EVALUATION REPORT Number: 504

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# NU-SEAL 0.50 PCF, 2.0 IBW PCF AND 2.0 IBS PCF SPRAY-APPLIED POLYURETHANE FOAM PLASTIC INSULATION

**CSI Section:**
**07 21 00 Thermal Insulation**

## 1.0 RECOGNITION

Nu-Seal 0.50 PCF, 2.0 IBW PCF, and 2.0 IBS PCF spray-applied polyurethane foam plastic insulations recognized in this report have been evaluated for use as spray-applied polyurethane foam plastic insulation. The attic and crawl space installations, physical characteristics, thermal resistance (R-Values), surface burning characteristics, air permeability, vapor permeance (2.0 IBW PCF and 2.0 IBS PCF only), and surface burning characteristic properties of the Nu-Seal 0.50 PCF, 2.0 IBW PCF and 2.0 IBS PCF spray-applied polyurethane foam plastic insulations comply with the intent of the provisions of the following codes and regulations:

- 2018, 2015, and 2012 International Building Code® (IBC)
- 2018, 2015, and 2012 International Residential Code® (IRC)
- 2019, 2015, and 2012 International Energy Conservation Code® (IECC)
- 2020 Florida Building Code, Building, (FBC, Building) -supplement attached
- 2020 Florida Building Code, Residential (FBC, Residential)- supplement attached
- 2020 Florida Building Code, Energy Conservation (FBC, Energy Conservation)- supplement attached

## 2.0 LIMITATIONS

Use of the Nu-Wool spray-applied foam plastic insulations recognized in this report are subject to the following limitations:

**2.1** The insulations shall be installed in accordance with the manufacturer's published installation instructions, this evaluation report, and the applicable code. If there are any conflicts between the manufacturer's published installation instructions and this report, the more restrictive governs.

**2.2** In accordance with Section 3.4 of this report, the insulations shall be separated from the interior of the building by a code complying thermal barrier.

**2.3** As noted in Sections 3.4, 3.5, and 4.1 of this report, the insulations shall not exceed the nominal density and thickness.

**2.4** During and after installation, the insulations shall be protected from exposure to weather and site conditions.

**2.5** The contractors that will be installing the insulations shall be certified by Nu-Wool Company, Inc. or by the Spray Polyurethane Foam Alliance (SPFA).

**2.6** Use of the insulation in areas of "very heavy" termite infestation shall be in accordance with 2018 and 2015 IBC Section 2603.8, 2012 IBC Section 2603.9, or IRC Section R318.4, as applicable.

**2.7** Evaluations for the insulations for use in Type V-B construction under the IBC and dwellings under the IRC have been approved.

**2.8** When required by the applicable code, a vapor retarder shall be installed.

**2.9** Labeling and Jobsite certification of the insulation and coatings shall comply with the following code sections as applicable:

- 2018, 2015, or 2012 IBC Section 2603.2
- 2018, 2015, or 2012 IRC Section R316.2
- 2015 IRC Section N1101.10.1.1
- 2012 IRC Section N1101.12.1
- 2018, 2015 or 2012 IECC Section C303.1.1.1 or R303.1.1.1

**2.10** The insulations are manufactured in Cortland, Illinois.

## 3.0 PRODUCT USE

**3.1 General:** Nu-Seal 0.50 PCF, 2.0 IBW PCF and 2.0 IBS PCF spray-applied polyurethane foam plastic insulations comply with IBC Section 2603, IRC Section R316, IECC Sections C303, C402, R303, and R402. When installed in accordance with Section 4.0, Nu-Seal 0.50 PCF, 2.0 IBW PCF and 2.0 IBS PCF spray-applied polyurethane foam plastic insulations may be used in wall cavities, floor assemblies or ceiling assemblies, or in attic and crawl spaces as nonstructural thermal insulation material. The spray-applied foam plastic insulations are used in Type V-B construction under the IBC and in one- and two-family dwellings under the IRC.

**3.2 Design:** Nu-Wool spray-applied foam plastic insulations shall comply with requirements in IECC Sections C402.1 and R402 The manufacturer's published installation instructions for Nu-Wool spray-applied foam plastic insulations and this report shall be available and strictly adhered to at all times on the job site during installation.

**3.3 Installation:** As referred to in the Nu-Wool Company, Inc's published installation instructions, the insulation is spray-applied on the job site using a volumetric positive displacement pump. The applied insulation is sprayed in multiple passes having a maximum thickness of 6 inches (152 mm) per pass for Nu-Seal 0.50 PCF spray-applied foam plastic insulation or a maximum thickness of 3 inches (50.8 mm) per pass for 2.0 IBW PCF and 2.0 IBS PCF spray-applied foam plastic insulations up to the maximum insulation thickness specified in this report. The maximum in-service temperature for all areas shall not exceed 180°F (82°C). The spray-applied foam plastic insulation shall not be used in electrical outlets or junction boxes or in contact with rain, water, or soil. The spray-applied foam plastic insulation shall be sprayed onto a substrate that is protected and clean from any debris or weather-related conditions during and after application.

**3.4 Installation With a Thermal Barrier:** Nu-Wool spray-applied foam plastic insulation shall be separated from the interior by an approved thermal barrier in accordance with IBC Section 2603.4, IRC Section R316.4, as applicable. Based on testing in accordance with NFPA 286 (with the acceptance criteria of 2018 IBC Section 803.1.1.1, and 2015 and 2012 IBC Section 803.1.2.1), Nu-Seal 0.50 PCF, 2.0 IBW PCF, and 2.0 IBS PCF spray-applied foam plastic insulation, at any thickness for wall cavities and for floor/ceiling cavities are recognized for use with a thermal barrier complying with and installed in accordance with IBC or IRC. Within an attic or crawl space, installation shall be in accordance with Section 3.5 of this report.

**3.5 Installation for Attics or Crawl Spaces**

**3.5.1 Installation With a Prescriptive Ignition Barrier:** Where entry is made only for the service of utilities, Nu-Wool spray-applied foam plastic insulations shall be installed within attics or crawl spaces with an ignition barrier in accordance with IBC Section 2603.4.1.6, or IRC Sections R316.5.3 and R316.5.4, as applicable. The maximum thickness is 5⅝ inches (143 mm) for the Nu-Seal 0.50 PCF and the maximum thickness of 4.0 inches (102 mm) for the Nu-Seal 2.0 IBW PCF and 2.0 IBS PCF. The ignition barrier shall be installed in a manner such that the foam plastic insulation is not exposed and is consistent with the requirements of the type of construction required by the applicable code. Nu-Wool insulations as described in this section may be installed in unvented attics and unvented enclosed rafter spaces in accordance with IRC Section R806.5.

**3.5.2 Installation Without a Prescriptive Ignition Barrier**

**3.5.2.1 General:** In accordance with Sections 3.5.2.2 of this report, when Nu-Wool spray-applied foam plastic insulations are installed in attics or crawl spaces without a prescriptive ignition barrier, the following conditions apply:

a. Entry is only to service utilities in the attic or crawl space and no storage is permitted.
b. Attic or crawl space areas shall not be interconnected.
c. Air from the attic or crawl space shall not be circulated to other parts of the building.
d. Attic ventilation is provided as required by IBC Section 1203.2 or IRC Section R806 except where air-impermeable insulation is permitted in unvented attics and shall comply with the following code sections as applicable:

   For Unvented Attics:
   - 2018 IBC Section 1202.3
   - 2015 IBC Section 1203.3
   - IRC Section R806.5

   For Crawl Spaces:
   - 2018 IBC Section 1202.4
   - 2015 IBC Section 1203.4
   - 2012 IBC Section 1203.3
   - IRC Section R408.1

e. In accordance with IBC Section 1203.2 or IRC Section R806, attic ventilation is provided, as applicable.
f. In accordance with IMC (International Mechanical Code®) Section 701, combustion air is provided.

**3.5.2.2 Installation for the Application of Foam Kote FC 50-50A Intumescent Coating:** Nu-Wool spray-applied foam plastic insulations may be spray-applied in attics to the underside of roof sheathing or roof rafters, and vertical surfaces; and may be spray-applied in crawl spaces to the underside of floors and vertical surfaces as described in this section. When applied to the underside of the top of the space, the thickness of the Nu-Seal 0.50 PCF foam plastic shall not exceed 12 inches (305 mm), and when applied to vertical surfaces the thickness shall not exceed 8 inches (203 mm). When applied to the underside of the top of the space, the thickness of the 2.0 IBW PCF and 2.0 IBS PCF foam plastic shall not exceed 11.5 inches (292 mm), and when applied to vertical surfaces maximum thickness shall not exceed 7.5 inches (191 mm). The Nu-Wool spray-applied foam plastic insulations shall be separated from the interior of the building by a thermal barrier complying with and installed in accordance with IBC or IRC, and from the attic space with Foam Kote FC 50-50A coating as described in Section 4.6 of this report. When installations comply with this section, the ignition barrier specified in IBC Section 2603.4.1.6 and IRC Section R316.5.3, as applicable, may be omitted.

**3.5.2.2.1 Foam Kote FC 50-50A Intumescent Coating Application and Curing:** Nu-Seal 0.50 PCF, 2.0 IBW PCF,

and 2.0 IBS PCF spray-applied foam plastic insulations shall be covered with a required minimum thickness of 10-mil (0.25 mm) wet film [7.5 mils (0.19 mm) dry film] thickness of the Foam Kote FC 50-50A as described in Section 4.5, and applied over the insulation in accordance with the coating manufacturer's published installation instructions and this report. The coating shall be applied in one or two coats by an airless sprayer, brush, or roller at a rate of either 1 gallon per 100 square feet (0.41 L/m$^2$) in one coat or ½ gallon per 100 square feet (0.41 L/m$^2$) per coat in two coats, to obtain the required minimum thickness of 10-mil (0.25 mm) wet film [7.5 mils (0.19 mm) dry film]. The coating has a minimum four-hour curing time per coat, and shall be applied to surfaces that are dry, clean, and free of dirt or any loose debris that could interfere with the adhesion of the coating, and when ambient and substrate temperatures are within a range of 50°F (10°C) to 90°F (32°C).

**3.5.2.2.2 Installation for the Application of DC-315 Fireproof Paint:** Nu-Wool spray-applied foam plastic insulations may be spray-applied in attics to the underside of roof sheathing, roof rafters and/or vertical surfaces, and in crawl spaces to the underside of floors and/or vertical surfaces as described in this section. When applied to the underside of the top of the space, the thickness of the Nu-Seal 0.50 PCF foam plastic shall not exceed 12 inches (305 mm), and when applied to vertical surfaces the thickness shall not exceed 8 inches (203 mm). When applied to the underside of the top of the space, the thickness of the 2.0 IBW PCF and 2.0 IBS PCF foam plastic shall not exceed 11.5 inches (292 mm), and when applied to vertical surfaces maximum thickness shall not exceed 7.5 inches (191 mm). The Nu-Wool spray-applied foam insulations shall be separated from the interior of the building by a thermal barrier complying with and installed in accordance with IBC or IRC, or from the attic space with DC-315 Fireproof Paint as described in Section 4.7 of this report. When installation complies with this section, the ignition barrier specified in IBC Section 2603.4.1.6, or IRC Section R316.5.3, as applicable, may be omitted.

**3.5.2.2.3 DC-315 Fireproof Paint Application and Curing:** Nu-Seal 0.50 PCF, 2.0 IBW PCF, and 2.0 IBS PCF spray-applied foam plastic insulations shall be covered with a required minimum thickness of 21-mil (0.53 mm) wet film [14 mils (0.36 mm) dry film] of the DC-315 Fireproof Paint as described in Section 4.7, and applied over the insulation in accordance with the coating manufacturer's published installation instructions and this report. The coating shall be applied in one coat by an airless sprayer, brush, or roller at a rate of 1 gallon (3.38 L) per 73 square feet (6.8 square meters), to obtain the required minimum thickness of 21-mil (0.53 mm) wet film [14 mils (0.36 mm) dry film]. The coating has a minimum 24-hour curing time, and shall be applied to surfaces that are dry, clean, and free of dirt or any loose debris that could interfere with the adhesion of the coating, and when ambient and substrate temperatures are within a range of 50°F (10°C) to 90°F (32°C).

**3.5.2.3 Application Without Intumescent Coating or Fireproof Paint:** Nu-Seal 0.50 PCF, 2.0 IBW PCF, and 2.0 IBS PCF spray-applied foam plastic insulations may be spray-applied without an intumescent coating to the underside of roof sheathing or roof rafters and vertical surfaces of attics and in crawl spaces. When applied to the underside of the top of the space, the thickness of the Nu-Seal 0.50 pcf foam plastic shall not exceed 10 inches (254 mm), and when applied to vertical surfaces the thickness shall not exceed 8 inches (203 mm). When applied to the underside of the top of the space, the thickness of the 2.0 IBW PCF and 2.0 IBS PCF foam plastic shall not exceed 11.25 inches (286 mm), and when applied to vertical surfaces maximum thickness shall not exceed 11.25 inches (286 mm). The insulations may be installed in unvented attics as described in this section in accordance with 2018 IBC Section 1303.4, 2015 IBC Section 1203.3, or 2015 or 2012 IRC Section R806.5, as applicable.

## 4.0 PRODUCT DESCRIPTION

**4.1 Properties:** Nu-Seal 0.50 PCF spray-applied foam plastic insulation is an open-cell, spray-applied, polyurethane foam plastic and complies as low-density insulation in accordance with Section 3.1.1 and Table 1 of AC377. The insulation is a two-component spray foam plastic with a nominal in-place density of 0.5 pcf (8 kg/m$^3$).

Nu-Seal 2.0 IBW PCF and 2.0 IBS PCF spray-applied foam plastic insulations are closed-cell, spray-applied, polyurethane foam plastics and comply as medium-density insulation in accordance with Section 3.1.1 of AC377. The insulations are two-component spray foam plastics with a nominal in-place density of 2.0 pcf (32 kg/m$^3$).

The spray-applied insulations are produced in the field by combining a polymeric isocyanate (A component) and a polymeric resin (B component). The liquid components shall be stored in 55-gallon (208 L) drums at temperatures between 50°F and 90°F (10°C and 32°C). When Component A and Component B are stored in factory-sealed containers at the recommended temperatures, the maximum shelf life is one year.

**4.2 Thermal Resistance (R-Values):** Nu-Wool spray-applied foam plastic insulations have thermal resistance (R-Values) at a mean temperature of 75°F (24°C) as shown in Table 1 of this report.

**4.3 Surface Burning Characteristics:** At a maximum thickness of 5⅝ inches (143 mm) and a nominal density of 0.5 pcf (8 kg/m$^3$), the Nu-Seal 0.50 PCF spray-applied foam plastic insulation yields a flame spread index of 25 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E84.

At a maximum thickness of 4.0 inches (102 mm) and a nominal density of 2.0 pcf (32 kg/m$^3$) Nu-Seal 2.0 IBW PCF and 2.0 IBS PCF spray-applied foam plastic insulations yield

a flame spread index of 25 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E84.

**4.4 Air Permeability:** When tested in accordance with ASTM E283 at a minimum thickness of 1 inch (25.4 mm), Nu-Seal 0.50 PCF, 2.0 IBW PCF, and 2.0 IBS PCF spray-applied foam plastic insulations are classified as air-impermeable insulations in accordance with 2018 IBC Section 1202.3, 2015 IBC Section 1203.3, IRC Section R806.5, as applicable.

**4.5 Vapor Permeance:** When tested in accordance with the ASTM E96 desiccant method (Procedure A), Nu-Seal 2.0 IBW PCF and 2.0 IBS PCF spray-applied foam plastic insulations have a vapor permeance of less than 1.0 perms [$5.7 \times 10^{-9}$ kg/(PA-s-m$^2$)], at a minimum thickness of 1.0 inch (25.4 mm) and qualifies as Class II vapor retarder in accordance with IBC Section 202 and IRC Section R202.

**4.6 Foam Kote FC 50-50A:** Foam Kote FC 50-50A is a water-based intumescent fire-retardant coating, manufactured expressly for the thermal protection of polyurethane foam plastic insulation. Foam Kote FC 50-50A is manufactured by Flame Control Coatings, LLC and is supplied in 1-gallon (4 L) and 5-gallon (19 L) pails. When Foam Kote FC 50-50A is stored in factory-sealed containers at temperatures between 50°F and 90°F (10°C and 32°C), the maximum shelf life is nine (9) months.

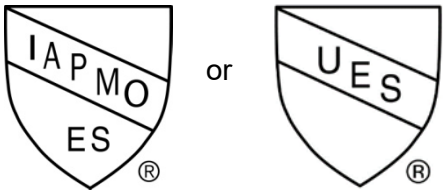
**4.7 DC-315 Fireproof Paint:** DC-315 Fireproof Paint is a water-based latex intumescent coating manufactured by International Fireproof Technology, Inc. and is recognized in ER-499.

## 5.0 IDENTIFICATION

The spray foam insulations are identified with the following:

a. Manufacturer's name (Nu-Wool Company, Inc.)
b. address and telephone number,
c. the product trade names (Nu-Wool)
d. use instructions
e. density, flame-spread, and smoke-development indices
f. date of manufacture or batch/run number
g. thermal resistance values
h. the evaluation report number (ER-504)
i. the name or logo of the inspection agency (Quality Control Consultants, LLC)

Each container of the Foam Kote FC 50-50A intumescent coating is labeled with the manufacturer's name (Flame Control Coatings, LLC), the product name, and use instructions. Each container of the DC-315 Fireproof paint is labeled in accordance with ER-499.

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## 6.0 SUBSTANTIATING DATA

**6.1** Data in accordance with the ICC-ES Acceptance Criteria for Spray-applied Foam Plastic Insulation, AC377, dated February 2020.

**6.2** Reports of room corner tests in accordance with NFPA 286.

**6.3** Reports of water vapor transmission tests in accordance with ASTM E96.

**6.4** Test reports are from laboratories in compliance with ISO/IEC 17025.

## 7.0 STATEMENT OF RECOGNITION

This evaluation report describes the results of research completed by IAPMO Uniform Evaluation Service on Nu-Seal 0.50 PCF, 2.0 IBW PCF, and 2.0 IBS PCF spray-applied polyurethane foam plastic insulations to assess conformance to the codes shown in Section 1.0 of this report and serves as documentation of the product certification.

**For additional information about this evaluation report please visit www.uniform-es.org or email us at info@uniform-es.org**

**TABLE 1**
**Thermal Resistance (R-Values)** [1,2]

| Thickness (inch) | NU-SEAL 0.50 PCF (°F•ft²•h/Btu) | NU-SEAL 2.0 IBW PCF AND 2.0 IBS PCF (°F•ft²•h/Btu) |
|---|---|---|
| 1 | 3.7 | 6.5 |
| 2 | 7.5 | 12 |
| 3.5 | 13 | 21 |
| 4 | 15 | 24 |
| 5 | 19 | 30 |
| 5.5 | 20 | 33 |
| 6 | 22 | 36 |
| 7 | 26 | 42 |
| 7.5 | 28 | 45 |
| 8 | 30 | 48 |
| 9 | 33 | 54 |
| 9.5 | 35 | 57 |
| 10 | 37 | 60 |
| 11.5 | 43 | 70 |
| 12 | 44 | 72 |

For **SI:** 1 inch = 25.4 mm, 1°F·ft²·h/Btu = 0.176 110 K·m²/W.
[1] *R*-Values are calculated based on tested *K* values at 1-inch and 4-inch thicknesses for Nu-Seal 0.50 PCF.
[2] *R*-Values are calculated based on tested *K* values at 1-inch and 4-inch thicknesses for 2.0 IBW PCF and 2.0 IBS PCF.

# FLORIDA SUPPLEMENT

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## NU-SEAL 0.50 PCF, 2.0 IBW PCF AND 2.0 IBS PCF SPRAY-APPLIED POLYURETHANE FOAM PLASTIC INSULATION

**CSI Section:**
**07 21 00 Thermal Insulation**

### 1.0 RECOGNITION

Nu-Seal 0.50 PCF, 2.0 IBW PCF and 2.0 IBS PCF spray-applied polyurethane foam plastic insulation as evaluated and represented in IAPMO UES Evaluation Report ER-504 and with changes as noted in this supplement is a satisfactory alternative for use in buildings built under the following codes (and regulations) including locations in the High-Velocity Hurricane Zone:

- 2020 Florida Building Code, Building, (FBC, Building)
- 2020 Florida Building Code, Residential (FBC, Residential)
- 2020 Florida Building Code, Energy Conservation (FBC, Energy Conservation)

### 2.0 LIMITATIONS

Nu-Seal 0.50 PCF, 2.0 IBW PCF, and 2.0 IBS PCF spray-applied polyurethane foam plastic insulation recognized in this report are subject to the following limitations:

**2.1** The clearance between the foam insulation installed above grade and exposed earth shall be in accordance with Sections 1403.8 and 2603.8 of the FBC, Building or Sections R318.7 and R318.8 of the FBC, Residential.

**2.2** Verification shall be provided that a quality assurance agency audits the manufacturer's quality assurance program and audits the production quality of products in accordance with Section (5)(d) of Florida Rule 61G20-3.008. The quality assurance agency shall be approved by the Commission (or the building official when the report holder does not possess an approval by the Commission).

**2.3** This supplement expires concurrently with ER-504.