Code Compliance Research Report
CCRR-0494

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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:
NSF Polymers
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REPORT SUBJECT:
NSF Polymers OC 365 and OC OG 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 2021 Code sections. Section numbers for earlier Code editions may differ.

1.2 OC 365 and OC OG insulations have been evaluated for the following properties (see Table 1):

- Surface-burning characteristics
- Physical properties
- Thermal resistance

1.3 OC 365 and OC OG insulations have been evaluated for the following uses (see Table 1):

- Use as nonstructural thermal insulation on or in interior and exterior walls, floors, and underside of roofs
- Alternatives to Code-prescribed thermal barriers
- Alternatives to Code-prescribed ignition barriers
- Use in the exterior walls of Type V construction

2.0 STATEMENT OF COMPLIANCE

OC 365 and OC OG insulations comply 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 Materials:

3.1.1 OC 365 and OC OG Insulation: OC 365 and OC OG insulations are semi-rigid, open-cell, polyurethane foam plastic. The insulations are a two-component spray foam plastic with a nominal in-place density of 0.5 pounds per cubic foot. The insulations are 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 must be stored at temperatures between 65°F and 95°F. The resin (B component) must be protected from freezing temperatures and has a shelf life of six months.

3.2 Intumescent Coatings:

3.2.1 DC315 Intumescent Coating: DC315 intumescent coating is a water-based coating manufactured by IFTI, Paint to Protect, and is 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 temperatures between 41°F and 95°F. DC315 complies with ICC-ES AC456 as recognized in IAPMO ER-0499.

4.0 Performance Characteristics:

4.1 Surface-burning Characteristics: OC 365 and OC OG insulations, at a maximum thickness of 4 inches and a nominal density of 0.5 pcf, have 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 insulations can be installed at greater

thicknesses as described in Sections 5.3 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 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, R-values: OC 365 and OC OG insulations have thermal resistance (R-value) at a mean temperature of 75°F as shown in Table 2.

4.3 Moisture Vapor Permeance: When applied at a minimum thickness of 3 inches, OC 365 and OC OG insulations have a moisture vapor permeance of less than 10 perms and qualify as Class III vapor retarders, based on testing in accordance with ASTM E96.

5.0 INSTALLATION

5.1 General:

OC 365 and OC OG insulations must be installed in accordance with the manufacturer's published installation instructions, the applicable Code, and this Research Report. The installation requirements in Sections 5.1 through 5.4 apply to all Types of construction. A copy of the manufacturer's instructions must be available on the jobsite during installation.

5.2 Application:

OC 365 and OC OG insulations are spray-applied on the jobsite using a volumetric positive displacement pump as identified in the manufacturer's application instructions. The insulations must be applied when the ambient temperature is greater than 14°F. The insulations must not be used in areas that have a maximum in-service temperature greater than 180°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 insulations must be protected from the weather during and after application. The insulations may be applied to a maximum thickness of 5-1/2 inches per pass. A minimum of 20 minutes must be allowed between applications of material.

5.3 Thermal Barrier:

5.3.1 Application with a Prescriptive Thermal Barrier: OC 365 and OC OG insulations 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. Exceptions are provided in Sections 5.3.2 and 5.4 of this report.

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 23/32-inch-thick wood structural panel is also permitted, and the maximum insulation thickness is unlimited.

5.3.2 Application without a Prescriptive Thermal Barrier: OC 365 and OC OG insulations 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 a maximum of 8 inches on walls and 14 inches on ceilings and be covered on all surfaces with DC315 applied at 18 wet mils (1.13 gal/100 ft^2).

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:

OC 365 and OC OG insulations may be applied in attics and crawl spaces as described in either 5.4.1 or 5.4.2. 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.

5.4.1 Application with a Prescriptive Ignition Barrier: When OC 365 and OC OG insulations are 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.

5.4.2 Application without a Prescriptive Ignition Barrier:

5.4.2.1 General: OC 365 and OC OG insulations may be installed in attics and crawl spaces as described in Sections 5.4.2.2, 5.4.2.3 and 5.4.2.4, 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.
f. Combustion air is provided in accordance with IMC (International Mechanical Code) Section 701.

5.4.2.2 Attics and Crawl Spaces: The insulation must be a maximum of 8 inches on walls and 14 inches on ceilings and be covered on all surfaces with DC315 applied at 4 wet mils (0.25 gal/100 ft^2).

5.4.2.3 Unvented Attics: End use configuration testing (per IBC Section 2603.9 and IRC Section R316.6) and analysis to qualify the use of OC 365 and OC OG insulations without a prescriptive ignition barrier or intumescent coating in unvented attics conforming with IBC Section 1202.3 or IRC Section R806.5 has been conducted. The testing and analysis are described in Priest & Associates EEV 10778B dated June 16, 2020. The conclusions of that evaluation are as follows: When OC 365 or OC OG 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. Rafters may be left without foam coverage or may be covered with foam up to the maximum thickness allowed. Maximum thickness on the underside of roof sheathing or on vertical wall surfaces is 18 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 exposed in the attic must be covered with a minimum of 3 inches of OC 365 or OC OG insulation.

5.4.2.4 Use on Attic Floors: OC 365 and OC OG insulations may be installed exposed at a maximum thickness of 8 inches between and over the joists in attic floors. The insulation must be separated from the interior of the building by 1/2-inch gypsum or an approved thermal barrier. The insulation may be installed without the prescriptive ignition barrier required by IBC Section 2603.4.1.6 or IRC Section R316.5.3 and R316.5.4 when covered with DC315 as described in Section 5.4.2.2.

6.0 CONDITIONS OF USE

OC 365 and OC OG spray-applied foam plastic insulations described in this Research Report comply with, or are a suitable alternative to, what is specified in those Codes listed in Section 1.0 of this report, subject to the following conditions:

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 between the manufacturer's instructions and this report, 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.

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

6.4 The insulation must be applied by contractors approved by NSF Polymers.

6.5 When OC 365 and OC OG insulations are installed under the conditions of Section 5.4.2.3 of this report, the following conditions apply:

6.5.1 Since the performance of OC 365 and OC OG, when installed in unvented attics without a Code-prescribed

ignition barrier or an intumescent coating, are 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 5.4.2.1. A copy of the Priest & Associates Engineering Evaluation (referenced in Section 7.4) must be provided to the Code Official upon request.

6.5.2 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-0494 on the Intertek Website*."

6.6 The insulation must be installed with a vapor retarder 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 IRC Section R318.4 or IBC Section 2603.8, as applicable.

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

6.9 The insulation is produced 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 E96, 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 Priest & Associates Engineering Evaluation 10778B, dated June 16, 2020

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 "NSF Polymers – OC 365 and OC OG Spray-applied Polyurethane Foam Plastic Insulation".

8.0 IDENTIFICATION

The A and B components of the insulation described in this Research Report are identified with the manufacturer's name (NSF Polymers), address and telephone number; the product name (OC 365 or OC OG); use instructions; the flame spread and smoke-developed indices; the lot number; the Intertek Mark, and the Code Compliance Research Report number (CCRR-0494).

9.0 OTHER CODES

This section does not apply.

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 Testing.

10.3 Reference to 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	2603.1.1	Not required	Not required
Surface-burning characteristics	2603.3	R316.3	Not applicable
Thermal barrier/ignition barrier	2603.4	R316.4	Not applicable
Thermal resistance	1301	N1101.10 N1102	C303.1 R303.1

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

TABLE 2 – THERMAL RESISTANCE (R Values) [1,2,3]

THICKNESS (inches)	R-VALUE (°F.ft^2.h/Btu)
1	3.7
2	7.4
3	11
3.5	13
12	43

[1] R-values are calculated based on tested K-values at 1 inch and 3.5 inch thicknesses.
[2] R-values greater than 10 are rounded to the nearest whole number.
[3] To determine R values for thickness not listed:
a. Between 1 inch and 3.5 inch can be determined through linear interpolation or
b. Greater than 3.5 inches can be calculated based on R= 3.57/inch