

ICC-ES Evaluation Report

ESR-1615*

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This report is subject to re-examination in one year.

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DIVISION: 07—THERMAL AND MOISTURE PROTECTION
Section: 07210—Building Insulation
REPORT HOLDER:
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EVALUATION SUBJECT:
**INSULSTAR® SPRAY APPLIED POLYURETHANE
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)

Properties evaluated:

- Surface-burning characteristics
- Physical properties
- Thermal resistance
- Attic and crawl space installation

2.0 USES

InsulStar® insulation is used as a medium-density thermal insulating material and has been evaluated for use in Type V-B construction (IBC) and dwellings under the IRC. Under the IRC, the insulation may be used as a vapor retarder, or as an air-impermeable insulation when applied in accordance with this report.

3.0 DESCRIPTION
3.1 General:

InsulStar® is a spray-applied cellular polyurethane foam plastic insulation that is installed in cavities of roofs, ceilings, floors, crawl spaces and stud wall assemblies. The foam plastic is a two-component, closed-cell, one-to-one-by-volume spray foam system with a nominal density of 2 pcf (32 kg/m³). InsulStar® insulation may be used for application to wood, metal, concrete, masonry and gypsum

board surfaces. InsulStar® insulation liquid components are supplied in nominally 55-gallon (208 L) drums, labeled as “A” component or “R” component.

3.2 Surface-burning Characteristics:

The insulation, at a maximum thickness of 4 inches (102 mm) and a nominal density of 2 pcf (32 kg/m³), has a flame-spread index of less than 25 and a smoke-developed index of less than 450 when tested in accordance with ASTM E 84. Thicknesses of up to 8 inches (203 mm) for wall cavities and 12 inches (305 mm) for ceiling cavities are recognized based on room corner fire testing in accordance with NFPA 286, when covered with minimum 1/2-inch-thick (13 mm) gypsum board or an equivalent thermal barrier complying with, and installed in accordance with, the applicable code. Thicknesses of up to 11.5 inches (292 mm) for wall cavities and 16 inches (406 mm) for ceiling cavities in attics and crawl spaces are recognized based on diversified fire tests, when installed in accordance with this report.

3.3 Thermal Transmission R-values:

The insulation has thermal resistance R-values, at a mean temperature of 75EF (24EC), as shown in Table 1.

3.4 Aldocoat® 757 Intumescent Coating:

Aldocoat® 757 intumescent coating is manufactured by Aldo Products Company and is a water-based latex coating with specific gravity of 1.4. Aldocoat® 757 is supplied in 5-gallon (19 L) pails and 55-gallon (208 L) drums and has a shelf life of six months when stored in a factory-sealed container at temperatures between 40°F (4.5°C) and 90°F (32°C).

4.0 INSTALLATION
4.1 General:

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

InsulStar insulation must be spray-applied on the jobsite using a volumetric positive displacement pump as identified in the NCFI application manual. The InsulStar R component must not be stored at temperatures below 65°F (18°C) or above 85°F (29°C). InsulStar must not be used in areas that have a maximum in-service temperature greater than 180°F (82°C). The foam plastic must not be used in electrical outlet or junction boxes or in direct continuous contact with water.

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The InsulStar[®] insulation, with a maximum nominal thickness of 8 inches (203 mm) for wall cavities and 12 inches (305 mm) for ceiling cavities, must be separated from the interior of the building by an approved thermal barrier of minimum 0.5-inch-thick (12.7 mm) gypsum wallboard or an equivalent 15-minute thermal barrier complying with and installed in accordance with the applicable code. Within an attic or crawl space, installation must be in accordance with Section 4.2.

4.2 Attics and Crawl Spaces:

4.2.1 Application with a Prescriptive Ignition Barrier:

When InsulStar[®] insulation 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 Sections R316.5.3 and 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. InsulStar[®] insulation as described in this section may be installed in unvented attics in accordance with IRC Section R806.4.

4.2.2 Application without a Prescriptive Ignition Barrier:

Where InsulStar[®] insulation is installed in accordance with Sections 4.2.2.1 and 4.2.2.2, the following conditions apply:

- Entry to the attic or crawl space is to service utilities, and no storage is permitted.
- There are no interconnected attic or crawl space areas.
- Air in the attic or crawl space is not circulated to other parts of the building.
- Attic ventilation is provided when required by IBC Section 1203.2 or IRC Section R806, except when air-impermeable insulation is permitted in unvented attics in accordance with Section R806.4 of IRC. Under-floor (crawl space) ventilation is provided when required by IBC Section 1203.3 or IRC Section R408.1, as applicable.
- The foam plastic is limited to the maximum thickness and density [2 pcf (32 kg/m³)] tested.
- Combustion air is provided in accordance with IMC (International Mechanical Code[®]) Sections 701 and 703.
- The installed coverage rate or thickness of the coating, must be equal to or greater than that specified in Section 4.2.2.1.

4.2.2.1 Application with Intumescent Coating: In attics, InsulStar[®] insulation may be spray-applied to the underside of roof sheathing or roof rafters, and/or vertical surfaces; and in crawl spaces, InsulStar[®] insulation may be spray-applied to the underside of floors and/or vertical surfaces as described in this section. The thickness of the foam plastic applied to the underside of the top of the space must not exceed 16 inches (406 mm). The thickness of the foam plastic applied to vertical surfaces must not exceed 10 inches (254 mm). The foam plastic must be covered with a minimum nominally 10-mil (0.25 mm) wet film thickness of the Aldocoat[®] 757 intumescent coating described in Section 3.4. The Aldocoat[®] 757 intumescent coating must be applied over the InsulStar[®] insulation in accordance with the coating manufacturer's instructions and this report. 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 Aldocoat[®] 757 coating is applied with a medium-size nap roller, soft

brush or conventional airless spray equipment at a rate of 1 gallon per 100 square feet to obtain a recommended minimum dry film thickness of 7.5 mils (0.19 mm) [10 wet mils (0.25 wet mm)]. The coating must be applied when ambient and substrate temperatures are within a range of 50°F (10°C) to 90°F (32°C), and requires a 24-hour curing time. InsulStar[®] insulation may be installed in unvented attics as described in this section in accordance with IRC Section R806.4.

4.2.2.2 Application without Intumescent Coating:

InsulStar[®] insulation may be spray-applied to the underside of roof sheathing or roof rafters, and/or vertical surfaces; and in crawl spaces, InsulStar[®] insulation may be spray-applied to the underside of floors and/or vertical surfaces as described in this section. The thickness of the foam plastic applied to the underside of the top of the space must not exceed 16 inches (406 mm). The thickness of the foam plastic applied to vertical surfaces must not exceed 11.5 inches (292 mm). InsulStar[®] insulation may be installed in unvented attics as described in this section in accordance with IRC Section R806.4.

4.2.3 Use on Attic Floors:

InsulStar[®] insulation may be installed exposed at a maximum thickness of 11.5 inches (292 mm) between joists in attic floors. The InsulStar[®] insulation must be separated from the interior of the building by an approved thermal barrier. The ignition barrier in accordance with IBC Section 2603.4.1.6 and IRC Section R316.5.3 may be omitted.

5.0 CONDITIONS OF USE

The InsulStar[®] 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:

- InsulStar[®] insulation and Aldocoat[®] 757 intumescent coating must be installed in accordance with the manufacturer's published installation instructions, this evaluation report and the applicable code. The instructions within this report govern if there are any conflicts between the manufacturer's published installation instructions and this report.
- InsulStar[®] insulation must be separated from the interior of the building by an approved 15-minute thermal barrier, as described in Section 4.1, except when installation is in attics and crawl spaces as described in Section 4.2.
- InsulStar[®] insulation must be protected from the weather during application.
- InsulStar insulation must be applied by installers certified by NCFI Polyurethanes.
- Use of InsulStar[®] 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.
- 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.
- InsulStar[®] insulation at a 1⁵/₁₆-inch (33.3 mm) thickness or greater is a Class II vapor retarder as defined in IRC Section R202 and IECC Section 202.
- InsulStar[®] insulation is produced in Mount Airy, North Carolina, and Clearfield, Utah, under a quality control program with inspections by PRI Construction Materials Technologies, LLC (AA-709).

6.0 EVIDENCE SUBMITTED

- 6.1 Data in accordance with ICC-ES Acceptance Criteria for Spray-applied Foam Plastic Insulation (AC377), dated June 2009, including reports of tests in accordance with Appendix X of AC377.
- 6.2 Reports on room corner fire tests in accordance with NFPA 286.
- 6.3 Reports on air leakage tests in accordance with ASTM E 283.
- 6.4 Reports on water vapor transmission tests in accordance with ASTM E 96.

7.0 IDENTIFICATION

Components of the InsulStar® insulation are identified with the manufacturer’s name (NCFI Polyurethanes), address and telephone number; the product trade name (InsulStar®); use and application instructions; the density; the flame-spread and smoke-development indices; the evaluation report number (ESR-1615); and the name of the inspection agency (PRI Construction Materials Technologies LLC).

Aldocoat® 757 intumescent coating is identified with the manufacturer’s name (Aldo Products Company, Inc.) and address; the product trade name (Aldocoat 757); use instructions; and the name of the inspection agency (PRI Construction Materials Technologies LLC).

8.0 OTHER CODES

8.1 Evaluation Scope:

The products recognized in this report have also been evaluated in accordance with the following codes:

- BOCA® *National Building Code*/1999 (BNBC)
- 1999 *Standard Building Code*® (SBC)
- 1997 *Uniform Building Code*™ (UBC)

8.2 Uses:

See Section 2.0, except the product has been evaluated for Type 5-B (BNBC), Type VI (SBC) and Type V-N (UBC).

8.3 Description:

See Section 3.0.

8.4 Installation:

See Section 4.0 except the wording of Section 4.2.1 should be replaced with the wording of Section 8.4.1 and the wording of Section 4.2.3 should be replaced with the wording of Section 8.4.2.

8.4.1 Application with a Prescriptive Ignition Barrier:

When InsulStar® insulation 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 BNBC Section 2603.4.1.4, SBC Section 2603.5.1.6, or UBC Section 2602.4, 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.

8.4.2 Use on Attic Floors: InsulStar® insulation may be installed exposed at a maximum thickness of 11.5 inches (292 mm) between joists in attic floors. The InsulStar® insulation must be separated from the interior of the building by an approved thermal barrier. The ignition barrier in accordance with BNBC Section 2603.4.1.4, SBC Section 2603.5.1.6, and UBC Section 2602.4 may be omitted.

8.5 Conditions of Use:

The InsulStar® insulation described in this report complies with, or is a suitable alternative to what is specified in, those codes listed in Section 8.1 of this report, subject to the conditions noted in Sections 5.1 through 5.8.

TABLE 1— THERMAL RESISTANCE (R-VALUES)

THICKNESS (inches)	R-VALUES (°F.ft ² .h/Btu)
ASTM C 518 TESTED VALUES	
1	6.4
4	25
CALCULATED R-VALUES¹	
2	13
3	19
3.5	22
4.75	30
5	32
6	38
7	45
7.5	48
8	51
9	57
10	64
11	70
11.5	73
12	76
16	102

For SI: 1 inch = 25.5 mm; 1 °F.ft².h/Btu = 0.176 110 °K.m²/W.

¹Calculated R-values are based on tested K-values at 4-inch thickness.