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DIVISION: 07 00 00 - THERMAL AND MOISTURE PROTECTION
Section: 07 21 00 - Thermal Insulation
Section: 07 21 19 – Foamed-In-Place Insulation

REPORT HOLDER:
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REPORT SUBJECT:
Thermoseal™ FlameGuard 500
Spray-applied Polyurethane Foam Insulation

1.0 SCOPE OF EVALUATION

- 1.1** This Research Report addresses compliance with the following Codes:
- 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)

NOTE: This report references 2018 Code sections. Sections for earlier Code editions may differ.

- 1.2** The insulation has been evaluated for the following properties (see Table 1):
- Physical properties
 - Surface-burning characteristics
 - Air permeability
 - Thermal resistance (R-values)

- 1.3** The insulation has been evaluated for the following uses (see Table 1):
- Use in Type V construction under the IBC and buildings regulated under the IRC
 - Use as nonstructural thermal insulation material on or in interior and exterior walls, floors, ceilings and the underside of roof decks

- Alternatives to ignition barriers (Section 5.4)
- Use as air-impermeable insulation (Section 4.3)

2.0 STATEMENT OF COMPLIANCE

The insulation complies with the Codes listed in Section 1.1, for the properties stated in Section 1.2, and uses stated in Section 1.3, when installed as described in this report, including the Conditions of Use stated in Section 6.

3.0 DESCRIPTION

3.1 FLAMEGUARD 500: FLAMEGUARD 500 is a two-component, open-cell, foam plastic insulation. The insulation is produced in the field by combining an isocyanate (Component A) with a proprietary resin (Component B), resulting in insulation with a nominal density of 0.66 pcf. The B-component has a shelf life of six months and the A-component has a shelf life of twelve months when stored at temperatures between 50°F and 85°F before installation.

4.0 PERFORMANCE CHARACTERISTICS

4.1 Surface burning Characteristics: The insulation, at a maximum thickness of 4 inches, 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. The insulation can be installed at greater thicknesses as described in Sections 5.3 and 5.4. When the insulation is separated from the interior occupied space of the building with minimum 1/2-inch-thick gypsum board, the maximum insulation thickness is not limited. Under the 2018 and 2015 IRC, a thermal barrier of minimum 23/32-inch-thick wood structural panel is also permitted, and the maximum insulation thickness is not limited.

4.2 Thermal Resistance (R-value): The insulation has a thermal resistance (R-value), at a mean temperature of 75°F, as shown in Table 2.

4.3 Air Permeability: The insulation, at a minimum thickness of 5 inches, is considered air-impermeable insulation in accordance with IBC Section 202 [not



applicable in the 2012 and 2009 IBC], or IRC Section R202 based on testing in accordance with ASTM E283.

5.0 INSTALLATION

5.1 General: The insulation must be installed in accordance with the manufacturer's published installation instructions, the applicable Code, and this Research Report. A copy of the manufacturer's instructions must be available on the jobsite during installation. The installation requirements in Sections 5.1 through 5.4 apply to all Types of construction.

The insulation components must be stored at temperatures between 50°F and 85°F and must not be used in areas that have a maximum service temperature greater than 180°F. The foam plastic insulation must not be used in electrical outlet or junction boxes, or in contact with rain or water. The substrate must be free of moisture, frost or ice, loose scales, rust, oil, and grease. The insulation must be protected from the weather during and after application, unless approved specifically by ThermoSeal, LLC.

5.2 Application: The insulation is spray-applied on the jobsite using spray equipment specified in ThermoSeal, LLC published installation instructions. The insulation is installed in one or more passes, up to 7 inches per pass, as necessary to achieve the specified thickness, subject to the thickness limitations identified in this report.

5.3 Thermal Barrier:

5.3.1 Application with a Prescriptive Thermal Barrier: The insulation must be separated from the interior of the building by an approved thermal barrier of 1/2 inch thick gypsum wallboard or an equivalent 15 minute thermal barrier complying with IBC Section 2603.4 or IRC Section R316.4, as applicable, except where installation is in an attic or crawl space as described in Section 5.4.

When the insulation is separated from the interior living space of the building with minimum 1/2-inch-thick gypsum board, the maximum insulation thickness of insulation is not limited. Under the 2018 and 2015 IRC, a thermal barrier of minimum 23/32-inch-thick wood structural panel is also permitted, and the maximum insulation thickness of insulation is not limited.

5.4 Attics and Crawl Spaces: The insulation may be applied in attics and crawl spaces as described in either Section 5.4.1 or 5.4.2. When the insulation is installed in an attic or crawl space in accordance with this section, a thermal barrier, as described in Section 5.3.1, is not required between the foam plastic insulation and the attic or crawl space, but is required between the insulation and the interior occupied space. Attics and crawl spaces must be ventilated in accordance with the applicable Code except as permitted in IBC Section 1202 and IRC Section R806.5, and when the insulation is sprayed at a minimum thickness of 5 inches.

5.4.1 Application with a Prescriptive Ignition Barrier:

Where the insulation is installed within attics or crawl spaces, and 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. The insulation, as specified in this section, may be installed in unvented attics and unvented enclosed rafter assemblies in accordance with 2015 IBC Section 1203.3 or IRC Section R806.5 when the insulation is sprayed at a minimum thickness of 5 inches.

5.4.2 Application without a Prescriptive Ignition Barrier:

The insulation may be installed in attics and crawl spaces, as described in this section and Table 3, without the ignition barrier prescribed in IBC Section 2603.4.1.6, and IRC Sections R316.5.3 and R316.5.4, subject to the following conditions:

- a. Entry to the attic or crawlspace is only to service utilities and no storage is permitted.
- b. There are no interconnected attic or crawl space areas.
- c. Air in the attic is not circulated to other parts of the building.
- d. Attic ventilation is provided when required by IBC Section 1202.2 or IRC Section R806.1, as applicable, except when insulation is permitted in unvented attics in accordance with IBC Section 1202.3 [not applicable under the 2012 or 2009 IBC], or IRC Section R806.5.





- e. Under-floor (crawl space) ventilation is provided in accordance with IBC Section 1202.4 or IRC Section R408.1, as applicable.
- f. Combustion air is provided in accordance with IMC (*International Mechanical Code*®) Section 701.

In attics, the insulation may be spray-applied to the underside of roof sheathing or roof rafters, and/or vertical surfaces, provided the assembly conforms to the assembly described in Table 3. In crawl spaces, the insulation may be spray-applied to the underside of floors and/or vertical surfaces provided the assembly conforms to the assembly described in Table 3.

The insulation may be installed in unvented attics as described in this section and in accordance with IBC Section 1202.3 or IRC Section R806.5, when the insulation is sprayed at a minimum thickness of 5 inches.

5.4.3 Use on Attic Floors: The insulation may be installed between and over joists in attic floors in accordance with this section, conditions a. through f. of Section 5.4.2, and Table 3 based on testing in accordance with AC377, Appendix X. The insulation must be separated from the interior of the building by an approved thermal barrier. The ignition barrier required in IBC Section 2604.4 and IRC R316.5.3 may be omitted.

6.0 CONDITIONS OF USE

6.1 Installation must comply with this Research Report, the manufacturer’s published installation instructions, and the applicable Code. In the event of a conflict, this report governs.

6.2 The insulation must be separated from the interior occupied space of the building by an approved 15-minute thermal barrier, as described in Section 5.3.1.

6.3 The insulation thickness must not exceed that noted in Sections 4.1, 5.3, and 5.4.

6.4 The insulation must be applied by professional spray polyurethane foam installers approved by ThermoSeal, LLC or certified by the Spray Polyurethane Foam Alliance (SPFA) for the installation of spray polyurethane foam insulation.

6.5 The insulation must be protected from the weather during and after installation as specified in the manufacturer’s instructions.

6.6 A vapor barrier must be installed when required by the applicable code.

6.7 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.

6.8 Jobsite certification and labeling of the insulation must comply with IRC Section N1101.10 and N1101.14 and IECC Section C303.1 or R303.1 and R401.3, as applicable.

6.9 The insulation system components are produced under a under quality control programs with inspections by Intertek Testing Services NA, Inc..

7.0 SUPPORTING EVIDENCE

7.1 Reports of tests in accordance with ASTM C518, ASTM E283, and ASTM E84.

7.2 Data in accordance with the ICC-ES Acceptance Criteria for Spray-applied Foam Plastic Insulation (AC377), dated April 2016; including reports of tests in accordance with Appendix X.

8.0 IDENTIFICATION

The A and B components of the insulations are identified with the manufacturer’s name (ThermoSeal, LLC), address and telephone number, the product trade name (FLAMEGUARD 500), and the component type (A or B), the mixing instructions, the density, the flame spread and smoke developed indexes, the shelf life and date of manufacture, the Intertek Mark as shown below, and the Code Compliance Research Report number (CCRR-1097).





9.0 OTHER CODES

This section is not applicable.

10.0 CODE COMPLIANCE RESEARCH REPORT USE

10.1 Approval of building products and/or materials can only be granted by a building official having legal authority in the specific jurisdiction where approval is sought.

10.2 Code Compliance Research Reports shall not be used in any manner that implies an endorsement of the product by Intertek.

10.3 Reference to the Intertek Directory of Building Products at <https://bpdirectory.intertek.com> is recommended to ascertain the current version and status of this report.

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TABLE 1 – PROPERTIES EVALUATED

| PROPERTY | 2018 IBC SECTION ¹ | 2018 IRC SECTION ¹ | 2018 IECC SECTION ¹ |
|------------------------------------|-------------------------------|-------------------------------|---|
| Physical Properties | Not Required | Not Required | Not Required |
| Surface-burning Characteristics | 2603.3 | R316.3 | Not Applicable |
| Thermal Barrier / Ignition Barrier | 2603.4 | R316.4; R316.5 | Not Applicable |
| Thermal Resistance | 1301 | N1101.10; N1102 | C303.1.1, C303.1.4, R303.1.1, R303.1.4 |
| Air Permeability / Air Barrier | 202,1301 | R806.5 | C402.4, R402.4 |

¹ Section numbers may be different for earlier versions of the International Codes.

TABLE 2—THERMAL RESISTANCE (R-value)^{1, 2, 3}

| THICKNESS (inches) | FLAMEGUARD 500 |
|--------------------|-------------------------------------|
| | R-VALUE (°F.ft ² .h/Btu) |
| 1.0 | 3.9 |
| 2.0 | 7.8 |
| 3.0 | 12 |
| 3.5 | 14 |
| 4.0 | 15 |
| 5.0 | 19 |
| 5.5 | 21 |
| 6.0 | 23 |
| 7.0 | 27 |
| 7.25 | 28 |
| 8.0 | 31 |
| 9.0 | 35 |
| 10.0 | 39 |
| 11.0 | 43 |
| 11.25 | 44 |

¹ R-values are calculated based on tested k-factors.

² R-values less than 10 are rounded to the nearest 0.1 unit; greater than 10 are rounded to the nearest whole unit.

³ R-values for thicknesses not listed can be calculated using $R = 3.88/\text{inch}$.





TABLE 3 – USE OF INSULATION IN ATTICS AND CRAWL SPACES WITHOUT A PRESCRIPTIVE IGNITION BARRIER

| INSULATION TYPE | MAXIMUM THICKNESS (in.) (Wall Cavities and Attic Floors) | MAXIMUM THICKNESS (in.) (Underside of Roof Sheathing / Rafters and Underside of Floors) | INTUMESCENT COATING, MINIMUM THICKNESS & TYPE (Applied to all Exposed Foam Surfaces) | MINIMUM APPLICATION RATE OF INTUMESCENT COATING | TEST SUBMITTED (AC377) |
|-----------------|--|---|--|---|------------------------|
| FLAMEGUARD 500 | 5-1/2 | 11-1/4 | None | N/A | Appendix X |

