

**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:**  
**AP 100 (OC) Spray-applied Polyurethane Foam Plastic Insulation**

### 1.0 SCOPE OF EVALUATION

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

- 2021, 2018, and 2015 *International Building Code*® (IBC)
- 2021, 2018, and 2015 *International Residential Code*® (IRC)
- 2021, 2018, and 2015 *International Energy Conservation Code*® (IECC)

NOTE: This report references the most recent version of the Codes cited. Section numbers for earlier Code editions may differ.

**1.2** AP 100 (OC) insulation has been evaluated for the following properties (see Table 1):

- Physical properties
- Surface-burning characteristics
- Thermal resistance
- Air permeance
- Water vapor transmission

**1.3** AP 100 (OC) insulation has been evaluated for the following uses (see Table 1):

- Use as a nonstructural thermal insulating material on or in interior and exterior walls, floors, ceilings, and the underside of roofs
- Alternative to Code-prescribed thermal barriers

- Alternative to Code-prescribed ignition barriers
- Use in Type I, II, III, and IV under the IBC
- Use in Type V construction under the IBC and buildings regulated under the IRC
- Use an air-impermeable insulation
- Use as a vapor retarder

### 2.0 STATEMENT OF COMPLIANCE

The AP 100 (OC) spray-applied polyurethane insulation described in this report 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 6.0.

### 3.0 DESCRIPTION

**3.1 AP 100 (OC):** AP 100 (OC) is a low-density, two-component, open cell, spray-applied polyurethane foam plastic insulation. The insulation is produced in the field by combining a polymeric isocyanate (A component) with a resin (B component). The insulation liquid components are supplied in 55-gallon drums and disposable 265-gallon totes. The liquid components must be stored at temperatures between 50°F and 110°F. The resin (B component) must be protected from freezing temperatures. The A and B components have a shelf life of twelve months when stored in factory-sealed containers at these temperatures.

**3.2 DC315 Intumescent Coating:** DC315 intumescent coating, manufactured by International Fireproof Technology, Inc., is a water-based coating supplied in 5-gallon pails and 55-gallon drums. The coating material has a shelf life of 24 months when stored in factory-sealed containers at a temperature between 41°F and 95°F. DC315 complies with ICC-ES AC456 and is recognized in ICC-ES ESR-3702.

**3.3 FS-IB™:** FS-IB™ is a one-part water-based intumescent coating manufactured by Flame Seal Products, Inc. The coating is supplied in 5-gallon pails and 55-gallon drums, and has a shelf life of 6 months when stored in unopened containers between 40°F and 80°F.



## 4.0 PERFORMANCE CHARACTERISTICS

**4.1 Surface-burning Characteristics:** The insulation, at a 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. Based on large scale tests in accordance with NFPA 286 and ICC-ES AC377 Appendix X, 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 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:** The thermal resistance of the insulation is shown in Table 2.

**4.3 Air Permeability:** The insulation, at a minimum thickness of 3 inches, is considered air-impermeable insulation in accordance with IBC Section 1202.3 or IRC Sections R202 and R806.5 and is considered an air barrier material complying with IECC Section C402.5.1.3, based on testing in accordance with ASTM E2178.

**4.4 Water Vapor Permeability:** The insulation, at a minimum thickness of 2.5 inches, is a Class III vapor retarder in accordance with IBC Section 202 and IRC Section R202, based on testing in accordance with ASTM E96 (desiccant method), and may be used where a Class III vapor retarder is required under IBC Section 1404.3 or IRC R702.7.

## 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.

**5.2 Application:** The insulation is spray-applied on the jobsite using a volumetric positive displacement pump as identified in the Alpha Polymers application instructions. The insulation must be applied when the ambient temperature is greater than 20°F. The insulation must not be used in areas that have a maximum in-service

temperature of greater than 180°F. The insulation must not be used in electrical outlet or junction boxes or in contact with water, rain, or soil. The insulation must not be sprayed onto a substrate that is wet or covered with frost or ice, loose scales, rust, oil, or grease. The insulation must be protected from the weather during and after application. The insulation is applied in passes a minimum of 1/2 inch thick and a maximum of 8 inches thick.

### 5.3 Thermal Barrier:

**5.3.1 Application with a Prescriptive Thermal Barrier:** The insulation must be separated from the interior living space of the building by an approved thermal barrier of 1/2 inch thick gypsum board, or an equivalent 15-minute thermal barrier complying with and installed in accordance with IBC Section 2603.4 or IRC Section R316.4, as applicable. The prescriptive thermal barrier is not required when the insulation is used in sill plates and headers or in perimeter joint spaces at no more than 3-1/4 inches thickness as permitted in IRC Section R316.5.11. Additional exceptions are provided in Sections 5.3.2 and 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 thickness is not limited. Under the IRC, a thermal barrier of 25/32-inch-thick wood structural panel is also permitted, and the maximum insulation thickness is unlimited.

**5.3.2 Application without a Prescriptive Thermal Barrier:** The insulation may be installed without the 15-minute thermal barrier prescribed in IBC Section 2603.4 and IRC Section R316.4, when installed as described in this section. The insulation, applied maximum of 8 inches on walls and maximum 14 inches on ceilings, must be covered on all surfaces with DC315 intumescent coating applied at 18 wet mils (1.13 gal/100ft<sup>2</sup>).

The coating must be applied over the 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 other substances that could interfere with adhesion of the coating. The coating is applied with low-pressure airless spray equipment.

**5.4 Attics and Crawl Spaces:** The insulation may be applied in attics and crawl spaces as described in 5.4.1,





5.4.2, or 5.4.3. When the insulation is installed in an attic or crawlspace in accordance with this section, a thermal barrier is not required between the insulation and the attic or crawl space but is required between the insulation and the interior living space. Attics and crawl spaces must be ventilated in accordance with the applicable Code.

**5.4.1 Application with a Prescriptive Ignition Barrier:** When the insulation is installed within attics and crawl spaces where entry is made only for service of utilities, the 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 such that the foam plastic insulation is not exposed.

**5.4.2 Application without a Prescriptive Ignition Barrier:** The insulation may be installed in attics and crawl spaces 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 crawl space 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 or crawl space is not circulated to other parts of the building.
- d. Under-floor (crawl space) ventilation is provided when required by IBC Section 1202.4 or IRC Section R408.1, as applicable.
- e. Attic ventilation is provided when required by IBC Section 1202.2.1 or IRC Section R806, except when air-impermeable insulation is permitted in unvented attics in accordance with IBC Section 1202.3 or IRC Section R806.5.
- f. Combustion air is provided in accordance with IMC (International Mechanical Code) Section 701.

The insulation may be spray-applied to the underside of the roof sheathing and/or rafters in attics; the underside of wood floors in crawl spaces; and to vertical surfaces in both attics and crawl spaces, as described in this section. The thickness of the insulation applied to the underside of horizontal surfaces must not exceed 14 inches, and to vertical surfaces must not exceed 8-1/2 inches. The insulation must be covered on all exposed surfaces with one of the following coatings:

- a. DC315 intumescent coating: Apply coating at a nominal thickness of 4 wet mils (0.25 gal/100 ft<sup>2</sup>).
- b. FS-IB™ intumescent coating: Apply coating at a nominal thickness of 5 wet mils (0.29 gal/100 ft<sup>2</sup>).

The coatings are applied with low-pressure airless spray equipment 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 other substances that could interfere with the adhesion of the coating.

**5.4.2.1 Use on Attic Floors:** The insulation may be applied between and over the joists in attic floors to a maximum thickness of 8-1/2 inches and must be covered with intumescent coating as described in Section 5.4.2. The insulation must be separated from the interior occupied space by an approved thermal barrier.

**Exception:** If installed in the attic floor only, the ignition barrier required in IBC 2604.4 and IRC R316.5.2 may be omitted and the insulation may be fully exposed with no covering at a maximum thickness of 14 inches, based on testing in accordance with ASTM E970. The insulation must be separated from the interior occupied space of the building by an approved thermal barrier.

**5.4.3 Unvented Attics:** End use configuration testing (per IBC Section 2603.9 and IRC Section R316.6) and analysis was performed to qualify the use of AP 100 (OC) insulation without a prescriptive ignition barrier, or intumescent coating, in unvented attics conforming with IBC Section 1202.3 or IRC Section R806.5. The testing and analysis are described in Intertek Report 104349713SAT-010, dated October 30, 2020. The conclusions of that evaluation are as follows: When the insulation is applied in unvented attics conforming to IBC Section 1202.3 or IRC Section R806.5, the insulation may be applied to the underside of roof sheathing and/or rafters, and to vertical surfaces to a minimum thickness of 3-1/2 inches and a maximum thickness of 16 inches. The insulation may be left exposed to the attic without a prescriptive ignition barrier or an intumescent coating. The attic must have attic access complying with IRC Section R807, horizontally placed in the attic floor and opening outward toward the living space. For items penetrating the roof deck or walls, such as skylight wells or vents, the annular space must be covered with a minimum of 3 inches of insulation.





### 5.5 Exterior Walls in Types I, II, III, and IV Construction:

The insulation may be used in exterior walls of Types I, II, III, or IV construction complying with IBC Section 2603.5, when the assembly is as described in [Design Listing APM/FI 30-01](#). The potential heat of the insulation is 3,858 Btu/ft<sup>2</sup> based on a maximum 6-inch thickness.

## 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 a thermal barrier as described in Section 5.3, except as described in Section 5.3.2 and 5.4.

**6.3** The insulation must not exceed the thicknesses noted in Sections 4.1, 5.3, and 5.4, as applicable.

**6.4** When AP 100 (OC) insulation is installed under the conditions of Section 5.4.3 of this report, the following conditions apply:

**6.4.1** Since the performance of the insulation, when installed in unvented attics without a Code-prescribed ignition barrier or an intumescent coating, is based on fire performance of an unvented attic, the installation must be approved by the Code official. The installation must conform with the provisions of Section 5.4.3, and Conditions a. through c. and Condition f of Section 5.4.2. A copy of the Intertek report (referenced in Section 7.0) must be provided to the Code official upon request.

**6.4.2** Signage shall be permanently affixed in the attic and shall be visible from all points within the attic. The sign shall state "Caution, this is an unvented attic by design. No modification may be made to this unvented condition. The attic shall not be vented. Holes into the unvented attic shall be immediately repaired and sealed. Penetrations of the ceiling or wall membrane between the unvented attic and living space, other than the horizontal access hatch, must be protected in an approved manner. This unvented attic shall not be used for storage. See Intertek Code Compliance Research Report CCRR-0483 on the Intertek Website."

**6.5** Use of the insulation in areas where the probability of termite infestation is "very heavy" must be in accordance with IRC Section R318.4 or IBC Section 2603.8, as applicable.

**6.6** Walls must include a vapor barrier complying with the Code.

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

**6.8** The insulation is manufactured under a quality control program with inspections by Intertek Testing Services NA, Inc.

## 7.0 SUPPORTING EVIDENCE

**7.1** Reports of tests in accordance with ASTM E84, ASTM E96, ASTM E2178, NFPA 259 NFPA 286, and NFPA 285.

**7.2** Data in accordance with the ICC-ES Acceptance Criteria for Spray-applied Foam Plastic Insulation (AC377), dated February 2020, including reports of tests in accordance with Appendix X.

**7.3** Data in accordance with ICC 1100 (2019).

**7.4** Research Reports for evaluation of data in accordance with ICC-ES Acceptance Criteria for Fire-protective Coatings Applied to Spray-applied Foam Plastic Insulation Installed without a Code-prescribed Thermal Barrier (AC456), dated October 2015.

**7.5** Intertek Product Evaluation Report No. 104349713SAT-010, October 30, 2020, "Application to Unvented Attic for Inclusion in an Intertek Code Compliance Research Report."

**7.6** Intertek Listing Report "Alpha Polymers - AP 100 (OC) Spray-applied Polyurethane Foam Plastic Insulation", on the [Intertek Directory of Building Products](#).

## 8.0 IDENTIFICATION

The A and B components of the insulations described in this Research Report are identified with the Alpha Polymers, LLC name, address and telephone number; the product name; use instructions; the flame-spread and smoke-developed





indices; the lot number; the Intertek Mark as shown below; and the Code Compliance Research Report number (CCRR-0483).



### 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 <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	2021 IBC SECTION <sup>1</sup>	2021 IRC SECTION <sup>1</sup>	2021 IECC SECTION <sup>1</sup>
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	Not applicable
Air permeability	1202.3	R806.5	C402.5
Thermal resistance	1301	N1101.10 N1102	C303.1 R303.1
Vapor permeability	202, 1404.3	R202, R702.7.1	Not applicable
Exterior walls of Type I-IV construction	2603.5	Not applicable	Not applicable

<sup>1</sup> Section numbers may be different for earlier versions of the International Codes

TABLE 2 – THERMAL RESISTANCE – AP 100 (OC)

THICKNESS (in.)	R-VALUE (°F.ft <sup>2</sup> .h/Btu) <sup>1, 2, 3</sup>
1	3.61
3.5	13
5.5	20
8.5	31
14	51
16	58

<sup>1</sup>R-values are calculated based on tested K values at 1 inch and 3.5 inches nominal thickness

<sup>2</sup>R-values between 1 inch and 3.5 inches may be interpolated; R-values greater than 3.5 inches are calculated using R=3.65 / inch

<sup>3</sup>R-values greater than 10 are rounded to the nearest whole number