

ICC-ES Evaluation Report

ESR-3102

Reissued August 1, 2011

This report is subject to renewal in two years.

www.icc-es.org | (800) 423-6587 | (562) 699-0543

A Subsidiary of the International Code Council®

**DIVISION: 07 00 00—THERMAL AND MOISTURE
PROTECTION**

Section: 07 21 00—Thermal Insulation

REPORT HOLDER:

BASF CORPORATION
13630 WATERTOWER CIRCLE
MINNEAPOLIS, MINNESOTA 55441
(888) 900-3626
www.spf.basf.com

EVALUATION SUBJECT:

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

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2009 *International Building Code*® (IBC)
- 2009 *International Residential Code*® (IRC)
- 2009 *International Energy Conservation Code*® (IECC)
- Other Codes (see Section 8.0)

Properties evaluated:

- Surface-burning characteristics
- Physical properties
- Thermal resistance (*R*-values)
- Attic and crawl space installation
- Air permeability

2.0 USES

ENERTITE® US is used as a nonstructural thermal insulating material in buildings of Type V construction (IBC) and dwellings under the IRC. Under the IRC, the insulation may be used as air-impermeable insulation when installed in accordance with Section 3.4. The insulation is for use in wall cavities and floor/ceiling assemblies, and in attic and crawl space installations as described in Section 4.4.

3.0 DESCRIPTION

3.1 General:

ENERTITE® US is a low-density, open-cell, water-blown polyurethane foam plastic insulation system with an installed nominal density of 0.5 pcf (8 kg/m³). ENERTITE® US is a two-component, spray-applied product. The two components of the insulation are polymeric isocyanate

(A-component) and a resin (B-component) which when stored in unopened containers at a temperature between 50°F and 80°F (10°C and 26.7°C), have a shelf life of nine months and twelve months, respectively.

3.2 Surface Burning Characteristics:

When tested in accordance with ASTM E 84, at a maximum thickness of 4 inches (102 mm) and a nominal density of 0.5 pcf (8 kg/m³), ENERTITE® US has a flame-spread index of 25 or less and a smoke-developed index of 450 or less. Thicknesses of up to 12 inches (305 mm) for wall cavities and 16 inches (406 mm) for ceiling cavities are recognized, based on room corner fire testing in accordance with NFPA 286, when the insulation is covered with minimum 1/2-inch-thick (12.7 mm) gypsum board or an equivalent thermal barrier complying with the applicable code.

3.3 Thermal Resistance:

ENERTITE® US has a thermal resistance (*R*-values) at a mean temperature of 75°F (24°C) as shown in Table 1.

3.4 Air Permeability:

ENERTITE® US spray-applied polyurethane foam insulations, at a minimum thickness of 3.5 inches (89 mm), is considered air-impermeable insulation in accordance with Section R806.4 of the IRC, based on testing in accordance with ASTM E 283 and ASTM E 2178.

3.5 Intumescent Coatings:

3.5.1 No Burn® Plus: No Burn® Plus intumescent coating is a latex-based coating manufactured by No Burn, Inc., and is supplied in 1-gallon (4 L) and 5-gallon (19 L) pails and 55-gallon (208 L) drums. The coating material has a shelf life of 12 months when stored in factory-sealed containers at temperatures between 40°F (4.4°C) and 90°F (32.2°C).

3.5.2 ALDOCOAT 800: ALDOCOAT 800 intumescent coating is a water-based latex coating manufactured by ALDO Products Company, Inc., and is supplied in 5-gallon (18.9 L) pails. The coating material has a shelf life of six months when stored in factory-sealed containers at temperatures between 40°F (4.4°C) and 90°F (32.2°C).

3.5.3 SPRAYCOAT™ 1920 Intumescent Coating: SPRAYCOAT™ 1920 intumescent coating, supplied by BASF Corporation, is a single-component, water-based, liquid-applied, intumescent coating. The coating is supplied in 5-gallon (18.8 L) pails and 55-gallon (208 L) drums and has a shelflife of six months when stored in factory-sealed containers at temperatures between 45°F (7.2°C) and 75°F (23.9°C).

3.5.4 FlameSeal TB Intumescent Coating: FlameSeal TB intumescent coating, manufactured by Flame Seal Products, Inc., is a two-component, four-to-one-by-volume, liquid-applied, water-based polymeric intumescent coating. The coating is supplied in 6-gallon (19 L) pails and 55-gallon (208 L) drums and has a shelflife of six months when stored in factory-sealed containers at temperatures between 40°F (4°C) and 90°F (32°C).

3.5.5 DC315 Intumescent Coating: DC315 Intumescent Coating, manufactured by International Fireproof Technology Inc., is a single-component, water-based, liquid-applied intumescent coating. The coating is supplied in 5-gallon (19 L) pails and 55-gallon (208 L) drums and has a shelf life of two years when stored in factory-sealed containers at temperatures between 41°F (5°C) and 95°F (35°C).

4.0 INSTALLATION

4.1 General:

ENERTITE® US must be installed in accordance with the manufacturer's published installation instructions and this report. The manufacturer's installation instructions and this report must be strictly adhered to, and a copy of the instructions and this evaluation report must be available on the jobsite at all times during installation.

4.2 Application:

ENERTITE® US must be applied using spray equipment specified by BASF Corporation. The product must not be used in areas which have a maximum service temperature greater than that specified in the manufacturer's published installation instructions, nor in electrical outlet or junction boxes or in contact with rain or water. The product must be protected from the weather during and after application. ENERTITE® US can be installed in multiple passes at 1/2 to 6 inches (12.7 mm to 152 mm) per pass to the maximum thickness. Where multiple passes are required, the cure time between passes is minimum 5 minutes for a 2-inch (51mm) pass.

4.3 Thermal Barrier:

4.3.1 Application with a Prescriptive Thermal Barrier: ENERTITE® US must be separated from the interior of the building by an approved thermal barrier, such as 1/2-inch (12.7 mm) gypsum wallboard installed using mechanical fasteners in accordance with the applicable code, or an equivalent 15-minute thermal barrier complying with the applicable code. When installation is within an attic or crawl space, as described in Section 4.4, a thermal barrier is not required between the foam plastic and the attic or crawl space, but is required between the foam plastic and the interior of the building. Thicknesses of up to 12 inches (305 mm) for wall cavities and 16 inches (406 mm) for ceiling cavities are recognized, based on room corner fire testing in accordance with NFPA 286, when the insulation is covered with minimum 1/2-inch-thick (12.7 mm) gypsum board or an equivalent thermal barrier complying with the applicable code.

4.3.2 Application without a Prescriptive Thermal Barrier: The ENERTITE® US may be installed without the 15-minute thermal barrier prescribed in the IBC Section 2603.4 and IRC Section R316.4, subject to the following conditions:

- a. All surfaces of the ENERTITE® US must be covered with FlameSeal TB or DC315 intumescent coatings as follows:
 - FlameSeal TB: minimum application rate of 30 wet mils (1.9 gallons per 100 ft²)

- DC315: minimum application rate of 21 wet mils (1.25 gallons per 100 ft²)

b. When covered with the intumescent coatings described in this section, the ENERTITE® US insulation must have a maximum installed thickness as follows:

- FlameSeal TB: 6 inches (152mm) in vertical walls and 12 inches (304mm) in ceilings.
- DC315: 6 inches (152mm) in vertical walls and 12 inches (304mm) in ceilings.

4.4 Attics and Crawl Spaces:

4.4.1 Application with a Prescriptive Ignition Barrier:

When ENERTITE® US is installed within attics or crawl spaces, where entry is made only for service of utilities, an ignition barrier must be installed in accordance with IBC Section 2603.4.1.6 or IRC Section R316.5.3 or R316.5.4, as applicable. The ignition barrier must be consistent with the requirements for the type of construction required by the applicable code and must be installed in a manner so that the foam plastic insulation is not exposed.

4.4.2 Application without a Prescriptive Ignition Barrier:

ENERTITE® US may be installed in an attic or crawl space without a prescriptive ignition barrier when all of the following conditions apply:

1. Entry to the attic or crawl space is only for the service of utilities and no storage is permitted.
2. There are no interconnected attic or crawl space areas.
3. Air in the attic or crawl space is not circulated to other parts of the building.
4. Combustion air is provided in accordance with IMC (*International Mechanical Code*®) Section 701.
5. Attic ventilation is provided when required by IBC Section 1203.2 or IRC Section R806, except air-impermeable insulation is permitted in unvented attics in accordance with Section R806.4 of the IRC. Under-floor (crawl-space) ventilation is provided when required by IBC Section 1203.3 or IRC Section R408.1, as applicable.

ENERTITE® US insulation may be spray-applied to the underside of roof sheathing and/or rafters in attics, and the underside of wood floors and/or floor joists in crawl spaces, as described in this paragraph and in Table 2. The thickness of the foam plastic applied to the underside of the roof sheathing must not exceed 1 1/4 inches (286 mm). The thickness of the spray foam plastic insulation applied to vertical wall surfaces must not exceed 1 1/4 inches (286 mm). The foam plastic must be covered with one of the intumescent coatings described in Section 3.5. The intumescent coating must be applied over the insulation in accordance with the coating manufacturer's instructions and as described in Table 2. Surfaces to be coated must be dry, clean, and free of dirt, loose debris and other substances that could interfere with adhesion of the coating. The coating is applied with low-pressure airless spray equipment.

The coating must be applied with ambient and substrate temperature is at least 50°F (10°C). The insulation may be installed in unvented attics as described in this section in accordance with IRC Section R806.4.

4.4.3 Use on Attic Floors: ENERTITE® US insulation may be installed at a maximum thickness of 1 1/4 inches (286 mm) between joists in attic floors when covered with one of the coatings applied as described in Section 4.4.2. The ENERTITE® US insulation must be separated from the interior of the building by an approved thermal barrier.

5.0 CONDITIONS OF USE

The ENERTITE® US spray-applied polyurethane 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 This evaluation report and the manufacturer's published installation instructions, when required by the code official, must be submitted at the time of permit application.
- 5.2 The insulation must be installed in accordance with the manufacturer's published installation instructions, this evaluation report and the applicable code. If there is a conflict between the installation instructions and this report, this report governs.

The insulation must be separated from the interior of the building by an approved 15-minute thermal barrier, except when installed as described in Section 4.3.2 or when installation is in attics and crawl spaces as described in Section 4.4.
- 5.3 The insulation must not exceed the thickness and density noted in Sections 3.2, 4.3 and 4.4.
- 5.4 The insulation must be protected from the weather during and after application.
- 5.5 The insulation must be applied by professional spray polyurethane foam installers approved by BASF Corporation or by the Spray Polyurethane Foam Alliance (SPFA) for the installation of spray polyurethane foam insulation.
- 5.6 Use of the insulation in areas where the probability of termite infestation is "very heavy" must be in accordance with IBC Section 2603.8 or IRC Section R318.4, as applicable.
- 5.7 Jobsite certification and labeling of the insulation must comply with IRC Sections N1101.4 and N1101.4.1 and IECC Sections 303.1.1 and 303.1.2, as applicable.
- 5.8 A vapor retarder must be installed in accordance with the applicable code.
- 5.9 ENERTITE® US is manufactured in Houston, Texas, under a quality control program with inspections by Underwriters Laboratories Inc. (AA-668).

6.0 EVIDENCE SUBMITTED

- 6.1 Data in accordance with the ICC-ES Acceptance Criteria for Spray-applied Foam Plastic Insulation (AC377), dated October 2010, including reports of tests in accordance with AC377 Appendices A and X.
- 6.2 Reports of room corner fire testing in accordance with NFPA 286 and UL 1715.
- 6.3 Reports of air permeance testing in accordance with ASTM E 283 and ASTM E 2178.

7.0 IDENTIFICATION

All packages and containers of ENERTITE® US must be labeled with the BASF Corporation, name and address; the product name; the flame spread index and the smoke-developed index; the shelf life expiration date; the name of the inspection agency Underwriters Laboratories Inc.; and the evaluation report number (ESR-3102).

Intumescent coatings are identified with the manufacturer's name and address, the product trade name and use instructions.

8.0 OTHER CODES

In addition to the codes referenced in Section 1.0, the products in the report were evaluated for compliance with the requirements of the following codes:

- 2006 *International Building Code*® (2006 IBC)
- 2006 *International Residential Code*® (2006 IRC)
- 2006 *International Energy Conservation Code*® (2006 IECC)
- 2003 *International Building Code*® (2003 IBC)
- 2003 *International Residential Code*® (2003 IRC)
- 2003 *International Energy Conservation Code*® (2003 IECC)

The products comply with the above-mentioned codes as described in Sections 2.0 through 7.0 of this report, with the revisions noted below:

- **Application with a Prescriptive Thermal Barrier:** See Section 4.3.1, except the approved thermal barrier must be installed in accordance with Section R314.4 of the 2006 IRC or Section R314.1.2 of the 2003 IRC, as applicable.
- **Application with a Prescriptive Ignition Barrier:** See Section 4.4.1, except an ignition barrier must be installed in accordance with Section R314.2.3 of the 2003 IRC, or Section R314.5.3 or R314.5.4 of the 2006 IRC.
- **Application without a Prescriptive ignition Barrier:** See Section 4.4.2, except that combustion air is provided in accordance with Sections 701 and 703 of the 2006 IECC.
- **Protection against Termites:** See Section 5.7, except use of the insulation in areas where the probability of termite infestation if "very heavy" must be in accordance with Section 320.4 of the 2003 IRC or Section R320.5 of the 2006 IRC.
- **Jobsite Certification and Labeling:** See Section 5.8, except jobsite certification and labeling must comply with Section 102.5.1 of the 2003 IECC, or Sections 102.1.1 and 102.1.11, as applicable, of the 2006 IECC.

TABLE 1—THERMAL RESISTANCE (R-VALUES)

THICKNESS (inches)	R-VALUE (°F·ft ² ·h/Btu)
1	3.7
2	7.1
3	10.5
3.5	12.2
4	13.8
5	17.2
5.5	18.9
6	20.6
7	24.1
7.5	25.8
8	27.5
9	31.0
9.5	32.7
10	34.4
11.5	39.6
12	41.3
16	55.0

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

¹R-values are calculated based on tested K values at 1- and 4-inch thicknesses.

TABLE 2—USE OF INSULATION IN ATTICS AND CRAWL SPACES WITHOUT A PRESCRIPTIVE IGNITION BARRIER

INSULATION TYPE	ATTICS - MAXIMUM THICKNESS (in) (Underside of Roof Sheathing/ Rafters, Wall Cavities & Top of Attic Floors)	CRAWL SPACES - MAXIMUM THICKNESS (in) (Underside of Floors/Floor Joists & Wall Cavities)	INTUMESCENT COATING MINIMUM THICKNESS & TYPE (Applied to all Exposed Foam Surfaces)	MINIMUM APPLICATION RATE OF THE INTUMESCENT COATING	TESTS SUBMITTED (AC377)
ENERTITE® US	11 ¹ / ₄	11 ¹ / ₄	18 wet mils of ALDOCOAT 800	1.12 gal / 100 ft ²	Appendix X
ENERTITE® US	11 ¹ / ₄	11 ¹ / ₄	12 wet mils of NoBurn Plus	0.75 gal / 100 ft ²	Appendix X
ENERTITE® US	9 ¹ / ₄	11 ¹ / ₄	14 wet mils of SPRAYCOAT™ 1920	0.88 gal / 100 ft ²	Appendix X
ENERTITE® US	6	12	30 wet mils of Flame Seal TB	1.90 gal / 100 ft ²	Appendix A1.2.1 and A2.2.1
ENERTITE® US	6	12	21 wet mils of DC315	1.25 gal / 100 ft ²	Appendix A1.2.1 and A 2.2.1

For **SI**: 1 inch = 25.4 mm; 1 mil = 0.0254 mm; 1 gallon = 3.38 L; 1 ft² = 0.93 m².