Code Compliance Research Report
CCRR-0409

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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:
VPC-50 NM Spray-Applied Polyurethane Foam 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 section numbers from the most recent Codes. Section numbers for earlier Code editions may differ.

1.2 VPC-50 NM insulation has been evaluated for the following properties (see Table 1):

- Surface-burning characteristics
- Thermal resistance
- Physical properties
- Air Permeability

1.3 VPC-50 NM insulation has been evaluated for the following uses (see Table 1):

- Use as nonstructural insulation on or in interior and exterior walls, floors, and under roof decks
- Alternatives to code-prescribed thermal barriers and ignition barriers
- Use as air-impermeable insulation
- Use in Type V construction under the IBC and construction under the IRC

2.0 STATEMENT OF COMPLIANCE

VPC-50 NM 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 6.0.

3.0 DESCRIPTION

3.1 Materials:

3.1.1 VPC-50 NM: The insulation is a two-component, open-cell, spray-applied 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 0.5 pcf. Both insulation components have a shelf life of six months when stored in unopened containers at temperatures between 65°F and 80°F before installation.

3.2 Intumescent Coatings:

3.2.1 Blazelok™ IB4: Blazelok™ IB4, manufactured by ICP Construction, is a one-component, water-based liquid coating. Blazelok™ IB4 is supplied in 5-gallon pails and/or 55-gallon drums, and has a shelf life of one year when stored in factory-sealed containers at temperatures between 45°F and 100°F.

3.2.2 DC315: DC315, manufactured by International Fireproof Technology, Inc., is a one-component, water-based, liquid coating. DC315 is supplied in 5-gallon pails and/or 55-gallon drums, and has a shelf life of one year when stored in unopened factory-sealed containers between 50°F to 80°F. DC315 complies with ICC-ES AC456 as recognized in ICC-ES ESR-3702.

4.0 PERFORMANCE CHARACTERISTICS

4.1 Surface-burning Characteristics: When tested in accordance with ASTM E84 at a maximum thickness of 6 inches, the insulation has a flame-spread index of 25 or less and a smoke-development index of 450 or less. VPC-50 NM insulation may be installed at greater thicknesses as described in Sections 5.3 and 5.4.2 of this report. 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 Air Permeability: The insulation, at a minimum thickness of 3-1/2 inches, is considered air-impermeable insulation in accordance with IBC Section 202 or IRC Section R202 based on testing in accordance with ASTM E283 and ASTM E2178.

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

5.0 INSTALLATION

5.1 General: VPC-50 NM 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 must be stored at temperatures between 65°F and 80°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 insulation is not intended for installation to the exterior of below-grade walls or beneath slabs-on-grade. 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 Victory Polymers.

5.2 Application: The insulation is spray-applied on the jobsite using spray equipment specified in Victory Polymers' published installation instructions. VPC-50 NM insulation may be installed at a maximum of 6 inches per pass to the maximum thickness specified. Where multiple passes (or lifts) are required, the cure time between passes is negligible.

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 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.

5.3.2 Application without a Prescriptive Thermal Barrier: VPC-50 NM 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 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. The coating identified in Table 3 must be applied over all surfaces and in accordance with the coating manufacturer's installation 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:

5.4.1 Application with a Prescriptive Ignition Barrier: Where VPC-50 NM 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 IBC Section 1202.3 or IRC Section R806.5.

5.4.2 Application without a Prescriptive Ignition Barrier: VPC-50 NF 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, as described in Section 5.4.2.1, Section 5.4.2.2, and Section 5.4.2.3, 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, 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 *International Mechanical Code*® Section 701.

5.4.2.1 General: 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 4. 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 4. When an intumescent coating is used, 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 intumescent coating must be applied to all surfaces in accordance with the respective coating manufacturer's installation instructions. The coating must be applied when ambient and substrate temperatures are above of 50°F unless otherwise permitted by the intumescent coating manufacturer's installation instructions.

When installed in accordance with this section, the insulation may be installed in unvented attics as described in this section in accordance with IBC Section 1202.3 or IRC Section R806.5, when applied at a minimum thickness of 3-1/2 inches.

5.4.2.2 Use on Attic Floors: VPC-50 NM 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 4 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.

5.4.2.3 Unvented Attics: Victory Polymers has conducted end use configuration testing (per IBC Section 2603.9 and IRC Section R316.6) and analysis to qualify the use of the 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 Priest & Associates EEV 10378G, dated May 19, 2020. The conclusions of that evaluation (and associated Engineering Letters) are as follows: When VPC-50 NM 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 inches. Maximum thickness on the underside of roof sheathing or on vertical wall surfaces is 13 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 penetrating item must be covered with a minimum of 3 inches of insulation.

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 of the building by an approved 15-minute thermal barrier, as described in Section 5.3, or by an approved ignition barrier, as described in Section 5.4.

6.3 The insulation thickness must not exceed that noted in Sections 3.1, 5.2, 5.3, and 5.4.

6.4 The insulation must be protected from the weather during and after application as specified in the manufacturer's instructions.

6.5 A vapor barrier must be installed when required by the applicable Code.

6.6 The insulation must be applied by contractors approved by Victory Polymers.

6.7 When insulation is installed under the conditions of Section 5.4.2.3 of this report, the following conditions apply:

6.7.1 Since the performance of VPC-50 NM 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 5.4.2.3 and Conditions a. through c. and Condition f. of Section 5.4.2. A copy of the Priest & Associates Engineering Evaluation (referenced in Sections 5.4.2.3 and 7.5) must be provided to the Code official upon request.

6.7.2 Signage shall be permanently affixed in the attic and shall be visible from all entry points into 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-0409 on the Intertek website."*

6.8 Use of the insulation in fire-resistance-rated construction is outside the scope of this report.

6.9 Use of the insulation in areas where the probability of termite infestation is "very heavy" must be in accordance with IBC Section 2603. or IRC Section R318.4, as applicable.

6.10 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.

6.11 The insulation components are 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 C518, ASTM E84, ASTM E283, ASTM E2178, ASTM E1354, and NFPA 286.

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 Priest & Associates Engineering Evaluation, Project 10378G, dated May 18, 2020.

7.6 Intertek Listing Report "Victory Polymers Corp. VPC-50 NM Spray-applied Polyurethane Insulation", on the Intertek Directory of Building Products.

8.0 IDENTIFICATION

The VPC-50 NM insulation is identified with the report holder's name (Victory Polymers), address and telephone number, the product name (VPC-50 NM), the product type (A or B component), the mixing instructions, the flame-spread and smoke-developed indices, date of manufacture, the Intertek Mark as shown below, and the Code Compliance Research Report number (CCRR-0409).

CODE COMPLIANCE
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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.

TABLE 1 - PROPERTIES EVALUATED

PROPERTY	2021 IBC SECTION[1]	2021 IRC SECTION[1]	2021 IECC SECTION[1]
Physical properties	Not required	Not required	Not required
Surface-burning characteristics	2603.3	R316.3	Not applicable
Alternatives to thermal barrier / ignition barrier	2603.4	R316.4	Not applicable
Thermal resistance	1301	N1101.10 N1102	C303.1 R303.1
Air permeability / air barrier	202, 1202.3	R202, R806.5	C402.5

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

TABLE 2 –VPC-50 NM THERMAL RESISTANCE (R-values)[1,2,3]

THICKNESS (inches)	R-VALUE (°F.ft^2.h/Btu)
1	3.7
3.5	13
5.5	21
7.25	27
9.25	35
11.25	42
12	45
13	49

[1] R-values are calculated based on tested k-factors at multiple thicknesses.

[2] R-values less than 10 are rounded to the nearest 1/10th; greater than 10 are rounded to the nearest whole number.

[3] To determine R-values for thicknesses not listed: between 1 inch and 3-1/2 inch can be determined through linear interpolation or greater than 3-1/2 inches can be calculated based on R = 3.75/inch.

TABLE 3 – ASSEMBLIES WITHOUT A PRESCRIPTIVE THERMAL BARRER

Coating	Maximum Insulation Thickness (in.) Vertical Surfaces	Maximum Insulation Thickness (in.) Ceiling Surfaces	VPC-50 NM Fire Protective Coating (Applied to all Foam Surfaces)			Method
			Minimum Thickness (mils)		Minimum Application Rate	
			Dry film (daft)	Wet film (wft)		
DC315	7.5	11.5	12	18	1.12 gal / 100 ft^2	NFPA 286

TABLE 4 – ASSEMBLIES WITHOUT A PRESCRIPTIVE IGNITION BARRER

Coating	Maximum Insulation Thickness (in.) Wall Cavities and Attic Floors	Maximum Insulation Thickness (in.) Underside of Roof Sheathing/Rafters and Floors	VPC-50 NM Fire Protective Coating (Applied to all Foam Surfaces)			Method
			Minimum Thickness (mils)		Minimum Application Rate	
			Dry film (dft)	Wet film (wft)		
Blazelok™ IB4	7.5	11.5	3	6	0.38 gal / 100 ft^2	Appendix X