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### DIVISION: THERMAL AND MOISTURE PROTECTION

Section: 07 21 00 – Thermal Insulation

Section: 07 21 19 – Foamed-In-Place Insulation

### REPORT HOLDER:

Gaco, a division of Firestone Building Products Company, LLC  
200 4<sup>th</sup> Avenue South  
Nashville, TN 37201  
(800) 428-4442  
[www.gaco.com](http://www.gaco.com)

### REPORT SUBJECT:

GacoEZSpray F4500 Spray-applied Polyurethane Insulation

## 1.0 SCOPE OF EVALUATION

1.1 This Research Report addresses compliance with the following Codes:

- 2021, 2018 and 2015 *International Building Code*® (IBC)
- 2021, 2018 and 2015 *International Residential Code*® (IRC)
- 2021, 2018 and 2015 *International Energy Conservation Code*® (IECC)

NOTE: This report references 2021 Code sections. Earlier versions of the code may reference different section numbers.

1.2 GacoEZSpray F4500 has been evaluated for the following (see Table 1):

- Physical properties
- Surface-burning characteristics
- Thermal resistance
- Air permeability
- Air barrier

1.3 The insulation has been evaluated for the following uses (see Table 1):

- Nonstructural thermal insulating material on or in interior and exterior walls, floors, ceilings, and underside of roof decks

- Alternatives to thermal and ignition barriers
- Use as air-impermeable insulation
- Use as an air barrier
- Use in Types I, II, III, IV, and V construction under the IBC and construction under the IRC
- Use as exterior duct insulation

## 2.0 STATEMENT OF COMPLIANCE

GacoEZSpray F4500 complies with the Codes listed in Section 1.1, for the properties stated in Section 1.2 and uses stated in Section 1.3, when installed as described in this report, including the Conditions of Use stated in Section 6.

## 3.0 DESCRIPTION

**3.1 GacoEZSpray F4500:** GacoEZSpray F4500 insulation is an open cell, low-density, polyurethane foam plastic. The insulation is a two-component, spray-applied foam plastic with a nominal in-place density of 0.55 pounds per cubic foot. The insulation is produced in the field by combining a polymeric isocyanate (A component) with a resin (B component). The insulation liquid components are supplied in 55-gallon drums and 250-gallon totes, and must be stored at temperatures between 40°F and 100°F. The resin (B component) must be protected from freezing temperatures. GacoEZSpray F4500 insulation has a shelf life of 6 months on the polymeric isocyanate (A component) and 6 months on the resin (B component) when stored in factory-sealed containers at these temperatures.

**3.2 DC 315 Intumescent Coating:** DC 315 intumescent coating, manufactured by IFTI, Paint to Protect, is a water-based coating supplied in 5-gallon pails and 55-gallon drums. The coating material has a shelf life of 24 months when stored in factory-sealed containers at a temperature between 41°F to 95°F. DC 315 complies with ICC-ES AC456 as recognized in ICC-ES ESR-3702.



**3.3 TPR<sup>2</sup> Fireshell Coating:** TPR<sup>2</sup> Fireshell F10E coating, manufactured by TPR<sup>2</sup> Corporation, is a water-based coating supplied in 5-gallon pails and 55-gallon drums. The coating has a shelf life of 1 year when stored unopened at temperatures between 45°F and 95°F. Fireshell F10E complies with ICC-ES AC456 as recognized in ICC-ES ESR-3997.

**3.4 No-Burn<sup>®</sup> Plus ThB Intumescent Coating:** No-Burn<sup>®</sup> Plus ThB intumescent coating is a water-based coating supplied in 5-gallon pails and 55-gallon drums. The coating has a shelf life of 18 months when stored unopened at temperatures between 40°F and 90°F. No-Burn<sup>®</sup> Plus ThB complies with ICC-ES AC456 as recognized in IAPMO UES ER-305.

#### 4.0 PERFORMANCE CHARACTERISTICS

**4.1 Surface Burning Characteristics:** The insulation, at a maximum thickness of 4 inches and a nominal density of 0.55 pounds per cubic foot, 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. Based on large scale tests in accordance with NPFA 286, GacoEZSpray F4500 insulation can be installed at greater thickness as described in Sections 5.3 and 5.4. When insulation is separated from the interior living space of the building with an approved thermal barrier of ½-inch-thick gypsum board or an equivalent 15-minute thermal barrier complying with, and installed in accordance with, IBC Section 2603.4 or IRC Section R316.4, the maximum thickness is not limited.

**4.2 Thermal Resistance:** The insulation has thermal resistance (R-value) at a mean temperature of 75°F as shown in Table 2.

**4.3 Air Permeability:** GacoEZSpray F4500 insulation, at a minimum thickness of 2.5 inches, is considered air-impermeable insulation in accordance with IBC Section 1202.3 or IRC Sections R202 and R806.5, based on testing in accordance with ASTM E2178.

**4.4 Air Barrier:** GacoEZSpray F4500 insulation, at a minimum thickness of 2.5 inches, is considered an air-barrier material in accordance with IECC Section C402.5.1.2.1, based on testing in accordance with ASTM E2178.

#### 5.0 INSTALLATION

**5.1 General:** GacoEZSpray F4500 must be installed in accordance with the manufacturer's published installation instructions, the applicable Code, and this Research Report. A copy of the manufacturer's instructions must be available on the jobsite during installation.

**5.2 Application:** GacoEZSpray F4500 insulation is spray-applied on the jobsite using a volumetric positive displacement pump as identified in the Gaco application instructions. The insulation must be applied when the ambient temperature is greater than 32°F. The insulation must not be used in areas that have a maximum in-service temperature greater than 200°F. The foam plastic must not be used in electrical outlet or junction boxes or in contact with water, rain 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. The insulation may be applied in a single pass to achieve the maximum thickness identified in this report.

#### 5.3 Thermal Barrier:

**5.3.1 Application with a Prescriptive Thermal Barrier:** GacoEZSpray F4500 insulation must be separated from the interior occupied space of the building by an approved thermal barrier of 1/2-inch-thick gypsum board or an equivalent 15-minute thermal barrier complying with, and installed in accordance with, IBC Section 2603.4 or IRC Section R316.4. Exceptions are provided in Sections 5.3.2 and 5.4.

When the insulation is separated from the interior occupied space of the building with a Code-prescribed thermal barrier, the maximum thickness is not limited.

**5.3.2 Application without a Prescriptive Thermal Barrier:** GacoEZSpray F4500 insulation may be installed without the 15-minute thermal barrier prescribed in IBC Section 2603.4 and IRC Section R316.4, when installed as described in this section. The insulation must be covered on all exposed surfaces with intumescent coating as described in Option 1, 2, 3, or 4 below:





Option 1:

Maximum Thickness	Minimum Application Rate
Vertical wall surfaces – 10 inches	1.1 gallon / 100 ft <sup>2</sup> of IFTI DC315 Intumescent Coating (18 mils WFT; 12 mils DFT)
Underside of roof decks, ceilings, or the underside of floors – 16 inches	

Option 2:

Maximum Thickness	Minimum Application Rate
Vertical wall surfaces – 8.5 inches	0.9 gallon / 100 ft <sup>2</sup> of IFTI DC315 Intumescent Coating (14 mils WFT; 9 mils DFT)
Underside of roof decks, ceilings, or the underside of floors – 14 inches	

Option 3:

Maximum Thickness	Minimum Application Rate
Vertical wall surfaces – 13 inches	1.05 gallon/100 ft <sup>2</sup> TPR <sup>2</sup> Fireshell F10E Intumescent Coating (17 mils WFT; 11 mils DFT)
Underside of roof decks, ceilings, or the underside of floors – 21 inches	

Option 4:

Maximum Thickness	Minimum Application Rate
Vertical wall surfaces – 12 inches	0.9 gallon/100 ft <sup>2</sup> No-Burn <sup>®</sup> Plus ThB Intumescent Coating (14 mils WFT; 9 mils DFT)
Underside of roof decks, ceilings, or the underside of floors – 16 inches	

The coating must be applied over the insulation in accordance with the coating manufacturer’s instructions and this report. Surfaces to be coated must be dry, clean, and free of dirt, loose debris, and other substances that could interfere with the adhesion of the coating. The coating is applied with low-pressure airless spray equipment.

**5.4 Attics and Crawl Spaces:** The insulation may be applied in attics and crawl spaces as described in either Section 5.4.1 or 5.4.2. When foam insulation is installed in an attic or crawl space in accordance with this section, a thermal barrier, as described in Section 5.3.1, is not required between the foam plastic insulation and the attic or crawl space but is required between the insulation and the interior living space.

**5.4.1 Application with Prescriptive Ignition Barrier:** When GacoEZSpray F4500 insulation is installed within attics and crawl spaces where entry is made only for service of utilities, the ignition barrier must be installed in accordance with IBC Section 2603.4.1.6 or IRC Section R316.5.3 or R316.5.4, as applicable. 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 the foam plastic insulation is not exposed. GacoEZSpray F4500 insulation as described in this section may be installed in unvented attics in accordance with IBC Section 1202.3 or IRC Section R806.5 at a minimum thickness of 2.5 inches. The maximum thickness of insulation is as noted in Section 5.4.2.1.

**5.4.2 Application without a Prescriptive Ignition Barrier:** GacoEZSpray F4500 insulation may be installed in attics and crawl spaces, without the ignition barrier prescribed in IBC Section 2603.4.1.6 and IRC Sections R316.5.3 and R316.5.4, as described in Sections 5.4.2.1, 5.4.2.2, and 5.4.2.3, subject to the following conditions:

- 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 when required by IBC Section 1202.4 or 1203.4 or IRC Section R408.1, as applicable.
- e. Attic ventilation is provided when required by IBC Section 1202.2 or IRC Section R806, except when insulation is permitted in unvented attics in accordance with IBC Section 1202.3 or IRC Section R806.5.
- f. Combustion air is provided in accordance with IMC (International Mechanical Code) Section 701.

GacoEZSpray F4500 is an air-impermeable insulation and may be installed in unvented attics, as described in this section, in accordance with IBC Section 1202.3 or IRC Section R806.5, when applied at a minimum thickness of 2.5 inches.

**5.4.2.1 Attics and Crawl Spaces:** GacoEZSpray F4500 insulation may be spray-applied to the underside of the roof sheathing and/or rafters in attics; the underside of wood floors in crawl spaces; and to vertical surfaces in both attics and crawl spaces, as described in this section. The





insulation may be installed without prescriptive thermal or ignition barrier required by IBC Section 2603.4.1.6 or IRC Section R316.5.3 and R316.5.4 when installed as described in this section. The insulation must be covered on all exposed surfaces with intumescent coating as described in Option 1 or 2 below:

Option 1:

Maximum Thickness	Minimum Application Rate
Vertical wall surfaces – 12 inches	0.3 gallon / 100 ft <sup>2</sup> of IFTI DC315 Intumescent Coating (4 mils wft; 3 mils dft)
Underside of roof decks or the underside of floors – 16 inches	

Option 2:

Maximum Thickness	Minimum Application Rate
Vertical wall surfaces – 12 inches	0.4 gallon / 100 ft <sup>2</sup> of No-Burn® Plus ThB Intumescent Coating (6 mils wft; 4 mils dft)
Underside of roof decks or the underside of floors – 16 inches	

**5.4.2.2 Attic Floor Only:** When installation of the insulation is in attic floors only, GacoEZSpray F4500 may be installed exposed (no coating), and without thermal or ignition barrier required by IBC Section 2603.4 and IRC Section R316.5.3, at a maximum thickness of 16 inches based on testing in accordance with ASTM E970 and NFPA 286. The insulation must be separated from the interior occupied space by an approved thermal barrier.

**5.4.2.3 Unvented Attics:** Gaco has conducted end use configuration testing per IBC Section 2603.9 and IRC Section R316.6, and analysis to qualify the use of GacoEZSpray F4500 insulation without a prescriptive ignition barrier or intumescent coating in unvented attics conforming with IBC Section 1202.3 or IRC Section R806.5. The testing and analysis are described in Priest & Associates EEV 10472B, October 5, 2017. The conclusions of that evaluation are as follows: When GacoEZSpray F4500 insulation is applied in unvented attics conforming to IBC Section 1203.3 or IRC Section R806.5, the insulation may be applied to the underside of roof sheathing and/or rafters, and to vertical surfaces to a minimum thickness of 3-1/2 inches. Maximum thickness on

the underside of roof sheathing or on vertical wall surfaces is 16 inches. The insulation may be left exposed to the attic without a prescriptive ignition barrier or an intumescent coating. The attic must have attic access complying with IRC Section R807, horizontally placed in the attic floor and opening outward toward the living space. For items penetrating the roof deck or walls, such as skylight wells or vents, the penetrating item must be covered with a minimum of 3-1/2 inches of GacoEZSpray F4500 insulation.

**5.5 Exterior Walls in Types I, II, III, and IV Construction:** GacoEZSpray F4500 Section 2603.5 may be installed in exterior walls of buildings of Types I, II, III, and IV construction complying with IBC Section 2603.5 and as described in the section. Intertek Design Listing [GWL/FI 30-06](#) describes the assembly certified by Intertek as complying with NFPA 285. Tested wall assemblies were extended to include various wall constructions described in Tables 3 through a third-party engineering analysis. The potential heat of the foam plastic in any portion of the wall must not exceed 484 Btu/ft<sup>2</sup> per inch of insulation thickness. The maximum thickness of insulation is 3-5/8 inches in the interior wall cavities.

**5.6 Duct Insulation:** GacoEZSpray F4500 may be applied to the exterior of residential ducts in attics and crawl spaces in compliance with IRC Section M1601.3. The insulation must be protected in accordance with the ignition barrier requirements of either Section 5.4.1 or 5.4.2.

**6.0 CONDITIONS OF USE**

**6.1** Installation must comply with this Research Report, the manufacturer’s published installation instructions, and the applicable Code. In the event of a conflict, this report governs.

**6.2** The insulation must be separated from the interior living space of the building by a thermal barrier as described in Section 5.3, except as described in Sections 5.3.2 and 5.4.

**6.3** The insulation must not exceed the thicknesses noted in Sections 4.1, 5.3, 5.4, and 5.5 as applicable.

**6.4** Use of the insulation in Types I, II, III, and IV construction must be as described in Section 5.5.





**6.5** Use of the insulation in areas where the probability of termite infestation is "very heavy" must be in accordance with IRC Section R318.4 or IBC Section 2603.8, as applicable.

**6.6** When GacoEZSpray F4500 is installed under the conditions of Section 5.4.2.3 of this report, the following conditions apply:

**6.6.1** Since the performance of GacoEZSpray F4500 insulation, when installed in unvented attics without a Code-prescribed ignition barrier or an intumescent coating, is based on fire performance of an unvented attic, the installation must be approved by the Code Official. The installation must conform with the provisions of Section 5.4.2.3 and conditions a. through c. and condition f. of Section 5.4.2. A copy of the Priest & Associates Engineering Evaluation (referenced in Sections 5.4.2.3 and 7.3) must be provided to the Code Official upon request.

**6.6.2** Signage shall be permanently affixed in the attic and shall be visible from all entry points into the attic. The sign shall state *"Caution, this is an unvented attic by design. No modification may be made to this unvented condition. The attic shall not be vented. Holes into the unvented attic shall be immediately repaired and sealed. Penetrations of the ceiling or wall membrane between the unvented attic and living space, other than the horizontal access hatch, must be protected in an approved manner. This unvented attic shall not be used for storage. See Intertek Code Compliance Research Report CCRR-1107 on the Intertek website"*.

**6.7** Jobsite certification and labeling of the insulation must comply with IRC Section N1101.10, N1101.14, and IECC Sections R303.1 or C303.1 and R401.3, as applicable.

**6.8** The GacoEZSpray F4500 is manufactured under a quality control program with inspections by Intertek Testing Services NA, Inc.

## 7.0 SUPPORTING EVIDENCE

**7.1** Reports of tests in accordance with ASTM C518, ASTM E84, ASTM E2178, ASTM C411, NFPA 285, NFPA 286, NFPA 259, and UL 1715.

**7.2** Priest & Associates Consulting, LLC Evaluation Report 10318E, dated November 6, 2017.

**7.3** Priest & Associates Consulting, LLC Evaluation Report 10472B, dated October 5, 2017.

**7.4** Data in accordance with the ICC-ES Acceptance Criteria for Spray-applied Foam Plastic Insulation (AC 377), dated February 2020, including reports of test in accordance with Appendix X.

**7.5** Data in accordance with ICC 1100 (2019).

**7.6** Research Reports for evaluation of data in accordance with ICC-ES Acceptance Criteria for Fire-protective Coatings Applied to Spray-applied Foam Plastic Insulation Installed without a Code-prescribed Thermal Barrier (AC456), dated October 2015.

**7.7** Intertek Listing Report "GacoEZSpray F4500 Spray-applied Polyurethane Foam Insulation" on the [Intertek Directory of Building Products](#).

## 8.0 IDENTIFICATION

The A and B components of the insulation are identified with the manufacturer's name (Firestone Building Products), address and telephone number, the product name (GacoEZSpray F4500), use instructions, the flame spread and smoke-development indices, the lot number, the Intertek Mark, and the Code Compliance Research Report number (CCRR-1107).

## 9.0 OTHER CODES

This section is not applicable.

## 10.0 CODE COMPLIANCE RESEARCH REPORT USE

**10.1** Approval of building products and/or materials can only be granted by a building official having legal authority in the specific jurisdiction where approval is sought.

**10.2** Code Compliance Research Reports shall not be used in any manner that implies an endorsement of the product by Intertek.

Reference to the <https://bpdirectory.intertek.com> is recommended to ascertain the current version and status of this report.





TABLE 1 - PROPERTIES EVALUATED

PROPERTY	2021 IBC SECTION <sup>1</sup>	2021 IRC SECTION <sup>1</sup>	2021 IECC SECTION <sup>1</sup>
<b>Physical properties</b>	Not required	Not required	Not required
<b>Surface-burning characteristics</b>	2603.3	R316.3	Not applicable
<b>Thermal barrier/ignition barrier</b>	2603.4	R316.4	Not applicable
<b>Air permeability</b>	1202.3	R806.5	C402.4 R402.4
<b>Air Barrier</b>	Not applicable	Not applicable	C402.4.1.2.1 C402.5.1.2.2
<b>Vapor retarder</b>	202, 1404.3.1	R702.7.1	Not applicable
<b>Thermal resistance</b>	1301	N1101.10	C303.1 R303.1
<b>Duct Insulation</b>	Not applicable	N1103.2.1 M1601.3	R403.2.1
<b>Exterior walls of Types I – IV construction</b>	2603.5	Not applicable	Not applicable

<sup>1</sup> Section numbers may be different for earlier versions of the International codes.

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PCA-101



TABLE 2 – THERMAL RESISTANCE (R Values)<sup>1,2,3</sup>

THICKNESSES (inches)	R-VALUE (°F.ft <sup>2</sup> .h/Btu)
1	4.0
2	7.8
3	12
3.5	13
4	15
5.5	21
6	23
7.25	28
8	31
9.25	36
10	38
11.25	43
12	46
13	50
14	54
15	58
16	62

<sup>1</sup> R-values are calculated based on tested K-values at 1 inch and 4-inch thicknesses.

<sup>2</sup> R-values greater than 10 are rounded to the nearest whole number.

<sup>3</sup> To determine R values for thickness not listed:

- a. Between 1 inch and 4 inch can be determined through linear interpolation; or,
- b. Greater than 4 inches can be calculated based on R 3.8/inch.





TABLE 3 – NFPA 285 COMPLYING WALLS WITH GACOEZSPRAY F4500 IN WALL CAVITY

WALL COMPONENTS	MATERIALS
<b>Base wall system</b> Use either 1, 2 or 3	1. Concrete Wall 2. Concrete Masonry wall 3. One-layer of 5/8 in. thick Type X gypsum wallboard installed on the interior side of minimum 3-5/8 in. deep, minimum No. 20 gage steel studs spaced a maximum of 24 in. on center (OC) with lateral bracing every 4 ft. vertically. Openings must be protected with minimum No. 20 gage steel framing. As an option, use nominal 2 x 4 fire-retardant treated woods studs spaced at a maximum 16 in. OC.
<b>Floorline Firestopping</b>	Mineral wool (4.0 lb/ft <sup>3</sup> density) friction fit in each stud cavity and at each floorline.
<b>Cavity Insulation</b>	3-5/8-inch depth or less o GacoEZSpray F4500 applied using sheathing as substrate and covering the width of the cavity and inside the stud flange.
<b>Exterior sheathing</b>	5/8 in. thick Type X exterior gypsum sheathing
<b>Exterior wall covering</b>	1. Any noncombustible exterior wall covering material 2. Any combustible exterior wall covering system that has successfully been tested in accordance with NFPA 285.
<b>Flashing of window, door and other exterior wall openings</b>	As an option, flash around window, door, and other exterior openings with limited amounts of maximum 12-inch-wide flashing tape (acrylic, asphalt or butyl-based) or liquid applied membrane materials with or without fiber mesh reinforcement.