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ICC-ES Evaluation Report

ESR-4165

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

REPORT HOLDER:

PURINOVA SP. Z.O.O.

EVALUATION SUBJECT:

PURIOS 500



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



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Section: 07 21 00—Thermal Insulation

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EVALUATION SUBJECT:

PURIOS 500

1.0 EVALUATION SCOPE

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)

Property evaluated:

- Surface-burning characteristics
- Physical properties
- Thermal resistance
- Attic and crawl space installation
- Air permeability

2.0 USES

Purinova PURIOS 500 open cell spray foam is a spray-applied polyurethane foam plastic insulation used as a nonstructural thermal insulating material in buildings of Type V-B construction under the IBC and in dwellings under the IRC. The insulation is intended for use in wall cavities, floor/ceiling assemblies, or attics and crawl spaces when installed in accordance with Section 4.4. Under the 2018, 2015 and 2012 IRC and 2018 and 2015 IBC, the insulation may be used as air-impermeable insulation when installed in accordance with Section 3.4.

3.0 DESCRIPTION

3.1 General:

Purinova PURIOS 500 is a low-density, spray-applied cellular polyurethane foam plastic insulation installed as a component of wall assemblies, ceilings, floors, crawlspaces and cavities of roofs. The foam plastic insulation is a two-component, open-cell, one-to-one by volume spray foam system with a nominal density of 0.6 pcf (9.6 kg/m³). The insulation is produced in the field by combining a polymeric isocyanate (A component) with a polymeric resin blend (B component). The insulation

components have a shelf life of six months when stored in factory-sealed containers at temperatures between 59°F (15°C) and 77°F (25°C). The liquid components are supplied in 55 gallon (208 L) drums.

3.2 Surface-burning Characteristics:

Purinova PURIOS 500 spray-applied foam plastic insulation, at a maximum thickness of 4 inches (102 mm) and a nominal density of 0.6 pcf (9.6 kg/m³), 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 (UL 723). There are no thickness limitations when insulation is covered by a code-prescribed 15-minute thermal barrier.

3.3 Thermal Resistance (R-values):

Purinova PURIOS 500 spray-applied foam plastic insulation has thermal resistance (R-value), at a mean temperature of 75°F (24°C), as shown in Table 1.

3.4 Air Permeability:

Purinova PURIOS 500 spray-applied foam plastic insulation, at a minimum 4¹/₈-inch (105 mm) thickness, is considered air-impermeable insulation in accordance with 2018, 2015 and 2012 IRC Section R806.5 and 2018 IBC Section 1202.3 [2015 IBC Section 1203.3] based on testing in accordance with ASTM E2178.

3.5 DC 315 Coating:

DC 315 Coating (see [ESR-3702](#)), manufactured by International Fireproof Technology / Paint To Protect, Inc., is a water-based coating supplied in 5-gallon (19L) pails and 55-gallon (208L) drums and has a shelf life of one (1) year when stored in factory-sealed containers at temperatures between 50°F (10°C) and 80°F (27°C).

4.0 DESIGN AND INSTALLATION

4.1 Design:

Purinova PURIOS 500 spray-applied foam plastic insulation must be installed in accordance with the report holder's published installation instructions and this report. A copy of the report holder'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 equipment identified in the report holder's published installation instructions. Purinova PURIOS 500 must be spray-applied when the ambient and substrate temperature is between 41°F (5°C) and 95°F (35°C). The insulation must not be used in areas that have a maximum service temperature greater than 180°F (82°C).

The spray-applied foam plastic insulation must not be used in electrical outlet or junction boxes or in contact with rain or water. The substrate must be free of moisture, frost or ice, loose scales, rust, oil and grease, or contaminants that will interfere with adhesion of the spray foam insulation. Purinova PURIOS 500 foam plastic insulation may be spray-applied in passes having a minimum thickness of 2.4 inches (70 mm) and a maximum thickness of 4 inches (102 mm) per pass. When multiple passes are required, subsequent passes can be applied after the previous pass has set.

4.3 Thermal Barrier:

4.3.1 Application with a Prescriptive Thermal Barrier:

Purinova PURIOS 500 spray-applied foam plastic insulation must be separated from the interior of the building by an approved thermal barrier of $\frac{1}{2}$ -inch-thick (12.7 mm) gypsum wallboard or an equivalent thermal barrier complying with and installed in accordance with the applicable code except where the installation complies with the requirements set forth in Section 4.3.2. When installation is within an attic or crawl space as described in Section 4.4, a thermal barrier is not required between the foam plastic and the attic or crawl space, but is required between the insulation and the interior of the building.

There is no thickness limit when installed behind a code-prescribed thermal barrier except as noted in Section 4.4.2.1 and 4.4.3.

4.3.2 Application without a Prescriptive Thermal Barrier:

Purinova PURIOS 500 spray-applied foam plastic insulation may be installed without the code-prescribed thermal barrier described in Section 4.3.1 when installation is in accordance with the following:

4.3.2.1 The insulation must be covered on all exposed surfaces with a fire protective coating at the minimum thickness set forth in Table 2.

4.3.2.2 The maximum installed thickness of the insulation must not exceed the thickness set forth in Table 2.

4.3.3 The coating must be applied over the insulation in accordance with the coating manufacturer's instructions and respective ICC-ES evaluation report for the coating and this report.

4.4 Ignition Barrier – Attics and Crawl Spaces:

4.4.1 Application with a Prescriptive Ignition Barrier:

When Purinova PURIOS 500 spray-applied foam plastic 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 and IRC Sections R316.5.3 and R316.5.4, as applicable, except when the installation is in accordance with Section 4.4.2. 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 that the foam plastic insulation is not exposed. The attic or crawl space area must be separated from the interior of the building by an approved thermal barrier as described in Section 4.3.1.

Purinova PURIOS 500 spray-applied foam plastic insulation, at a minimum $4\frac{1}{8}$ -inch (105 mm) thickness, may be installed as air impermeable insulation in unvented attics in accordance with 2018, 2015 and 2012 IRC Section R806.5 or 2018 IBC Section 1202.3 [2015 IBC Section 1203.3], when installed as specified in Section 4.4.2.

4.4.2 Application without a Prescriptive Ignition Barrier:

Where the spray-applied insulation is installed in accordance with Section 4.4.2.1, the following conditions apply:

- a) Entry to the attic or crawl space is to only 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) Attic ventilation is provided when required by 2018 IBC Section 1202.2.1 [2015 and 2012 IBC Section 1203.2] or IRC Section R806, except when air-impermeable insulation is permitted in unvented attics in accordance with the 2018 IBC Section 1202.3 [2015 IBC Section 1203.3] or 2018, 2015 and 2012 IRC Section R806.5.
- e) Under-floor (crawl space) ventilation is provided when required by 2018 IBC Section 1202.4 [2015 IBC Section 1203.4 (2012 IBC Section 1203.3)] or IRC Section R408.1, as applicable.
- f) Combustion air is provided in accordance with *International Mechanical Code*® Section 701.

4.4.2.1 Application with DC 315 Coating:

In attics, Purinova PURIOS 500 insulation may be spray-applied to the underside of roof sheathing and/or rafters, and to vertical surfaces and the underside of floors in crawl spaces as described in this section. The thickness of the foam plastic applied to the underside of the overhead surfaces (roof sheathing, rafters and the underside of floors) must not exceed 14 inches (356 mm) and the thickness of the foam plastic applied to vertical surfaces must not exceed 8 inches (203 mm). Exposed surfaces of the foam plastic insulation must be covered with a minimum nominal thickness of 3 dry mils (0.08 mm) [4 wet mils (0.10 mm)] of the DC 315 Coating described in Section 3.5. The coating must be spray-applied over the exposed insulation in accordance with the coating manufacturer's instructions and this report at a rate of 1 gallon (3.38 L) per 400 square feet (37.2 m²) to obtain the minimum nominal 3 dry mil thickness noted in this section. Exposed insulation surfaces to be coated must be dry and clean, and free of dirt, loose debris and any other substances that could interfere with adhesion of the coating. The attic or crawl space must be separated from the interior of the building by an approved thermal barrier as described in Section 4.3.1.

4.4.3 Use on Attic Floors:

Purinova PURIOS 500 spray-applied foam plastic insulation may be installed at a maximum thickness of 8 inches (203 mm) between and over joists in attic floors, when covered with a minimum nominal thickness of 3 dry mils (0.08 mm) [4 wet mils (0.10 mm)] of the DC 315 Coating described in Section 3.5. The coating must be spray-applied over the exposed insulation in accordance with the coating manufacturer's instructions and this report at a rate of 1 gallon (3.38 L) per 400 square feet (37.2 m²) to obtain the minimum nominal 3 dry mil thickness noted in this section. Surfaces to be coated must be dry and clean, and free of dirt, loose debris and any other substances that could interfere with adhesion of the coating. The spray-applied foam plastic insulation must be separated from the interior of the building by an approved thermal barrier.

5.0 CONDITIONS OF USE

The Purinova PURIOS 500 spray-applied foam plastic insulation described in this report complies with, or is a suitable alternative to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1** The spray-applied foam plastic insulation must be installed in accordance with the report holder's

published installation instructions, this evaluation report and the applicable code. If there are any conflicts between the report holder’s published installation instructions and this report, this report governs.

- 5.2 The spray-applied foam plastic insulation must be separated from the interior of the building by an approved thermal barrier, except when installation is as described in Section 4.3.2. A thermal barrier must be installed between the insulation and the interior of the building above the crawl space and below the attic.
- 5.3 The spray-applied foam plastic insulation must not exceed the thicknesses noted in this report based upon the intended end use.
- 5.4 The spray-applied insulation must be protected from exposure to weather during and after application.
- 5.5 The spray-applied insulation must be applied by professional spray polyurethane foam installers approved by Purinova Sp. z.o.o. or certified by the Spray Polyurethane Foam Alliance (SPFA) for the installation of spray polyurethane foam insulation.
- 5.6 Use of the spray-applied foam plastic insulation in areas where the probability of termite infestation is “very heavy” must be in accordance with 2018 and 2015 IBC Section 2603.8 (2012 IBC Section 2603.9) or IRC Section R318.4, as applicable.
- 5.7 Jobsite certification and labeling of the insulation must comply with 2018 or 2015 IRC Sections N1101.10.1 and N1101.10.1.1 (2012 IRC Sections N1101.12.1 and N1101.12.1.1)] and 2018, 2015 and 2012 IECC Sections C303.1.1, C303.1.1.1, R303.1.1 and R303.1.1.1, as applicable.
- 5.8 The A and B components of the spray-applied foam plastic insulation produced in Bydgoszcz, Poland,

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 (editorially revised April 2018), including a report of testing in accordance with Appendix X.
- 6.2 Report of air leakage testing in accordance with ASTM E2178.
- 6.3 Report of a room corner test in accordance with NFPA 286.

7.0 IDENTIFICATION

- 7.1 The A and B components of the insulation are identified with the report holder’s name [Purinova Sp. z.o.o.] and address, the product name (Purinova PURIOS 500 or Purinova PURIOS A-side), mixing instructions, density, flame-spread and smoke-developed indices, date of manufacture, thermal resistance values, and the evaluation report number (ESR-4165).

The International Fireproof Technology Inc. / Paint To Protect Inc. DC 315 Coating is identified with the coating manufacturer’s name, the product trade name, use instructions and ICC-ES evaluation report number ([ESR-3702](#)).

- 7.2 The report holder’s contact information is the following:

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TABLE 1—THERMAL RESISTANCE (R-VALUES)¹

THICKNESS (inches)	R-VALUE (°F.ft ² .h/Btu)	THICKNESS (inches)	R-VALUE (°F.ft ² .h/Btu)
1.0	3.8	7.5	28
2.0	7.4	8.0	29
3.0	11	9.0	33
3.5	13	9.5	35
4.0	15	10.0	37
5.0	18	11.0	41
5.5	20	11.5	42
6.0	22	12.0	44
7.0	26	14.0	52

For SI: 1 inch = 25.4 mm; 1°F.ft².h/Btu = 0.176 110°K.m²/W.

¹R-values are calculated based on tested K-values at 1- and 3.5-inch thicknesses.

TABLE 2—USE OF INSULATION WITHOUT A PRESCRIPTIVE THERMAL BARRIER (TESTED IN ACCORDANCE WITH NFPA 286)¹

FOAM PLASTIC INSULATION	MAXIMUM THICKNESS (in.) (Vertical Surfaces)	MAXIMUM THICKNESS (in.) (Overhead Surfaces)	COATING ³	MINIMUM COATING THICKNESS ² (Applied to all Exposed Surfaces of Foam Plastic Insulation)	MINIMUM APPLICATION RATE OF COATING ²
Purinova PURIOS 500	8	14	DC315	18 mils WFT 12 mils DFT	1 gal / 100 ft ²

For SI: 1 inch = 25.4 mm; 1 mil = 0.0254 mm; 1 gallon = 3.38 L; 1 ft² = 0.93 m².

¹See Section 4.3.2.

²DFT = Dry Film Thickness; WFT = Wet Film Thickness

³See Section 3.5.