3 or IRC section R408.1, as applicable, crawl-space ventilation is provided, as applicable.
- h. In accordance with the Uniform Mechanical Code (UMC) Section 701.1 or the International Mechanical Code® (IMC) Section 701, combustion air is provided, as applicable.
- i. Fire-protective coating, noted in this report, is applied in accordance with Table 3 unless meeting the requirements of Section 3.6.2.

3.3.6.2 Installation of XTREME 1700 and XTREME 2000 without a Fire Protective Coating:

XTREME 1700 and XTREME 2000 spray foam insulations may be applied at a maximum density of 2.1 pcf to the underside of roof sheathing or roof rafters and vertical surfaces of attics and in crawl spaces. When applied to the underside of the top of the space, the thickness of the XTREME 1700 and XTREME 2000 spray foam insulations shall not exceed 9 inches (229 mm), and when applied to vertical surfaces or floor, the maximum thickness shall not exceed 7 inches (178 mm).

3.3.7 Unvented Attics: XTREME 450, XTREME 1700 and XTREME 2000 spray foam insulations may be installed in unvented attic assemblies and unvented enclosed rafter assemblies in accordance with Section 1202.3 of the 2018 IBC, Section 1203.3 of the 2015 IBC or Section R806.5 of the 2015 and 2012 IRC, as applicable. A vapor retarder shall be installed as required in Section 1203.3 (4) or the 2015 IBC in Climate Zones 5, 6, 7 and 8.

3.4 Use in Exterior Walls of Types I, II, III and IV Construction (IBC)

3.4.1 General: When XTREME 450, XTREME 1700 and XTREME 2000 spray-applied polyurethane foam plastic insulations are used in exterior walls of Types I, II, III or IV construction of any height, the insulation shall comply with IBC Section 2603.5 and Section 3.4 of this report. Walls required to be fire-resistance rated construction are beyond the scope of this report and shall comply with IBC Section 2603.5.1.

3.4.2 Complying Exterior Wall Assemblies: Wall assemblies that comply with Section 2603.5 of the IBC and this report that may be used in exterior walls of buildings of Type I, II, III, or IV construction of any height are described in Tables 4 and 5 of this report.

4.0 PRODUCT DESCRIPTION

XTREME 450 spray foam insulation is a spray-applied, polyurethane foam plastic and complies as a low-density insulation in accordance with Section 3.1.1 and Table 1 of AC377. The insulation is a two-component spray foam plastic with a nominal in-place density of 0.5 pcf (16 kg/m³).

XTREME 1700 and XTREME 2000 spray foam insulations are spray-applied, polyurethane foam plastic and comply as medium-density insulations in accordance with Section 3.1.1 and Table 1 of AC377. The insulations are two-component spray foam plastic with a nominal in-place density of 2.1 pcf (67 kg/m³) and manufactured from the same specifications.

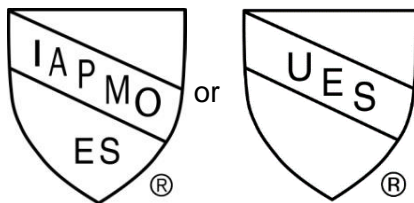
The spray-applied insulation is mixed in the field by combining a polymeric isocyanate (A component) and a resin blend (B component). The liquid components shall be stored in 55-gallon (208 L) drums at temperatures between 50°F and 70°F (10°C and 21°C). When Component A and Component



B are stored in factory-sealed containers at the recommended temperatures, the maximum shelf life is six months.

5.0 IDENTIFICATION

XTREME 450, XTREME 1700 and XTREME 2000 spray foam insulation's containers are identified by the manufacturer's name (Foam Direct LLC) address and telephone number, product name, use instructions, density, flame-spread and smoke-development indices, date of manufacture, and evaluation report number (ER-736). The identification may also include either of the IAPMO Uniform Evaluation Service Marks of Conformity. Either Mark of Conformity may be used as shown below:



IAPMO UES ER-736

6.0 SUBSTANTIATING DATA

6.1 Manufacturer's descriptive literature and installation instructions. Test reports are from laboratories in compliance with ISO/IEC 17025.

6.2 Data in accordance with the Acceptance Criteria for Spray-applied Foam Plastic Insulation, ICC-ES AC377, dated April 2016, (editorially revised April 2018) including Appendix X.

6.3 Report of Flammability Testing in accordance with NFPA 286.

6.4 Report of Air Permeance based on ASTM E2178.

6.5 Reports of fire propagation characteristics in accordance with NFPA 285

6.6 Third party engineering analysis for extension of NFPA 285 results.

7.0 STATEMENT OF RECOGNITION

This evaluation report describes the results of research carried out by IAPMO Uniform Evaluation Service on XTREME 450, XTREME 1700 and XTREME 2000 spray foam insulations to assess its conformance to the codes shown in Section 1.0 of this report and documents the product's certification. Products are manufactured at the location noted in Section 2.9 of this report under a quality control program with periodic inspections under the supervision of IAPMO UES.

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**TABLE 2
ALTERNATIVE THERMAL BARRIER ASSEMBLIES¹**

Spray Foam Insulation	FIRE-PROTECTIVE COATING/COVERING			MAXIMUM SPF THICKNESS (inch)	
	TYPE	MINIMUM THICKNESS (mils)	THEORETICAL APPLICATION RATE	WALLS AND VERTICAL SURFACES	CEILING AND OVERHEAD SURFACES
XTREME 450	DC315 ²	18 WFT (12 DFT)	1.1 gal/100 ft ²	10	12
XTREME 1700	DC315 ²	19 WFT (13 DFT)	1.2 gal/100 ft ²	5.5	9.5
XTREME 2000	DC315 ²	19 WFT (13 DFT)	1.2 gal/100 ft ²	5.5	9.5

For SI: 1 inch = 25.4 mm, 1 mil = 0.0254 mm

¹ Fire-protective coatings and coverings shall be applied over all exposed SPF surfaces in accordance with the coating/covering manufacturer's instructions and this report.

²International Fireproof Technology Inc., recognized in IAPMO UES ER-499.

**TABLE 3
ALTERNATIVE IGNITION BARRIER ASSEMBLIES¹**

Spray Foam Insulation	FIRE-PROTECTIVE COATING/COVERING			MAXIMUM SPF THICKNESS (inch)	
	TYPE	MINIMUM THICKNESS (mils)	THEORETICAL APPLICATION RATE	WALLS AND VERTICAL SURFACES	CEILING AND OVERHEAD SURFACES
XTREME 450	DC315 ²	4 WFT (3 DFT)	0.25 gal/100 ft ²	8	14
XTREME 450	FS-IB ³	6 WFT (3DFT)	0.38 gal/100 ft ²	10	15

For SI: 1 inch = 25.4 mm, 1 mil = 0.0254 mm, 1 gallon = 3.785 L, 1 ft² = 0.0929 m²

¹ Fire-protective coatings and coverings shall be applied over all exposed SPF surfaces in accordance with the coating/covering manufacturer's instructions and this report.

²International Fireproof Technology Inc., recognized in IAPMO UES ER-499.

³Flame Seal Products, Inc., recognized in IAPMO UES ER-600

**TABLE 4 – NFPA 285 COMPLYING EXTERIOR WALL ASSEMBLIES
XTREME 450, XTREME 1700 and XTREME 2000 APPLIED IN WALL STUD CAVITY**

Wall Component	Material Description
Base Wall (BWS)	Steel Stud Wall - 1 layer of 5/8-inch minimum Type X gypsum wallboard installed on the interior side of minimum 3 3/8-inch deep minimum to 6-inch deep maximum No. 20 gauge steel studs spaced a maximum of 24 inches on center.
Fire-Stopping in Stud Cavity at Floor Lines	4-inch 4 pcf mineral wool (friction fit or installed with Z-Clips)
Cavity Insulation Use Item 1 or 2	1) XTREME 1700 and XTREME 2000 up to 6 inches in base wall noted above. 2) XTREME 450 1 5/8 inches minimum to 6 inches maximum with a maximum 2-inch air gap for studs ranging from 3 3/8-inch deep minimum to 6-inch deep maximum.
Exterior Sheathing	Minimum 5/8-inch thick exterior gypsum sheathing.
Water -resistive Barrier over Base Wall	1) None. 2) Any WRB or alternative vapor barrier that has been approved to be used in a NFPA 285 compliant assembly paired with mineral wool, polyisocyanurate, EPS, or XPS insulation or no exterior insulation for claddings approved for that WRB by an approved evaluation or certification entity.
Exterior Insulation Use either Item 1, 2 or 3	1) None – only where the cladding is listed to be approved with specific water-resistant barrier (WRB). (See Note 1)



	<p>2) 2-inch thick minimum 4 pcf mineral fiber insulation allowed for use with any WRB on the base wall surface. (see Note 1)</p> <p>3) Any polyisocyanurate, EPS or XPS insulation that has been approved (see note 2) to be used in an NFPA 285 compliant assembly paired with the WRBs in Item 2 above and claddings in Item 2 below. (see Note 2)</p>
Exterior Cladding	<p>1) Claddings below may only be used with noncombustible exterior insulation in Item 2 above (mineral fiber)</p> <p>a. Any noncombustible cladding, such as brick, stone, terra cotta, fiber cement, concrete, sheet metal, etc.</p> <p>b. Combustible cladding- Use any cladding that has been successfully tested by the panel manufacturer (or fabricator) via the NFPA 285 test method. (See Note 2)</p> <p>2) Claddings below may be used with any approved combustible insulation in Exterior Insulation Item 3 above.</p> <p>Any cladding (combustible or noncombustible) that has been approved to be used in an NFPA 285 compliant assembly paired with approved polyisocyanurate, EPS, XPS or SPF insulation. Each insulation must be specifically approved for the exact cladding types listed in the approval. (See Note 2)</p>
Window/Door Perimeters	<p>Windows and doors shall be framed as required for the base wall.</p> <p>The exterior side of the base wall shall use design for specific system being considered. (see note)</p> <p>Note: EPS and XPS require specific door/window header and jamb details to be compliant to NFPA 285. Polyisocyanurate and spray foam may require specific header/jamb details. Approvals shall be from an approved evaluation or certification entity for the header/jamb detail required for each insulation type.</p>

For SI: 1 inch = 25.4 mm

Notes to Table 4:

Note 1 Examples for use with no exterior insulation or with mineral wool insulation per table above.

1. Any combustible cladding that has passed NFPA 285 testing (examples below)
 - a. NFPA 285 approved MCM/ACM Metal/Aluminum Composite building panels
 - b. NFPA 285 approved stone/aluminum honeycomb composite
 - c. NFPA 285 approved HPL High-Pressure Laminate Panels.
2. Any noncombustible cladding such as (but not limited to):
 - a. Brick - Nominal 4-inch clay brick or veneer with a maximum 2-inch air gap behind the brick. Brick Ties/Anchors 24 inches o.c. (maximum).
 - b. Stucco - 3/4 - inch exterior cement plaster and lath. A secondary water-resistive barrier can be installed between the insulation and lath. The secondary WRB may not be full coverage asphalt or butyl based self-adhering membranes.
 - c. Natural Stone (granite, limestone marble, sandstone) – 2 inch using any installation technique with a 2-inch air gap (max.).
 - d. Artificial Cast Stone – 1 1/2 – inch using any installation technique with a 2-inch air gap (max)
 - e. Terra Cotta Cladding - 1 1/4-inch using any installation technique with a 2-inch air gap (max)
 - f. 1/4-inch (min) fiber cement panels (installed per manufacturer instructions)
 - g. Concrete - 2 inches thick with a 2-inch air gap (max)
 - h. CMU blocks – 4 inches with a maximum 2-inch air gap
 - i. Sheet metals such as aluminum, copper or zinc – any thickness

Note 2: If the base wall is covered with a combustible WRB/insulation and various claddings (combustible or noncombustible) each insulation/WRB/cladding combination allowed must have explicitly been tested or approved to be used with each other by an approved evaluation or certification entity.

**TABLE 5 –NFPA 285 COMPLYING EXTERIOR WALL ASSEMBLIES
Masonry for Walls with XTREME 1700 and XTREME 2000 Exterior Insulation and/or XTREME 450, XTREME 1700
and XTREME 2000 APPLIED IN WALL STUD CAVITY**



Wall Component	Material Description
Base Wall (BWS) Use either Item 1, 2 or 3	<ol style="list-style-type: none"> 1. Concrete Wall 2. Concrete Masonry Wall 3. Steel Stud Wall - 1 layer of 5/8-inch minimum Type X gypsum wallboard installed on the interior side of minimum 3/8-inch deep to 6-inch deep maximum No. 20 gauge steel studs spaced a maximum of 24 inches on center.
Fire-Stopping in Stud Cavity at Floor Lines	4-inch 4 pcf mineral wool (friction fit or installed with Z-Clips)
Cavity Insulation Use Item 1 or 2	<ol style="list-style-type: none"> 1) None 2) XTREME 1700 or XTREME 2000 up to 6 inches in base wall noted above. 3) XTREME 450 1 5/8 inches minimum to 6 inches maximum with a maximum 2-inch air gap for studs ranging from 3/8-inch deep minimum to 6-inch deep maximum. 4) Any noncombustible insulation per ASTM E136 5) Any mineral fiber (faced or unfaced) 6) Any fiberglass batt (faced or unfaced)
Exterior Sheathing	Minimum 1/2-inch thick exterior gypsum sheathing.
Exterior Insulation	4-inch maximum thickness of XTREME 1700 or XTREME 2000
Exterior Cladding	<ol style="list-style-type: none"> 1. Brick – Standard type brick veneer anchors, installed a maximum of 24 inches on center, vertically on each stud with maximum 1-inch air gap between exterior insulation and brick. Brick to be standard nominal 4-inch thick clay brick installed in a running bond pattern using Type S mortar. 2. Stucco – Minimum 3/4-inch thick, exterior plaster and lath. A secondary water resistive barrier (WRB) can be installed between the exterior insulation and lath. The secondary WRB shall not be full coverage asphalt or butyl based self-adhered membranes. 3. Minimum 2-inch thick natural stone (granite, limestone, marble or sandstone). Any standard non-open joint installation technique shall be used. 4. Artificial cast stone – 1 1/2 -inch minimum using any standard non-open joint installation technique. 5. Terra Cotta Cladding – 1 1/4 - inch minimum using any standard non-open joint installation technique. 6. Concrete – 2 inches thick with a maximum 2-inch air gap any standard non-open joint installation technique. 7. CMU Blocks – 4 inches minimum with a maximum 2-inch air gap any standard non-open joint installation technique.
Window/Door Perimeters	Framed as required for base wall. Use 25-gauge sheet steel for flashing area outside of base wall.

For SI: 1 inch = 25.4 mm