ICC-ES Evaluation Report

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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

Compliance with the following codes:

- 2012 and 2009 *International Building Code*® (IBC)
- 2012 and 2009 *International Residential Code*® (IRC)
- 2012 and 2009 *International Energy Conservation Code*® (IECC)
- Other Codes (see Section 8.0)

Properties evaluated:

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

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^3). 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 50ºF (10ºC) and 100ºF (38ºC) 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 50ºF (10ºC) and 100ºF (38ºC) and has a shelf life of six months when stored in factory-sealed containers at these temperatures.

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^3), 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 75ºF (24ºC) 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 2012 IRC Section R806.5 or 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, manufactured by TPR^2 Corporation, is a one-component, water-based liquid coating with specific gravity of 1.3. 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 45ºF (7ºC) and 90ºF (32ºC).

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 45ºF (7.2ºC). The insulation must not be used in areas that have a maximum in-service temperature higher than 180ºF (82ºC). 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 2012 IRC Section R806.5 or 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: The prescriptive 15-minute thermal barrier or ignition barrier may be omitted when installation is in accordance with this section. Demilec APX™ spray foam insulation and Blazelok™ TBX intumescent coating may be spray-applied to the interior facing of walls and the underside of roof sheathing or roof rafters, and in crawl spaces, and may be left exposed as an interior finish without a prescribed 15-minute thermal barrier or ignition barrier. The foam plastic insulation thickness must not exceed $7^1/_2$ inches (191 mm) in walls and $11^1/_2$ inches (292 mm) in floors and ceilings. All foam surfaces must be covered with an 11-mil dry thickness (0.28 mm) [17 mils wet thickness (0.43 mm)] of Blazelok™ TBX intumescent coating, described in Section 3.5. The intumescent coating must be spray-applied over the insulation in accordance with the coating manufacturer's instructions and this report at a rate of 85 square feet per gallon (2.09 m^2/ L) to obtain the recommended minimum dry film thickness noted in this section.

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 2012 IRC Section R806.5 or 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:

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 1203.3 or IRC Section R408.1, as applicable.

e. 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 2012 IRC Section R806.5 or 2009 Section R806.4 or Section 1203.2 of the IBC as applicable.

f. 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 $11^3/_4$ 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 $11^3/_4$ 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 $11^3/_4$ 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 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 LLC.

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 2012 IBC Section 2603.9 or 2009 IBC Section 2603.8, 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 IRC Sections N1101.4 and N1101.4.1 or IECC Section R401.3, 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 November 2012, 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 LLC), 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; the evaluation report number (ESR-3470).

Each pail of the Blazelok™ TBX intumescent coating is labeled with the manufacturer's name (TPR^2 Corporation), the product name, and use instructions.

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^2.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^2.h/Btu = 0.176 110 °K.m^2/W.

[1] *R*-values are calculated based on tested *K*-values at 1- and 4-inch thicknesses.