



HOLCIM SOLUTIONS AND PRODUCTS

US, LLC

26 Century Boulevard

Suite 205

Nashville, Tennessee 37214

ENVERGEONEPASS™ HFO SPRAY FOAM INSULATION

CSI Section:

07 21 00 Thermal Insulation

1.0 RECOGNITION

EnvergeOnePass™ HFO Spray Foam Insulation recognized in this report has been evaluated for use as spray foam insulation complying with IBC Section 2603, IRC Section R316, and IECC Sections C303, C402, R303, and R402. The surface burning, physical properties, thermal resistance, and applications in Type V construction and exterior walls of Types I - IV construction of EnvergeOnePass™ HFO Spray Foam Insulation has been evaluated to comply to the intent of the following codes and regulations:

- 2021, 2018, 2015, and 2012 International Building Code® (IBC)
- 2021, 2018, 2015, and 2012 International Residential Code® (IRC)
- 2021, 2018, 2015, and 2012 International Energy Conservation Code® (IECC)
- 2023 Florida Building Code, Building (FBC, Building) - supplement attached.
- 2023 Florida Building Code, Residential (FBC, Residential) - supplement attached.
- 2023 Florida Building Code, Energy (FBC, Energy)-supplement attached.

2.0 LIMITATIONS

Use of EnvergeOnePass™ HFO Spray Foam 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, and if there are any conflicts, the more restrictive governs.

2.2 The insulation shall be separated from the interior of the building by a thermal barrier, in accordance the applicable code, or Sections 3.3.2 to Section 3.3.4 of this report.

2.3 As noted in Sections 3.3.3 and 3.3.4 of this report, EnvergeOnePass™ HFO Spray Foam Insulation shall not exceed the nominal density and thickness.

2.4 During installation, the insulation and the surfaces to which it is applied shall be protected from exposure to weather.

2.5 The contractors installing the insulation shall be certified by Holcim Solutions and Products US, LLC or by the Spray Polyurethane Foam Alliance (SPFA).

2.6 Use of EnvergeOnePass™ HFO Spray Foam Insulation in areas of “very heavy” termite infestation shall be in accordance with 2021, 2018, and 2015 IBC Section 2603.8, 2012 IBC Section 2603.9, or IRC Section 318.4, as applicable.

2.7 Labeling and job site certification of the insulation and coatings shall comply with 2021, 2018, and 2015 IRC 1101.10, 2012 IRC Section 1101.12, IECC Sections C303.1.1 and C303.1.2, as applicable.

2.8 Foam Plastic used in plenums as interior finish or interior trim shall comply with Section 2603.7 of the IBC.

2.9 The insulation recognized in this report is produced by Holcim Solutions and Products US, LLC, located in Waukesha, Wisconsin, and Spring, Texas.

3.0 PRODUCT USE

3.1 General: When installed in accordance with Section 3.3 of this report, EnvergeOnePass™ HFO Spray Foam Insulation may be used in wall cavities, floor assemblies or ceiling assemblies, and in attic and crawl spaces as nonstructural thermal insulation material. The spray-applied foam plastic insulation is used in Type V-B construction under the IBC and in dwellings under the IRC. The spray-applied foam plastic insulation also may be used in Type I, II, III, or IV construction when installed in accordance with Section 3.4 of this report.

EnvergeOnePass™ HFO Spray Foam Insulation may be used as air impermeable insulation when installed in accordance with Section 3.2.4 of this report.

3.2 Design:

3.2.1 General. EnvergeOnePass™ HFO Spray Foam Insulation shall comply with requirements in IECC Sections C402.1 and R402, as applicable.

3.2.2 Thermal Resistance. (R-Values): EnvergeOnePass™ HFO Spray Foam Insulation has a thermal resistance (R-Value) at a mean temperature of 75°F (24°C) as shown in Table 1 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.





TABLE 1 – Thermal Resistance (R-Value)^{1,2}
(°F·ft²·h/Btu)

Thickness (inch)	EnvergeOnePass™ HFO
1	7.2
2	14
3	21
3.5	25
4	28
5	35
6	42
7	49
8	56
9	64
10	71
11	78
12	84

For SI: 1 inch = 25.4 mm, 1°F·ft²·h/Btu = 0.176 110 K·m²/W.

¹ R-Values are calculated based on tested K values at 1-inch and 3.5-inch thicknesses.

² R-Values greater than 10 are rounded to the nearest whole number.

3.2.3 Surface Burning Characteristics. At a maximum thickness of 4 inches (102 mm) and a nominal density of 2.0 pcf (32 kg/m³), the EnvergeOnePass™ HFO Spray Foam Insulation has a flame spread index of 25 or less and smoke-developed index of 450 or less when tested in accordance with ASTM E84.

3.2.4 Air Permeability. When tested in accordance with ASTM E2178 at a minimum thickness of 1 inch (25.4 mm), EnvergeOnePass™ HFO Spray Foam Insulation is classified as an air-impermeable insulation in accordance with Section 1202.3 of the 2021 and 2018 IBC, Section 1203.3 of the 2015 IBC, or Section R806.5 of the IRC, as applicable.

3.2.5 Vapor Permeance: When tested in accordance with the ASTM E96 desiccant method (Procedure A), EnvergeOnePass™ HFO Spray Foam Insulation has a vapor permeance of less than 1.0 perms [57.4 x 10⁻⁹ g/(Pa·s·m²)], at a minimum thickness of 1⁵/₈ inches (41.3 mm) and qualifies as a Class II vapor retarder in accordance with IBC Section 202 and IRC Section R202.

3.2.6 Fire-Protective Coatings and Coverings: Fire protective coatings, for use as part of an alternative thermal barrier assembly, shall be in accordance with Table 2 of this report, as applicable, and installed in accordance with Section 3.3.3 of this report.

3.3 Installation:

3.3.1 General. The manufacturer’s published installation instructions for EnvergeOnePass™ HFO Spray Foam Insulation and this report shall be available on the jobsite during installation for quality control purposes.

EnvergeOnePass™ HFO Spray Foam Insulation shall be spray-applied on the job site using a volumetric positive

displacement pump in accordance with the manufacturer’s published installation instructions. The applied insulation shall be sprayed in multiple passes having a maximum thickness of 4 inches (50.8 mm) per pass up to the maximum insulation thickness specified in this report. The maximum in-service temperature for all areas shall not exceed 180°F (82°C). The spray-applied foam plastic insulation shall not be used in electrical outlets or junction boxes or in continuous contact with rain or water. The spray-applied foam plastic insulation shall be sprayed onto a substrate that is protected and clean from any debris or weather-related conditions during application.

3.3.2 Installation with a Prescriptive Thermal Barrier: EnvergeOnePass™ HFO Spray Foam Insulation shall be separated from the interior by an approved thermal barrier of minimum ½-inch-thick (12.7 mm) gypsum wallboard or an equivalent thermal barrier. When installed in accordance with this section, the spray foam may be any thickness when installed behind a prescriptive thermal barrier. The barrier shall comply with and be installed in accordance with IBC Section 2603.4 or IRC Section R316.4, as applicable. Thicknesses are not limited for ceiling cavities and wall cavities when covered by a code complying prescriptive thermal barrier, such as minimum ½-inch thick (12.7 mm) gypsum board.

3.3.3 Installation with an Alternative Thermal Barrier Assembly: The thermal barrier required by IBC Section 2603.4 or IRC Section R316.4 may be omitted when applied as part of an alternative thermal barrier assembly as shown in Table 2 of this report.

3.3.4 Installation for Attics and Crawl Spaces: When used in an attic or crawl space where entry is made only for service of utilities, EnvergeOnePass™ HFO Spray Foam Insulation shall be installed in accordance with this section. The insulation shall be separated from the interior of the building by an approved thermal barrier as described in Sections 3.3.2 and 3.3.3 of this report, as applicable.

3.3.4.1 Installation with a Prescriptive Ignition Barrier: Where entry is made only for the service of utilities, EnvergeOnePass™ HFO Spray Foam Insulation may be installed within attics or crawl spaces with an ignition barrier in accordance with IBC Section 2603.4.1.6 or IRC Sections R316.5.3 and R316.5.4, as applicable. The ignition barrier shall be installed in a manner such that the foam plastic insulation is not exposed and is consistent with the requirements of the type of construction required by the applicable code. When installed with a prescriptive ignition barrier in accordance with this section, the thickness of the spray foam insulation is not limited.

3.3.4.2 Installation with an Alternative Ignition Barrier Assembly: When installation is in accordance with this section, the ignition barrier specified by Section 2603.4.1.6 of the IBC or Sections R316.5.3 and R316.5.4 of the IRC, as applicable, may be omitted.



3.3.4.2.1 General: When EnvergeOnePass™ HFO Spray Foam Insulation is installed in attics and crawl spaces without a prescriptive ignition barrier, the following conditions apply:

- a. The thickness of the foam plastic insulation applied to the underside of the top of the space shall not exceed 11½ inches (292 mm).
- b. The thickness of the foam plastic insulation applied to the vertical surfaces shall not exceed 7½ inches (190 mm).
- c. Entry is only to service utilities in the attic or crawl space and no storage is permitted.
- d. Attic or crawl space areas cannot be interconnected.
- e. Air from the attic or crawl space cannot be circulated to other parts of the building.
- f. In accordance with 2021 and 2018 IBC Section 1202.2, 2015 and 2012 IBC Section 1203.2, or IRC Section R806, as applicable, attic ventilation is provided, as applicable.
- g. In accordance with 2021 and 2018 IBC Section 1202.4, 2015 and 2012 IBC Section 1203.4, or IRC Section R408.1, as applicable, crawl-space ventilation is provided, as applicable.
- h. In accordance with IMC (International Mechanical Code®) Section 701, combustion air is provided.

3.3.4.2.2 Attics and Crawl Spaces: EnvergeOnePass™ HFO Spray Foam Insulation may be spray-applied in attics to the underside of roof sheathing, roof rafters and/or vertical surfaces, and in crawl spaces to the underside of floors and/or vertical surfaces as described in this section. When applied to the underside of the top of the space and the thickness of the EnvergeOnePass™ HFO Spray Foam Insulation does not exceed 11½ inches (292 mm), and when applied to vertical surfaces, the maximum thickness does not exceed 7½ inches (190 mm), the EnvergeOnePass™ HFO Spray Foam Insulation does not require the application of either an ignition barrier or a fire protective coating.

Optional: If desired, EnvergeOnePass™ HFO Spray Foam Insulation may be applied as part of an alternative ignition barrier assembly with a fire coating as shown in Table 3 of this report.

3.3.4.2.3 Unvented Attics: EnvergeOnePass™ HFO Spray Foam Insulation may be installed in unvented attic assemblies and unvented enclosed rafter assemblies in accordance with Section 1202.3 of the 2021 and 2018 IBC, Section 1203.3 of the 2015 IBC, or Section R806.5 of the IRC, as applicable.

3.4 Exterior Walls of Buildings of Type I, II, III, or IV Construction. When EnvergeOnePass™ HFO Spray Foam Insulation is used in exterior walls of buildings of Type I, II, III, or IV construction of any height, the insulation shall comply with Section 2603.5 of the IBC and this section. EnvergeOnePass™ HFO Spray Foam insulation shall be installed at a maximum thickness of 4 inches (102 mm).

3.4.1 Complying Exterior Wall Assemblies. Wall assemblies that comply with Section 2603.5.5 of the IBC and this report that may be used in exterior walls of buildings of Type I, II, III, or IV construction of any height are described in Table 4 of this report.

3.5 Use as a Water-resistive Barrier. EnvergeOnePass™ HFO, when applied to form a minimum 1.5-inch thick (38.1 mm) continuous layer, may be used as an alternative water-resistive barrier specified in Section 1403.2 of the 2021 and 2018 IBC, and Section 1404.2 of the 2015 and 2012 IBC, and Section R703.2 of the IRC, as applicable.

3.6 Weather Protection. EnvergeOnePass™ HFO, when applied to form a minimum 1.5-inch thick (38.1 mm) continuous layer, may be used to meet the requirements for weather protection applied to sheathing over framing spaced at 16 inches on center as provided in Exception 2 of Section 1402.2 of the 2021 and 2018 IBC and Exception 2 of Section 1403.2 of the 2015 and 2012 IBC.

4.0 PRODUCT DESCRIPTION

EnvergeOnePass™ HFO Spray Foam Insulation is spray-applied, polyurethane foam plastic and complies as medium-density insulation in accordance with Section 3.1.1 and Table 1 of AC377. The insulation is a two-component spray foam plastic with a nominal in-place density of 2.0 pcf (32 kg/m³).

The spray-applied insulation is mixed in the field by combining a polymeric isocyanate (A component) and a resin blend (B component). The liquid components shall be stored in 55-gallon (208 L) drums at temperatures between 50°F and 70°F (10°C and 21°C). When Component A and Component B are stored in factory-sealed containers at the recommended temperatures, the maximum shelf life is six months.

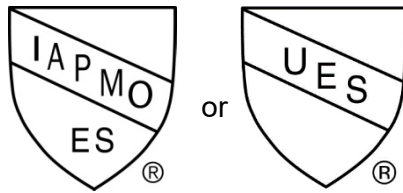
5.0 IDENTIFICATION

The spray foam insulation containers are identified with the following:

- a. Manufacturer's name (Holcim Solutions and Products US, LLC)
- b. address and telephone number,
- c. the product trade name (EnvergeOnePass™ HFO Spray Foam Insulation)
- d. use instructions
- e. density, flame-spread and smoke-development indices
- f. date of manufacture or batch/run number
- g. the IAPMO Uniform ES evaluation report number (ER-859)
- h. the name or logo of the inspection agency



Either IAPMO UES Mark of Conformity may also be used as shown below:



IAPMO UES ER-859

6.0 SUBSTANTIATING DATA

6.1 Data in accordance with the ICC-ES Acceptance Criteria for Spray-applied Foam Plastic Insulation, AC377, dated June 2023, including reports of tests in accordance with Appendix X of AC377.

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

6.3 Reports of fire characteristics testing in accordance with NFPA 285.

6.4 Reports of potential heat of building material testing in accordance with NFPA 259.

6.5 Reports of water vapor transmission testing in accordance with ASTM E96.

6.6 Reports of testing in accordance with ASTM E331.

6.7 Test reports are from laboratories in compliance with ISO/IEC 17025.

7.0 STATEMENT OF RECOGNITION

This evaluation report describes the results of research completed by IAPMO Uniform Evaluation Service on Holcim Solutions and Products US's EnvergeOnePass™ HFO Spray Foam Insulation to assess conformance to the codes shown in Section 1.0 of this report and serves as documentation of the product certification. Products are manufactured at the locations noted in Section 2.9 of this report under a quality control program with periodic inspection under the supervision of IAPMO UES.

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 ASSEMBLIES

FIRE-PROTECTIVE COATING/COVERING ¹			MAXIMUM SPF THICKNESS (inches)	
TYPE	MINIMUM THICKNESS	THEORETICAL APPLICATION RATE (COATINGS ONLY)	WALLS AND VERTICAL SURFACES	CEILING AND OVERHEAD SURFACES
DC315 ²	14 mils WFT (9 mils DFT)	0.87 gal/100 ft ²	5.5	10.25
Plus ThB ³	14 mils WFT (9 mils DFT)	0.87 gal/100 ft ²	6	9.5
60-60A ⁴	12 mils WFT (8 mils DFT)	0.75 gal/100 ft ²	6	10

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 International Fireproof Technology, Inc, recognized in [IAPMO UES ER-499](#) and tested to the requirements of [NFPA 286](#).

³ No-Burn, Inc, recognized in IAPMO UES ER-305 and tested to the requirements of UL 1715.

⁴ Flame Control Coatings, recognized in IAPMO ER-596 and tested to the requirements of NFPA 286.

TABLE 3 - ALTERNATIVE IGNITION BARRIER ASSEMBLIES

FIRE-PROTECTIVE COATING/COVERING ¹			MAXIMUM SPF THICKNESS (inch)	
TYPE	MINIMUM THICKNESS	THEORETICAL APPLICATION RATE (COATINGS ONLY)	WALLS AND VERTICAL SURFACES	CEILING AND OVERHEAD SURFACES
DC315 ²	4 mils WFT (3 mils DFT)	0.25 gal/100 ft ²	10	12

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



TABLE 4 – NFPA 285 COMPLYING EXTERIOR WALL ASSEMBLIES

Wall Component	Material Description
Base Wall System (BWS) Use either 1, 2 or 3	<p>1 – Concrete wall</p> <p>2 – Concrete masonry wall</p> <p>3 – 1 layer of 5/8-inch thick Type X gypsum wallboard installed on the interior side of minimum 3 5/8-inch-deep minimum No. 20-gauge thick steel studs spaced a maximum of 24 inches on center. Lateral bracing shall be installed minimum every 4 feet vertically or as required by design stud cavities shall be filled at each floor line with minimum 4 pcf density mineral wool (e.g. Thermafiber), friction fit between steel wall studs.</p>
Resilient Channel when used with BWS 3 above	Double-leg ‘hat’ shaped steel resilient channel, minimum No. 30 gage, installed perpendicular to the wall studs (interior side only) and spaced a maximum of 24-inches on center between the steel studs and Type X gypsum wallboard. The Entire perimeter of window openings to be framed with resilient channels.
Perimeter Fire Barrier System	A Perimeter fire barrier system complying with Section 715.4 of the IBC shall be installed, as applicable, to fill the void created at the intersection of the exterior curtain wall assembly and the concrete floor slab.
Interior Insulation Use either 1, 2, 3, 4 or 5; or combination of 3 and 4; or combination of 3 and 5	<p>1 – None</p> <p>2 – Maximum 3 5/8-inch thickness of Enverge® EasySeal.5 (Enverge® SucraSeal®) applied to the interior surface of BWS 1 or 2 above.^{1,4}</p> <p>3 – Enverge® EasySeal.5 (Enverge® SucraSeal®) applied to the full depth of the wall stud cavity, or less, with exterior gypsum sheathing (see BWS 3 above) as the substrate covering the width of the cavity and the inside of the steel wall stud framing flange limited to the potential heat in Note 4.⁴</p> <p>4 – Fiberglass batt insulation (faced or unfaced)</p> <p>5 – Mineral wool insulation (faced or unfaced)</p>
Exterior Sheathing Use either 1, 2 or 3	<p>1 – None (for BWS 1 or 2 above)</p> <p>2 – 1/2-inch thick exterior gypsum sheathing (for BWS 3 above)</p> <p>3 – 5/8-inch-thick Type X exterior type gypsum sheathing (for BWS 3 above)</p>
Exterior Insulation	Maximum 4-inch thick Enverge OnePass™ Spray Foam Insulation ³
Exterior Wall Covering² Use either 1, 2, 3, 4 or 5	<p>1 - Brick - steel brick veneer anchors, installed a maximum 24-inches on-center, vertically on each stud with maximum 2-inch air gap between exterior insulation and brick. Brick to be standard nominal 4-inch- thick clay brick installed in a running bond pattern using Type S mortar.</p> <p>2 - Stucco - minimum 3/4-inch thick, exterior cement plaster and lath. A secondary water-resistive barrier (WRB) shall be installed between the exterior insulation and the lath. The Secondary WRB shall not be full-coverage asphalt or butyl-based self-adhering membranes.</p> <p>3 – Minimum 2-inch- thick natural stone. Joints shall be mortared (non-open jointed).</p> <p>4 – Minimum 1 1/2-inch thick concrete masonry unit, pre-cast concrete or artificial cast stone. Joints shall be mortared.</p> <p>5 – Minimum 1 1/4-inch thick terra cotta. Joints shall be mortared.</p>
Flashing of windows, doors or other exterior wall penetrations	As an option, flash around windows, doors, and other exterior wall penetrations with limited amounts of maximum 12-inch-wide flashing tape (acrylic, asphalt or butyl-based) or liquid-applied membrane material with or without fiber mesh reinforcement.

SI: 1 inch = 24.4 mm; 1 pcf = 16.0 kg/m³; 1 BTU/ft² = 0.01128 MJ/m²

¹ Fireblocking per Section 718 of the 2021, 2018, 2015, and 2012 IBC and thermal barrier material requirements per Section 2603.4 of the IBC shall be met for Base Wall Systems 1 and 2, as required by specific wall construction details when a combustible concealed space is created on interior side of exterior wall assembly.

² Exterior wall coverings shall be installed in accordance with the manufacturer’s installation instructions and shall comply with the provisions of Chapter 14 of the IBC and Chapter 7 of the IRC, as applicable.

³ The potential heat of 4-inch-thick EnvergeOnePass™ HFO Spray Foam Insulation is 2,066 Btu/ft² per inch of thickness when tested in accordance with NFPA 259.

⁴ The potential heat of 3 5/8-inch-thick Holcim Solutions and Products US 0.5 lb. Spray Foam Insulation is 466 Btu/ft² per inch of thickness when tested in accordance with NFPA 259.



FLORIDA SUPPLEMENT

HOLCIM SOLUTIONS AND PRODUCTS

US, LLC

26 Century Boulevard

Suite 205

Nashville, Tennessee 37214

ENVERGEONEPASS™ HFO SPRAY FOAM INSULATION

CSI Section:

07 21 00 Thermal Insulation

1.0 RECOGNITION

The EnvergeOnePass™ HFO Spray Foam Insulation evaluated in IAPMO UES Evaluation Report ER-859 is a satisfactory alternative to the following codes and regulations:

- 2023 Florida Building Code, Building (FBC, Building)
- 2023 Florida Building Code, Residential (FBC, Residential)
- 2023 Florida Building Code, Energy (FBC, Energy)

2.0 LIMITATIONS

2.1 Use of EnvergeOnePass™ HFO Spray Foam Insulation recognized in this supplement is subject to the following limitations:

2.2 EnvergeOnePass™ HFO Spray Foam Insulation shall comply with the provisions applicable to the 2021 IBC or 2021 IRC as described in ER-859 unless noted otherwise in this supplement.

2.3 The clearance between the foam insulation installed above grade and exposed earth shall be in accordance with Sections 1403.8 and 2603.8 of the FBC, Building or Section R318.8 of the FBC, Residential, as applicable.

2.4 Verification shall be provided that a quality assurance agency audits the manufacturer's quality assurance program and audits the production quality of products, in accordance with Section (5)(d) of Florida Rule 61G20-3.008. The quality assurance agency shall be approved by the Commission (or the building official when the report holder does not possess an approval by the Commission).

2.5 This supplement expires concurrently with ER-859.

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