

# EVALUATION REPORT



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## DIVISION: 07—THERMAL AND MOISTURE PROTECTION

### Section: 07210—Building Insulation

#### REPORT HOLDER:

**BASF POLYURETHANE FOAM ENTERPRISES, LLC**

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#### EVALUATION SUBJECT:

**ENERTITE® US OPEN-CELL SPRAY POLYURETHANE FOAM INSULATION**

### 1.0 EVALUATION SCOPE

#### 1.1 Compliance with the following codes:

- 2006 International Building Code® (IBC)
- 2006 International Residential Code® (IRC)
- 2006 International Energy Conservation Code® (IECC)

#### 1.2 Evaluated in accordance with:

- ICC AC 377 Dated July 2009

#### Property evaluated:

- Surface burning characteristics
- Thermal Performance (R-value)
- Physical Properties
- Sound Transmission

### 2.0 USES

ENERTITE® US insulation system is installed as a nonstructural thermal insulation material in wall, floor, ceiling, attic, and crawlspace

assemblies in accordance with applicable codes. The use is limited to jobsite installations of spray applied polyurethane foam. The foam is applied in a liquid state, allowed to free rise, and cure in situ.

### 3.0 DESCRIPTION

#### 3.1 Product Information:

**3.1.1 ENERTITE® US** is a spray applied, rigid, open-cell polyurethane foam plastic insulation that is water-blown with a nominal density of 0.5 lbs/ft<sup>3</sup> (8 kg/m<sup>3</sup>). The polyurethane foam plastic is produced at the jobsite by combining a polymeric isocyanate (A-component) and a resin (B-component) at a one-to-one by volume ratio using plural-component processing equipment designed for the processing of polyurethane systems.

#### 3.2 Surface Burning Characteristics:

**3.2.1** The ENERTITE® US, at a thickness of 4.0 inches (101.6 mm) and a nominal density of 0.5 lbs/ft<sup>3</sup> (8 kg/m<sup>3</sup>), has a flame-spread index of 25 or Less, and a smoke-development index of 450 or Less when tested in accordance with ASTM E84. Thicknesses of up to 12 inches (305 mm) for wall cavities and up to 16 inches (406 mm) in ceiling cavities are recognized based on room corner fire testing in accordance with NFPA 286 and the acceptance criteria of IBC Section 803.2.

#### 3.3 Thermal Resistance, R-Values

**3.3.1** The ENERTITE® US provides thermal resistance (R-value), of 3.7 ft<sup>2</sup>-h-°F/Btu (0.80 m<sup>2</sup>-K/W) at 75 °F (24 °C) mean test temperature, 1 inch (25.4 mm) thickness and a density of 0.5 lbs/ft<sup>3</sup> (8 kg/m<sup>3</sup>) and of 13.7 ft<sup>2</sup>-h-°F/Btu (2.96 m<sup>2</sup>-K/W) at 4 inch (101.6 mm) thickness and a density of 0.5 lbs/ft<sup>3</sup> (8 kg/m<sup>3</sup>). See Table 1 for R-value ratings at other thicknesses.

#### 3.4 Intumescent Coatings:

**3.4.1** Aldocoat 800 Ignition Barrier Protective Coating® is a water based latex coating manufactured by Aldo Products Company, Inc.

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Aldocoat 800 is supplied in 5-gallon (19 L) pails and 55-gallon (208 L) drums. It has a shelf life of 6 months when stored in factory sealed containers at temperatures between 40 °F (4.5 °C) and 90 °F (32 °C).

**3.4.2** No Burn® Plus intumescent fire retardant coating is a latex based coating manufactured by No-Burn, Inc. No Burn® Plus is supplied in 1-gallon (4 L) or 5-gallon (19 L) pails and 55-gallon (208 L) drums. It has a shelf life of 24 months when stored in factory sealed containers at temperatures between 40 °F (4.5 °C) and 90 °F (32 °C).

### 3.5 Sound Transmission:

**3.5.1** ENERTITE® US provides a Sound Transmission Class of 36 when tested per ASTM E90 and an Outdoor-Indoor Transmission Class of 28 per ASTM E1332 in a wall assembly constructed as follows:

- Framing: 2x4 wood studs, 16 inches on center,
- Exterior Sheathing: 1/2-inch thick Oriented Strand Board (OSB), attached with 1-5/8 inch long drywall screws spaced 6 inch o.c. around perimeter and 12 inch o.c. in field.
- ENERTITE® US Spray Polyurethane Foam Insulation: 3-1/2 inch thick,
- Interior Finish: 1/2-inch thick gypsum board, attached with 1-5/8 inch long drywall screws spaced 6 inch o.c. around perimeter and 12 inch o.c. in field.

## 4.0 INSTALLATION

### 4.1 General:

The ENERTITE® US shall be installed in accordance with the manufacturer's published installation instructions and this report. A copy of the manufacturer's published installation instructions and this report shall be available on the jobsite during installation.

### 4.2 Application:

**4.2.1** ENERTITE® US is spray-applied on the jobsite using positive-displacement equipment designed to process multi-component polyurethane systems. The ENERTITE® US

Resin must be stored between 50 °F (10 °C) and 80 °F (27 °C). The ENERTITE® US shall not be installed in areas having a maximum service temperature greater than 180 °F (82 °C). The foam plastic shall not be used in electrical outlet or junction boxes and should not come in contact with rain, water, or soil. The foam plastic shall not be sprayed onto a substrate that is wet, covered with frost or ice, loose scale, rust, oil, or grease. The insulation shall be protected from the weather during and after application.

**4.2.2** When required by sections 4.4.2, 4.5.2, or 4.6.2 the Aldocoat 800 ignition barrier protective coating is recommended to be applied by medium nap rollers, soft brushes or conventional airless spray equipment. Surface must be free of loose particles or other foreign matter that may inhibit proper adhesion and affect performance of the coating. Apply Aldocoat 800 in one coat at the rate of not less than 1.0 gallon per 100 sq. ft. Minimum dry thickness shall be 8 mils. Do not store material at temperatures below 45 °F (7.2 °C). Do not apply Aldocoat 800 when ambient air and substrate temperatures fall below 50 °F (10 °C). Aldocoat fully cures in 24 hours but may require longer curing time with high humidity.

**4.2.3** When required by Sections 4.4.2, 4.5.2, or 4.6.2, the No Burn® Plus protective coating must be applied in accordance with the coating manufacturer's instructions. Surfaces to be coated must be dry, clean, and free of dirt, Loose debris and any other substances that could interfere with adhesion of the coating. The No Burn® Plus ignition barrier is applied by brush, roller or airless sprayer. Apply uniformly to entire surface in one coat at the rate of not less than 0.75 gallon per 100 sq. ft. The wet film thickness should be 12 mil yielding a dry thickness of 8 mil. A wet film thickness gauge can be used at the start of the application to check that sufficient No Burn® Plus has been applied. Surface and ambient temperature must be maintained at greater than 50 °F (10 °C) during application and must remain so for at least 48 hours following the application. The



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application of No Burn® Plus should be uniform and leave no exposed uncoated surfaces or edges.

#### 4.3 Thermal Barrier:

ENERTITE® US, at a maximum thickness of 12 inches (305 mm) in wall cavities and 16 inches (406 mm) in ceiling cavities, shall be separated from the interior, occupied area of the building by 0.5-inch (12.7 mm) gypsum wallboard or equivalent 15-minute thermal barrier complying with and installed in accordance with the applicable code, except where installation is in an attic or crawl space as described in Section 4.4, 4.5 or 4.6 of this report.

#### 4.4 Attics:

**4.4.1 Application with a Prescriptive Ignition Barrier.** ENERTITE® US may be installed within attics, when covered by a prescriptive ignition barrier, in accordance with IBC Section 2603.4.1.6 or IRC Section R314.5.3, under the following conditions:

- ENERTITE® US may be applied at a maximum thickness of 4.0 inches (101.6 mm) on the underside of the roof deck and on the walls.
- Entry to the attic is limited to service of utilities, mechanical and electrical systems.
- The ENERTITE® US shall be protected against ignition by one of the following:
  - 1.5-inch thick (38 mm) mineral fiber insulation;
  - 0.25-inch thick (6.4 mm) wood structural panel, particleboard or hardboard;
  - 0.375-inch thick (9.5 mm) gypsum wallboard,
  - corrosion-resistant steel having a base metal thickness of 0.016 inch (0.4 mm), or
  - other approved material installed in such a manner that the ENERTITE® US is not exposed.

- The protective covering shall be consistent with the requirements for the type of construction.

The ENERTITE® US must be separated from the interior occupied area of the building by an approved thermal barrier in accordance with Section 4.3.

**4.4.2 Application without a Prescriptive Ignition Barrier.** ENERTITE® US may be installed in attics without a prescriptive ignition barrier subject to the following conditions:

- Entry to the attic is limited to the service of utilities, mechanical and electrical systems. No storage is permitted.
- Air in the attic is not circulated to other parts of the building.
- There are no interconnected attic areas.
- Attic ventilation is provided when required by IBC Section 1203.2 or IRC section R806.
- Combustion air is provided in accordance with Section 701 and Section 703 of the International Mechanical Code.
- The maximum thickness of ENERTITE® US allowed is 11.25 inches (286 mm) in the ceiling or under the roof deck and 11.25 inches (286 mm) in walls.
- The ENERTITE® US must be covered by a protective coating as outlined below:
  - ALDOCOAT 800 at a minimum thickness of 18 mils (wet) / 8 mils (dry).
  - No Burn® Plus at a minimum thickness of 12 mils (wet) / 8 mils (dry).

The ENERTITE® US must be separated from the interior occupied area of the building by an approved thermal barrier in accordance with Section 4.3.

#### 4.5 Attic Floors:

**4.5.1 Application with prescriptive ignition barrier.** ENERTITE® US may be installed between and over joists in accessible attic floors at a maximum thickness of 4.0 inches (101.6



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mm) in accordance with IBC Section 2603.4.1.6 or IRC Sections R314.5.3 with a prescriptive ignition barrier, under the following conditions:

- Entry to the attic is limited to service of utilities, mechanical and electrical systems.
- The ENERTITE® US shall be protected against ignition by one of the following:
  - 1.5-inch-thick (38 mm) mineral fiber insulation;
  - 0.25-inch-thick (6.4 mm) wood structural panel, particleboard or hardboard;
  - 0.375-inch (9.5 mm) gypsum wallboard,
  - corrosion-resistant steel having a base metal thickness of 0.016 inch (0.4 mm), or
  - other approved material installed in such a manner that the ENERTITE® US is not exposed.
- The protective covering shall be consistent with the requirements for the type of construction.

The ENERTITE® US must be separated from the interior occupied area of the building by an approved thermal barrier in accordance with Section 4.3.

**4.5.2 Application without a Prescriptive Ignition Barrier.** ENERTITE® US may be installed in attics without a prescriptive ignition barrier subject to the following conditions:

- Entry to the attic is limited to the service of utilities, mechanical and electrical systems. No storage is permitted.
- Air in the attic is not circulated to other parts of the building.
- There are no interconnected attic areas.
- Attic ventilation is provided when required by IBC Section 1203.2 or IRC section R806.
- Combustion air is provided in accordance with Section 701 and Section 703 of the International Mechanical Code.

- The ENERTITE® US must be covered by a protective coating as outlined below:
  - ALDOCOAT 800 at a minimum thickness of 18 mils (wet) / 8 mils (dry).
  - No Burn® Plus at a minimum thickness of 12 mils (wet) / 8 mils (dry).
- The maximum thickness of ENERTITE® US allowed is 11.25 inches (286 mm) on the attic floor.

The ENERTITE® US must be separated from the interior occupied area of the building by an approved thermal barrier in accordance with Section 4.3.

#### 4.6 Crawl Spaces:

**4.6.1. Application with prescriptive ignition barrier.** ENERTITE® US may be installed within crawl spaces, when covered by a prescriptive ignition barrier, in accordance with IBC Section 2603.4.1.6 or IRC Section R314.5.3, under the following conditions:

- ENERTITE® US may be applied at a maximum thickness of 4.0 inches (101.6 mm) on the underside of the floor and the walls.
- Entry to the crawl space is limited to service of utilities, mechanical and electrical systems.
- The ENERTITE® US shall be protected against ignition by one of the following:
  - 1.5-inch-thick (38 mm) mineral fiber insulation;
  - 0.25-inch-thick (6.4 mm) wood structural panel, particleboard or hardboard;
  - 0.375-inch (9.5 mm) gypsum wallboard;
  - corrosion-resistant steel having a base metal thickness of 0.016 inch (0.4 mm), or.



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- other approved material installed in such a manner that the ENERTITE® US is not exposed.
- The protective covering shall be consistent with the requirements for the type of construction.

The ENERTITE® US must be separated from the interior occupied area of the building by an approved thermal barrier in accordance with Section 4.3.

**4.6.2 Application without a Prescriptive Ignition Barrier.** ENERTITE® US may be installed in crawl spaces without a prescriptive ignition barrier subject to the following conditions:

- Entry to the crawl space is limited to the service of utilities, mechanical and electrical systems. No storage is permitted.
- Air in the crawl space is not circulated to other parts of the building.
- There are no interconnected crawl space areas.
- Under-floor (crawl space) ventilation is provided when required by IBC Section 1203.3 or IRC Section R408.1, as applicable.
- Combustion air is provided in accordance with Section 701 and Section 703 of the International Mechanical Code.
- The ENERTITE® US must be covered by a protective coating as outlined below:
  - ALDOCOAT 800 at a minimum thickness of 18 mils (wet) / 8 mils (dry).
  - No Burn® Plus at a minimum thickness of 12 mils (wet) / 8 mils (dry).
- The maximum thickness of ENERTITE® US allowed is 11.25 inches (286 mm) on the underside of the floor and 11.25 inches (286 mm) in walls.

The ENERTITE® US must be separated from the interior occupied area of the building by an

approved thermal barrier in accordance with Section 4.3.

## 5.0 CONDITIONS OF USE

**5.1** The ENERTITE® US Spray Foam Insulation described in this report complies

with, or is a suitable alternative to what is specified in those codes listed in Section 1.0 of this report subject to the following conditions:

**5.1.1** This evaluation report and the manufacturer's published installation instructions, when required by the code official, shall be submitted at the time of permit application.

**5.1.2** The ENERTITE® US Spray Foam Insulation shall be installed in accordance with the manufacturer's published installation instructions, this evaluation report, and the applicable code.

**5.1.3** The ENERTITE® US shall be separated from the interior occupied area of the building by an approved 15-minute thermal barrier, except when installed in attics and crawl spaces as described in Section 4.0 of this report.

**5.1.4** The ENERTITE® US shall not exceed the thicknesses noted in Section 4.3, 4.4, 4.5, and 4.6 of this report.

**5.1.5** The ENERTITE® US shall be protected from the weather during and after installation.

**5.1.6** The ENERTITE® US shall be installed by contractors certified by BASF Polyurethane Foam Enterprises, LLC.

**5.1.7** In geographic locations where the probability of termite infestation is very heavy per IBC Section 2603.8 or IRC Section R320.5, when installed in buildings of wood construction, the insulation shall not be installed on the exterior of foundation walls or below floor slabs on ground or in contact with the ground. The insulation shall have a clearance above grade and exposed earth of 6 inches (152 mm) or greater.



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**5.1.8** The ENERTITE® US is produced in Houston, Texas under a quality control program with inspections by Underwriter's Laboratories.

**5.1.9** The use of ENERTITE® US as fire blocking has not been evaluated and is outside the scope of this report.

**5.1.10** Jobsite certification and labeling of the insulation must comply with IRC Sections N11 01.4 and N11 01.4.1 and IECC Sections 102.1.1 and 102.1.11, as applicable.



IAPMO #0172

## 6.0 EVIDENCE SUBMITTED

**6.1** Data in accordance with ICC-ES Acceptance Criteria for Spray-Applied Foam Plastic Insulation (AC377), dated July 2009.

**6.2** Data in accordance with NFPA 286 and IBC 803.2.

**6.3** Data in accordance with ASTM E90, and ASTM E1332.

**6.4** Test results are from laboratories in compliance with ISO/IEC 17025.

A handwritten signature in black ink, appearing to read 'Amir M. C.', written over a light blue grid background.

Director of Evaluation Services

## 7.0 IDENTIFICATION

**7.1** Each package of components for ENERTITE® US is identified with the following:

- Manufacturer's name (BASF Polyurethane Foam Enterprises, LLC).
- Manufacturer's address and telephone number.
- Product trade name (ENERTITE® US).
- Use instructions.
- Density
- Flame-spread and smoke-development indices.
- Evaluation report number (IAPMO-0172)
- Inspection agency (Underwriter's Laboratories).

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**TABLE 1 - Thermal Resistance (aged) of ENERTITE® US**

<b>Framing Stud/Joist Size</b>	<b>ENERTITE® US Thickness, inches</b>	<b>R-value °F-ft<sup>2</sup> -hr/BTU</b>
	1.00	3.7
	2.00	7.4
	3.00	11.1
2" x 4"	3.50	13.0
	4.00	13.7
	5.00	17.2
2" x 6"	5.50	18.9
	6.00	20.6
	7.00	24.1
2" x 8"	7.25	24.9
	8.00	27.5
	9.00	30.9
2" x 10"	9.25	31.8
	10.00	34.4
	11.00	37.8
	11.25	38.7
	12.00	41.2
	13.00	44.7
2" x 14"	13.25	45.5
	14.00	48.1
	15.00	51.5
2" x 16"	15.25	52.4
	16.00	55.0