



*Most Widely Accepted and Trusted*

# ICC-ES Evaluation Report

# ESR-4073

ICC-ES | (800) 423-6587 | (562) 699-0543 | [www.icc-es.org](http://www.icc-es.org)

Reissued 08/2018  
This report is subject to renewal 08/2019.

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

**REPORT HOLDER:**

**DEMILEC (USA) INC.**

**EVALUATION SUBJECT:**

**HEATLOK® HFO HIGH LIFT SPRAY FOAM INSULATION**



*“2014 Recipient of Prestigious Western States Seismic Policy Council (WSSPC) Award in Excellence”*



*ICC-ES Evaluation Reports are not to be construed as representing aesthetics or any other attributes not specifically addressed, nor are they to be construed as an endorsement of the subject of the report or a recommendation for its use. There is no warranty by ICC Evaluation Service, LLC, express or implied, as to any finding or other matter in this report, or as to any product covered by the report.*



# ICC-ES Evaluation Report

**ESR-4073**

Reissued August 2018

This report is subject to renewal August 2019.

[www.icc-es.org](http://www.icc-es.org) | (800) 423-6587 | (562) 699-0543

A Subsidiary of the International Code Council®

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

### Section: 07 21 00—Thermal Insulation

#### REPORT HOLDER:

DEMILEC (USA) INC.

#### EVALUATION SUBJECT:

HEATLOK® HFO HIGH LIFT SPRAY FOAM INSULATION

## 1.0 EVALUATION SCOPE

### Compliance with the following codes:

- 2018, 2015, 2012 and 2009 *International Building Code*® (IBC)
- 2018, 2015, 2012 and 2009 *International Residential Code*® (IRC)
- 2018, 2015, 2012 and 2009 *International Energy Conservation Code*® (IECC)

### Property evaluated:

- Surface-burning characteristics
- Physical properties
- Thermal resistance
- Attic and crawl space installation
- Water vapor transmission
- Air permeability
- Exterior walls in Types I through IV construction

## 2.0 USES

Demilec Heatlok® HFO closed cell spray foam is a spray-applied polyurethane foam plastic insulation used as a nonstructural thermal insulating material in Types I, II, III, IV and V construction under the IBC and in dwellings under the IRC. The insulation is intended for use in wall cavities, floor/ceiling assemblies, or attics and crawl spaces when installed in accordance with Section 4.4. Under the IRC and 2018 and 2015 IBC, the insulation may be used as air-impermeable insulation when installed in accordance with Section 3.5. The insulation also may be used in exterior walls of Type I, II, III or IV construction when used as described in Section 4.5.

## 3.0 DESCRIPTION

### 3.1 General:

Demilec Heatlok® HFO product is a rigid, medium-density, spray-applied cellular polyurethane foam plastic insulation

installed as a component of wall assemblies, ceilings, floors, crawlspaces and cavities of roofs. The foam plastic insulation is a two-component, closed-cell, one-to-one by volume spray foam system with a nominal density of 2.0 pcf (32 kg/m<sup>3</sup>). The insulation is produced in the field by combining a polymeric isocyanate (A component) with a polymeric resin blend (B component). The insulation components have a shelf life of six months when stored in factory-sealed containers at temperatures between 50°F (10°C) and 80°F (26°C).

### 3.2 Surface-burning Characteristics:

Demilec Heatlok® HFO product, at a maximum thickness of 4 inches (102 mm) and a nominal density of 2.0 pcf (32 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 (UL 723). There are no thickness limitations when insulation is covered by a code-prescribed 15-minute thermal barrier.

### 3.3 Thermal Resistance (R-values):

Demilec Heatlok® HFO product has thermal resistance (R-value), at a mean temperature of 75°F (24°C), as shown in Table 1.

### 3.4 Vapor Permeance:

Demilec Heatlok® HFO has a vapor permeance of 1.0 perm or greater and less than 10 perms when applied at a minimum of 1 inch (25.4 mm) thickness and may be used where a Class III vapor retarder is required by the applicable code.

### 3.5 Air Permeability:

Demilec Heatlok® HFO foam plastic insulation, at a minimum 1-inch (25.4 mm) thickness, is considered air-impermeable insulation in accordance with 2018, 2015 and 2012 IRC Section R806.5 (2009 IRC Section R806.4) and 2018 IBC Section 1202.3 [2015 IBC Section 1203.3] based on testing in accordance with ASTM E283.

### 3.6 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 coating. The coating is supplied in 5-gallon (19 L) pails and 55-gallon (208 L) drums and has a shelf life of (1) year when stored in factory-sealed containers at temperatures between 45°F (7°C) and 95°F (35°C).

### 3.7 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 and 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 Design:

Demilec Heatlok® HFO product must be installed in accordance with the manufacturer's published installation instructions and this report. A copy of the manufacturer's published installation instructions must be available at all times on the jobsite during installation.

### 4.2 Application:

The insulation is spray-applied on the jobsite using equipment identified in the manufacturer's published installation instructions. The Demilec Heatlok® HFO product must be applied when the ambient and substrate temperature is between 50°F (10°C) and 100°F (38°C). The insulation must not be used in areas that have a maximum service temperature greater than 180°F (82°C). The foam plastic insulation must not be used in electrical outlet or junction boxes or in continuous contact with rain or water. The substrate must be free of moisture, frost or ice, loose scales, rust, oil and grease, or contaminants that will interfere with adhesion of the spray foam insulation. The Demilec Heatlok® HFO product may be applied in passes having a maximum thickness of 6½ inches (165 mm) per pass. When multiple passes are required, subsequent passes can be sprayed once the core temperature drops below 100°F (37.7°C).

### 4.3 Thermal Barrier:

**4.3.1 Application with a Prescriptive Thermal Barrier:** Demilec Heatlok® HFO insulation must be separated from the interior of the building by an approved thermal barrier of ½-inch-thick (12.7 mm) gypsum wallboard or an equivalent thermal barrier complying with and installed in accordance with the applicable code except where the installation complies with the requirements set forth in Section 4.3.2. When installation is within an attic or crawl space as described in Section 4.4, a thermal barrier is not required between the foam plastic and the attic or crawl space, but is required between the insulation and the interior of the building.

There is no thickness limit when installed behind a code-prescribed thermal barrier except as noted in Section 4.4.2.1.

**4.3.2 Application without a Prescriptive Thermal Barrier:** Heatlok® HFO 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.

**4.3.3** The coating must be applied over the insulation in accordance with the coating manufacturer's instructions and respective ICC-ES evaluation report for the coating and this report.

### 4.4 Ignition Barrier – Attics and Crawl Spaces:

**4.4.1 Application with a Prescriptive Ignition Barrier:** When Demilec Heatlok® HFO 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 and IRC Sections R316.5.3 and R316.5.4, as applicable, except when the installation is in accordance with Section 4.4.2. 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 that the foam plastic insulation is not exposed. The attic or crawl space area must be separated from the interior of the building by an approved 15-minute thermal barrier as described in Section 4.3.1.

Demilec Heatlok® HFO insulation, as described in this section, may be installed in unvented attics in accordance with 2018, 2015 and 2012 IRC Section R806.5 (2009 IRC Section R806.4) or 2018 IBC Section 1202.3 [2015 IBC Section 1203.3].

**4.4.2 Application without a Prescriptive Ignition Barrier:** Where the spray-applied insulation is installed in accordance with Section 4.4.2.1, the following conditions apply:

- Entry to the attic or crawl space is to only 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.
- Attic ventilation is provided when required by 2018 IBC Section 1202.2.1 [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 the 2018 IBC Section 1202.3 [2015 IBC Section 1203.3] or 2018, 2015 and 2012 IRC Section R806.5 (2009 IRC Section R806.4).
- Under-floor (crawl space) ventilation is provided when required by 2018 IBC Section 1202.4 [2015 IBC Section 1203.4 (2012 and 2009 IBC Section 1203.3)] or IRC Section R408.1, as applicable.
- Combustion air is provided in accordance with *International Mechanical Code*® Section 701.

**4.4.2.1 Application without a Prescriptive Ignition Barrier:** In attics and crawl spaces, Demilec Heatlok® HFO insulation may be spray-applied to the underside of roof sheathing and/or rafters, and to vertical surfaces and the underside of floors as described in this section. The thickness of the foam plastic applied to the underside of the overhead surfaces (roof sheathing, rafters and the underside of floors) must not exceed 7¼ inches (184 mm). The thickness of the foam plastic applied to vertical surfaces must not exceed 11¼ inches (286 mm). The attic or crawl space must be separated from the interior of the building by an approved thermal barrier as described in Section 4.3.1.

**4.4.3 Use on Attic Floors:** Demilec Heatlok® HFO insulation may be installed at a maximum thickness of 7¼ inches (184 mm) between and over joists in attic floors. The Demilec Heatlok® HFO insulation must be separated from the interior of the building by an approved thermal barrier.

### 4.5 Exterior Walls of Type I, II, III and IV Construction:

**4.5.1 General:** When used on exterior walls of Type I, II, III, and IV construction, the assembly must comply with Section 2603.5 of the IBC and this section, and the Demilec Heatlok® HFO insulation must be installed at a maximum thickness described in Table 3. The potential heat of Demilec Heatlok® HFO insulation is 2300 Btu/ft<sup>2</sup> (26 Mj/m<sup>2</sup>) per inch of thickness when tested in accordance with NFPA 259.

**4.5.2 Specific Wall Assemblies:** Wall assemblies complying with Section 4.5 must be as described in Table 3.

**5.0 CONDITIONS OF USE**

The Heatlok® HFO 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 manufacturer’s published installations instructions, this evaluation report and the applicable code. If there are any conflicts between the manufacturer’s published installation instructions and this report, this report governs.
- 5.2 The insulation must be separated from the interior of the building by an approved thermal barrier, except when installation is as described in Sections 4.3.2 and 4.4.2. A thermal barrier must be installed between the insulation and the interior space above (crawl space) or below (attic).
- 5.3 The insulation must not exceed the thicknesses noted in this report based upon the intended end use.
- 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 2018, 2015, and 2009 IBC Section 2603.8 (2012 IBC Section 2603.9) or IRC Section R318.4, as applicable.
- 5.7 When use is on exterior walls of buildings of Types I, II, III, and IV, construction must be as described in Section 4.5.
- 5.8 Jobsite certification and labeling of the insulation must comply with 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 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 The insulation components A and B are produced in Arlington, Texas and Boisbriand, Quebec, Canada, 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 (editorially revised April 2018), including reports of tests in accordance with AC377 Appendix X.
- 6.2 Reports of air leakage testing in accordance with ASTM E283.
- 6.3 Reports of water vapor transmission test in accordance with ASTM E96.
- 6.4 Reports of room corner tests in accordance with NFPA 286.
- 6.5 Reports of fire propagation characteristics tests in accordance with NFPA 285.
- 6.6 Reports of potential heat of foam plastic tests in accordance with NFPA 259.
- 6.7 Supplementary fire engineering analysis.

**7.0 IDENTIFICATION**

7.1 Components of the insulation are identified with the manufacturer’s name [Demilec (USA) Inc], address and telephone number; the product name (Demilec Heatlok® HFO B-side or A-PDMI); use instructions; the density; the flame-spread and smoke-developed indices; the date of manufacture; thermal resistance values; and the evaluation report number (ESR-4073).

The TPR<sup>2</sup> Corporation Blazelok™ TBX intumescent coating and primer is identified with the manufacturer’s name, the product 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](#).

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

**DEMILEC (USA) INC.**  
**3315 EAST DIVISION STREET**  
**ARLINGTON, TEXAS 76011**  
**(817) 640-4900**  
[www.demilecusa.com](http://www.demilecusa.com)

**TABLE 1—THERMAL RESISTANCE (R-VALUES)**

THICKNESS (inches)	R-VALUE (°F.ft <sup>2</sup> .h/Btu)	THICKNESS (inches)	R-VALUE (°F.ft <sup>2</sup> .h/Btu)
1.0	6.3	7.0	52
1.5	10	7.5	56
2.0	14	8.0	60
2.5	18	8.5	64
3.0	22	9.0	67
3.5	26	9.5	71
4.0	30	10.0	75
4.5	34	10.5	79
5.0	37	11.0	82
5.5	41	11.5	86
6.0	45	12.0	90

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>2,3</sup> (Applied to all Foam Surfaces)	MINIMUM APPLICATION RATE OF COATING <sup>2</sup>
Heatlok HFO	7½	11½	Blazelok TBX 18 mils WFT 12 mils DFT	1.2 gal / 100 ft <sup>2</sup>
Heatlok HFO	7½	11½	DC 315 18 mils WFT 12 mils DFT	1.125 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>See Section 4.3.2.

<sup>2</sup>DFT = Dry Film Thickness; WFT = Wet Film Thickness

<sup>3</sup>See Sections 3.6 and 3.7.

TABLE 3—NFPA 285 COMPLYING EXTERIOR WALL ASSEMBLIES – WALL CAVITY INSULATION

WALL COMPONENT	MATERIALS
Base Wall System – Use either 1, 2 or 3	1 – Concrete wall. 2 – Concrete masonry wall. 3 –Minimum 3 <sup>5</sup> / <sub>8</sub> -inch-deep (92 mm), No. 25 gage, C-shaped steel studs, spaced a maximum of 24 inches on center with lateral bracing every 4 feet (1219 mm) as required by code. Interior sheathing must be 1 layer <sup>5</sup> / <sub>8</sub> -inch-thick (19.1 mm) Type X gypsum wallboard complying with ASTM C1396. Exterior Sheathing shall be a described in Exterior Sheathing below.
Floorline Firestopping	Minimum 4 pcf mineral wool in each stud cavity at each floorline, attached with Z-clips. Thickness must match stud cavity depth.
Perimeter Fire Barrier System	Perimeter fire barrier system complying with 2018, 2015 and 2012 IBC Section 715.4 (2009 IBC Section 714.4) must be installed to fill the void between the edge of the concrete floor slab and the interior surface of the exterior wall assembly.
Cavity / Interior Insulation – Use either 1, 2, 3, 4 or 5; (Note: Cavity Insulation No. 3 may be combined with No. 4 or Cavity Insulation No. 3 may be combined with No. 5 to achieve depth of insulation required)	1 – None. 2 – 3 <sup>5</sup> / <sub>8</sub> inches (92 mm) of Heatlok <sup>®</sup> HFO applied to the interior surface of Base Wall System 1 or 2 <sup>a</sup> . 3 – Full cavity depth not exceeding 3 <sup>5</sup> / <sub>8</sub> inches (92 mm) of Heatlok <sup>®</sup> HFO. 3 – Any insulation qualified as noncombustible in accordance with ASTM E136. 4 – Glass fiber batt insulation <sup>b</sup> . 5 – Mineral fiber insulation <sup>b</sup> . <sup>a</sup> Fireblocking in accordance with 2018, 2015 and 2012 IBC Section 718 (2009 IBC Section 717) and thermal barrier material requirements in accordance with IBC Section 2603.4 shall be met for Base Wall Systems 1 and 2, when a combustible concealed space is present on interior side of the exterior wall assembly. <sup>b</sup> Insulation must comply with the applicable requirements of 2018, 2015 or 2012 IBC Section 720.2 (2009 IBC Section 719.2).
Exterior Sheathing – Only for Base Wall System No.3 –	Minimum <sup>5</sup> / <sub>8</sub> -inch-thick (19.1 mm) glass mat gypsum sheathing complying with ASTM C1177. Sheathing shall be attached with No. 6, 1¼-inch-long (32 mm) self-tapping screws located 8 inches (203 mm) on center along the perimeter and 12 inches (302 mm) on center in the field of wallboard. Joints must be taped and treated with joint compound in accordance with ASTM C840 or GA-216.
Exterior Wall Covering – Use either 1 or 2	1 – Any noncombustible exterior wall covering material using any standard installation technique (Base Wall 1 or 2) 2 – Any noncombustible exterior wall covering system with a combustible WRB that has successfully been tested in accordance with NFPA 285. (Base Wall 3) Details of the exterior wall covering must be provided to the code official by the report holder, designer or specifier, with an engineering analysis demonstrating that (1) the exterior wall covering conforms to ASTM E136 and (2) the addition of the wall covering and/or water-resistive barrier to the assembly described in this section does not negatively affect conformance of the assembly with the requirements of IBC Section 2603.5.