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# ICC-ES Evaluation Report

# ESR-3470

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

**REPORT HOLDER:**

**DEMILEC (USA) INC.**

**3315 EAST DIVISION STREET  
ARLINGTON, TEXAS 76011**

**EVALUATION SUBJECT:**

**DEMILEC APX™ SPRAY-APPLIED POLYURETHANE FOAM INSULATION**



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**DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION**

**Section: 07 21 00—Thermal Insulation**

**REPORT HOLDER:**

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**EVALUATION SUBJECT:**

**DEMILEC APX™ SPRAY-APPLIED POLYURETHANE FOAM INSULATION**

**1.0 EVALUATION SCOPE**

**1.1 Compliance with the following codes:**

- 2015, 2012 and 2009 *International Building Code*® (IBC)
- 2015, 2012 and 2009 *International Residential Code*® (IRC)
- 2015, 2012 and 2009 *International Energy Conservation Code*® (IECC)
- 2013 *Abu Dhabi International Building Code* (ADIBC)<sup>†</sup>

<sup>†</sup>The ADIBC is based on the 2009 IBC. 2009 IBC code sections referenced in this report are the same sections in the ADIBC.

- Other Codes (see Section 8.0)

**Properties evaluated:**

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

**1.2 Evaluation to the following green standard:**

2008 ICC 700 *National Green Building Standard*™ (ICC 700-2008)

**Attributes verified:**

See Section 3.1

**2.0 USES**

Demilec APX™ spray-applied polyurethane foam insulation is used as a nonstructural thermal insulating

material in Type V-B construction under the IBC and in dwellings under the IRC. The insulation is for use in wall cavities, floor/ceiling assemblies, or attics and crawl spaces when installed in accordance with Section 4.0. Under the IRC, the insulation may be used as air-impermeable insulation when installed in accordance with Section 3.4.

**3.0 DESCRIPTION**

**3.1 General:**

Demilec APX™ spray-applied foam insulation is semi-rigid, low-density, polyurethane foam plastic installed as a component of floor/ceiling and wall assemblies. The insulation is a two-component spray foam plastic with a nominal in-place density of 0.5 pcf (8 kg/m<sup>3</sup>). The insulation is produced in the field by combining a polymeric isocyanate (A-PMDI™ component) with a polymeric resin (APX™ B-Side Resin). The insulation liquid components are supplied in 55-gallon (208 L) drums and/or 250-gallon (946 L) totes. The A-PMDI™ component must be stored at temperatures between 50°F (10°C) and 100°F (38°C) and has a shelf life of one year when stored in factory-sealed containers at these temperatures. The APX™ B-Side Resin must be stored at temperatures between 50°F (10°C) and 100°F (38°C) and has a shelf life of six months when stored in factory-sealed containers at these temperatures.

The attribute of the insulation has been verified as conforming to the provision of ICC 700-2008 Section 703.2.1.1.1(c) as an air impermeable insulation. Note that decisions on compliance for those areas rest with the user of this report. The user is advised of the project-specific provisions that may be contingent upon meeting specific conditions, and the verification of those conditions is outside the scope of this report. These codes or standards often provide supplemental information as guidance.

**3.2 Surface-burning Characteristics:**

The insulation, at a maximum thickness of 4 inches (102 mm) and a nominal density of 0.5 pcf (8 kg/m<sup>3</sup>), 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. Greater thicknesses are recognized as described in Sections 4.3 and 4.4. The thickness of Demilec APX™ foam is not limited when the insulation is separated from the interior of the building by a prescriptive thermal barrier such as 1/2-inch-thick (12.7 mm) gypsum board.

**3.3 Thermal Resistance, R-values:**

The insulation has thermal resistance (*R*-value) at a mean temperature of 75°F (24°C) as shown in Table 1.

### 3.4 Air Permeability:

Demilec APX™ spray-applied polyurethane foam insulation, at a minimum thickness of 3 1/2 inches (89 mm), is considered air-impermeable insulation in accordance with 2015 IBC Section 1203.3 or 2015 and 2012 IRC Section R806.5 (2009 IRC Section R806.4), based on testing in accordance with ASTM E283 and ASTM E2178.

### 3.5 Blazelok™ TBX Intumescent Coating:

Blazelok™ TBX intumescent coating (see [ESR-3997](#)), manufactured by TPR<sup>2</sup> Corporation, is a one-component, water-based liquid-applied intumescent coating. Blazelok™ TBX is supplied in 5-gallon (19 L) pails and 55-gallon (208 L) drums and has a shelf life of one year when stored in factory-sealed containers at temperatures between 50°F (10°C) and 80°F (24°C).

### 3.6 DC 315 Intumescent Coating:

DC 315 intumescent coating (see [ESR-3702](#)), manufactured by International Fireproof Technology, Inc., is a water-based coating supplied in 5-gallon (19L) pails and 55-gallon (208L) drums. The coating material has a shelf life of one (1) year when stored in factory-sealed containers at temperatures between 50°F (10°C) and 80°F (24°C).

## 4.0 DESIGN AND INSTALLATION

### 4.1 General:

Demilec APX™ spray-applied foam insulation must be installed in accordance with the Center for Polyurethane Industries' *Guidance on Best Practices for the Installation of Spray Polyurethane Foam*, the manufacturer's published technical data sheet and product application guide, and this report. A copy of each must be available at all times on the jobsite during installation.

### 4.2 Application:

The Demilec APX™ insulation is spray-applied on the jobsite using a volumetric positive displacement pump as identified in the Demilec application guide. The insulation must be applied when the ambient and substrate temperatures are higher than 45°F (7.2°C). The insulation must not be used in areas that have a maximum in-service temperature higher than 180°F (82°C). 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 to the maximum thickness in a single pass. Where insulation is used as an air-impermeable insulation, such as in unvented attic assemblies under 2015 IBC Section 1203.3 or 2015 and 2012 IRC Section R806.5 (2009 IRC Section R806.4), the insulation must be installed at a minimum thickness of 3 1/2 inches (89 mm).

### 4.3 Thermal Barrier:

#### 4.3.1 Application with a Prescriptive Thermal Barrier:

Demilec APX™ spray foam insulation must be separated from the interior of the building by an approved thermal barrier of 1/2-inch-thick (12.7 mm) gypsum wallboard or an equivalent 15-minute thermal barrier complying with, and installed in accordance with, IBC Section 2603.4 or IRC Section R316.4, as applicable, except where insulation is in an attic or crawl space as described in Section 4.4. Demilec APX™ foam thickness is not limited when the insulation is separated from the interior of the building by an approved thermal barrier, based on fire testing in accordance with NFPA 286 and AC377.

#### 4.3.2 Application without a Thermal or Ignition Barrier:

Agribalance® spray foam insulation may be installed without the prescriptive 15-minute thermal barrier or ignition barrier described in Section 4.3.1 or Section 4.4.1, respectively when installation is in accordance with the following:

**4.3.2.1** The insulation must be covered on all 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.

**4.3.2.3** The coating must be applied over the insulation in accordance with the coating manufacturer's instructions and this report.

### 4.4 Attics and Crawl Spaces:

#### 4.4.1 Application with a Prescriptive Ignition Barrier:

When Demilec APX™ spray foam 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 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. Demilec APX™ spray-applied foam insulation as described in this section may be installed in unvented attics in accordance with 2015 IBC Section 1203.3 or 2015 and 2012 IRC Section R806.5 (2009 IRC Section R806.4), as applicable.

#### 4.4.2 Application without a Prescriptive Ignition Barrier:

Where Demilec APX™ spray-applied foam insulation is installed in accordance with this section and Section 4.4.2.2, the following conditions apply:

- Entry to the attic or crawl space is only to service utilities, and no storage is permitted.
- There are no interconnected attic or crawl space areas.
- Air in the attic or crawl space is not circulated to other parts of the building.
- Under-floor (crawl space) ventilation is provided when required by 2015 IBC Section 1203.4 (2012 and 2009 IBC Section 1203.3) or IRC Section R408.1, as applicable.
- Attic ventilation is provided when required by IBC Section 1203.2 or IRC Section R806, except when air-impermeable insulation is permitted in unvented attics in accordance with 2015 IBC Section 1203.3 or 2015 and 2012 IRC Section R806.5 (2009 Section R806.4) or Section 1203.2 of the IBC as applicable.
- Combustion air is provided in accordance with IMC (International *Mechanical Code*®) Section 701.

#### 4.4.2.1 Attics and Crawl Spaces:

In attics and crawl spaces, the insulation may be spray-applied to the underside of the roof sheathing and/or rafters, to the underside of wood floors and to vertical surfaces as described in this section. The thickness of the foam plastic applied to the underside of the top of the space must not exceed 1 3/4 inches (298 mm), and the thickness when applied to vertical surfaces must not exceed 7 3/4 inches (197 mm). The insulation does not require an ignition barrier or coating.

**4.4.2.2 Use on Attic Floors:** The spray-applied foam insulation may be installed at a maximum thickness of

11<sup>3</sup>/<sub>4</sub> inches (197 mm) between and/or over floor joists in attic floors without an ignition barrier, coating or covering. Demilec APX™ spray foam insulation may be applied to a maximum thickness of 11<sup>3</sup>/<sub>4</sub> inches (298 mm) on the attic floor between and/or over the joists when a prescriptive ignition barrier is installed in accordance with IBC Section 2603.4.1.6 or IRC Section 316.5.3. The insulation must be separated from the interior by an approved thermal barrier.

## 5.0 CONDITIONS OF USE

The Demilec APX™ spray foam 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 products must be installed in accordance with the Center for Polyurethane Industries' *Guidance on Best Practices for the Installation of Spray Polyurethane Foam*, the manufacturer's published technical data sheet and product application guide, this evaluation report and the applicable code. If there are any conflicts between other published guides and this report, this report governs.
- 5.2 The insulation must be separated from the interior of the building by an approved 15-minute thermal barrier as described in Section 4.3.1, except when installation is as described in Section 4.3.2 or in attics and crawl spaces as described in Section 4.4.
- 5.3 The insulation must not exceed the thicknesses noted in Sections 3.2, 4.2, 4.3 and 4.4.
- 5.4 The insulation must be protected from exposure to weather during and after application.
- 5.5 The insulation must be applied by contractors authorized by Demilec (USA) Inc.
- 5.6 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 2015 and 2009 IBC Section 2603.8 (2012 IBC Section 2603.9), as applicable.
- 5.7 A vapor retarder must be installed in accordance with the applicable code.
- 5.8 Jobsite certification and labeling of the insulation must comply with 2015 IRC Sections N1101.10.1 and N1101.10.1.1 (2012 IRC Sections N1101.12.1 and N1101.12.1.1 or 2009 IRC Sections N1101.4 and N1101.4.1) and 2015 and 2012 IECC Sections C303.1.1, C303.1.1.1, R303.1.1 and R303.1.1.1 (2009 IECC Sections 303.1.1 and 303.1.1.1), as applicable.
- 5.9 The insulation is produced in Arlington, Texas, 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, including reports of tests in accordance with Appendix X of AC377.
- 6.2 Reports of air leakage testing in accordance with ASTM E283.
- 6.3 Reports of air permeance tests in accordance with ASTM E2178.
- 6.4 Reports of room corner tests in accordance with NFPA 286.

## 7.0 IDENTIFICATION

Components of the spray foam insulation are identified with the manufacturer's name (Demilec (USA) Inc.), address and telephone number; the product name (Demilec APX™ B-Side Resin or A-PMDI™); use instructions; the density; the flame-spread and smoke-developed indices; the date of manufacture; thermal resistance values; and the evaluation report number (ESR-3470).

The TPR<sup>2</sup> Corporation Blazelok™ TBX intumescent coating is identified with the manufacturer's name, the product trade name, use instructions and ICC-ES Evaluation Report number ESR-3997.

The International Fireproof Technology/Paint To Protect, Inc. DC 315 intumescent coating is identified with the manufacturer's name, the product trade name, use instructions and ICC-ES Evaluation Report number ESR-3702.

## 8.0 OTHER CODES

In addition to the codes referenced in Section 1.0, the products recognized in this report have also been evaluated in accordance with the following codes:

- 2006 and 2003 *International Building Code*® (IBC)
- 2006 and 2003 *International Residential Code*® (IRC)
- 2006 and 2003 *International Energy Conservation Code*® (IECC)

The products comply with the above-mentioned codes as described in Sections 2.0 through 7.0 of this report except as noted below:

- **Application with a prescriptive thermal barrier:** See Section 4.3.1, except the approved thermal barrier must be installed in accordance with Section R314.4 of the 2006 IRC or Section R314.1.12 of the 2003 IRC.
- **Application with a prescriptive ignition barrier:** See Section 4.4.1, except attics must be vented in accordance with Section 1203.2 of the 2006 and 2003 IBC or Section R806 of the 2003 IRC, and crawl space ventilation must be in accordance with IBC Section 1203.3 of the 2006 and 2003 IBC or IRC Section R408, as applicable. Additionally, an ignition barrier must be installed in accordance with Section R314.5.3 or R314.5.3 of the 2006 IRC or Section R314.2.3 of the 2003 IRC, as applicable.
- **Application without a prescriptive ignition barrier:** See Section 4.4.2, except attics must be vented in accordance with Section 1203.2 of the 2006 and 2003 IBC or Section R806 of the IRC, and crawl space ventilation must be in accordance with Section 1203.3 of the 2006 and 2003 IBC or Section R408 of the IRC, as applicable.
- **Protection against termites:** See Section 5.6, except use of the insulation in areas where the probability of termite infestation is "very heavy" must be in accordance with Section R320.5 of the 2006 IRC or Section R320.4 of the 2003 IRC.
- **Jobsite certification and labeling:** See Section 5.9, except jobsite certification and labeling must comply with Sections 102.1.1 and 102.1.11, as applicable, of the 2006 IECC.

TABLE 1—THERMAL RESISTANCE (R-VALUES)

THICKNESS (inches)	R-VALUE (°F.ft <sup>2</sup> .h/Btu)
1	3.7
3.5	12
4	14
5.5	19
7.5	26
8.75	30
11	38
14.25	49

For SI: 1 inch = 25.4 mm; 1 °F.ft<sup>2</sup>.h/Btu = 0.176 110 °K.m<sup>2</sup>/W.

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

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

INSULATION TYPE	MAXIMUM THICKNESS (in.) (Vertical Surfaces)	MAXIMUM THICKNESS (in.) (Overhead Surfaces)	COATING TYPE & MINIMUM THICKNESS <sup>1</sup> (Applied to all Foam Surfaces)	MINIMUM THEORETICAL APPLICATION RATE OF COATING <sup>2</sup>
Demilec APX™	7½	11½	Blazelok TBX 11 mils DFT 17 mils WFT	1.2 gal / 100 ft <sup>2</sup>
Demilec APX™	8	10	DC 315 13 mils DFT 20 mils WFT	1.25 gal / 100 ft <sup>2</sup>

For SI: 1 inch = 25.4 mm; 1 mil = 0.0254 mm; 1 gallon = 3.38 L; 1 ft<sup>2</sup> = 0.93 m<sup>2</sup>.

**Notes:**

<sup>1</sup>DFT = Dry Film Thickness; WFT = Wet Film Thickness

<sup>2</sup> As reported in the manufacturer's application instructions. Actual application rate, based on specific project conditions, must be in accordance with the manufacturer's application instructions.