

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

**REPORT HOLDER:**  
**Victory Polymers Corp.**  
**1700 Post Oak Boulevard**  
**2 BLVD, Suite 600**  
**Houston, TX 77056**  
**832-240-7222**

**REPORT SUBJECT:**  
**VPC-50X Spray-applied Polyurethane 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 with [2015 and 2012] Code sections shown in brackets where they differ.

**1.2** VPC-50X has been evaluated for the following (see Table 1):

- Physical properties
- Surface-burning characteristics
- Thermal resistance
- Air permeability
- Air barrier

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

- Nonstructural thermal insulating material on or in interior and exterior walls, floors, ceilings, and underside of roof decks.
- Alternatives to thermal and ignition barriers
- Use as air-impermeable insulation

- Use as an air barrier
- Use in Types I, II, III, IV, and V construction under the IBC and construction under the IRC
- Use as exterior duct insulation

### 2.0 STATEMENT OF COMPLIANCE

VPC-50X 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 VPC-50X:** VPC-50X insulation is an open cell, low-density, polyurethane foam plastic. The insulation is a two-component, spray-applied foam plastic with a nominal in-place density of 0.55 pcf. 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 250-gallon totes, and must be stored at temperatures between 40°F and 120°F. The resin (B component) must be protected from freezing temperatures. VPC-50X insulation has a shelf life of 6 months on the polymeric isocyanate (A component) and 6 months on the resin (B component) when stored in factory-sealed containers at these temperatures.

**3.2 DC 315 Intumescent Coating:** DC 315 intumescent coating, manufactured by IFTI, Paint to Protect, 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 to 95°F. DC315 complies with ICC-ES AC456 as recognized in Intertek CCRR-1076.

### 4.0 PERFORMANCE CHARACTERISTICS

**4.1 Surface Burning Characteristics:** The insulation, at a maximum thickness of 4 inches and a nominal density of 0.55 pcf, 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 NPFA 286, VPC-50X insulation can be installed at greater thickness as described in Sections 5.3 and 5.4. When insulation is separated from the interior living space of the building with 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, the maximum thickness is not limited.

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

**4.3 Air Permeability:** VPC-50X insulation, at a minimum thickness of 2.5 inches, is considered air-impermeable insulation in accordance with IBC Section 1202.3 [2015 - 1203.3] [2012 - not applicable] or IRC Sections R202 and R806.5, based on testing in accordance with ASTM E2178.

**4.4 Air Barrier:** VPC-50X insulation, at a minimum thickness of 2.5 inches, is considered an air-barrier material in accordance with IECC Section C402.5.1.2.1 [2012 - C402.4.1.2.1], based on testing in accordance with ASTM E2178.

**5.0 INSTALLATION**

**5.1 General:**

VPC-50X 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:**

VPC-50X insulation is spray-applied on the jobsite using a volumetric positive displacement pump as identified in the Victory Polymers Corp. application instructions. The insulation must be applied when the ambient temperature is greater than 32°F. The insulation must not be used in areas that have a maximum in-service temperature greater than 200°F. The foam plastic must not be used in electrical outlet or junction boxes or in contact with water, rain or soil. The foam plastic 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 may be applied in a single pass to achieve the maximum thickness identified in this report.

**5.3 Thermal Barrier:**

**5.3.1 Application with a Prescriptive Thermal Barrier:** VPC-50X insulation must be separated from the interior occupied 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. Exceptions are provided in Sections 5.3.2 and 5.4.

When the insulation is separated from the interior occupied space of the building with a Code-prescribed thermal barrier, the maximum thickness is not limited.

**5.3.2 Application without a Prescriptive Thermal Barrier:**

VPC-50X 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 must be covered on all exposed surfaces with DC 315 intumescent coating as described in Option 1 or 2 below:

Option 1:

Maximum thickness	Minimum application rate
Vertical wall surfaces – 10 inches	1.1 gallon / 100 ft <sup>2</sup> (18 mils wft; 12 mils dft)
Underside of roof decks, ceilings, or the underside of floors – 16 inches	

Option 2:

Maximum thickness	Minimum application rate
Vertical wall surfaces – 8.5 inches	0.9 gallon / 100 ft <sup>2</sup> (14 mils wft; 9 mils dft)
Underside of roof decks, ceilings, or the underside of floors – 14 inches	

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 the 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 either Section 5.4.1 or 5.4.2. When foam 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 living space.

**5.4.1 Application with Prescriptive Ignition Barrier:** When VPC-50X 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 in a manner so the foam plastic insulation is not exposed. VPC-50X insulation as described in this section may be installed in unvented attics in accordance with 2018 IBC Section 1202.3 [2015 and 2012 - 1203.3] or IRC Section R806.5 at a minimum thickness of 2.5 inches. The maximum thickness of insulation is as noted in Section 5.4.2.1.

#### 5.4.2 Application without a Prescriptive Ignition Barrier:

VPC-50X 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 Sections 5.4.2.1, 5.4.2.2 and 5.4.2.3, subject to the following conditions:

- Entry to the attic or crawl space is only 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.

- Under-floor (crawl space) ventilation is provided when required by IBC Section 1202.4 [2015 - 1203.4 and 2012 - 1203.3] or IRC Section R408.1, as applicable.
- Attic ventilation is provided when required by IBC Section 1202.2.1 [2015 and 2012 - 1203.2] or IRC Section R806, except when air-impermeable insulation is permitted in unvented attics in accordance with IBC Section 1202.3 [2015 - 1203.3] [2012 - not applicable] or IRC Sections R806.5.
- Combustion air is provided in accordance with IMC (International Mechanical Code) Section 701 [Sections 701 and 703].

VPC-50X is an air-impermeable insulation and may be installed in unvented attics, as described in this section, in accordance with IBC Section 1202.3 [2015 - 1203.3] [2012 - not applicable] or IRC Sections R806.5 when applied at a minimum thickness of 2.5 inches.

**5.4.2.1 Attics and Crawl Spaces:** VPC-50X 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 foam plastics applied to the underside of the top of the space must not exceed 16 inches, and to vertical surfaces must not exceed 12 inches. The insulation must be covered on all exposed surfaces with DC 315 intumescent coating at an application rate of 0.3 gallon per 100 sq. ft. to achieve a nominal wet film thickness of 4 mils (dry film thickness of 3 mils). The insulation may be installed without prescriptive thermal or ignition barrier required by IBC Section 2603.4.1.6 or IRC Section R316.5.3 and R316.5.4.

**5.4.2.2 Attic Floor Only:** When installation of the insulation is in attic floors only, VPC-50X may be installed exposed (no coating), and without thermal or ignition barrier required by IBC Section 2603.4 and IRC Section R316.5.3, at a maximum thickness of 16 inches based on testing in accordance with ASTM E970 and NFPA 286. The insulation must be separated from the interior occupied space by an approved thermal barrier.

**5.4.2.3 Unvented Attics:** Victory Polymers Corp. has conducted end use configuration testing per IBC Section 2603.9 [2012 - 2603.10] and IRC Section R316.6, and





analysis to qualify the use of VPC-50X insulation without a prescriptive ignition barrier or intumescent coating in unvented attics conforming with 2018 IBC Section 1202.3 [2015 - 1203.3] or IRC Section R806.5 (unvented attics were not addressed in the 2012 and earlier versions of the IBC). The testing and analysis is described in Priest & Associates EEV 10318G, May 30, 2018. The conclusions of that evaluation are as follows: When VPC-50X 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. Maximum thickness on the underside of roof sheathing or on vertical wall surfaces is 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 penetrating item must be covered with a minimum of 3-1/2 inches of VPC-50X insulation.

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

VPC-50X Section 2603.5 may be installed in exterior walls of buildings of Types I, II, III, and IV construction complying with IBC Section 2603.5 and as described in the section. Intertek Design Listing VPS/FI 30-03 describes the assembly certified by Intertek as complying with NFPA 285. Tested wall assemblies were extended to include various wall constructions described in Tables 3 through a third-party engineering analysis. The potential heat of the foam plastic in any portion of the wall must not exceed 484 Btu/ft<sup>2</sup> per inch of insulation thickness. The maximum thickness of insulation is 3-5/8 inches in the interior wall cavities.

#### 5.6 Duct Insulation:

VPC-50X may be applied to the exterior of residential ducts in attics and crawl spaces in compliance with IRC Section M1601.3. The insulation must be protected in accordance with the ignition barrier requirements of either Section 5.4.1 or 5.4.2.

## 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 living space of the building by a thermal barrier as described in Section 5.3, except as described in Sections 5.3.2 and 5.4.

**6.3** The insulation must not exceed the thicknesses noted in Sections 4.1, 5.3, 5.4, and 5.5 as applicable.

**6.4** Use of the insulation in Types I, II, III, and IV construction must be as described in Section 5.5.

**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 [2012 - 2603.9], as applicable.

**6.6** When VPC-50X is installed under the conditions of Section 5.4.2.3 of this report, the following conditions apply:

**6.6.1** Since the performance of VPC-50X 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 7.3) must be provided to the Code Official upon request.

**6.6.2** 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-1118 on the Intertek website”.*

**6.7** The VPC-50X is manufactured under a quality control program with inspections by Intertek Testing Services NA, Inc. (AA-647).

## 7.0 SUPPORTING EVIDENCE

**7.1** Reports of tests in accordance with ASTM C518, ASTM E84, ASTM E2178, ASTM C411, NFPA 285, NFPA 286, and NFPA 259.

**7.2** Priest & Associates Consulting, LLC Evaluation Report 10318E, dated November 6, 2017.

**7.3** Priest & Associates Consulting, LLC Evaluation Report 10318G, May 30, 2018.

**7.4** Data in accordance with the ICC-ES Acceptance Criteria for Spray-applied Foam Plastic Insulation (AC 377), dated April 2016, including reports of test in accordance with Appendix X.

**7.5** 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.

**7.6** Intertek Listing Report "VPC-50X Spray-applied Polyurethane Foam Insulation" on the [Intertek Directory of Building Products](#).

## 8.0 IDENTIFICATION

The A and B components of the insulation are identified with the manufacturer's name (Victory Polymers Corp.), address and telephone number, the product name (VPC-50X), use instructions, the flame spread and smoke-development indices, the lot number, the Intertek Mark, and the Code Compliance Research Report number (CCRR-1118).

## 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.

This Code Compliance Research Report ("Report") is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this Report. Only the Client is authorized to permit copying or distribution of this Report and then only in its entirety, and the Client shall not use the Report in a misleading manner. Client further agrees and understands that reliance upon the Report is limited to the representations made therein. The Report is not an endorsement or recommendation for use of the subject and/or product described herein. This Report is not the Intertek Listing Report covering the subject product and utilized for Intertek Certification and this Report does not represent authorization for the use of any Intertek certification marks. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek.





TABLE 1 - PROPERTIES EVALUATED

PROPERTY	2018 IBC SECTION <sup>1</sup>	2018 IRC SECTION <sup>1</sup>	2018 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, R316.5.3, R316.5.4	Not applicable
Air permeability	1202.3 [2015 and 2012 – 1203.3]	R806.5	C402.4 R402.4
Air Barrier	Not applicable	Not applicable	C402.4.1.2.1 [C402.4.1.2.1] C402.5.1.2.2 [C402.4.1.2.2]
Thermal resistance	1301	N1101.10 N1102 [N1101.1, N1101.12]	C303.1.1 C303.1.4 R303.1.1 R3031.4 [303.1.1 and 303.1.2]
Duct Insulation	Not applicable	N1103.2.1 M1601.3	R403.2.1
Exterior walls of Types I – IV construction	2603.5	Not applicable	Not applicable

<sup>1</sup> Section numbers may be different for earlier versions of the International and Florida codes.



TABLE 2 – THERMAL RESISTANCE (R Values)<sup>1,2,3</sup>

THICKNESSES (inches)	R-VALUE (°F.ft <sup>2</sup> .h/Btu)
1	4.0
2	7.8
3	12
3.5	13
4	15
5.5	21
6	23
7.25	28
8	31
9.25	36
10	38
11.25	43
12	46
13	50
14	54
15	58
16	62

<sup>1</sup> R-values are calculated based on tested K-values at 1 inch and 4 inch thicknesses.

<sup>2</sup> R-values greater than 10 are rounded to the nearest whole number.

<sup>3</sup> To determine R values for thickness not listed:

- a. Between 1 inch and 4 inch can be determined through linear interpolation; or,
- b. Greater than 4 inches can be calculated based on R 3.8/inch.





TABLE 3 – NFPA 285 COMPLYING WALLS WITH VPC-50X IN WALL CAVITY

WALL COMPONENTS	MATERIALS
<b>Base wall system</b> Use either 1, 2 or 3	1. Concrete Wall 2. Concrete Masonry wall 3. One layer of 5/8 in. thick Type X gypsum wallboard installed on the interior side of minimum 3-5/8 in. deep, minimum No. 20 gage steel studs spaced a maximum of 24 in. on center (OC) with lateral bracing every 4 ft. vertically. Opening must be protected with minimum No. 20 gage steel framing.
<b>Floorline Firestopping</b>	Mineral wool (4.0 lb/ft <sup>3</sup> density) friction fit in each stud cavity and at each floorline.
<b>Cavity Insulation</b>	3-5/8 inch depth or less o VPC-50X applied using sheathing as substrate and covering the width of the cavity and inside the stud flange.
<b>Exterior sheathing</b>	5/8 in. thick Type X exterior gypsum sheathing
<b>Exterior wall covering</b>	1. Any noncombustible exterior wall covering material 2. Any combustible exterior wall covering system that has successfully been tested in accordance with NFPA 285.

