ESR-2298
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This report is subject to re-examination in one year.

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DIVISION: 07—THERMAL AND MOISTURE PROTECTION
Section: 07570—Coated Foam Roofing

REPORT HOLDER:

BASF POLYURETHANE FOAM ENTERPRISES, LLC
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EVALUATION SUBJECT:

BASF POLYURETHANE FOAM ENTERPRISES COATED FOAM PLASTIC ROOF COVERINGS: FE348 SERIES

ADDITIONAL LISTEE:

UNITED COATINGS
19011 EAST CATALDO
GREENACRES, WASHINGTON 99016

1.0 EVALUATION SCOPE

Compliance with the following code:

2006 *International Building Code*® (IBC)

Properties evaluated:

- Physical properties
- Fire classification
- Wind resistance
- Impact resistance

2.0 USES

The coated foam plastic roof coverings described in this report are used for Class A or B roof coverings. Roof coverings with an A or B classification, as noted in Table 1, are permitted on buildings of any type of construction.

3.0 DESCRIPTION

3.1 General:

BASF Polyurethane Foam Enterprises FE348 Series coated foam plastic roof coverings consist of liquid-applied coatings over FE348-2.5, FE348-2.7, FE348-2.8 or FE348-3.0 spray-applied polyurethane foam plastic insulations.

3.2 Polyurethane Foam Plastic Insulation:

BASF Polyurethane Foam Enterprises FE348-2.5, FE348-2.7, FE348-2.8 and FE348-3.0 are two-component, spray-applied, foam plastic insulations complying with ASTM C 1029, and are produced in densities of 2.5, 2.7, 2.8 and 3.0 pcf (40.0, 43.2, 44.8 and 48.0 kg/m^3), respectively. The foam plastic insulations have a flame-spread rating of 75 or less when tested in accordance with ASTM E 84 at a maximum thickness of 2.0 inches (51 mm). The foam plastic ingredients (Component A and Component B) are available in 55-gallon (208 L) containers and have a shelf life of three months when stored at temperatures between 50˚F and 80˚F (10˚C and 26.7˚C).

3.3 Coatings:

3.3.1 General: The coatings recognized in this report for use in the BASF Polyurethane Foam Enterprises roofing systems are United Coatings Diathon acrylic roof coating, BASF FECoat 1000 acrylic roof coating, and BASF ELASTOCOAT 3-5000 silicone roof coating.

3.3.2 United Coatings Diathon Acrylic Roof Coating: Diathon coating is a single-component, liquid-applied, 100 percent acrylic elastomeric coating, produced by United Coatings. It is supplied in 5-gallon (18.9 L) pails and 55-gallon (208 L) drums and has a shelf life of six months when stored at temperatures between 50˚F and 80˚F (10˚C and 26.7˚C). The Diathon coating complies with ASTM D 6083.

3.3.3 BASF FECoat 1000 Acrylic Roof Coating: BASF FECoat 1000 coating is a single-component, liquid-applied, 100 percent acrylic elastomeric coating. It is supplied in 5-gallon (18.9 L) pails and 55-gallon (208 L) drums and has a shelf life of six months when stored at temperatures between 50˚F and 80˚F (10˚C and 26.7˚C). The BASF FECoat 1000 coating complies with ASTM D 6083.

3.3.4 BASF ELASTOCOAT 3-5000 Silicone Roof Coating: BASF ELASTOCOAT 3-5000 coating is a single-component, silicone rubber liquid coating, and is brush-, roller- or spray-applied over the foam plastic insulation. The coating is supplied in 5- and 55-gallon (18.9 and 208 L) containers and has a shelf life of six months when stored at temperatures up to 90˚F (32.2˚C). The BASF ELASTOCOAT 3-5000 coating complies with ASTM D 6694.

3.4 Impact Resistance:

The coated foam plastic roof coverings described in this report comply with the Resistance to Foot Traffic Test in Section 5.5 of FM 4470.

4.0 INSTALLATION

4.1 Preparation of Substrates:

The substrates to be covered must be free of all grease, oil, loose particles, moisture, and other foreign materials. Areas not receiving a foam plastic insulation application must be masked off or otherwise protected from overspray.

4.2 Substrates:

4.2.1 Plywood Substrates: Plywood substrates must be minimum $^{15}/_{32}$-inch-thick (11.9 mm), code-complying, exterior-grade or Exposure 1 plywood. All plywood edges must be

supported by blocking or have tongue-and-groove joints as required by IBC Section 2603.4.1.5.

4.2.2 Noncombustible Substrates:

4.2.2.1 Cementitious Substrates: Structural concrete with a minimum compressive strength of 2500 psi. Cementitious decks must be thoroughly cured and must be subjected to specialized treatment, such as wire brushing or commercial sandblasting, or must be chemically cleaned to ensure adequate bonding.

4.2.2.2 Metal Substrates: Minimum No. 22 gage galvanized steel [0.030 inch (0.76 mm)] deck. Metal decks must be cleaned of any adhesion inhibitors, and gaps in end or sidelaps must be sealed with an approved sealant.

4.3 Roof Slope:

The polyurethane foam plastic insulation must be spray-applied to form roof slopes that have a minimum slope of $^1/_4$:12 (2 percent) and a maximum roof slope as specified in Table 1.

4.4 Foam Plastic Insulation Application:

The polyurethane foam plastic insulation described in Section 3.2 is applied in a 1:1 ratio by volume of the A and B components to one of the substrates described in Section 4.2, using foam-spraying equipment recommended by BASF Polyurethane Foam Enterprises. Application of the foam plastic insulation must be performed when the substrate temperature is at least 50˚F (10˚C), the ambient temperature is at least 50˚F (10˚C), and the wind speed is equal to or less than 15 miles per hour (24.1 km/h). The foam plastic insulation must not be applied to wet or damp substrates, or when dew, condensation, precipitation, or freezing temperatures are expected prior to completion of the foam and coating application.

Foam plastic is applied in maximum 2-inch-thick (51 mm) passes, to reach the desired thickness as noted in Table 1. The total finished thickness must be achieved within the same day. The finished surface of the foam must be smooth and free of voids, pinholes and crevices.

4.5 Application of Coating:

The foam plastic insulation surface must be dry and free of all damaged foam, dirt and foreign material before application of the coating. If the insulation surface is damaged to the point where cracks, voids or large depressions appear, additional insulation must be applied to create a satisfactory surface. After the insulation has developed sufficient strength to support foot traffic, but within 72 hours, the coating must be brush-, roller-, or spray-applied at the application rates noted in Table 1. The ambient temperature must be at least 50˚F (10˚C) during coating application, and above 32˚F (0˚C) for the 24-hour period after application. The coating must not be applied when dew, condensation, precipitation or freezing temperatures are anticipated prior to completion of the coating application. Refer to Figure 1 for typical installation details.

4.6 Fire Classification:

4.6.1 New Construction: Roof covering systems, as noted in Table 1, when installed in accordance with this report, are Class A or Class B roof coverings in accordance with ASTM E 108 or UL 790.

4.6.2 Reroofing: Prior to installation of new roof coverings, inspection in accordance with IBC Section 1510, and approval from the code official having jurisdiction, are required. Installation must be over uninsulated systems only.

4.7 Wind Resistance:

The allowable wind uplift pressures for the coated foam plastic roof coverings are noted in Table 2.

5.0 CONDITIONS OF USE

The BASF Polyurethane Foam Enterprises FE348 Series coated foam plastic roof coverings described in this report comply with, or are suitable alternatives to what is specified in, the code indicated in Section 1.0 of this report, subject to the following conditions:

5.1 Installation and application of the coated foam plastic roof coverings must comply with the code, the report holder's published installation instructions, and this report. The instructions within this report govern if there are any conflicts between the report holder's installation instructions and this report.

5.2 All materials must be applied by factory-trained personnel approved by BASF Polyurethane Foam Enterprises, LLC.

5.3 Where moderate or heavy foot traffic occurs for maintenance of equipment, or is otherwise necessary, the roof covering must be adequately protected to prevent rupture or wearing of the surface.

5.4 Foam plastic insulation must be separated from the interior of the building by an approved thermal barrier in accordance with IBC Section 2603.4.

5.5 The allowable wind uplift pressures listed in Table 2 are for the roof covering only. The deck and supporting structure to which the roof covering is attached must be designed to withstand the applicable wind pressures determined in accordance with ASCE 7.

5.6 Flashing must be installed at wall and roof intersections, at gutters and around roof openings, as required by IBC Section 1503.2.

5.7 The evaluation of the foam plastic insulation as a vapor retarder is outside the scope of this report.

5.8 The polyurethane foam plastic insulation components are manufactured in Houston, Texas, and Minneapolis, Minnesota, under a quality control program with inspections by Underwriters Laboratories Inc. (AA-668). The roof coatings are manufactured in Greenacres, Washington, and Elizabethtown, Kentucky, under quality control programs with inspections by Underwriters Laboratories Inc. (AA-668).

6.0 EVIDENCE SUBMITTED

6.1 Data in accordance with the ICC-ES Acceptance Criteria for Foam Plastic Insulation (AC12), dated February 2007.

6.2 Reports of tests on United Coatings Diathon and BASF FECoat 1000 in accordance with ASTM D 6083.

6.3 Reports of tests on BASF ELASTOCOAT 3-5000 in accordance with ASTM D 6694.

6.4 Reports of tests in accordance with Section 5.5 of FM 4470.

6.5 Reports of tests in accordance with ASTM E 108 / UL 790.

7.0 IDENTIFICATION

Each container of polyurethane foam plastic insulation bears a label with the BASF Polyurethane Foam Enterprises, LLC, name and address; the product name (FE348); the component type [A (FE800A) or B (FE348)]; the density (Component B only); the flame-spread index; the evaluation report number (ESR-2298), the shelf life; and the date of manufacture. The containers also bear the name of the inspection agency (Underwriters Laboratories Inc.).

Each container of Diathon acrylic roof coating is labeled with the United Coatings name, the product name (Diathon), the date of manufacture, the shelf life, the name of the inspection agency (Underwriters Laboratories Inc.), and the evaluation report number (ESR-2298).

Each container of FECoat 1000 acrylic roof coating is labeled with the BASF Polyurethane Foam Enterprises, LLC, name; the product name (FECoat 1000); the date of manufacture; the shelf life; the name of the inspection agency (Underwriters Laboratories Inc.); and the evaluation report number (ESR-2298).

Each container of ELASTOCOAT 3-5000 silicone roof coating is labeled with the BASF Polyurethane Foam Enterprises, LLC, name; the product name (ELASTOCOAT 3-5000); the date of manufacture; the shelf life; the name of the inspection agency (Underwriters Laboratories Inc.); and the evaluation report number (ESR-2298).

TABLE 1—FIRE CLASSIFICATION—COATED FOAM ROOF ASSEMBLIES

SYSTEM NO.	FIRE CLASSIFICATION	SUBSTRATE	MAXIMUM ROOF SLOPE	FOAM PLASTIC INSULATION		COATING		TOP SURFACING
				Designation	Thickness (inches)	Designation	Application Rate	
1F	A	Non-combustible	$1^1/_2$:12	FE348-2.5, 2.7, 2.8 and 3.0	2	Diathon or FECoat 1000	Two coats at $1^1/_2$ gallons per 100 ft^2 each	No. 11 granules, 30 pounds per 100 ft^2 (Optional)
2F	A	Non-combustible	3:12	FE348-2.5, 2.7, 2.8 and 3.0	2	ELASTOCOAT 3-5000	Two coats at $1^1/_2$ gallons per 100 ft^2 each	No. 11 granules, 30 pounds per 100 ft^2 (Optional)
3F	A	Non-combustible	3:12	FE348-2.5, 2.7, 2.8 and 3.0	4	Diathon or FECoat 1000	Two coats at $1^1/_2$ gallons per 100 ft^2 each	No. 11 granules, 30 pounds per 100 ft^2
4F	B	$^{15}/_{32}$-inch-thick plywood	$^1/_2$:12	FE348-2.5, 2.7, 2.8 and 3.0	1	Diathon, FECoat 1000 or ELASTOCOAT 3-5000	Two coats at $1^1/_2$ gallons per 100 ft^2 each	No. 11 granules, 30 pounds per 100 ft^2 (Optional)
5F	A	Non-combustible	2:12	FE348-2.5, 2.7, 2.8 and 3.0	4	Diathon or FECoat 1000	Two coats at $1^1/_2$ gallons per 100 ft^2 each	—
6F	A	Non-combustible	$2^1/_2$:12	FE348-2.5, 2.7, 2.8 and 3.0	4	ELASTOCOAT 3-5000	Two coats at $1^1/_2$ gallons per 100 ft^2 each	—

For **SI:** 1 inch = 25.4 mm; 1 gallon per 100 square feet = 0.41 L/m^2; 1 gallon = 3.785 L; 1 ft^2 = 0.0929 m^2.

TABLE 2—WIND RESISTANCE—COATED FOAM ROOF COVERINGS[1]

SYSTEM NO.	ALLOWABLE WIND UPLIFT (psf)	SUBSTRATE	FOAM PLASTIC INSULATION	
			DESIGNATION	THICKNESS (inches)
1W	187	Structural concrete	FE348-2.5, 2.7, 2.8 and 3.0	2
2W	105	Steel deck	FE348-2.5, 2.7, 2.8 and 3.0	1 (above top of deck)

For **SI:** 1 inch = 25.4 mm; 1 psf = 4.882 kg/m^2.

[1]Coating must be one of the following:
(a) United Coatings Diathon applied in two coats at $1^1/_2$ gallons per 100 ft^2 per coat.
(b) BASF FECoat 1000 applied in two coats at $1^1/_2$ gallons per 100 ft^2 per coat.
(c) BASF ELASTOCOAT 3-5000 applied in two coats at $1^1/_2$ gallons per 100 ft^2 per coat.