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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:

HUNTSMAN BUILDING SOLUTIONS

EVALUATION SUBJECT:

APX™ SPRAY-APPLIED POLYURETHANE FOAM INSULATION

1.0 EVALUATION SCOPE

1.1 Compliance with the following codes:

- 2021, 2018, 2015, 2012 and 2009 *International Building Code*® (IBC)
- 2021, 2018, 2015, 2012 and 2009 *International Residential Code*® (IRC)
- 2021, 2018, 2015, 2012 and 2009 *International Energy Conservation Code*® (IECC)
- 2013 *Abu Dhabi International Building Code* (ADIBC)†

†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

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:

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. The APX™ spray-applied foam insulation meets or exceeds the minimum requirements set forth in Section 2603.1.1 of the 2021 IBC.

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^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 (UL 723). Greater thicknesses are recognized as described in Sections 4.3 and 4.4. The thickness of 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:

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 2021 and 2018 IBC Section 1202.3 [2015 IBC Section 1203.3] or 2021, 2018, 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 or Fireshell® F10E Coating:

Blazelok™ TBX or Fireshell® F10E coating (see ESR-3997), manufactured by ICP Construction, is a one-component, water-based liquid-applied intumescent coating. Blazelok™ TBX or Fireshell® F10E 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 Coating:

DC 315 coating (see ESR-3702), manufactured by International Fireproof Technology, Inc. / Paint to Protect Inc., is a water-based intumescent 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 45°F (7.2°C) and 95°F (35°C).

4.0 DESIGN AND INSTALLATION

4.1 General:

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 APX™ insulation is spray-applied on the jobsite using a volumetric positive displacement pump as identified in the Huntsman Building Solutions 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 2021 and 2018 IBC Section 1202.3 (2015 IBC Section 1203.3) or 2021, 2018, 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: 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. 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: APX™ 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 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. APX™ spray-applied foam insulation as described in this section may be installed in unvented attics in accordance with 2021 and 2018 IBC Section 1202.3 [2015 IBC Section 1203.3] or 2021, 2018, 2015 and 2012 IRC Section R806.5 (2009 IRC Section R806.4), as applicable.

4.4.2 Application without a Prescriptive Ignition Barrier: Where 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 2021 and 2018 IBC Section 1202.4 [2015 IBC Section 1203.4 (2012 and 2009 IBC Section 1203.3)] or IRC Section R408.1, as applicable.

e. Attic ventilation is provided when required by 2021 and 2018 IBC Section 1202.2 (2015, 2012 and 2009 IBC Section 1203.2) or IRC Section R806, except when air-impermeable insulation is permitted in unvented attics in accordance with 2021 and 2018 IBC Section 1202.3 (2015 IBC Section 1203.3) or 2021, 2018, 2015 and 2012 IRC Section R806.5 (2009 Section R806.4), 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. 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 R316.5.3. The insulation must be separated from the interior by an approved thermal barrier.

5.0 CONDITIONS OF USE

The 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 Huntsman Building Solutions, 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 2021, 2018, 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 2021, 2018, or 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 2021, 2018, 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 Installation in unvented attics, when equipped with vapor diffusion ports in accordance with Section 1202.3, Item 5.2 of the 2021 IBC and Section R806.5, Item 5.2 of the 2021 and 2018 IRC, is outside the scope of this report.

5.10 The insulation is produced in Arlington, Texas and Boisbriand, Quebec, Canada, under a quality-control programs 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 2020 (editorially revised July 2020), 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

7.1 Components of the spray foam insulation shall be identified with the report holder's name (Huntsman Building Solutions, LLC), address and telephone number; the product name (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; ICC-ES mark of conformity; and the evaluation report number (ESR-3470). The evaluation report number, ICC-ES ESR-3470, may be used in lieu of the mark conformity.

The ICP Construction, Blazelok™ TBX or Fireshell® F10E intumescent coating is identified with the manufacturer's name, the product trade name, date of manufacture, shelf life or expiration date, manufacturer's instructions for application and evaluation report number (ESR-3997).

The International Fireproof Technology, Inc. / Paint To Protect, Inc., DC 315 intumescent coating is identified with the manufacturer's name, the product trade name, shelf life or expiration date, manufacturer's instructions for application and evaluation report number (ESR-3702).

7.2 The report holder's contact information is the following:

HUNTSMAN BUILDING SOLUTIONS, LLC
3315 EAST DIVISION STREET
ARLINGTON, TEXAS 76011
(817) 640-4900
info@huntsmanbuilds.com
www.huntsmanbuilds.com

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.

TABLE 2—USE OF INSULATION WITHOUT A PRESCRIPTIVE THERMAL BARRIER (TESTED IN ACCORDANCE WITH NFPA 286)[1]

INSULATION TYPE	MAXIMUM THICKNESS (in.) (Vertical Surfaces)	MAXIMUM THICKNESS (in.) (Overhead Surfaces)	COATING TYPE & MINIMUM THICKNESS (Applied to all Foam Surfaces)[2,3]	MINIMUM APPLICATION RATE OF COATING
APX™	$7^1/_2$	$11^1/_2$	Blazelok TBX or Fireshell® F10E 11 mils DFT 17 mils WFT	1.2 gal / 100 ft^2
APX™	8	10	DC 315 13 mils DFT 20 mils WFT	1.25 gal / 100 ft^2

For **SI:** 1 inch = 25.4 mm; 1 mil = 0.0254 mm; 1 gallon = 3.38 L; 1 ft^2 = 0.093 m^2.

Notes:

[1]See Section 4.3.2.

[2]See Section 3.5 and 3.6.

[3]DFT = Dry Film Thickness; WFT = Wet Film Thickness

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Section: 07 21 00—Thermal Insulation

REPORT HOLDER:

HUNTSMAN BUILDING SOLUTIONS

EVALUATION SUBJECT:

APX™ SPRAY-APPLIED POLYURETHANE FOAM INSULATION

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that the APX™ spray-applied polyurethane foam insulation, described in ICC-ES evaluation report ESR-3470, have also been evaluated for the codes noted below.

Applicable code editions:

- 2019 *California Building Code* (CBC)

For evaluation of applicable chapters adopted by the California Office of Statewide Health Planning and Development (OSHPD) and Division of the State Architect (DSA), see Sections 2.1.1 and 2.1.2 below.

- 2019 *California Residential Code* (CRC)
- 2019 *California Energy Code* (CEC)

2.0 CONCLUSIONS

2.1 CBC and CRC:

The APX™ spray-applied polyurethane foam insulation, described in Sections 2.0 through 7.0 of the evaluation report ESR-3470, comply with the 2019 CBC and CRC, provided the design and installation are in accordance with the 2018 *International Building Code*® (IBC) and 2018 *International Residential Code*® (IRC) provisions noted in the evaluation report.

2.1.1 OSHPD:

The applicable OSHPD Sections and Chapters of the CBC are beyond the scope of this supplement.

2.1.2 DSA:

The applicable DSA Sections and Chapters of the CBC are beyond the scope of this supplement.

2.2 CEC:

The APX™ spray-applied polyurethane foam insulation, described in Sections 2.0 through 7.0 of the evaluation report ESR-3470, comply with the 2019 CEC, provided the design and installation are in accordance with the 2018 *International Building Code*® (IBC) provisions noted in the evaluation report.

2.2.1 Conditions of Use:

In accordance with Section 110.8 of the 2019 California Energy Code, verification of certification by the Department of Consumer Affairs, Bureau of Household Goods and Services, must be provided to the code official, demonstrating that the insulation conductive thermal performance is approved pursuant to the California Code of Regulations, Title 24, Part 12, Chapters 12-13, Article 3, “Standards for Insulating Material.” Certification can be verified with the DCA Bureau of Household Goods and Services using the following link to the bureau’s Directory of Certified Insulation Materials: https://bhgs.dca.ca.gov/consumers/ti_directory.pdf

This supplement expires concurrently with the evaluation report, reissued March 2021 and revised October 2021.