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NATURAL THERM® 450 SPRAY-APPLIED POLYURETHANE FOAM PLASTIC INSULATION

CSI Section:
07 21 00 Thermal Insulation

1.0 RECOGNITION

Natural Therm® 450 spray-applied polyurethane foam plastic insulation has been evaluated for use as an open-cell spray foam insulation complying with IBC Section 2603, 2024 IRC Section R303, 2021 and 2018 IRC Section R316, IECC Sections C303, C402, R303, and R402. The surface burning, physical properties, thermal resistance, and applications in Type V-B construction of Natural Therm® 450 open cell spray-applied foam insulation were evaluated to comply with the intent of the following codes and regulations:

- 2024, 2021, and 2018 International Building Code® (IBC)
- 2024, 2021, and 2018 International Residential Code® (IRC)
- 2024, 2021, and 2018 International Energy Conservation Code® (IECC)
- 2023 Florida Building Code, Building, (FBC, Building) - Supplement attached
- 2023 Florida Building Code, Residential (FBC, Residential) - Supplement attached
- 2023 Florida Building Code, Energy Conservation (FBC, Energy Conservation) - Supplement attached
- 2025 and 2022 California Building Code (CBC) – Supplement attached
- 2025 and 2022 California Residential Code (CRC) – Supplement attached
- 2023 City of Los Angeles Building Code (LABC) – Supplement attached
- 2023 City of Los Angeles Residential Code (LARC) – Supplement attached

2.0 LIMITATIONS

Use of the Natural Therm® 450 spray-applied foam plastic insulation recognized in this report is subject to the following limitations:

2.1 The insulation shall be installed in accordance with the manufacturer’s published installation instructions. It shall also be installed in accordance with this evaluation report and

the applicable code, and if there are any conflicts between the manufacturer’s published installation instructions and this report, the more restrictive governs.

2.2 The insulation shall be separated from the interior of the building by a code approved thermal barrier.

2.3 During installation, the insulation and the surfaces to which it is applied shall be protected from exposure to weather and site conditions.

2.4 The contractors that will be installing the insulation shall meet the training requirements noted in the Natural Polymers Open Cell Product Application guide.

2.5 Use of the insulation in areas of “very heavy” termite infestation shall be in accordance with the IBC Section 2603.8, 2024 IRC Section R305.4, or 2021 and 2018 IRC Section R318.4, as applicable.

2.6 Labeling and jobsite certification of the insulation and coatings shall comply with IBC Section 2603.2; IRC Sections N1101.10 and N1101.10.1.1; and IECC Sections C303.1.1 and C303.1.2, as applicable.

2.7 Foam plastic used in plenums as interior finish or interior trim shall comply with Section 2603.7 of the IBC.

2.8 The insulation recognized in this report is produced by Natural Polymers, LLC in Cortland, Illinois.

3.0 PRODUCT USE

3.1 General: When installed in accordance with Section 3.3 of this report, Natural Therm® 450 spray-applied foam plastic insulation can be used in wall cavities, floor assemblies or ceiling assemblies, and in attic and crawl spaces as nonstructural thermal insulation material. The spray-applied foam plastic insulation is used in Type V-B construction under the IBC and in dwellings under the IRC.

3.2 Design: Natural Therm® 450 spray-applied foam plastic insulation shall comply with requirements in IECC Sections C402 and R402, as applicable.

3.3 Installation: The manufacturer’s published installation instructions for Natural Therm® 450 spray-applied foam plastic insulation and this report shall be available and strictly adhered to at all times on the jobsite during installation.

The spray-applied foam plastic insulation shall be spray-applied on the jobsite using a volumetric positive displacement pump in accordance with the manufacturer’s published installation instructions. Natural Therm® 450 shall

The product described in this Uniform Evaluation Service (UES) Report has been evaluated as an alternative material, design or method of construction in order to satisfy and comply with the intent of the provision of the code, as noted in this report, and for at least equivalence to that prescribed in the code in quality, strength, effectiveness, fire resistance, durability and safety, as applicable, in accordance with Section 104.2.3 of the 2024 IBC and Section 104.11 of previous editions. This document shall only be reproduced in its entirety.





be sprayed in multiple passes having a maximum thickness of 6 inches (152 mm) per pass, at the required conditions between passes, up to the maximum insulation thickness specified in this report.

The 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 continuous contact with rain or water. 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 application.

3.4 Thermal Barrier:

3.4.1 Installation with a Prescriptive Thermal Barrier:

Natural Therm[®] 450 spray-applied foam plastic insulation shall be separated from the interior by an approved thermal barrier of minimum ½-inch-thick (12.7 mm) gypsum wallboard or an equivalent thermal barrier. When installed in accordance with this section, the spray foam may be any thickness when installed behind a prescriptive thermal barrier. The barrier shall comply with and be installed in accordance with IBC Section 2603.4; 2024 IRC Section R303.4; or 2021 and 2018 IRC Section R316.4, as applicable.

3.4.2 Alternative Thermal Barrier Assemblies: Natural Therm[®] 450 spray-applied foam plastic insulation may be installed without a prescriptive thermal barrier as defined in Section 3.4.1 of this report when installed with a fire-protective coating as described in Table 3 of this report.

3.5 Installation for Attics and Crawl Spaces:

3.5.1 General: When used in an attic or crawl space where entry is made only for service of utilities, Natural Therm[®] 450 spray-applied foam plastic insulation shall be installed in accordance with this section. The insulation shall be separated from the interior of the building by an approved thermal barrier as described in Sections 3.4 of this report.

3.5.2 Installation with a Prescriptive Ignition Barrier:

Where entry is made only for the service of utilities, Natural Therm[®] 450 spray-applied foam plastic insulation may be installed within attics or crawl spaces with an ignition barrier in accordance with IBC Section 2603.4.1.6, 2024 IRC Sections R303.5.3 and R303.5.4, and 2021 and 2018 IRC Sections R316.5.3 and R316.5.4, as applicable. 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.

3.5.3 Installation in Attics and Crawl Spaces Using an Alternative Ignition Barrier Assembly:

Natural Therm[®] 450 spray-applied foam plastic insulation may be installed in attics and crawl spaces without a prescriptive ignition barrier provided:

- a. Entry is only to service utilities in the attic or crawl space and no storage is permitted.
- b. Attic or crawl space areas cannot be interconnected.
- c. Air from the attic or crawl space cannot be circulated to other parts of the building.
- d. Attic ventilation is provided as required by 2024, 2021, and 2018 IBC Section 1202.2, and 2015 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:

- 2024, 2021, and 2018 IBC Section 1202.3
- 2015 IBC Section 1203.3
- IRC Section R806.5

Ventilated crawl spaces shall be provided with ventilation as required by the following code sections as applicable:

- 2024, 2021, and 2018 IBC Section 1202.4
- 2015 IBC Section 1203.4
- IRC Section R408.1

- e. Natural Therm[®] 450 spray-applied foam plastic insulation may be applied at a nominal density of 0.45 pcf (7.2 kg/m³) to the underside of roof sheathing or roof rafters and vertical surfaces of attics and in crawl spaces without a prescriptive ignition barrier when meeting the requirements of Table 2 of this report.
- f. In accordance with the International Mechanical Code[®] Section 701 or Uniform Mechanical Code Section 701, combustion air is provided.

3.5.4 Unvented Attics: Natural Therm[®] 450 spray-applied foam plastic insulation may be installed in unvented attic assemblies and unvented enclosed rafter assemblies in accordance with Section 1202.3 of the IBC or Section R806.5 of the IRC, as applicable. The attic shall be protected as required in Sections 3.4 and 3.5.

4.0 PRODUCT DESCRIPTION

4.1 Properties: Natural Therm[®] 450 is a spray-applied, polyurethane foam plastic insulation and complies as a low-density insulation in accordance with Section 3.1.1 and Table 1 of AC377. The insulation is a two-component spray-applied foam plastic with a nominal in-place density of 0.45 pcf (7.2 kg/m³).

The spray-applied insulation is mixed in the field by combining a polymeric isocyanate (A component) and a resin blend (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 six months.



4.2 Thermal Resistance (R-Values): Natural Therm® 450 spray-applied foam plastic insulation has a thermal resistance (R-Value) at a mean temperature of 75°F (24°C) as shown in Table 1 of this report.

TABLE 1
Thermal Resistance (R-Value)^{1,2}
(°F·ft²·h/BTU)

| Thickness (inch) | R-Value |
|------------------|-------------------|
| | Natural Therm 450 |
| 1 | 3.6 |
| 2 | 7.2 |
| 3 | 11 |
| 3.5 | 13 |
| 4 | 14 |
| 5 | 18 |
| 5.5 | 20 |
| 6 | 22 |
| 7 | 25 |
| 7.25 | 26 |
| 8 | 29 |
| 9 | 32 |
| 9.25 | 33 |
| 10 | 36 |
| 11 | 40 |
| 11.25 | 41 |
| 12 | 43 |
| 13 | 47 |
| 14 | 50 |
| 15 | 54 |
| 16 | 58 |

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 values at 1-inch and 3.5-inch thicknesses.

² R-Values greater than 10 are rounded to the nearest whole number.

4.3 Surface Burning Characteristics: At a maximum thickness of 4 inches (102 mm) and a nominal density of 0.45 pcf (7.2 kg/m³), the Natural Therm® 450 spray-applied foam plastic insulation 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.

4.4 Air Permeability: When tested in accordance with ASTM E2178 at a minimum thickness of 3.5 inches (89 mm), Natural Therm® 450 spray-applied foam plastic insulation is classified as air-impermeable insulation in accordance with IBC Section 1202.3 and IRC Section R806.5, as applicable.

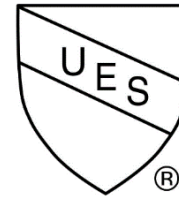
4.5 Vapor Permeance: Natural Therm® 450, when tested in accordance with the ASTM E96 desiccant method (Procedure A), has a permeance of less than 10 perms (574 x 10⁹ g/Pa·s·m), at a minimum thickness of 3½ inches (89 mm) and qualifies as a Class III vapor retarder in accordance with IBC Section 202 and IRC Section R202.

5.0 IDENTIFICATION

The spray-applied foam plastic insulation is identified with the following:

- a. Manufacturer’s name (Natural Polymers, LLC)
- b. address and telephone number,
- c. the product trade name (Natural Therm® 450)
- d. use instructions
- e. density, and flame-spread and smoke-development indices
- f. date of manufacture or batch/run number
- g. thermal resistance values
- h. the evaluation report number (IAPMO UES ER-992)
- i. the name or logo of the inspection agency

The IAPMO Uniform Evaluation Service Mark of Conformity may also be used as shown below:



IAPMO UES ER-992

6.0 SUBSTANTIATING DATA

6.1 Manufacturer’s descriptive literature and installation instructions.

6.2 Data in accordance with IAPMO/ANSI ES 1000-2020 Building Code Compliance of Spray-Applied Polyurethane Foam.

6.3 Data in accordance with the Acceptance Criteria for Spray-applied Foam Plastic Insulation, ICC-ES AC377, dated June 2023.

6.4 Data in accordance with 2019 ICC 1100 Standard for Spray-applied Polyurethane Foam Plastic Insulation.

6.5 Report of testing for water vapor transmission with ASTM E96, Procedure A desiccant method.

6.6 Reports of air permeance testing in accordance with ASTM E2178.

6.7 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 Natural Therm® 450 spray-applied foam plastic insulation to



assess its conformance to the codes shown in Section 1.0 of this report and documents the product's certification. Products are manufactured at the location noted in Section 2.8 under a quality control program with periodic inspections under the supervision of IAPMO UES.

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

**TABLE 2
ALTERNATIVE IGNITION BARRIER ASSEMBLIES¹**

| FIRE-PROTECTIVE COATING/COVERING | | | MAXIMUM SPF THICKNESS (inch) | |
|----------------------------------|--------------------------|------------------------------|------------------------------|-------------------------------|
| TYPE | MINIMUM THICKNESS (mils) | THEORETICAL APPLICATION RATE | WALLS AND VERTICAL SURFACES | CEILING AND OVERHEAD SURFACES |
| DC315 ² | 6 WFT (4 DFT) | 0.38 gal/100 ft ² | 10 | 14 |
| Plus ThB ³ | 6 WFT (4 DFT) | 0.38 gal/100 ft ² | 10 | 14 |

For SI: 1 inch = 25.4 mm, 1 mil = 0.0254 mm, 1 gallon = 3.785 L, 1 ft² = 0.0929 m²

¹ Fire-protective coatings and coverings shall be applied over all exposed SPF surfaces in accordance with the coating/covering manufacturer's instructions and this report.

² International Fireproof Technology Inc., recognized in [IAPMO UES ER-499](#).

³ No-Burn, Inc., recognized in [IAPMO UES ER-305](#).

**TABLE 3
ALTERNATIVE THERMAL BARRIER ASSEMBLIES¹**

| FIRE-PROTECTIVE COATING/COVERING | | | MAXIMUM SPF THICKNESS (inch) | |
|----------------------------------|--------------------------|------------------------------|------------------------------|-------------------------------|
| TYPE | MINIMUM THICKNESS (mils) | THEORETICAL APPLICATION RATE | WALLS AND VERTICAL SURFACES | CEILING AND OVERHEAD SURFACES |
| DC315 ² | 18 WFT (12 DFT) | 1.12 gal/100 ft ² | 10 | 14 |

For SI: 1 inch = 25.4 mm, 1 mil = 0.0254 mm, 1 gallon = 3.785 L, 1 ft² = 0.0929 m²

¹ Fire-protective coatings and coverings shall be applied over all exposed SPF surfaces in accordance with the coating/covering manufacturer's instructions and this report.

² International Fireproof Technology Inc., recognized in [IAPMO UES ER-499](#).



FLORIDA SUPPLEMENT

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NATURAL THERM[®] 450
SPRAY-APPLIED POLURETHANE FOAM
PLASTIC INSULATION

CSI Section:
07 21 00 Thermal Insulation

1.0 RECOGNITION

Natural Therm[®] 450 spray-applied foam plastic insulation as evaluated and represented in IAPMO UES Evaluation Report ER-992, in accordance with the requirements of the 2021 International Building Code and the International Residential Code, as applicable, 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:

- 2023 Florida Building Code, Building, (FBC, Building)
- 2023 Florida Building Code, Residential (FBC, Residential)
- 2023 Florida Building Code, Energy Conservation (FBC, Energy Conservation)

2.0 LIMITATIONS

Use of Natural Therm[®] 450 spray-applied foam plastic insulation recognized in this report is 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 IAPMO UES ER-992.

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



CALIFORNIA SUPPLEMENT

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PLASTIC INSULATION

CSI Section:
07 21 00 Thermal Insulation

1.0 RECOGNITION

Natural Therm[®] 450 spray-applied foam plastic insulation evaluated and represented in IAPMO UES Evaluation Report ER-992 and with changes as noted in this supplement is a satisfactory alternative for use in buildings built under the following codes (and regulations):

- 2025 and 2022 California Building Code (CBC)
- 2025 and 2022 California Residential Code (CRC)

2.0 LIMITATIONS

Natural Therm[®] 450 spray-applied foam plastic insulation, when installed and recognized in this report for the 2024 International Building Code or the 2024 International Residential Code, as applicable, for use under the 2025 CBC or CRC, or the 2021 International Building Code or International Residential Code, for use under the 2022 CBC or CRC, is subject to the limitations stated in Evaluation Report ER-992.

This supplement expires concurrently with IAPMO UES ER-992.

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CITY OF LOS ANGELES SUPPLEMENT

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CSI Section:
07 21 00 Thermal Insulation

1.0 RECOGNITION

Natural Therm[®] 450 spray-applied foam plastic insulation evaluated and represented in IAPMO UES Evaluation Report ER-992 and with changes as noted in this supplement is a satisfactory alternative for use in buildings built under the following codes (and regulations):

- 2023 City of Los Angeles Building Code (LABC)
- 2023 City of Los Angeles Residential Code (LARC)

2.0 LIMITATIONS

Natural Therm[®] 450 spray-applied foam plastic insulation, when installed and recognized in this report shall be in accordance with the 2021 International Building Code or the 2021 International Residential Code, as applicable, and is subject to the limitations stated in Evaluation Report ER-992, and the California Supplement to ER-992.

This supplement expires concurrently with IAPMO UES ER-992.

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