



ACCELLA POLYURETHANE SYSTEMS, LLC.

QuadFoam® 500 OC SPRAY-APPLIED POLYURETHANE FOAM PLASTIC INSULATION

CSI Section:

07 21 00 Thermal Insulation

1.0 RECOGNITION

QuadFoam® 500 OC spray-applied polyurethane foam plastic insulation described in this report has been evaluated for use as thermal insulation and for use in construction Types I through V. The physical properties, thermal resistance, surface burning characteristics, air permeability, fire-resistance-rating, attic and crawl space installations were evaluated for compliance with the following codes and regulations:

- 2015, 2012, 2009, and 2006 International Building Code® (IBC)
- 2015, 2012, 2009, and 2006 International Residential Code® (IRC)
- 2015, 2012, 2009, and 2006 International Energy Conservation Code® (IECC)

2.0 LIMITATIONS

Use of QuadFoam® 500 OC spray-applied polyurethane 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, this evaluation report and the applicable code. If there are any conflicts between the manufacturer’s published installation instructions and this report, the more restrictive shall govern.

2.2 In accordance with Sections 4.6.1 and 4.6.2 of this report, the insulation shall be separated from the interior of the building by a code-complying thermal barrier or ignition barrier or an alternative thermal barrier or ignition barrier assembly, as appropriate.

2.3 The insulation shall not exceed the nominal density and thickness for the installation conditions described in this report.

2.4 During application, the insulation shall be protected from exposure to weather.

2.5 The insulation shall be installed by professional spray polyurethane foam installers approved by Accella

Polyurethane Systems, LLC, or by the Spray Polyurethane Foam Alliance (SPFA).

2.6 Use of the insulation in areas of “very heavy” termite infestation probability shall be in accordance with 2015 IBC Section 2603.8, 2012 IBC Section 2603.9, 2009 or 2006 IBC Section 2603.8, 2015, 2012 or 2009 IRC Section R318.4, or 2006 IRC Section R320.5, as applicable.

2.7 When required by the applicable code, a vapor retarder shall be installed.

2.8 Labeling and jobsite certification of the insulation and coatings shall comply with the following code sections as applicable:

- 2015, 2012 or 2009 IBC Section 2603.2
- 2015, 2012 or 2009 IRC Section R316.2
- 2015 IRC Section N1101.10.1.1
- 2012 IRC Section N1101.12.1.1
- 2009 IRC Section N1101.4.1
- 2015 or 2012 IECC Sections C303.1.1.1 or R303.1.1.1
- 2009 IECC Section 303.1.1.1

2.9 The insulation recognized in this report is produced by Accella Polyurethane Systems, LLC in Spring, Texas.

3.0 PRODUCT USE

QuadFoam® 500 OC spray-applied polyurethane foam plastic insulation complies with IBC Section 2603, IRC Section R316, 2012 IECC Sections C303, C402, R303, and R402, 2009 IECC Sections 303 and 402, and 2006 IECC Section 402. When installed in accordance with Section 4.0 of this report, the foam plastic insulation may be used in wall cavities, floor assemblies or ceiling assemblies, and/or in attics and crawl spaces as nonstructural thermal insulation material. QuadFoam® 500 OC insulation is used in Type V-B construction under the IBC and in one- and two-family dwellings under the IRC.

QuadFoam® 500 OC insulation may also be used in Construction Types I, II, III or IV when installed in accordance with Section 4.6.3 of this report.

QuadFoam® 500 OC Spray-Applied Polyurethane Foam Plastic Insulation may be used as air impermeable insulation when installed in accordance with Section 4.4 of this report.

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 IBC Section 104.11. This document shall only be reproduced in its entirety.





4.0 PRODUCT DESCRIPTION

4.1 Properties: QuadFoam® 500 OC is open cell, spray-applied polyurethane foam plastic insulation in accordance with Section 3.1.1 and Table 1 of AC377. The insulation has a nominal in-place density of 0.5 pcf (8 kg/m³). The two-component spray foam plastic is produced in the field by combining a polymeric isocyanate (A component) and a polymeric resin (B component). The liquid components shall be stored in 55-gallon (208 L) drums at temperatures between 65°F and 85°F (18°C and 29°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): QuadFoam® 500 OC spray-applied polyurethane foam plastic insulation has thermal resistance (R-Value) at a mean temperature of 75°F (24°C) as shown in Table 1 of this report.

Thickness (inch)	R-Value (°f·ft²·h/Btu)
1	3.7
2	7.3
3	11
3.5	13
4	15
5	18
5.5	20
6	22
7	26
7.5	27
8	29
9	33
9.5	35
10	37
11.5	42
12	44
16	59

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-inch and 3.5-inch thicknesses.

4.3 Surface Burning Characteristics: At a maximum thickness of 4 inches (102 mm) and a nominal density of 0.5 pcf (8.0 kg/m³), the QuadFoam® 500 OC insulation yields a flame spread index of 25 or less and smoke-developed index of 450 or less when tested in accordance with ASTM E84. Greater thicknesses, depending on the end use, are recognized when installed in accordance with this report.

4.4 Air Permeability: QuadFoam® 500 OC insulation is classified as air-impermeable insulation when tested in accordance with ASTM E283 at a minimum thickness of 3-inches (76 mm), in accordance with 2015 IBC Section

1203.3, 2015 and 2012 IRC Section R806.5 and 2009 and 2006 IRC Section R806.4.

4.5 Fire- Protective Coatings and Coverings: Fire protective coatings, for use as alternative thermal barriers or ignition barriers, shall be in accordance with Tables 2 and 3 of this report, as applicable, and installed in accordance with Section 4.6 of this report.

4.6 INSTALLATIONS: QuadFoam® 500 OC spray-applied polyurethane foam plastic insulation shall comply with one of the following requirements:

- 2015, 2012 IECC Sections C402.1 (prescriptive)
- 2015, 2012 IECC Section R407 (performance)
- 2009 IECC Sections 402, 405, 502 or 506 as appropriate.

The manufacturer’s published installation instructions for QuadFoam® 500 OC insulation and this report shall be available on the jobsite during installation. Where conflicts occur, the most restrictive governs.

QuadFoam® 500 OC insulation shall be spray-applied on the jobsite using equipment specified in the manufacturer’s published installation instructions. The insulation is applied in multiple passes having a maximum thickness of 6 inches (152 mm) per pass up to the maximum insulation thickness specified in this report. The spray-applied foam plastic insulation shall be allowed to fully expand and cure for a minimum of 15 minutes prior to application of additional passes. The maximum in-service temperature for all areas shall not exceed the maximum temperature stated in the manufacturer’s published installation instructions. The insulation shall be sprayed onto a substrate that is protected and clean from any debris or weather-related conditions during and after application, and shall not be used in electrical outlets or junction boxes or in contact with rain, water, or soil.

4.6.1 Thermal Barrier

4.6.1.1 Application With a Prescriptive Thermal Barrier: QuadFoam® 500 OC Spray-Applied Polyurethane Foam Plastic Insulation in ceiling cavities and in wall cavities shall be separated from the interior by an approved thermal barrier of minimum ½ inch thick (12.7 mm) gypsum wallboard or equivalent 15-minute thermal barrier. The thermal barrier shall comply with, and be installed in accordance with IBC Section 2603.4, 2015, 2012 and 2009 IRC Section R316.4 or 2006 IRC Section 314.4, as applicable.

4.6.1.2 Alternative Thermal Barrier Assemblies: QuadFoam® 500 OC spray applied foam plastic insulation may be installed without a thermal barrier as defined in Section 4.6.1.1 of this report when installed in accordance with Table 2 of this report.



4.6.2 Installation in Attics or Crawl Spaces: QuadFoam® 500 OC Spray-applied Polyurethane Foam Plastic Insulation may be installed in attics or crawl spaces when installed in accordance with this section (Section 4.6.2). The insulation may be installed in unvented attics and unvented enclosed rafter spaces for use as air-impermeable insulation described in Section 4.4 of this report.

When installed in attics or crawl spaces where entry is made only for the service of utilities, QuadFoam® 500 OC insulation may be installed in accordance with this section. QuadFoam® 500 OC insulation need not be surfaced with a thermal barrier; however, such attic and crawl space areas shall be separated from the interior of the building by a thermal barrier in accordance with Section 4.6.1 of this report.

4.6.2.1 Installation Using a Prescriptive Ignition Barrier: When installed within attics or crawl spaces where entry is made only for the service of utilities, QuadFoam® 500 OC spray-applied polyurethane foam plastic insulation shall be covered with a prescriptive ignition barrier in accordance with IBC Section 2603.4.1.6, 2015, 2012 or 2009 IRC Sections R316.5.3 and R316.5.4 or 2006 IRC Sections R314.5.3 and R314.5.4, as applicable.

Exception: The prescriptive ignition barrier may be omitted when installed in accordance with Section 4.6.2.2 or Section 4.6.2.3 of this report.

4.6.2.2 Installation Using an Alternative Ignition Barrier Assembly: QuadFoam® 500 OC Spray-Applied Polyurethane Foam Plastic Insulation may be installed in attics and crawl spaces using an alternative ignition barrier assembly 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 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:

- 2015 IBC Section 1203.3
- 2015 and 2012 IRC Section R806.5
- 2009 IRC Section R806.4

Crawl space ventilation is provided as required by the following code sections as applicable:

- 2015 IBC Section 1203.4
- 2012, 2009 and 2006 IBC Section 1203.3
- 2015, 2012, 2009 and 2006 IRC Section R408.1

- e. The foam plastic insulation is limited to the maximum thickness and density tested.
- f. In accordance with IMC (International Mechanical Code®) Section 701, [2006 IMC Sections 701 and 703], combustion air is provided.
- g. The installed coverage rate or thickness of coatings shall be equal to or greater than described in Section 4.6.2.3 of this report.

4.6.2.3 Installation Using an Alternative Ignition Barrier with Application of Fire-Protective Coatings: QuadFoam® 500 OC Spray-Applied Polyurethane Foam Plastic Insulation may be spray-applied in attics to the underside of roof sheathing or roof rafters, and vertical surfaces; and may be spray-applied in crawl spaces to the underside of floors and vertical surfaces as described in this section. Coating thickness shall be in accordance with Table 3 of this report.

The coating shall be applied over the insulation using airless spray equipment, roller, or a brush in accordance with the coating manufacturer's published installation instructions and this report. The ambient and substrate temperatures shall be minimum 50°F (10°C), and the surface shall be dry, clean, free of dirt and loose debris, and any other substance that could interfere with adhesion of the coating.

4.6.3 Exterior Walls of Types I, II, III or IV Construction (IBC)

4.6.3.1 General: When QuadFoam® 500 OC insulation is used in exterior walls of Types I, II, III or IV construction of any height, the insulation shall comply with IBC Section 2603.5 and this section.

4.6.3.2 Complying Exterior Wall Assemblies: Wall assemblies that comply with Section 2603.5 of the IBC and this Section of this report (Section 4.6.3.2) may be used in non-loadbearing exterior walls of buildings of Type I, II, III or IV construction of any height. The wall assembly shall consist of 3⁵/₈-inch (92 mm) wide, No. 20 gage steel studs, spaced maximum of 24 inches (610 mm) on center. Openings, for windows, doors, etc., shall be framed with minimum No. 20 gage steel framing. The exterior of the wall, and openings, shall be covered with 5⁵/₈-inch (15.9 mm) thick Type X water-resistant-core glass mat gypsum substrate sheathing complying with ASTM C1177 fastened with 1¹/₄-inch (32 mm) long self-tapping screws spaced 8 inches (203 mm) around the perimeter and 12 inches (305 mm) in the field. QuadFoam® 500 OC insulation is spray applied to the full depth of the studs, maximum of 3⁵/₈ inch (92 mm) thick. A layer of 5⁵/₈-inch (15.9 mm) thick Type X gypsum wallboard complying with ASTM C1396 is installed on the interior surface and fastened with 1¹/₄ inch (32 mm) long self-tapping screws spaced 8 inches (203 mm) around the perimeter and 12 inches (305 mm) in the field.



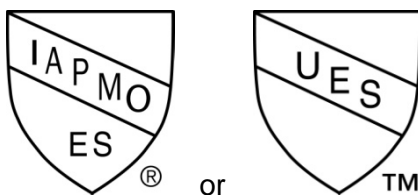
4.7 Non-Loadbearing One-Hour Fire-Resistance-Rated Wall Assemblies: QuadFoam® 500 OC spray-applied polyurethane foam plastic insulation may be used in non-loadbearing one-hour fire-resistance-rated wall assemblies in accordance with this section. Steel studs shall be nominally 5½ inch (140 mm) deep, minimum No. 20 gage, spaced a maximum of 24 inches (610 mm) on-center. The interior of the wall assembly shall be covered with minimum 5/8 inch (15.9 mm) thick Type X gypsum wallboard complying with ASTM C79 fastened with No. 6, 1¼ inch (32 mm) long self-drilling drywall screws spaced 8 inches (203 mm) on-center around the perimeter and 12 inches (305 mm) on-center in the field. The foam plastic insulation shall be spray-applied into the stud cavities to a maximum nominal thickness of 4 inches (102 mm). The exterior of the wall assembly shall be covered with minimum 5/8 inch (15.9 mm) thick Type X exterior gypsum sheathing complying with ASTM C1396 fastened with No. 6, 1¼ inch (32 mm) long self-drilling drywall screws spaced 8 inches (203 mm) on-center around the perimeter and 12 inches (305 mm) on-center in the field. A layer of DuPont Tyvek HomeWrap water-resistive barrier shall be attached over the Type X exterior gypsum sheathing. The water-resistive barrier shall be covered with 5/16-inch (7.9 mm) thick HardiPanel® cement board fastened with screws spaced 6 inches (152 mm) on-center around the perimeter and 12 inches (305 mm) on-center in the field.

5.0 IDENTIFICATION

The spray foam insulation is identified with the following:

- a. Manufacturer's name (Accella Polyurethane Systems, LLC)
- b. address and telephone number,
- c. the product trade name (QuadFoam® 500 OC)
- d. use instructions
- e. density, flame-spread and smoke-development indices
- f. date of manufacture or batch/run number
- g. thermal resistance values
- h. the evaluation report number (ER-590)
- i. the name or logo of the inspection agency

Either mark of conformity may be used as shown below:



IAPMO UES ER-590

6.0 SUBSTANTIATING DATA

6.1 Data in accordance with the ICC-ES Acceptance Criteria for Spray-applied Foam Plastic Insulation, AC377, dated April 2016, including Appendix X.

6.2 Reports of room corner fire testing in accordance with NFPA 286.

6.3 Reports of Fire Tests of Building Construction in accordance with ASTM E119.

6.4 Report of air permeance testing in accordance with ASTM E283.

7.0 CONTACT INFORMATION

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8.0 STATEMENT OF RECOGNITION

This evaluation report describes the results of research carried out by IAPMO Uniform Evaluation Service on QuadFoam® 500 OC to assess its conformance to the codes and standards shown in Section 1.0 of this report and documents the product's certification. Products are manufactured at locations noted in Section 2.9 of this report under a quality control program with periodic inspection under the supervision of IAPMO UES.

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



TABLE 2 - ALTERNATIVE THERMAL BARRIER ASSEMBLIES²

FIRE-PROTECTIVE COATING/COVERING ¹			MAXIMUM SPF THICKNESS (inch)	
TYPE	MINIMUM THICKNESS (mils)	THEORETICAL APPLICATION RATE	WALLS AND VERTICAL SURFACES	CEILING AND OVERHEAD SURFACES
DC315 ³	22 WFT	76 ft ² /gal.	10	11.5
Fireshell® BMS TC ⁴	20 WFT (12 DFT)	83 ft ² /gal.	7.5	9.5

For SI: 1 inch = 25.4 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 Potential Heat of QuadFoam® 500 OC was 11,717.96 BTU/lb.

³ International Fireproof Technology, Inc, recognized in [IAPMO UES ER-499](#).

⁴ TPR² Corporation, (requires verification of a current evaluation report from an approved evaluation body).

**TABLE 3
ALTERNATIVE IGNITION BARRIER ASSEMBLIES**

FIRE-PROTECTIVE COATING/COVERAGE ¹			MAXIMUM SPF THICKNESS (inch)	
TYPE	MINIMUM THICKNESS (mils)	THEORETICAL APPLICATION RATE	WALLS AND VERTICAL SURFACES	CEILINGS AND OVERHEAD SURFACES
No Burn Plus XD ²	6 WFT (4 DFT)	267 ft ² /gal.	11.25	16
Bayseal IC ³	6 WFT (4 DFT)	200 ft ² /gal.	11.25	16
Flame Seal FS-IB™ ⁴	7.5 WFT (4 DFT)	200 ft ² /gal.	12	16
Fireshell IB ^{4 5}	5 WFT (3.5 DFT)	83 ft ² /gal.	7.5	9.5
Fireshell® BMS IC ⁵	7 WFT (4 DFT)	230 ft ² /gal.	7.0	9.5

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

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

² No-Burn, Inc., recognized in [IAPMO UES ER-305](#).

³ Covestro LLC, (requires verification of a current evaluation report from an approved evaluation body).

⁴ Flame Seal Products, Inc., (requires verification of a current evaluation report from an approved evaluation body).

⁵ TPR² Corporation, (requires verification of a current evaluation report from an approved evaluation body).