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ICC-ES Evaluation Report
ESR-5242

Issued February 2023
Revised July 2023
This report is subject to renewal February 2024.

DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION
Section: 07 21 00—Thermal Insulation

REPORT HOLDER:

ALPHA POLYMERS LLC

EVALUATION SUBJECT:

AP 210 HFO (CC) SPRAY-APPLIED INSULATION

1.0 EVALUATION SCOPE

1.1 Compliance with the following codes:

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

Properties evaluated:

- Surface-burning characteristics
- Physical properties
- Thermal resistance
- Attic and crawl space installation
- Air permeability
- Water vapor transmission

1.2 Evaluation to the following green standard:

- 2008 ICC 700 *National Green Building Standard™* (ICC 700-2008)

Attributes verified:

- See Section 3.1

2.0 USES

AP 210 HFO (CC) is a closed cell spray foam insulation used as a nonstructural thermal insulating material in Type V construction (IBC) and dwellings under the IRC. The insulation is for use in wall cavities, floor assemblies, ceiling assemblies or attics and crawl spaces when installed in accordance with Section 4.4.

Under the IRC and the IBC the insulation may be used as air-impermeable insulation when installed in accordance with Section 3.5.

3.0 DESCRIPTION

3.1 General:

AP 210 HFO (CC) is a rigid, medium-density, spray-applied cellular polyurethane foam plastic insulation installed as a component of wall assemblies, ceilings, floors, crawlspaces and cavities of roofs. The foam plastic insulation is a two-component, closed-cell, one-to-one by volume spray foam system with a nominal density of 2.0 pcf (32.0 kg/m^3). The insulation is produced in the field by combining a polymeric isocyanate (A component) with a polymeric resin blend (B component). The insulation components have a shelf life of six months when stored in factory-sealed containers at temperatures between 50°F (10°C) and 80°F (27°C).

The attributes of the insulation have been verified as conforming to the provisions of ICC 700-2008 Section 703.2.1.1.1(c) as an air impermeable insulation. Note that decisions on compliance for those areas rest with the user of this report. The user is advised of the project-specific provisions that may be contingent upon meeting specific conditions, and the verification of those conditions is outside the scope of this report. These codes or standards often provide supplemental information as guidance.

3.2 Surface-burning Characteristics:

AP 210 HFO (CC), at a maximum thickness of 4 inches (102 mm) and a nominal density of 2.0 pcf (32 kg/m^3), 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 (UL 723). There are not any thickness limitations when insulation is covered by a code-prescribed thermal barrier.

3.3 Thermal Resistance (*R*-values):

AP 210 HFO (CC) has thermal resistance (*R*-value), at a mean temperature of 75°F (24°C), as shown in Table 1.

3.4 Vapor Permeance:

AP 210 HFO (CC) has a vapor permeance of greater than 0.1 perms and less than 1.0 perms when applied at a minimum of 2 inches (51 mm) thickness and may be used where a Class II vapor retarder is required by the applicable code.

3.5 Air Permeability:

AP 210 HFO (CC) foam plastic insulation, at a minimum 2 inch (51 mm) thickness, is considered air-impermeable

insulation in accordance with 2018 IRC Section R806.5 and IBC Section 1202.3 based on testing in accordance with ASTM E2178.

3.6 DC315 Intumescent Coating:

DC 315 Intumescent Coating, described in ESR-3702 and manufactured by International Fireproof Technology Inc., is a single-component, water-based, liquid-applied intumescent coating. The coating is supplied in 5–gallon (19L) pails and 55-gallon (208 L) drums and has a shelf-life of one (1) year when stored in factory-sealed containers at temperatures between 50°F (10°C) and 80°F (27°C).

3.7 ICP FIRESHELL® F10E Coating:

FIRESHELL® F10E coating, described in ESR-3997, manufactured by ICP Construction, is a proprietary 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 one (1) year when stored in factory-sealed containers at temperatures between 45°F (7.2°C) and 95°F (35°C).

4.0 INSTALLATION

4.1 General:

The AP 210 HFO (CC) product must be installed in accordance with the manufacturer's published installation instructions and this report. A copy of the manufacturer's published installation instructions must be available at all times on the jobsite during installation.

4.2 Application:

The insulation is spray-applied on the jobsite using equipment identified in the manufacturer's published installation instructions. The AP 210 HFO (CC) product must be applied when the ambient and substrate temperature is between 23ºF (-5ºC) and 120ºF (49ºC). The insulation must not be used in areas that have a maximum service temperature greater than 180ºF (82ºC). The foam plastic insulation must not be used in electrical outlets or junction boxes, or in continuous contact with rain or water. The substrate must be free of moisture, frost or ice, loose scales, rust, oil and grease, or contaminates that will interfere with adhesion of the spray foam insulation. The AP 210 HFO (CC) product is applied in passes having a maximum thickness of 4 inches (102 mm) per pass. When multiple passes are required, a minimum waiting time of 10 minutes is required before subsequent passes can be sprayed.

4.3 Thermal Barrier:

4.3.1 Application with a Prescriptive Thermal Barrier: The AP 210 HFO (CC) must be separated from the interior of the building by an approved thermal barrier of $^1/_2$-inch-thick (12.7 mm) gypsum wallboard or an equivalent thermal barrier complying with and installed in accordance 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 insulation and the interior of the building.

There is no thickness limit when installed behind a code-prescribed thermal barrier.

4.3.2 **Application without a Prescriptive Thermal Barrier:** The prescriptive 15-minute thermal barrier or ignition barrier may be omitted when installation is in accordance with this section (Section 4.3.2) and Table 2. The insulation and intumescent coating may be spray-applied to the interior facing of walls, the underside of the roof sheathing or roof rafter, and in crawl spaces, and may be left exposed as an interior finish without a prescribed 15-minute thermal barrier or ignition barrier. The thickness of the foam plastic and coating must be as described in Table 2. The foam plastic must be covered on all surfaces with one of the coatings as described in Table 2. The coating must be applied over the insulation in accordance with the coating manufacturer's instructions and this report. The Fireshell‡ F10E coating must be applied over the insulation in accordance with the coating manufacturer's instructions, ESR-3997 and this report or the DC315 Intumescent Coating must be applied over the insulation in accordance with the coating manufacturer's instructions, ESR-3702 and this report. The foam plastic 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.

4.4 Ignition Barrier—Attics and Crawl Spaces:

4.4.1 Application with a Prescriptive Ignition Barrier: When AP 210 HFO (CC) 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 and 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 attic or crawl space area must be separated from the interior of the building by an approved thermal barrier as described in Section 4.3.1.

The insulation, as described in this section, may be installed in unvented attics in accordance with IBC Section 1202.3 or IRC Section R806.5.

4.4.2 Application without a Prescriptive Ignition Barrier:

General: AP 210 HFO (CC) insulation may be installed in attics and crawl spaces as described in this section without the ignition barriers required by 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 2021 and 2018 IBC Section 1202.4 [2015 IBC Section 1203.4 (2012 and 2009 IBC Section 1203.3)] or IRC Section R408.1, as applicable.

e. Attic ventilation is provided when required by 2021 and 2018 IBC Section 1202.2.1 or IRC Section R806, except when air-impermeable insulation is permitted in unvented attics in accordance with 2021 and 2018 IBC Section 1202.3 or 2021 or 2018 IRC Section R806.5.

f. Combustion air is provided in accordance with IMC Section 701.

4.4.2.1 Attics and Crawl Spaces: In attics and crawl spaces, the insulation may be spray-applied to the underside of the roof sheathing and/or rafters, to the underside of wood floors, and to 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 12 inches (305 mm), and the thickness when applied to vertical surfaces must not exceed 8 inches (203 mm).

4.4.2.2 Use on Attic Floors: The spray-applied foam insulation may be installed at a maximum thickness of 8 inches (203 mm) between and over the joists in attic floors.

5.0 CONDITIONS OF USE

AP 210 HFO (CC) 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 AP 210 HFO (CC) insulation and applicable coating must be installed in accordance with the manufacturer's published installation instructions, this 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.

5.3 AP 210 HFO (CC) insulation must be separated from the interior of the building by an approved thermal barrier, as described in Section 4.3.1. In attics and crawlspaces the insulation must be separated from the interior of the attic or crawlspace by an ignition barrier, as described in Section 4.4.1.

5.4 AP 210 HFO (CC) insulation must be protected from the weather during application.

5.5 AP 210 HFO (CC) insulation must be applied by installers approved by Alpha Polymers LLC.

5.6 Use of AP 210 HFO (CC) 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 N1101.10.1 and N1101.10.1.1 and IECC Sections C303.1.1, C303.1.1.1, R303.1.1 and R303.1.1.1, as applicable.

5.8 Installation in unvented attics, when equipped with vapor diffusion ports in accordance with Section 1202.3, Item 5.2 of the 2021 IBC and Section R806.5, Item 5.2 of the 2021 and 2018 IRC, is outside the scope of this report.

5.9 AP 210 HFO (CC) insulation is produced in Arlington, Texas a quality-control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

6.1 Data in accordance with the ICC-ES Acceptance Criteria for Spray-applied Foam Plastic Insulation (AC377), February 2023, including tests in accordance with Appendix X.

6.2 Report on air leakage testing in accordance with ASTM E2178.

6.3 Reports on water vapor transmission tests in accordance with ASTM E96 (desiccant method).

6.4 Reports of tests in accordance with NFPA 286.

7.0 IDENTIFICATION

7.1 The ICC-ES mark of conformity, electronic labeling, or the evaluation report number (ICC-ES ESR-5242) along with the name, registered trademark, or registered logo of the report holder must be included in the product label.

7.2 In addition, components for AP 210 HFO (CC) insulation are identified with the manufacturer's name (Alpha Polymers LLC), address and telephone number; the product trade name (AP 210 HFO (CC)); product type (A or B component); use instructions; the density; the flame-spread and smoke-developed indices; the evaluation report number (ESR-5242).

The ICP Construction FIRESHELL® F10E coating is identified with the manufacturer's name; the product trade name; shelf life or expiration date; manufacturer's instructions for application and evaluation report number (ESR-3997).

The International Fireproof Technology Inc. DC315 intumescent coating is identified with the manufacturer's name; the product trade name; date of manufacture, shelf life or expiration date; manufacturer's instructions for application and evaluation report number (ESR-3702).

7.3 The report holder's contact information is the following:

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TABLE 1—THERMAL RESISTANCE (*R*-VALUES)[1]

THICKNESS (inches)	*R*-VALUE (°F.ft².h/Btu)
1	6.8
2	13
3.5	23
4	26
5	33
6	39
7	46
8	52
9	59
10	65
11	72
12	78

For **SI:** 1 inch = 25.4 mm; 1°F.ft².hr/Btu = 0.176 110 k.m²/W.

[1]Calculated *R*-values are based on tested K-values at 1- and 3.5-inch thicknesses.
**R*-values greater than 10 are rounded to the nearest whole number.

TABLE 2—USE OF INSULATION WITHOUT A PRESCRIPTIVE THERMAL BARRIER[1]

INSULATION TYPE	MAXIMUM THICKNESS (in.) (Walls & Vertical Surfaces)	MAXIMUM THICKNESS (in.) (Ceilings, Underside of Roof Sheathing/Rafters & Floors)	FIRE-PROTECTIVE COATING MINIMUM THICKNESS & TYPE (Applied to all Foam Surfaces)[2]	MINIMUM APPLICATION RATE OF FIRE-PROTECTIVE COATING	TESTS SUBMITTED
AP 210 HFO (CC)	8	12	Fireshell® F10E 18 wet mils / 12 dry mils	1.20 gal / 100 ft²	NFPA 286
	8	12	DC 315 14 wet mils / 9 dry mils	0.88 gal / 100 ft²	NFPA 286

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

[1]See Section 4.3.2.
[2]See Section 3.6 and 3.7

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AP 210 HFO (CC) SPRAY-APPLIED INSULATION

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that AP 210 HFO (CC) spray-applied insulation, described in ICC-ES evaluation report ESR-5242, has also been evaluated for compliance with the codes noted below.

Applicable code editions:

- 2020 *Florida Building Code—Building*
- 2020 *Florida Building Code—Residential*

2.0 CONCLUSIONS

The AP 210 HFO (CC) spray-applied insulation, described in Sections 2.0 through 7.0 of ICC-ES evaluation report ESR-5241, comply with the *Florida Building Code—Building* or *Florida Building Code—Residential*. The design requirements shall be in accordance with the *Florida Building Code—Building* or *Florida Building Code—Residential,* as applicable. The installation requirements noted in ICC-ES evaluation report ESR-5242 for the 2018 *International Building Code®* meet the requirements of the *Florida Building Code—Building or Florida Building Code—Residential,* as applicable.

Installation must meet the requirements of Section 1403.8 and 2603.8 of the *Florida Building Code—Building* and Sections R318.7 and R318.8 of the *Florida Building Code—Residential*, as applicable.

Use of the AP 210 HFO (CC) spray-applied insulation for compliance with the High-Velocity Hurricane Zone provisions of the *Florida Building Code—Building* or the *Florida Building Code—Residential* has not been evaluated and is outside the scope of this supplemental report.

For products falling under Florida Rule 61G20-3, verification that the report holder's quality assurance program is audited by a quality assurance entity approved by the Florida Building Commission for the type of inspections being conducted is the responsibility of an approved validation entity (or the code official when the report holder does not possess an approval by the Commission).

This supplement expires concurrently with the evaluation report, issued February 2023, revised July 2023.