ICC EVALUATION SERVICE
In Cooperation with Innovation RESEARCH LABS

Most Widely Accepted and Trusted

ICC-ES Evaluation Report

ESR-3136

Reissued 06/2017
This report is subject to renewal 06/2018.

ICC-ES | (800) 423-6587 | (562) 699-0543 | www.icc-es.org

DIVISION: 07 00 00— THERMAL AND MOISTURE PROTECTION
SECTION: 07 21 00— THERMAL INSULATION

REPORT HOLDER:

NATURAL POLYMERS, LLC

4N 325 POWIS ROAD
WEST CHICAGO, ILLINOIS 60185

EVALUATION SUBJECT:

NATURAL-THERM™ 0.50 PCF, NU-SEAL 0.50 PCF®, NATURAL-THERM™ 2.0 W PCF AND NU-SEAL 2.0 W PCF® SPRAY-APPLIED POLYURETHANE FOAM INSULATION

ICC ES C ICC ES PMG C ICC ES LISTED

Look for the trusted marks of Conformity!

"2014 Recipient of Prestigious Western States Seismic Policy Council (WSSPC) Award in Excellence"

A Subsidiary of ICC INTERNATIONAL CODE COUNCIL®

ICC-ES Evaluation Reports are not to be construed as representing aesthetics or any other attributes not specifically addressed, nor are they to be construed as an endorsement of the subject of the report or a recommendation for its use. There is no warranty by ICC Evaluation Service, LLC, express or implied, as to any finding or other matter in this report, or as to any product covered by the report.

ANSI ACCREDITED ISO/IEC 17065 Product Certification Body #1000

SCC Accredited CB-P/S OCPS Accrédité CCN

ICC-ES Evaluation Report

ESR-3136

Reissued June 2017
Revised October 2017
This report is subject to renewal June 2018.

www.icc-es.org | (800) 423-6587 | (562) 699-0543 *A Subsidiary of the International Code Council®*

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

REPORT HOLDER:

NATURAL POLYMERS, LLC
4N 325 POWIS ROAD
WEST CHICAGO, ILLINOIS 60185
(630) 587-0718
www.naturalpolymersllc.com

ADDITIONAL LISTEE:

NU-WOOL COMPANY INCORPORATED
2472 PORT SHELDON STREET
JENISON, MICHIGAN 49428
www.nuwool.com

EVALUATION SUBJECT:

NATURAL-THERM™ 0.50 PCF, NU-SEAL 0.50 PCF®, NATURAL-THERM™ 2.0 W PCF AND NU-SEAL 2.0 W PCF® SPRAY-APPLIED POLYURETHANE FOAM INSULATION

1.0 EVALUATION SCOPE

1.1 Compliance with the following codes:

- 2012 and 2009 *International Building Code®* (IBC)
- 2012 and 2009 *International Residential Code®* (IRC)
- 2012 and 2009 *International Energy Conservation Code®* (IECC)

Properties evaluated:

- Surface-burning characteristics
- Physical properties
- Thermal resistance (*R*-values)
- Attic and crawl space installations
- Water vapor transmission (2.0 W PCF only)
- Air permeability (0.50 PCF only)

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

Natural-Therm™ 0.50 PCF and Natural-Therm™ 2.0 W PCF spray-applied polyurethane foam insulations are used as nonstructural thermal insulating material in Type V-B construction under the IBC and in dwellings under the IRC. The insulations are for use in wall cavities, floor assemblies or ceiling assemblies, or in attic and crawl spaces when installed in accordance with Section 4.0.

Nu-Seal 0.50 PCF® foam insulation is identical to Natural-Therm™ 0.50 PCF foam insulation and may be used and installed in the same manner as Natural-Therm™ 0.50 PCF foam insulation. Nu-Seal 2.0 W PCF® foam insulation is identical to Natural-Therm™ 2.0 W PCF foam insulation and may be used and installed in the same manner as Natural-Therm™ 2.0 W PCF foam insulation

3.0 DESCRIPTION

3.1 Materials:

Natural-Therm™ 0.50 PCF spray-applied foam insulation is an open-cell, low-density, spray-applied, polyurethane foam plastic. The insulation is a two-component spray foam plastic with a nominal in-place density of 0.5 pcf (8 kg/m^3). The insulation is produced in the field by combining a polymeric isocyanate (A component) and a polymeric resin (B component). The insulation liquid components are supplied in 55-gallon (208 L) drums and must be stored at temperatures between 45°F and 90°F (7°C and 32°C). The liquid components have a shelf life of one year when stored in factory-sealed containers at these temperatures.

Natural-Therm™ 2.0 W PCF spray-applied foam insulation is a closed-cell, medium-density, spray-applied, polyurethane foam plastic. The insulation is a two-component spray foam plastic with a nominal in-place density of 2.0 pcf (32 kg/m^3). The insulation is produced in the field by combining a polymeric isocyanate (A component) and a polymeric resin (B component). The insulation liquid components are supplied in 55-gallon (208 L) drums and must be stored at temperatures between 45°F and 90°F (7°C and 32°C). The liquid components have a shelf life of one year when stored in factory-sealed containers at these temperatures.

The attributes of the insulations 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:

The Natural-Therm™ 0.50 PCF insulation, at a maximum thickness of $5^5/_8$ inches (143 mm) and a nominal density of 0.5 pcf (8 kg/m^3) has a flame-spread index of 25 or less and smoke-developed index of 450 or less when tested in accordance with ASTM E84 (UL 723). There is no thickness limit when installation is behind a code-prescribed 15-minute thermal barrier, except as noted in Section 4.4.3.

The Natural-Therm™ 2.0 W PCF insulation, at a maximum thickness of 4.0 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 smoke-developed index of 450 or less when tested in accordance with ASTM E84 (UL 723). There is no thickness limit when installation is behind a code-prescribed 15-minute thermal barrier, except as noted in Section 4.4.3.

3.3 Thermal Resistance (*R*-values):

Natural-Therm™ 0.50 PCF and Natural-Therm™ 2.0 W PCF spray-applied foam insulations have thermal resistance (*R*-values) at a mean temperature of 75°F (24°C) as shown in Table 1.

3.4 Air Permeability:

Natural-Therm™ 0.50 PCF at a minimum thickness of 3.5 inches (89 mm) is considered air-impermeable insulation in accordance with 2012 IRC Section R806.4 [2009 IRC Section R806.4], based on testing in accordance with ASTM E283.

3.5 Water Vapor Transmission:

At a minimum thickness of 1.0 inches (25.4 mm), Natural-Therm™ 2.0 W PCF insulation has a vapor permeance of less than 1.0 perms [5.7x10^{-8} kg/(PA-s-m^2)], when tested in accordance with the ASTM E96 desiccant method (Procedure A), and qualifies as Class II vapor retarder.

3.6 FoamKote® FC 50-50A:

FoamKote® FC 50-50A intumescent coating, manufactured by Flame Control Coatings, LLC, is a one-component, water-based liquid coating. FoamKote® FC 50-50A is supplied in 1-gallon (4 L) and 5-gallon (19 L) pails and has a shelf life of nine months when stored in factory-sealed containers at temperatures between 50°F and 90°F (10° and 32°C).

3.7 DC 315 Coating:

DC 315 Coating is manufactured by International Fireproof Technology, Inc., and is water-based latex intumescent coating supplied in 55-gallon (208 L) drums. The coating has a shelf life of one year when stored in a factory-sealed container at temperatures between 50°F and 80°F (10°C and 26.7° C).

4.0 INSTALLATION

4.1 General:

Natural-Therm™ 0.50 PCF and Natural-Therm™ 2.0 W PCF spray-applied foam insulations must be installed in accordance with the manufacturer's published installation instructions and this report. The manufacturer's published instructions and this report must be strictly adhered to, and a copy of this report and 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 a volumetric positive displacement pump as identified in the Natural Polymers, LLC's, application manual. The insulation is applied in multiple passes having a maximum thickness of 6 inches (152 mm) per pass for Natural-Therm™ 0.50 PCF or a maximum thickness per pass of 2 inches (50.8 mm) for Natural-Therm™ 2.0 W PCF up to the maximum insulation thicknesses specified in this report. The insulation components must be stored at temperatures between 50°F and 90°F (10° and 32°C). The insulation must not be used in areas that have a maximum in-service temperature greater than 180°F (82°C). The foam plastic must not be used in electrical outlet or junction boxes or in contact with rain, water, 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.

4.3 Application with a Prescriptive Thermal Barrier:

Natural-Therm™ 0.50 PCF and Natural-Therm™ 2.0 W PCF spray-applied foam insulation 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 15-minute thermal barrier complying with, and installed in accordance 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 4.4.2. There is no thickness limit when installation is behind a code-prescribed 15-minute thermal barrier, except as noted in Section 4.4.3.

4.4 Attics and Crawl Spaces:

4.4.1 Application with a Prescriptive Ignition Barrier: When Natural-Therm™ 0.50 PCF and 2.0 W PCF spray-applied foam 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 or IRC Sections R316.5.3 and R316.5.4, as applicable, except where the installation is in accordance with Section 4.4.2. The ignition barrier must be consistent with the requirements of the type of construction required by the applicable code, and must be installed in a manner such that the foam plastic insulation is not exposed.

4.4.2 Application without a Prescriptive Ignition Barrier:

4.4.2.1 General: When Natural-Therm™ 0.50 PCF and Natural-Therm™ 2.0 W PCF spray-applied foam insulation is installed without a prescriptive ignition barrier in attics and crawl spaces, in accordance with Sections 4.4.2.2 and 4.4.3, the following conditions apply:

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 in accordance with IBC Section 1203.3 or IRC Section R408.1, as applicable.

e. Attic ventilation is provided in accordance with IBC Section 1203.2 or IRC Section R806, as applicable.

f. Combustion air is provided in accordance with IMC (*International Mechanical Code*®) Section 701.

In attics, Natural-Therm™ 0.50 PCF and Natural-Therm™ 2.0 W PCF insulation may be spray-applied to the underside of roof sheathing or roof rafters, and/or vertical surfaces and, in crawl spaces, the insulation may be spray-applied to the underside of floors and/or vertical surfaces as described in this section. The thickness of the Natural-Therm™ 0.50 PCF applied to the underside of the top of the space must not exceed 10 inches (254 mm). The thickness of the Natural-Therm™ 0.50 PCF applied to vertical surfaces must not exceed 8 inches (203 mm). The thickness of the Natural-Therm™ 2.0 W PCF applied to the underside of the top of the space must not exceed $11^1/_4$ inches (286 mm). The thickness of the Natural-Therm™ 2.0 W PCF applied to vertical surfaces must not exceed $11^1/_4$ inches (286 mm). The foam plastic may be installed without a covering or coating. The insulation may be installed in unvented attics in accordance with 2012 IRC Section R806.5 (2009 IRC Section R806.4). The ignition barrier in accordance with IBC Section 2603.4.1.6 or IRC Section R316.5.3 may be omitted.

4.4.2.2 Application with FoamKote® FC 50-50A Intumescent Coating: In attics, Natural-Therm™ 0.50 PCF and Natural-Therm™ 2.0 W PCF foam insulation may be spray-applied to the underside of the roof sheathing and/or rafters; and, in crawl spaces, to the underside of wood floors and/or floor joists as described in this section. The thickness of the Natural-Therm™ 0.5 PCF foam plastic applied to the underside of the top of the space must not exceed 12 inches (305 mm). The thickness of the Natural-Therm™ 0.5 PCF spray foam insulation applied to vertical wall surfaces in attics and crawl spaces must not exceed 8 inches (203 mm). The thickness of the Natural-Therm™ 2.0 W PCF foam plastic applied to the underside of the top of the space must not exceed 11.5 inches (292 mm). The thickness of the Natural-Therm™ 2.0 W PCF spray foam insulation applied to vertical wall surfaces in attics and crawl spaces must not exceed 7.5 inches (191 mm). The foam plastic insulation must be covered with a minimum nominally 10-mil (0.25 mm) wet film [7.5 mils (0.19 mm) dry film] thickness of the FoamKote® FC 50-50A described in Section 3.5, applied over the insulation in accordance with the coating manufacturer's instructions and this report. The coating is 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 $^1/_2$ 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. The coating must be applied to surfaces that are dry, clean, and free of dirt, loose debris and any other substances that could interfere with adhesion of the coating, and when ambient and substrate temperatures are within a range of 50°F (10°C) to 90°F (32°C).

4.4.2.3 Application with DC 315 Coating: : In attics, Natural-Therm™ 0.50 PCF and Natural-Therm™ 2.0 W PCF foam insulation may be spray-applied to the underside of roof sheathing or roof rafters, and/or to vertical surfaces. In crawl spaces, the insulation may be spray-applied to the underside of the floors and/or vertical surfaces. The thickness of the Natural-Therm™ 0.50 PCF foam plastic applied to the underside of the top of the space must not exceed 10 inches (254 mm). The thickness of the Natural-Therm™ 0.50 PCF spray foam insulation applied to vertical wall surfaces in attics and crawl spaces must not exceed 8 inches (203 mm). The thickness of Natural-Therm™ 2.0 W PCF spray foam insulation applied to the underside of the top of the space and to vertical wall surfaces in attics and crawl spaces must not exceed $11\ ^1/_4$ inches (286 mm). Natural-Therm™ 0.50 PCF must be covered on all exposed surfaces with DC315 coating, described in Section 3.6, at a minimum wet film thickness of 20 mils (0.51 mm) [14 dry mils (0.36 mm)]. Natural-Therm™ 2.0W PCF must be covered on all exposed surface with DC 315 intumescent coating at a minimum wet film thickness of 21 mils (0.53 mm) [14 dry mils (0.36 mm)]. The DC 315 intumescent coating must be applied over Natural-Therm 0.50 PCF insulation in accordance with the manufacturer's instructions and this report. Surfaces to be coated must be dry, clean, and free of dirt loose debris and any other substance that could interfere with adhesion of the coating. The coating must be applied when ambient and substrate temperatures are a minimum of 50°F (10°C).

4.4.3 Use on Attic Floors: Natural-Therm™ 0.50 PCF spray-applied foam insulation may be installed at a maximum thickness of 8 inches (203 mm) between joists on attic floors. Natural-Therm™ 2.0 W PCF spray-applied foam insulation may be installed at a maximum thickness of 7.5 inches (191 mm) between joists on attic floors. The Natural-Therm™ spray-applied foam insulation must be separated from the interior of the building by an approved thermal barrier, and separated from the attic space with FoamKote® FC 50-50A coating as described in Section 4.4.2.2. The ignition barrier in accordance with IBC Section 2603.4.1.6 and IRC Section R316.5.3 may be omitted.

5.0 CONDITIONS OF USE

The Natural-Therm™ 0.50 PCF and Natural-Therm™ 2.0 W PCF spray-applied foam insulations described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 The insulations must 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, this report governs.

5.2 The insulations must be separated from the interior of the building by an approved 15-minute thermal barrier, in accordance with Section 4.3.

5.3 The insulations must not exceed the nominal density and thicknesses noted in Sections 3.2, 4.3 and 4.4 of this report.

5.4 The insulations must be protected from exposure to weather during and after application.

5.5 The insulations must be applied by contractors certified by Natural Polymers, LLC.

5.6 Use of the insulation in areas where the probability of termite infestation is "very heavy" must be in accordance with IBC Section 2603.8 or IRC Section 318.4, as applicable.

5.7 The insulations have been evaluated only for use in Type V-B construction under the IBC and dwellings under the IRC.

5.8 A vapor retarder must be installed when required by the applicable code.

5.9 Jobsite certification and labeling of the insulation must comply with IRC Sections N1101.4 and N1101.4.1 and IECC Sections 303.1.1 and 303.1.2, as applicable.

5.10 The insulations produced in West Chicago, Illinois, under 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), dated April 2016, including reports of tests in accordance with Appendix X of AC377.

6.2 Reports of room corner tests in accordance with NFPA 286 for Natural-Therm™ 0.5 PCF.

6.3 Reports of water vapor transmission test for Natural-Therm™ 2.0 W PCF in accordance with ASTM E96.

6.4 Reports of air leakage tests for Natural-Therm™ 0.50 PCF in accordance with ASTM E283.

7.0 IDENTIFICATION

Components of the spray foam insulation are identified with the manufacturer's name (Natural Polymers, LLC) or listee's name (Nu-Wool Company, Inc.), address and telephone number; the product trade name (Natural-Therm™ or Nu-Seal®); use instructions; the density; the flame-spread and smoke-development indices; the date of manufacture; thermal resistance values; the evaluation report number (ESR-3136).

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

THICKNESS (inches)	NATURAL-THERM™ 0.50 PCF OR NU-SEAL 0.50 PCF *R*-VALUE (°f·ft^2·h/Btu)	NATURAL-THERM™ 2.0 W PCF OR NU-SEAL 2.0 W PCF *R*-VALUE (°f·ft^2·h/Btu)
1	3.7	6.7
2	7.5	13
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	47
9	33	53
9.5	35	56
10	37	59
11.5	43	68
12	44	71

For **SI:** 1 inch = 25.4 mm, 1°F·ft^2·h/Btu = 0.176 110°K·m^2/W.

[1]*R*-Values are calculated based on tested *K* values at 1-inch and 4-inch thicknesses for Natural-Therm™ 0.50 PCF.
[2]*R*-Values are calculated based on tested *R* values at 1-inch and 4-inch thicknesses for Natural-Therm™ 2.0 W PCF.

ICC-ES Evaluation Report

ESR-3136 FBC Supplement

Reissued June 2017

This report is subject to renewal June 2018.

www.icc-es.org | (800) 423-6587 | (562) 699-0543 *A Subsidiary of the International Code Council®*

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

REPORT HOLDER:

NATURAL POLYMERS, LLC
4N 325 POWIS ROAD
WEST CHICAGO, ILLINOIS 60185
(630) 587-0718
www.naturalpolymersllc.com

EVALUATION SUBJECT:

NATURAL-THERM™ 0.50 PCF, NU-SEAL 0.50 PCF®, NATURAL-THERM™ 2.0 W PCF AND NU-SEAL 2.0 W PCF® SPRAY-APPLIED POLYURETHANE FOAM INSULATION

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that Natural-Therm 0.50 PCF, Natural-Therm 2.0 W PCF and Nu-Seal 0.50 PCF polyurethane foam insulation, recognized in ICC-ES master report ESR-3136, have also been evaluated for compliance with the codes noted below.

Applicable code editions:

- 2010 *Florida Building Code—Building*
- 2010 *Florida Building Code—Residential*

2.0 CONCLUSIONS

The polyurethane foam insulations, described in Sections 2.0 through 7.0 of the master evaluation report ESR-3136, comply with the 2010 *Florida Building Code—Building* and the 2010 *Florida Building Code—Residential*, provided the design and installation are in accordance with the *International Building Code®* provisions noted in the master report.

Use of the Natural-Therm 0.50 PCF, Nu-Seal 0.5 PCF, Natural-Therm 2.0 W PCF and Nu-Seal 2.0 W PCF polyurethane foam insulation, for compliance with the High-Velocity Hurricane Zone provisions of the 2010 *Florida Building Code—Building* and the 2010 *Florida Building Code—Residential* has not been evaluated, and is outside the scope of this evaluation report.

For products falling under Florida Rule 9N-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 master report, reissued June 2017 and revised October 2017.