ENVERGE®

ARCHITECTURAL BINDER

EASYSEAL .5®
OPEN CELL SPRAY FOAM

SUCRASEAL®
OPEN CELL SPRAY FOAM

NEXSEAL®
CLOSED CELL SPRAY FOAM

NEXSEAL LE®
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ONEPASS® HFO
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HOLCIM

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SECTION 1

- UL LISTED FIRE RESISTANCE RATING ASSEMBLIES
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UL LIsted Fire Resistance Rated Assemblies

	UL Assembly #	Description	Rating
Ceiling Assemblies	**P522**	Attic truss with ENVERGE ocSPF Sprayed to attic floor or directly to roof deck with Resilient Channel installed at 12” OC with (1) layer of 5/8” Type C Gypsum	**1 HR**
	P531	Attic truss with EVERGE ocSPF Sprayed to attic floor or directly to roof deck with Resilient Channel installed at 12” OC with (1) layer of 5/8” Type C Gypsum	**1 HR**
	P552	Attic truss with EVERGE ocSPF Sprayed to attic floor or directly to roof deck with Resilient Channel installed at 12” OC with (1) layer of 5/8” Type C Gypsum	**1 HR**
	P579	Attic truss with EVERGE ocSPF Sprayed to attic floor or directly to roof deck with Resilient Channel installed at 12” OC with (1) layer of 5/8” Type C Gypsum	**1 HR**
Wall Assemblies	**U301**	2x4 wood frame wall 16” OC with mid-point bracing ENVERGE ocSPF full cavity sprayed with (2) layers 5/8” Type X Gypsum fastened to both sides of the wall	**2 HR**
	U305	2x4 wood frame wall 16” OC with mid-point bracing ENVERGE ocSPF full cavity sprayed with (1) layers 5/8” Type X Gypsum fastened to both sides of the wall	**1 HR**
	U397	2x4 wood frame wall 16” OC (1) layer 5/8” Type X Gypsum fastened to both sides of the wall with ENVERGE NexSeal sprayed to Exterior as exterior insulation and wrb	**1 HR**
	U460	3 1/2” minimum steel studs 24” OC (1) layer 5/8” Type X Gypsum fastened to both sides of the wall with ENVERGE NexSeal sprayed to Exterior as exterior insulation and wrb	**1 HR**
	U460	2x4 wood frame wall 16” OC with mid-point bracing ENVERGE Foam sprayed with (2) layers 5/8” Type X Gypsum fastened to both sides of the wall or rated for exposure from 1 side as a bearing wall with (2) Layers of 5/8” Type X Gypsum on 1 side and 7/16 OSB installed on non-fire side	**1 HR**
Floor Assemblies	**U460**	18” minimum floor truss with Resilient Channel 12” OC with (1) layer 5/8” Type C Gypsum, 22/32” Structural Panels with 1/4” underlayment and 3/4” lightweight concrete	**1 HR**

Acoustical Tested Assemblies

	UL Assembly #	Description	STC	IIC
Partition Wall Assembly	**U301**	2x4 wood frame wall 16" OC with mid-point bracing SES ocSPF full cavity sprayed with (2) layers 5/8" Type X Gypsum fastened to both sides of the wall, with PAC International RSIS-1 Clips on (1) side spaced 48" OC	**50**	**NA**
Floor Assembly	**M540**	18" minimum floor truss with Resilient Channel 12" OC with (1) layer 5/8" Type C Gypsum, 22/32" Structural Panels with 1/4" underlayment and 3/4" lightweight concrete with Carpet and Pad	**56**	**71**

USGBC Leadership in Energy and Environmental Design (LEED) Point Contributions

New Construction	Homes	Schools
EA Credit 1: Optimize Energy Performance	EA Credit 1.1: Performance of ENERGY STAR Homes (or EA 2-10 Pathway)	EA Credit Prerequisite 2: Minimum Energy Performance
MR Credit 2: Construction Waste Management	EA Credit 2.1: Basic Insulation	EA Credit 1: Optimize Energy Performance
MR Credit 5: Regional Materials	EA Credit 3: Air Infiltration	MR Credit 5: Regional Materials
IEQ Credit 7.1: Thermal Comfort	EA Credits 5.1 & 5.2: Heating & Cooling distribution system	IEQ Credit 4: Low Emitting Materials
ID Credit 1: Innovation in Design	MR Credit 2.2: Environmentally Preferable Products	IEQ Credit 7.1: Thermal Comfort – Design
	MR Credit 2.2: Environmentally Preferable Products	IEQ Credit 7.1: Thermal Comfort – Design
	EQ Credit 1: ENERGYSTAR with Indoor Air Package Pathway	IEQ Credit 7.1: Thermal Comfort – Design
	EQ Credit 10: Garage Pollutant Protection	ID Credit 1: Innovation in Design

SECTION 2

- SPRAY FOAM GUIDE
BY JOE LSTIBUREK, PH.D., P.ENG., ASHRAE FELLOW

SPRAY FOAM GUIDE

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MEET THE AUTHOR

BY JOE LSTIBUREK, PH.D., P.ENG., ASHRAE FELLOW

Joseph Lstiburek is the founding principal of Building Science Corporation. Dr. Lstiburek's work ranges widely, from providing expert witness testimony to overseeing research and development projects, to writing for the ASHRAE Journal and buildingscience.com. Dr. Lstiburek's commitment to advancing the building industry has had a lasting impact on building codes and practices throughout the world, particularly in the areas of air barriers, vapor barriers, and vented and unvented roof assemblies. For example, his work with industry partners through the Department of Energy's Building America program led to significant research into the wetting and drying of walls and ultimately to a major code change relaxing the requirement for vapor barriers in the International Residential Code.

Dr. Lstiburek is also an acclaimed educator who has taught thousands of professionals over the past three decades and written countless papers as well as the best-selling Builder Guides. Fittingly, the Wall Street Journal has described him as "the dean of North American building science." He has a joy for telling tall tales to his protégés and audiences.

Dr. Lstiburek holds a Bachelor of Applied Science in Mechanical Engineering, a Master of Engineering in Civil Engineering, and a Doctor of Philosophy (Ph.D.) in Building Science. While still an undergrad, Dr. Lstiburek worked as a residential construction manager; during his Master's degree, he developed the Air Drywall Approach to air barriers. Other formative experiences include working on the Canada-wide Super Energy Efficient Housing R-2000 program and serving as senior engineer on commercial construction projects for Trow in Toronto. Dr. Lstiburek founded BSC in 1990 with his business partner Betsy Pettit, and he has been a key figure in establishing BSC as one of the most influential, innovative, and respected building science firms in North America.

RESIDENTIAL FOAM GUIDE

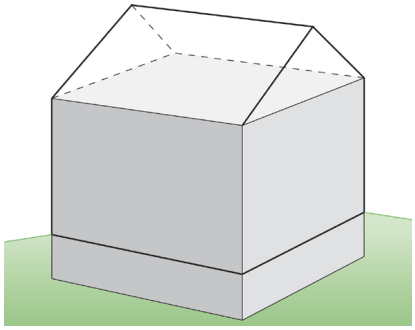
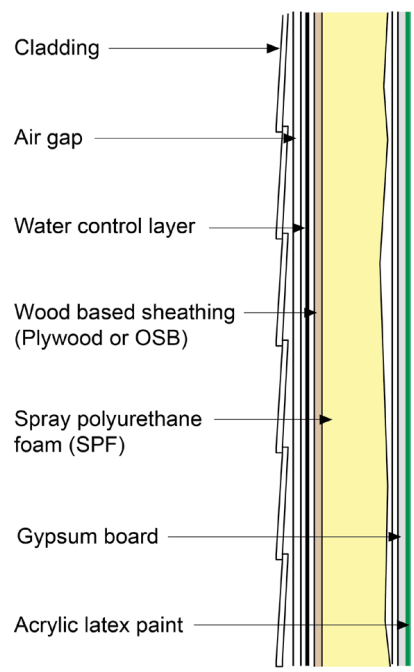


Figure 1: Houses have walls, roofs and foundations that each have to be connected to each other.

Houses are environmental separators – they keep the outside out and the inside in. Houses have walls, roofs and foundations that each have to be connected to each other (**Figure 1**). To function as environmental separators the walls, roofs and foundations have to be able to handle water, air, vapor and heat. How they handle water, air, vapor and heat depends on the materials used and the design. Spray foam is unique in that it has the ability to handle all four although many designs do not require spray foam to handle all four. This guide provides information on how to use spray foam in walls, roofs and foundations.

OVERVIEW

Spray foam insulation has significant advantages over other insulation systems due to the spray foam ability to provide continuity of the water control, air control, vapor control and thermal control layers necessary for environmental separation. Using spray foam results in low exterior air leakage that provides significant energy efficiency and significant sound attenuation. Using spray foam results in excellent vapor control and thermal efficiency.



Notes: High density closed cell foam can be used in all IECC Climate Zones. Low density open cell foam can be used in IECC Climate Zones 1 through 4 without an interior vapor retarder.

Figure 2: Common residential wall using spray polyurethane foam (SPF).

WALLS

The most common residential wall is a wood frame wall with wood based sheathing. The wood based sheathing has a water control layer installed on its exterior surface. A cladding is installed over this water control layer. An air gap is provided between the cladding and the water control layer to provide drainage of rainwater that penetrates the cladding. The cavity insulation can be low density open cell or high density closed cell spray foam. Both foam types work in most climates. As long as spray foam is sprayed to the minimum depth classified as an air impermeable insulation, the foam does not need to completely fill the cavity. In the International Energy Conservation Code (IECC) Climate Zones 6 and higher, high density closed cell spray foam provides additional condensation control and will qualify as Class II vapor retarder at 1.5". Low density open cell spray foam can be utilized with an interior vapor retarder to control condensation. High density closed cell insulation is preferred in cold climates and meets the code requirements for both condensation control for air impermeable insulation and acts as a code prescribed Class II vapor retarder as specified in the International Residential Code (IRC) section R702.7 for IECC Climate Zones 5-8 and marine 4. The interior lining is gypsum board with acrylic latex paint (**Figure 2**). The water control layer can be a housewrap, a building paper, a fluid applied membrane, a fully adhered synthetic membrane, or it can be a coating that comes on the wood based sheathing from the manufacturer. The water control layer in this type of wall should not be a vapor barrier – it should be semi vapor permeable – greater than 5 perms. Interior vapor barrier coatings on the gypsum board such as vinyl wallcoverings, oil or alkyd paints should be avoided. The air gap behind the cladding can be provided by using a textured housewrap, a drainage mat or furring strips at least 3/16 inch thick. Sill gasket is an effective furring strip.

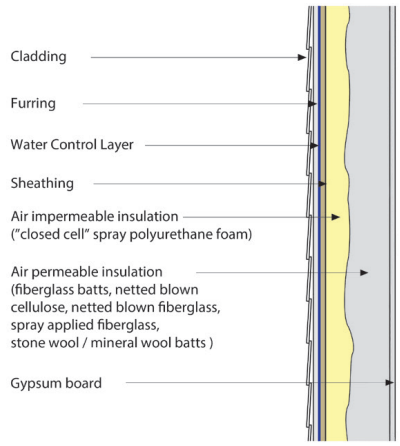
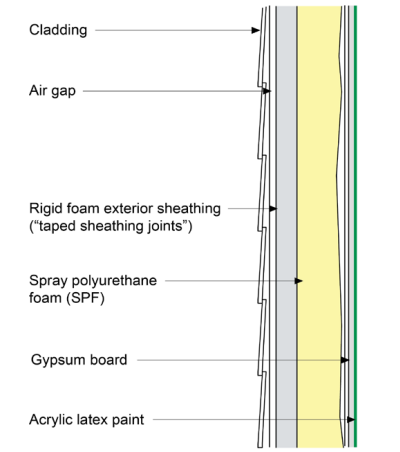


Figure 3: Hybrid walls can be constructed where spray polyurethane foam can be used in conjunction with other cavity insulations such as fiberglass and cellulose.



Notes: High density closed cell foam can be used in all IECC Climate Zones. Where low density open cell foam can be used the thickness or thermal resistance of the rigid foam exterior sheathing is specified by the International Residential Code (IRC) based on Climate Zone and the thickness of the wall framing.

Figure 4: Spray polyurethane foam can also be applied to the interior of rigid foam exterior sheathings such as foil faced isocyanurates and extruded polystyrene (XPS). In these assemblies the water control layer is typically the taped joints of the exterior rigid insulation. The cavity insulation can be low density open cell or high density closed cell spray foam.

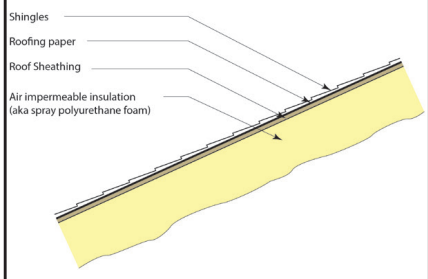


Figure 5: Unvented conditioned attics can be constructed by installing low density open cell or high density closed cell spray foam directly to the underside of the roof deck.

Hybrid walls can be constructed where spray polyurethane foam can be used in conjunction with other cavity insulations such as fiberglass and cellulose. **Figure 3** is a variation of **Figure 2** where high density closed cell spray polyurethane foam is installed on the interior surface of the wood based sheathing. The thickness or thermal resistance of the spray foam is specified by the International Residential Code (IRC) based on climate zone and thickness of the wall framing (**Table 1**).

Spray polyurethane foam can also be applied to the interior of rigid foam exterior sheathings such as foil faced isocyanurates and extruded polystyrene (XPS). In these assemblies the water control layer is typically the taped joints of the exterior rigid insulation. The cavity insulation can be low density open cell or high density closed cell spray foam (**Figure 4**). Where low density open cell spray foam is used, the thickness or thermal resistance of the rigid foam exterior sheathing is specified by the International Residential Code (IRC) based on climate zone and thickness of the wall framing (**Table 1**).

Table 1

Insulation for Condensation Control*

Climate Zone	Rigid Board or Air Impermeable Insulation	Total Cavity Insulation	Total Wall Assembly Insulation	Ratio of Rigid Board Insulation or Air Impermeable R-Value to Total Insulation R-Value
4	R-3.5	R-13	R-16.5	20%
	R-5	R-20	R-25	20%
5	R-5	R-13	R-18	30%
	R-7.5	R-20	R-27.5	30%
6	R-7.5	R-13	R-20.5	35%
	R-11.25	R-20	R-31.25	35%
7	R-10	R-13	R-28	45%
	R-15	R-20	R-35	45%
8	R-15	R-13	R-28	50%
	R-20	R-20	R-40	50%

***Adapted from Table 702.1 2018 International Residential Code (IRC)**

ROOFS

The most common residential roof is an attic that is wood framed, typically using trusses. It can be either an unvented conditioned attic or a vented unconditioned attic. Unvented conditioned attics are common in warm climates where basement construction is not common. The absence of basements typically results in mechanical systems and ductwork being located in attic spaces. Locating mechanical systems and ductwork in vented unconditioned attic spaces is a large thermal penalty, and in hot humid and mixed humid climates results in significant condensation issues. Vented unconditioned attics are common in cold climates where basement construction is typical. Mechanical systems and ductwork in cold climates are typically located in basements and interior floor framing rather than in attics, avoiding associated large thermal penalties.

Unvented conditioned attics can be constructed by installing low density open cell or high density closed cell spray foam directly to the underside of the roof deck (**Figure 5**). Both foam types work in most climates. In IECC Climate Zones 5 and higher only high density closed cell spray foam should be used.

Hybrid attics can be constructed in IECC Climate Zones 5 and higher using a combination of high density closed cell spray foam and low density open cell spray foam (**Figure 6**). The thickness or thermal resistance of the high density closed cell spray foam is specified by the International Residential Code (IRC) based on climate zone (**Table 2**). A further variation is where the low density open cell spray foam is replaced with fiberglass or cellulose insulation (**Figure 7**). Again, the thickness or thermal resistance of the high density closed cell spray foam is specified by the International Residential Code (IRC) based on climate zone (**Table 2**).

Vented unconditioned attics are typically constructed using spray foam in conjunction with fiberglass or cellulose insulation. The key to the performance of vented unconditioned attics is continuity of the air control layer located at the ceiling plane. It is difficult to provide airtightness at the ceiling plane using typical sealants. Spray foam is used to seal the ceiling plane in an airtight manner (**Figure 8**). It is critical to provide air sealing at the perimeter to control wind washing of air permeable insulation. The spray foam creates an airtight "bathtub" that is then filled with air permeable insulation such as fiberglass or cellulose. Typically, high density closed cell spray foam is used for this application.

In low slope roof construction similar approaches are used to those used with unvented conditioned attics. Most low slope roof construction using spray foam use a hybrid approach where a combination of high density closed cell spray foam is used with fiberglass or cellulose insulation (**Figure 9**). Again, the thickness or thermal resistance of the high density closed cell spray foam is specified by the International Residential Code (IRC) based on climate zone (**Table 2**).

Table 2

Insulation for Condensation Control*

Climate Zone	Rigid Board or Air Impermeable Insulation	Code Required R-Value	Ratio of Rigid Board Insulation or Air Impermeable R-Value to Total Insulation R-Value
1,2,3	R-5	R-38	10%
4C	R-10	R-49	20%
4A,4B	R-15	R-49	30%
5	R-20	R-49	40%
6	R-25	R-49	50%
7	R-30	R-49	60%
8	R-35	R-49	70%

***Adapted from Table R 806.5 2018 International Residential Code (IRC)**

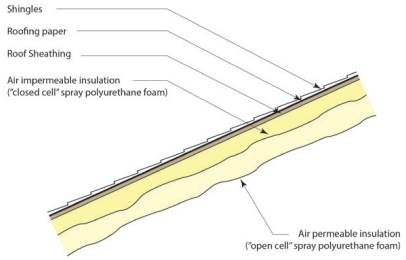


Figure 6: Hybrid attics can be constructed using a combination of high density closed cell spray foam and low density open cell spray foam.

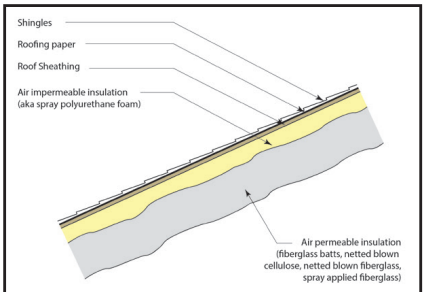


Figure 7: A further variation of hybrid attics is where the low density open cell spray foam is replaced with fiberglass or cellulose insulation.

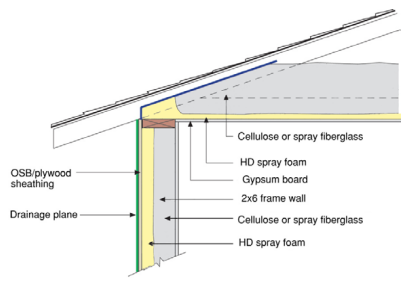


Figure 8: Vented unconditioned attics are typically constructed using spray foam in conjunction with fiberglass or cellulose insulation. The key to the performance of vented unconditioned attics is continuity of the air control layer located at the ceiling plane.

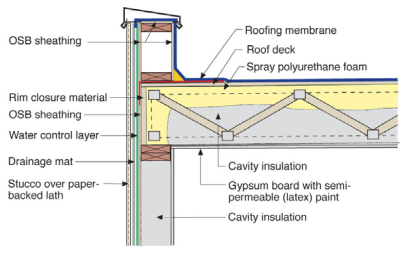


Figure 9: Most low slope roof construction using spray foam use a hybrid approach where a combination of high density closed cell spray foam is used with fiberglass or cellulose insulation.

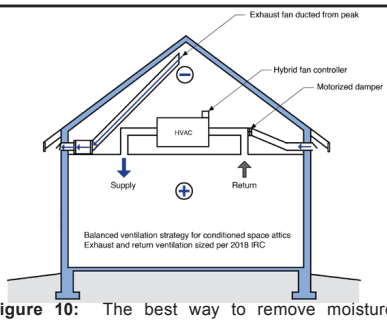


Figure 10: The best way to remove moisture from the attic space is to provide air change. Air is exhausted from the peak of the attic using an exhaust fan ducted to the exterior.

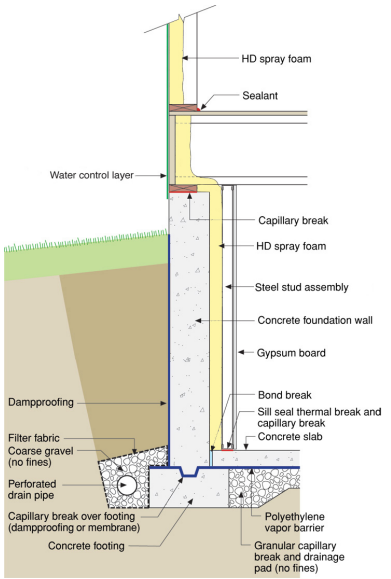


Figure 11a: Spray foam insulation can be directly applied to the interior of concrete foundation walls.

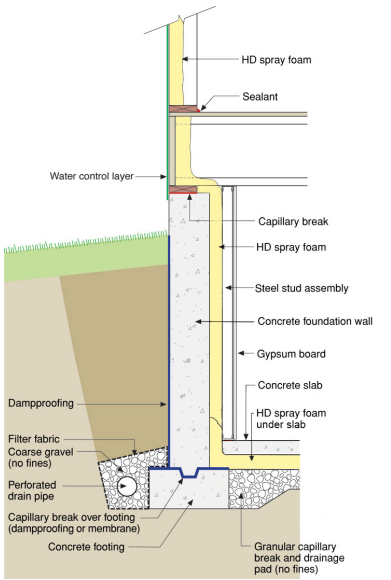


Figure 11b: Spray foam insulation can be directly applied to the interior of concrete foundation walls and under basement floor slabs.

Wherever unvented conditioned attics are constructed, a means of moisture removal from the attic is necessary. The "conditioned" part of unvented conditioned attics is important. The best way to remove moisture from the attic space is to provide air change. Air is exhausted from the peak of the attic using an exhaust fan ducted to the exterior. This creates a slight negative air pressure in the attic, and air is drawn from the house below. To create "balanced' ventilation in the house, supply air is provided from the outside to the return side of the air handler (**Figure 10**). The amount of air supplied and exhausted should be the same – hence the term balanced ventilation. The quantity of this air flow should be based on the International Residential Code – 2018. To prevent over ventilation or under ventilation, a motorized damper is installed at the outdoor air supply of the system. The operation of the motorized damper is coupled or linked to the operation of the attic exhaust fan – the attic exhaust fan operates only when the motorized damper is open and the HVAC system blower is operating.

FOUNDATIONS

Basement foundations are best insulated on the interior thereby avoiding issues with respect to insects such as ants and termites, issues with respect to protecting exterior insulation during the construction process, and protecting exterior insulation above grade during the life of the building.

Spray foam insulation can be directly applied to the interior of concrete foundation walls (**Figure 11a**) and under basement floor slabs (**Figure 11b**). High density closed cell or low density open cell spray foam should not be used on the exterior of basement foundations. In IECC Climate Zones 5 and higher high density closed cell spray foam is recommended on the interior of concrete basement foundation walls. Low density open cell spray foam should never be used under basement floor slabs….only high density closed cell spray foam should be used…and should only be used over a granular capillary break. A hybrid approach can also be used in combination with fiberglass or cellulose insulation (**Figure 12**).

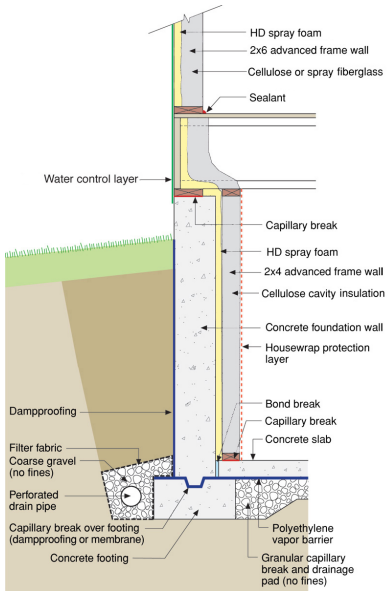


Figure 12: A hybrid approach for basement foundations can also be used in combination with fiberglass or cellulose insulation.

There are two common crawlspace foundation approaches - the crawlspace is either "vented" and "not conditioned" and connected to the "outside"...or...the crawlspace is "not vented" and "conditioned" and connected to the "inside". Of the two approaches, the most energy efficient is the not-vented conditioned approach. However, not all sites are compatible with not-vented conditioned crawlspaces such as areas with high water tables, swamps and flooding concerns.

Vented crawlspaces must keep air and vapor out of the crawlspace floor framing. Only high density closed cell spray polyurethane foam should be used in all IECC Climate Zones (**Figure 13** and **Figure 14**). A protection board such as fibercement should be installed to prevent animals from getting into the floor assembly.

Conditioned crawlspaces should be constructed as “mini” basements and completely connected to the house (**Figure 15**).

Conditioning is provided by air change between the crawlspace and the house or by dehumidification. The building code calls for 50 cfm per 1,000 ft^2 (approximately 25 l/s per 100 m^2) of supply air or dehumidification. Numerous approaches can be used (**Figure 16a**, **16b**, **16c**, **16d**, **16e** and **16f**). When you supply air to the crawlspace from an air conditioner or furnace (**Figure 16a**) there needs to be a way for air to come back to the house...besides poor workmanship. A transfer grille is recommended (**Figure 17**). If you pull air out of the crawlspace with a return duct (**Figure 16b**) there needs to be a way for air to get from the house to the crawlspace and a transfer grille is recommended.

If you supply and return air to the crawlspace from an air conditioner or furnace (**Figure 16c**) you need a way to balance the air flows to avoid pressure differences and a transfer grille is recommended.

A furnace or air conditioner with ducts to condition crawlspaces is not always necessary. Conditioning can be accomplished with a supply fan (**Figure 16d**). A transfer grille is required to provide a pathway back to the house.

An exhaust fan can be used to pull air out of the crawlspace and exhaust this air to the exterior pulling air from the house (**Figure 16e**).

Conditioning can also be accomplished by installing a dehumidifier (**Figure 16f**).

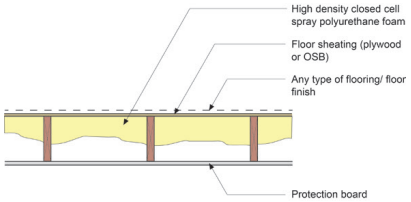


Figure 13: Vented crawlspaces must keep air and vapor out of the crawlspace floor framing. Only high density closed cell spray polyurethane foam should be used in all IECC Climate Zones.

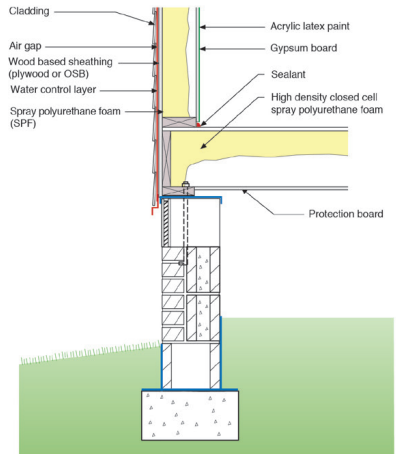


Figure 14: A protection board such as fibercement should be installed to prevent animals from getting into the floor assembly.

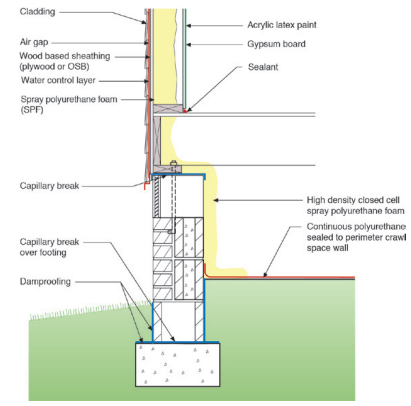


Figure 15: Conditioned crawlspaces should be constructed as “mini” basements and completely connected to the house.

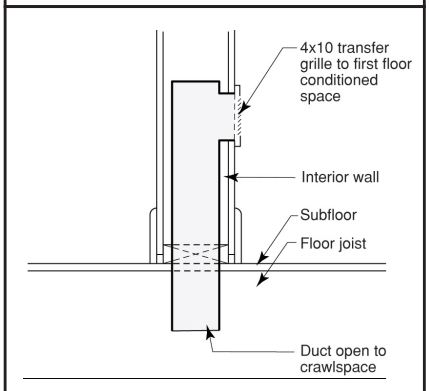


Figure 17: Transfer grille.

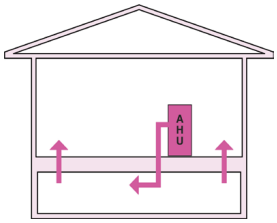


Figure 16 a: Supply air to crawlspace.

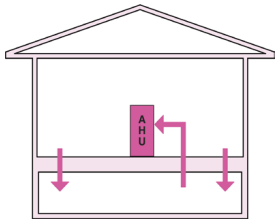


Figure 16 b: Return air from crawlspace.

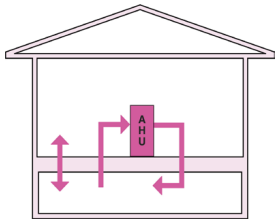


Figure 16 c: Supply and return air to and from crawlspace.

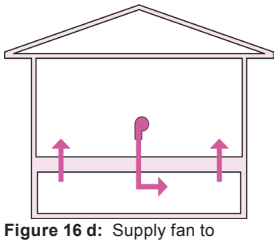


Figure 16 d: Supply fan to crawlspace.

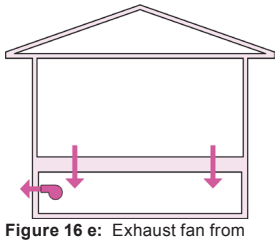


Figure 16 e: Exhaust fan from crawlspace.

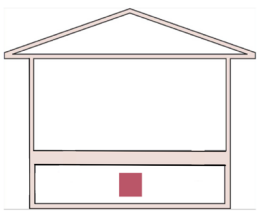


Figure 16 f: Dehumidifier.

COMMERCIAL FOAM GUIDE

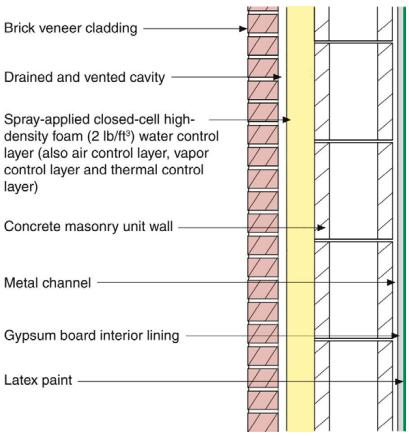


Figure 1: Concrete Masonry Wall – Spray-applied closed-cell high-density foam is the water control layer, the air control layer, the vapor control layer and the thermal control layer. The high density closed cell spray foam should be sprayed directly on the block wall. An intervening additional water control layer should not be installed as it interferes with the bonding of the high density closed cell spray foam to the substrate. The spray foam is the water control layer.

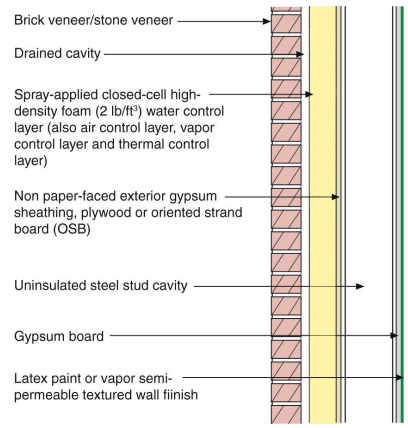


Figure 2: Steel Stud Wall – Spray-applied closed-cell high-density foam is the water control layer, the air control layer, the vapor control layer and the thermal control layer. The high density closed cell spray foam should be sprayed directly on the exterior sheathing. An intervening additional water control layer should not be installed as it interferes with the bonding of the high density closed cell spray foam to the substrate. The spray foam is the water control layer. The steel stud cavity can be insulated acoustically with low density open cell spray foam or with fiberglass or cellulose. High density closed cell spray foam should not be used for acoustical purposes.

OVERVIEW

Spray foam insulation has significant advantages over other insulation systems due to the spray foam ability to provide continuity of the water control, air control, vapor control and thermal control layers necessary for environmental separation. Using spray foam results in low exterior air leakage that provides significant energy efficiency and significant sound attenuation. Using spray foam results in excellent vapor control and thermal efficiency.

Spray polyurethane foam (SPF) – high density closed cell - is the only product that can perform all of the functions of the principal control layers of the "Perfect Wall" namely:

The water control layer

The air control layer

The vapor control layer

The thermal control layer

Figure 1 and **Figure 2** illustrate the typical configuration. The high density closed cell spray foam should be sprayed directly on the block wall or directly on the exterior sheathing. An intervening additional water control layer should not be installed as it interferes with the bonding of the high density closed cell spray foam to the substrate. The spray foam is the water control layer.

The steel stud cavity in **Figure 2** can be insulated acoustically with low density open cell spray foam or with fiberglass or cellulose. High density closed cell spray foam should not be used for acoustical purposes.

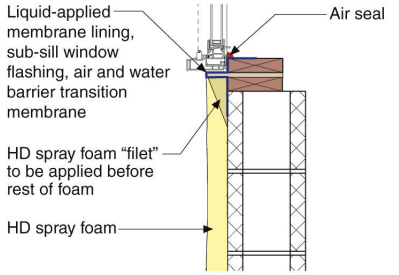


Figure 3: Masonry Wall Sill Detail – Wood buck with plywood or OSB lip creates under window gutter. Note the foam "filet" picture framing the opening.

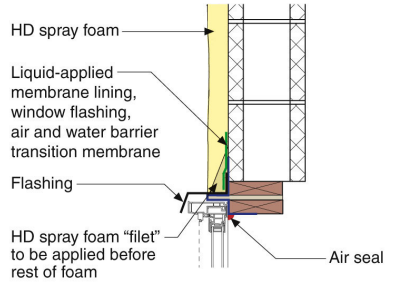


Figure 4: Masonry Wall Head Detail - The foam "filet" is sprayed first to prevent the head flashing from being pulled upward leading to a negative slope.

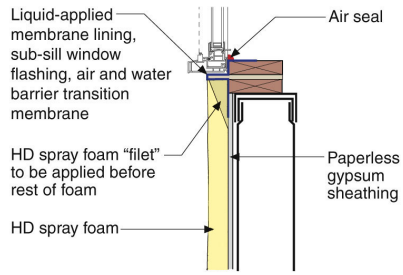


Figure 5: Steel Frame Wall Sill Detail – Note the importance of the foam "filet".

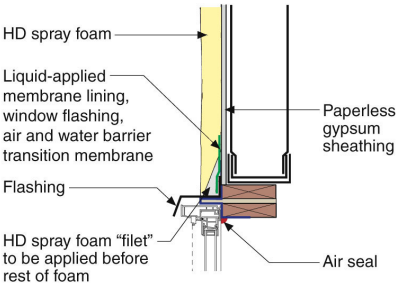


Figure 6: Steel Frame Wall Head Detail - Negative slopes on flashing should be avoided.

WINDOW INSTALLATION

Do not spray the SPF to the windows. A transition assembly between the glazing systems and the wall assembly is required. The concept of an extended "buck" is recommended (**Figure 3** and **Figure 4** for masonry back-up walls and **Figure 5** and **Figure 6** for steel stud back-up walls). Notice the plywood or OSB "lip" and the use of a liquid applied flashing membrane to provide a drained opening – an under window "gutter" that directs water to the outside face of the SPF should the window assembly leak. This approach allows standard window installation approaches to be used. Also notice how the membrane extends around the opening onto the face of the masonry back-up wall or on the face of the sheathing over the steel stud back-up wall. This is called "raccooning" – after the eyes of a raccoon. With this approach the windows can be installed either before or after the application of the SPF.

Notice in the images the use of "grey" shading to "define" a spray foam "filet"? Upon application SPF tends to pull away from some surfaces – shrinkage is a term sometimes used. To prevent a gap from opening up between the edge of the extended buck and the SPF the perimeter of the opening is "picture framed" with SPF in a "filet" shape/geometry. Then the field of the wall is sprayed.

This is important at the tops of windows because if you don't do it the flashings can be pulled upwards resulting in a negative slope on the flashings. All flashing, not just window flashing should have the "filet" treatment first before the field of the wall gets sprayed.

Treat door openings the same way.

FRAME MOVEMENT

Concrete frame buildings shrink over time (**Figure 7**). This is often referred to as “creep” or “frame-shortening” is used. It is common for “relieving angles” and “soft” joints to be used to address frame movement (**Figure 8** and **Figure 9**) and the concept of the “nested” track in **Figure 10**. The relieving angle is shown in **Figure 11**. Also note how the relieving angle is held away from the wall on brackets (or “stand-offs”) to control thermal bridging.

Buildings also move from side to side and vertical control joints are also necessary (**Figure 12** and **Figure 13**).

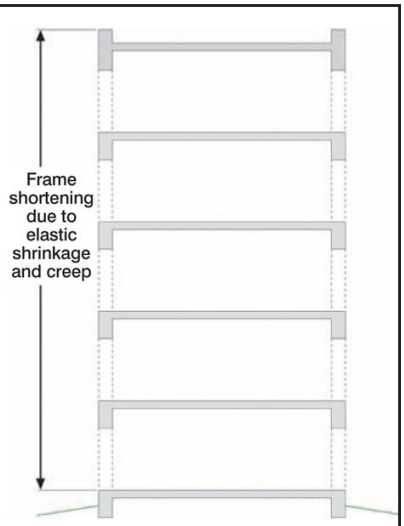


Figure 7: Frame Shortening or Creep

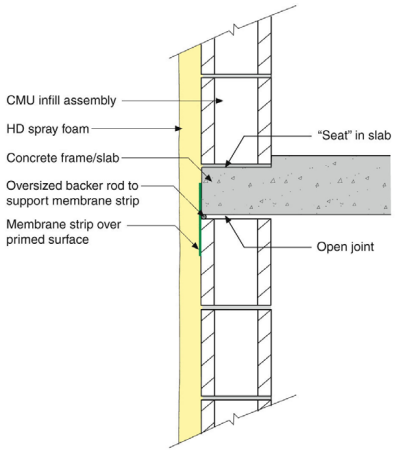


Figure 8: Masonry Soft Joint – Notice the gap. Also, note the “seat” in the slab to deal with incidental rainwater leakage.

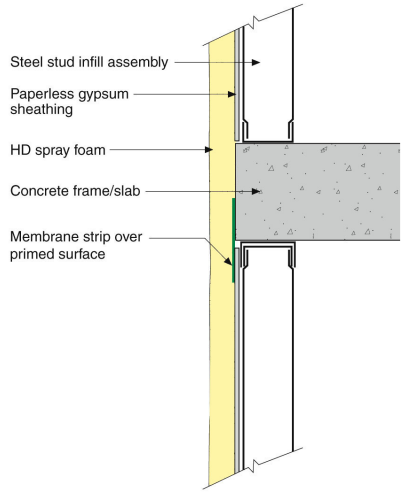


Figure 9: Steel Frame Soft Joint – Note the “nested” track for the steel frame.

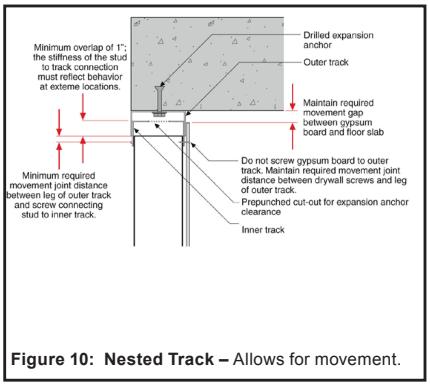


Figure 10: Nested Track – Allows for movement.

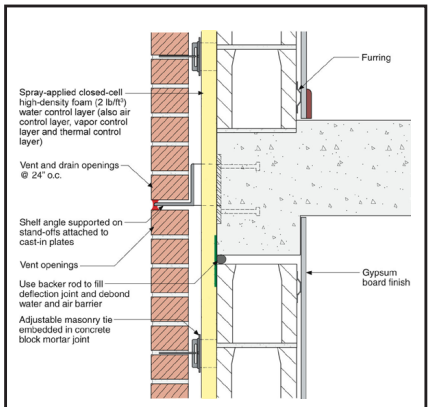


Figure 11: Stand-Offs For Relieving Angle – Thermal bridging is controlled as well as frame shortening along with water, air and vapor.

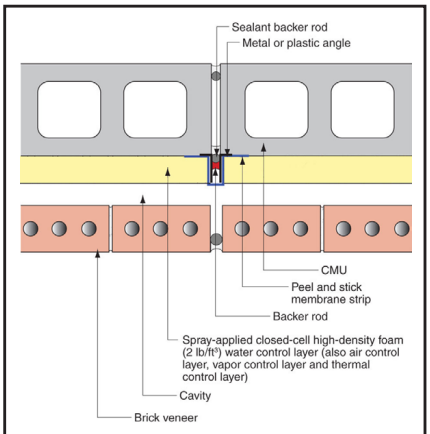


Figure 12: Vertical Control Joint – Control joint in back up wall and cladding.

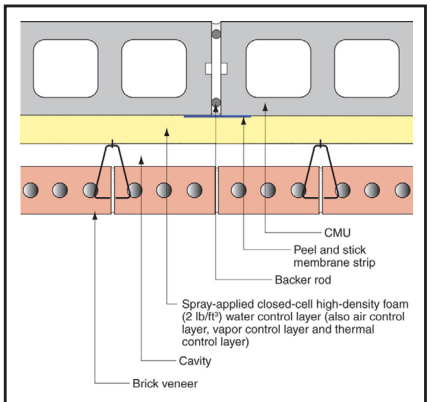


Figure 13: Vertical Control Joint – Control joint only in back up wall.

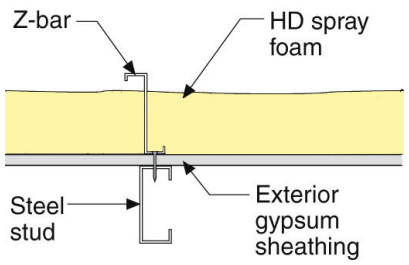


Figure 14: Z-Bar Thermal Bridge – Not energy efficient.

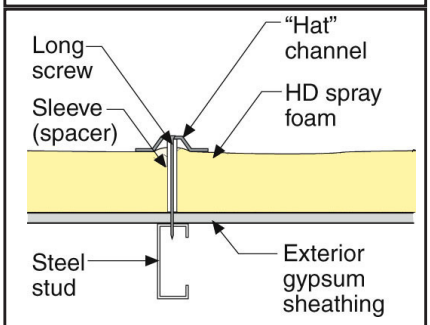


Figure 15: Hat Channel Stand-Off – Energy efficient.

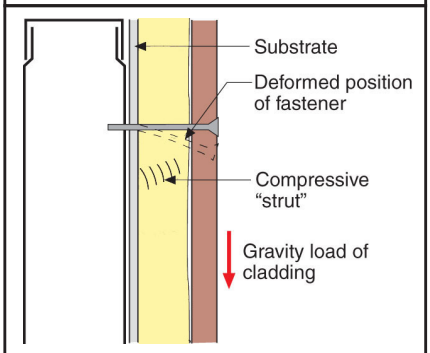


Figure 16: Inward Rotation Resistance - For the screw to bend it has to rotate inward into the wall. For it to rotate inward into the wall the girt or purlin has to rotate with it. The compressive strength of the SPF resists the inward rotation.

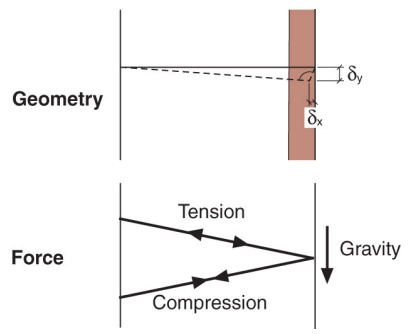


Figure 17: Truss Analogy - Structurally, this can be calculated as a "truss.

CLADDING ATTACHMENT

SPF does not go on completely smooth and flat and of uniform thickness. With brick veneers that is not an issue due to the air gap behind brick.

Attaching panel cladding through SPF requires "straight" and "planar" purlins or girts. The key is to minimize thermal bridging. Using a metal Z-bar typically results in thermal bridging (**Figure 14**). A "stand-off" approach is recommended to address the conductivity of metal Z-bars. Long screws in a "spacer sleeve" can be used (**Figure 15**). The compressive strength of the SPF addresses the issue of screw bending – the "bending moment" of the screw. For the screw to bend it has to rotate inward into the wall. For it to rotate inward into the wall the girt or purlin has to rotate with it. The compressive strength of the SPF resists the inward rotation (**Figure 16** and **Figure 17**). Structurally, this can be calculated as a "truss". When the SPF is applied the foam expands outward and bonds to the frames stiffening the assembly.

WALL TO ROOF CONTROL LAYER CONTINUITY

It is necessary to connect the water, air, vapor and thermal control functions of the wall SPF to the corresponding water, air, vapor and thermal control functions of commercial roof assemblies (**Figure 18**, **Figure 19**, **Figure 20** and **Figure 21**).

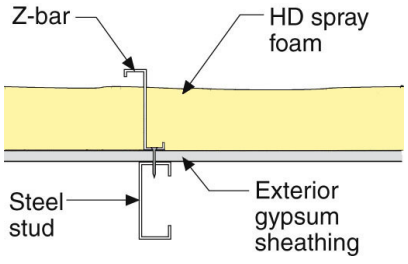


Figure 18: Parapet Control Layer Continuity – Steel stud to steel roof.

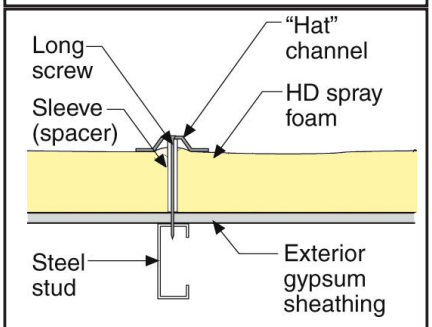


Figure 19: Parapet Control Layer Continuity – Masonry wall to concrete roof.

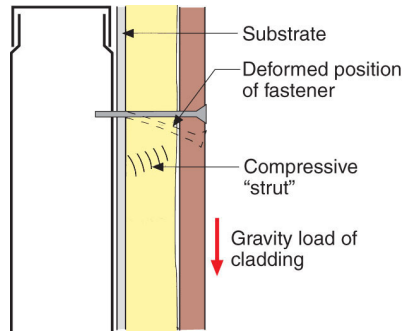


Figure 20: Parapet Control Layer Continuity – Balloon frame steel stud to steel roof.

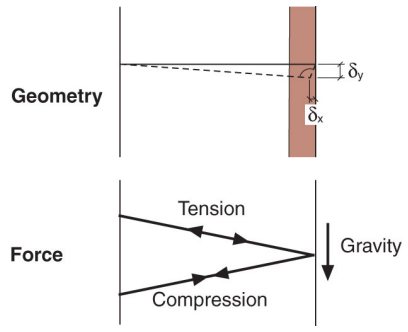


Figure 21: Parapet Control Layer Continuity – Zero height parapet.

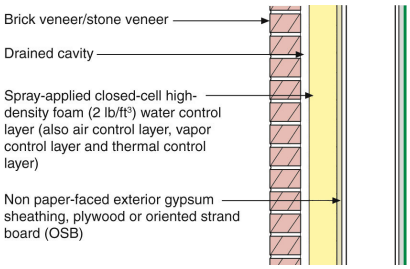


Figure 22: Exterior Rated Wall – High density closed cell spray foam with a 1 hour rating – UL – System No. EWS0015. It can be constructed with a brick veneer, stone veneer, terracotta cladding and stucco.

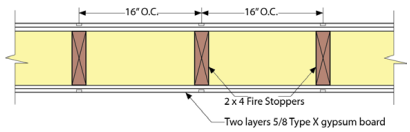


Figure 23: Separation Wall - 2 hour separation wall insulated with low density open cell spray foam with a STC 50 rating using a single 2x4 wall – U301.

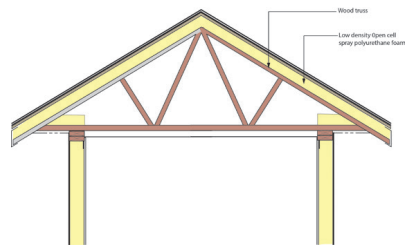


Figure 24: Conditioned Unvented Roof Assembly - 1 hour rated roof assembly insulated with low density open cell spray foam – UL P522.

FIRE RATED EXTERIOR WALL, INTERIOR SEPARATION WALL AND ROOF ASSEMBLIES

Figure 22 shows a 1 hour rated exterior wall assembly – UL – System No. EWS0015 insulated with up to 4 inches of high density closed cell spray foam. It can be constructed with a brick veneer, stone veneer, terracotta cladding and stucco.

Figure 23 shows a 2 hour separation wall insulated with low density open cell spray foam with a STC 50 rating using a single 2x4 wall – U301.

Figure 24 shows a 1 hour rated roof assembly insulated with up to 10 inches of low density open cell spray foam – P522.

SECTION 3

- TECHNICAL DATA SHEETS

EASYSEAL® .5
OPEN CELL SPRAY FOAM

SUCRASEAL®
OPEN CELL SPRAY FOAM

NEXSEAL®
CLOSED CELL SPRAY FOAM

NEXSEAL LE®
CLOSED CELL SPRAY FOAM

ONEPASS® HFO
CLOSED CELL SPRAY FOAM

ENVERGE® | EASYSEAL .5 ®
OPEN CELL SPRAY FOAM

TECHNICAL DATA SHEET
CSI MASTER SPEC #: 072119

PRODUCT USAGE

Enverge® EasySeal .5 is a spray-applied, two component, open cell polyurethane foam insulation used to insulate and seal in walls, attics, ceilings, crawlspaces (ventilated in low humidity environments), ducts, and interior applications.

PHYSICAL PROPERTIES

Property	Test Method	Value
APPARENT DENSITY	ASTM D-1622	0.5 lbs/ft^3 (nominal)
R-VALUE (AGED)	ASTMC-518 (75°FMEAN)	3.8 R/in*
COMPRESSIVE STRENGTH	ASTM D-1621	< 5 lbs/in^2
OPEN CELL CONTENT	ASTM D-6226	> 90% (vol.)
AIR PERMEANCE	ASTM E-2178	< 0.002 L/s-m2
WATER VAPOR PERMEANCE	ASTM E-96	~23 perm-in
FUNGI RESISTANCE	ASTM C-1338	No Growth
DIMENSIONAL STABILITY, -40°F	ASTM D-2126	< 5% Change
DIMENSIONAL STABILITY, +200°F	ASTM D-2126	< 5% Change
DIMENSIONAL STABILITY, +158°F & 100%RH	ASTM D-2126	< 5% Change
IGNITION BARRIER	ICC ES AC377 Appendix X	Pass DC-315 4 mils wft NO BURN THB PLUA 6MILS
THERMAL BARRIER	NFPA 286	PASS TPR2 20 MILS WFT PASS DC-315 14 MILS WFT FLAME CONTROL 60-60A 14 MILS WFT

*Calculated from 3.5" thick sample.

These values are typical. However values will vary and should not be considered part of the product specifications. It is imperative that the trained applicator read and understand this technical data sheet and SDS to process the material correctly and understand environmental and equipment limitations.

SURFACE BURNING CHARACTERISTICS

Enverge EasySeal .5 spray foam is an ASTM E-84 (NFPA 255, UL723) class 1 (class A) spray foam insulation.

- **Flame Spread Index: <25**
- **Smoke Developed Index: <450**
- **Thickness: 4''**

These numerical flame sp ead values are not a true refle tion of how this or any material will perform in actual fi e conditions.

STORAGE AND SHELF LIFE

Store drums at 50°F to 80°F (10°C to 27°C) for optimal shelf life. Excessively high temperatures may reduce shelf life. Cold or very hot chemicals can cause pump cavitation and, therefore, incorrect metering. Store material at 70°F to 90°F (21°C to 32°C) for 48 hours prior to application of the product.

A COMPONENT - 12 MONTHS
B COMPONENT - 6 MONTHS

MATERIAL TEMPERATURE

1. Storage recommendations for maximum shelf life:
• Temperature 50°F to 80°F (10°C to 27°C)
• Humidity <85% do not allow material to freeze.
2. For best results, the resin and iso components should be at 95°F (35°C) prior to use.
3. If necessary, circulate the resin and iso components through heaters to bring the material up to 95°F (35°C). Use gentle mixing to ensure homogeneous temperature throughout the drum. **TURN MIXER OFF WHEN THE MATERIAL IS AT TEMPERATURE.**

SERVICE TEMPERATURES

Enverge EasySeal .5 spray foam insulation is designed to be used in ambient temperatures from -40°F to 180°F, 220°F (-40°C to 82°C, 104°C) intermittent. It is strongly recommended that test sprays be conducted before installation for use in extreme temperatures.

SAFETY AND HANDLING INFORMATION

It is critical to read and become familiar with the safety data sheets prior to working with Enverge EasySeal .5 spray foam liquid components. During application, respiratory protection is required for the applicator, assistant, or bystanders. For more information consult safety data sheets, www.EnvergeSprayFoam.com or www.spraypolyurethane.org

ENVERGE® | EASYSEAL .5 ®
OPEN CELL SPRAY FOAM

TECHNICAL DATA SHEET
CSI MASTER SPEC #: 072119

INDOOR AIR QUALITY

Enverge EasySeal .5 is a low VOC emitting material in compliance with the California Department of Public Health (CDPH) standard 01350. This program demands strict certification c iteria and considers safety factors to account for sensitive individuals (such as children and the elderly), and ensures that a product is acceptable for use in environments such as schools and healthcare facilities. It is referenced by both the Collaborative for High Performance Schools (CHPS) and the Leadership in Energy and Environmental Design (LEED) Building Rating System.

THERMAL BARRIERS

Enverge EasySeal .5 spray foam must be separated from the interior of the building (occupied space) by an approved 15 minute thermal barrier such as 0.5" inch gypsum board or other equivalent material. Exceptions for the thermal barrier are allowed; for example, sprayfoam application in attics and crawlspaces with limited access. Consult local building codes for requirements and restrictions.

VAPOR RETARDER

Enverge EasySeal .5 meets the requirement of one perm or less to qualify as a Class III vapor retarder, per the International Code Council and ASHRAE when installed at 2" (50.8 mm) in depth.

LEED® INFORMATION

VOC Compliance:	Low emitting insulation by CA Section 01350
Post Consumer:	Recycled Content: 0%
Post Industrial:	Recycled Content: 0%
Manufacturing Location:	Spring, TX / Waukesha, WI

NOTE: LEED® is a registered trademark of the U.S. Green Building Council

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ENVERGE® | SUCRASEAL®
OPEN CELL SPRAY FOAM

TECHNICAL DATA SHEET
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OPEN CELL CONTENT	ASTM D-6226	> 90% (VOL.)
AIR PERMEANCE	ASTM E-283	< 0.002 L/S-M2
WATER VAPOR PERMEANCE	ASTM E-96	~20 PERM-IN
FUNGI RESISTANCE	ASTM C-1338	ZERO RATING
RENEWABLE CONTENT	ASTM D-6866	17%
DIMENSIONAL STABILITY, -40°F	ASTM D-2126	< 3% CHANGE
DIMENSIONAL STABILITY, +200°F	ASTM D-2126	< 3% CHANGE
DIMENSIONAL STABILITY, +158°F & 100%RH	ASTM D-2126	< 10% CHANGE
IGNITION BARRIER	ICC ES AC377 APPENDIX X	PASS NO COATING
THERMAL BARRIER	NFPA 286	PASS TPR2 20 MILS WFT PASS DC-315 AT 14 MILS WFT

*Calculated from 4" thick sample

These values are typical. However values will vary and should not be considered part of the product specifications. It is imperative that the trained applicator read and understand this technical data sheet and SDS to process the material correctly and understand environmental and equipment limitations.

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- **Thickness: 4”**

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STORAGE AND SHELF LIFE

Store drums at 50°F to 80°F (10°C to 27°C) for optimal shelf life. Excessively high temperatures may reduce shelf life. Cold or very hot chemicals can cause pump cavitation and, therefore, incorrect metering. Store material at 70°F to 90°F (21°C to 32°C) for 48 hours prior to application of the product.

A COMPONENT - 12 MONTHS
B COMPONENT - 6 MONTHS

MATERIAL TEMPERATURE

1. Storage recommendations for maximum shelf life:
• Temperature 50°F to 80°F (10°C to 27°C)
• Humidity <85% do not allow material to freeze.
2. For best results, the resin and iso components should be 60°F to 80°F (16°C to 27°C); maximum of 80°F (27°C) prior to use.
3. If necessary, circulate the resin and iso components through heaters to bring the material up to temperature. Use gentle mixing to ensure homogeneous temperature throughout the drum. TURN MIXER OFF WHEN THE MATERIAL IS AT TEMPERATURE.

SERVICE TEMPERATURES

Enverge SucraSeal spray foam insulation is designed to be used in ambient temperatures from -40°F and 180°F, 220°F (-40°C and 82°C, 104°C) intermittent. It is strongly recommended that test sprays be conducted before installation for use in extreme temperatures.

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It is critical to read and become familiar with the Safety Datasheets prior to working with Enverge SucraSeal spray foam liquid components. During application respiratory protection is required for the applicator and bystanders or helpers. For more information consult Safety Datasheets, www.envergesprayfoam.com or www.spraypolyurethane.org

INDOOR AIR QUALITY

Enverge SucraSeal is a low VOC emitting material in compliance with the California Department of Public Health (CDPH) standard 01350. This program demands strict certification c iteria and considers safety factors to account for sensitive individuals (such as children and the elderly), and ensures that a product is acceptable for use in environments such as schools and healthcare facilities. It is referenced by both the Collaborative for High Performance Schools (CHPS) and the Leadership in Energy and Environmental Design (LEED) Building Rating System.

THERMAL BARRIERS

Enverge SucraSeal spray foam must be separated from the interior of the building (occupied space) by an approved 15 minute thermal barrier such as 0.5" inch gypsum board or other equivalent material. Exceptions for the thermal barrier are allowed; for example, sprayfoam application in attics and crawlspaces with limited access. Consult local building codes for requirements and restrictions.

VAPOR RETARDER

Enverge SucraSeal meets the requirement of one perm or less to qualify as a Class III vapor retarder, per the International Code Council and ASHRAE when installed at 2" (50.8 mm) in depth.

LEED® POINT CONTRIBUTIONS

New construction	Homes	Schools
EA CREDIT 1: OPTIMIZE ENERGY PERFORMANCE	EA CREDIT 1.1: PERFORMANCE OF ENERGY STAR HOMES (OR EA 2-10 PATHWAY)	EA CREDIT PREREQUISITE 2: MINIMUM ENERGY PERFORMANCE
MR CREDIT 2: CONSTRUCTION WASTE MANAGEMENT	EA CREDIT 2.1: BASIC INSULATION	EA CREDIT 1: OPTIMIZE ENERGY PERFORMANCE
MR CREDIT 5: REGIONAL MATERIALS	EA CREDIT 3: AIR INFILTRATION	MR CREDIT 5: REGIONAL MATERIALS
IEQ CREDIT 7.1: THERMAL COMFORT	EA CREDITS 5.1 & 5.2: HEATING & COOLING DISTRIBUTION SYSTEM	IEQ CREDIT 4: LOW EMITTING MATERIALS
ID CREDIT 1: INNOVATION IN DESIGN	MR CREDIT 2.2: ENVIRONMENTALLY PREFERABLE PRODUCTS	IEQ CREDIT 7.1: THERMAL COMFORT – DESIGN
	MR CREDIT 3.2: CONSTRUCTION WASTE REDUCTION	IEQ CREDIT 9: ENHANCED ACOUSTICAL PERFORMANCE
	EQ CREDIT 1: ENERGYSTAR WITH INDOOR AIR PACKAGE PATHWAY	IEQ CREDIT 10: MOLD PREVENTION
	EQ CREDIT 10: GARAGE POLLUTANT PROTECTION	ID CREDIT 1: INNOVATION IN DESIGN

LEED® INFORMATION

VOC Compliance:	Low emitting insulation by CA Section 01350
Rapidly Renewable Content:	17% by ASTM D-6866
Post Consumer:	Recycled Content: 0%
Post Industrial:	Recycled Content: 0%
Manufacturing Location:	Spring, TX

NOTE: LEED® is a registered trademark of the U.S. Green Building Council

INTERNATIONAL CODE COUNCIL AC377 - APPENDIX X

Demand an insulation product that has passed International Codes Council (ICC) ES Acceptance Criteria 377 (spray foam insulation), Appendix X. The ICC developed a sound, vetted and justified p otocol for life safety when utilizing foam plastics in attics and crawlspaces. Spray polyurethane foam is a cellular plastic and will burn and flash over (like wood) in some fi e situations. You should insist on a spray foam that has passed Appendix X. Whether the foam is covered or uncovered, Appendix X is the benchmark for life safety. Sucraseal meets the requirements of Appendix X without a costly, burdensome additional ignition barrier or coating.

ENVERGE® | NEXSEAL®
CLOSED CELL SPRAY FOAM

TECHNICAL DATA SHEET
CSI MASTER SPEC #: 072119

PRODUCT USAGE

Enverge® NexSeal is a spray-applied, two component, closed cell polyurethane foam insulation used to insulate and seal in walls, attics, ceilings, crawlspaces (ventilated in low humidity environments), ducts, and interior applications.

PHYSICAL PROPERTIES

Property	Test Method	Value
APPARENT DENSITY	ASTM D-1622	2 LBS/FT^3 (NOMINAL)
R-VALUE (AGED)	ASTM C-518	7.2 R/IN
COMPRESSIVE STRENGTH	ASTM D-1621	NOM. 25 LBS/IN^2
TENSILE STRENGTH	ASTM D-1623	NOM. 50 LBS/IN^2
CLOSED CELL CONTENT	ASTM D-6226	> 90% (VOL.)
WATER ABSORPTION	ASTM D-2842	< 2%
WATER VAPOR PERMEANCE	ASTM E-96	< 2 PERM-INCHES
FUNGI RESISTANCE	ASTM C-1338	NO GROWTH
FLAME SPREAD INDEX	ASTM E-84	< 25
SMOKE DEVELOPED INDEX	ASTM E-84	< 450
DIMENSIONAL STABILITY, -20°F	ASTM D-2126	< 5% CHANGE
DIMENSIONAL STABILITY, +200°F	ASTM D-2126	< 10% CHANGE
DIMENSIONAL STABILITY, +158°F & 100%RH	ASTM D-2126	< 10% CHANGE
IGNITION BARRIER	ICC ES AC377 APPENDIX X	PASS NO COATING
THERMAL BARRIER	NFPA 286	PASS DC315 89 FT^2/GAL 1 NOBURN PLUS THB 114 FT^2/
GLOBAL WARMING POTENTIAL	ASHRAE STANDARD 34	1

*Calculated from 3.5" thick sample.

These values are typical. However values will vary and should not be considered part of the product specifications. It is imperative that the trained applicator read and understand this technical data sheet and SDS to process the material correctly and understand environmental and equipment limitations.

SURFACE BURNING CHARACTERISTICS

Enverge NexSeal spray foam is an ASTM E-84 (NFPA 255, UL723) class 1 (Class A) spray foam insulation.

Flame Spread Index <25
Smoke Developed Index <450
Thickness 4”

These numerical flame sp ead values are not a true refle tion on how this or any material will perform in actual fi e conditions.

STORAGE AND SHELF LIFE

Store drums at 70° to 90°F (21°C to 32°C) for 48 hours prior to application of the product. Excessively high temperatures may reduce shelf life. Cold or very hot chemicals can cause pump cavitation and, therefore, incorrect metering.

A COMPONENT -12 MONTHS
B COMPONENT -6 MONTHS

MATERIAL TEMPERATURE

1. Storage recommendations for maximum shelf life:
- Temperature 70°to 90°F (21°C to 32°C)
- Humidity <85% do not allow material to freeze.
2. For best results the resin and iso components need to be at 80°F prior to use.

SERVICE TEMPERATURES

Enverge NexSeal spray foam insulation is designed to be used in ambient temperatures from -40°F and 180°F, 220°F (-40°C and 82°C, 104°C intermittent. It is strongly recommended that test sprays be conducted before installation for use in extreme temperatures.

SAFETY AND HANDLING INFORMATION

It is critical to read and become familiar with the safety data sheets prior to working with Enverge NexSeal spray foam liquid components. During application, respiratory protection is required for the applicator, assistant, or bystanders. For more information consult safety data sheets, www.EnvergeSprayFoam.com or www.spraypolyurethane.org

THERMAL BARRIERS

Enverge NexSeal spray foam must be separated from the interior of the building (occupied space) by an approved 15 minute thermal barrier such as ½” inch gypsum board or other equivalent material. Consult local building codes for requirements and restrictions.

VAPOR RETARDER

Enverge NexSeal meets the requirement of one perm or less for a Class II vapor retarder per the International Code Council and ASHRAE when installed at 1.6" (40.6 mm) in depth.

INDOOR AIR QUALITY

Enverge NexSeal is a low VOC emitting material in compliance with the California Department of Public Health (CDPH) standard 01350. This program demands strict certification c iteria and considers safety factors to account for sensitive individuals (such as children and the elderly), and ensures that a product is acceptable for use in environments such as schools and healthcare facilities. It is referenced by both the Collaborative for High Performance Schools (CHPS) and the Leadership in Energy and Environmental Design (LEED) Building Rating System.

LEED® POINT CONTRIBUTIONS

New construction	Homes	Schools
EA CREDIT 1: OPTIMIZE ENERGY PERFORMANCE	EA CREDIT 1.1: PERFORMANCE OF ENERGY STAR HOMES (OR EA 2-10 PATHWAY)	EA CREDIT PREREQUISITE 2: MINIMUM ENERGY PERFORMANCE
MR CREDIT 2: CONSTRUCTION WASTE MANAGEMENT	EA CREDIT 2.1: BASIC INSULATION	EA CREDIT 1: OPTIMIZE ENERGY PERFORMANCE
MR CREDIT 5: REGIONAL MATERIALS	EA CREDIT 3: AIR INFILTRATION	MR CREDIT 5: REGIONAL MATERIALS
IEQ CREDIT 7.1: THERMAL COMFORT	EA CREDITS 5.1 & 5.2: HEATING & COOLING DISTRIBUTION SYSTEM	IEQ CREDIT 4: LOW EMITTING MATERIALS
ID CREDIT 1: INNOVATION IN DESIGN	MR CREDIT 2.2: ENVIRONMENTALLY PREFERABLE PRODUCTS	IEQ CREDIT 7.1: THERMAL COMFORT – DESIGN
	MR CREDIT 3.2: CONSTRUCTION WASTE REDUCTION	IEQ CREDIT 9: ENHANCED ACOUSTICAL PERFORMANCE
	EQ CREDIT 1: ENERGYSTAR WITH INDOOR AIR PACKAGE PATHWAY	IEQ CREDIT 10: MOLD PREVENTION
	EQ CREDIT 10: GARAGE POLLUTANT PROTECTION	ID CREDIT 1: INNOVATION IN DESIGN

LEED® INFORMATION

VOC Compliance:	Low emitting insulation by CA Section 01350
Pre Consumer:	Recycled Content: 9.2%
Post Industrial:	Recycled Content: 0%
Rapidly Renewable Content:	5.2% by ASTM D-6886
Manufacturing Location:	Spring, TX

NOTE: LEED® is a registered trademark of the U.S. Green Building Council

ENVERGE® | NEXSEAL®
CLOSED CELL SPRAY FOAM

TECHNICAL DATA SHEET
CSI MASTER SPEC #: 072119

ENVERGE® | NEXSEAL LE®
CLOSED CELL SPRA Y FOAM

TECHNICAL DATA SHEET
CSI MASTER SPEC #: 072119

PRODUCT USAGE

Enverge® NexSeal LE is a spray-applied, two component, closed cell polyurethane foam insulation used to insulate and seal in walls, attics, ceilings, crawlspaces (ventilated in low humidity environments), ducts, and interior applications.

PHYSICAL PROPERTIES

Property	Test Method	Value
APPARENT DENSITY	ASTM D-1622	2 LBS/FT^3 (NOMINAL)
R-VALUE (AGED)	ASTM C-518	7.2 R/IN
COMPRESSIVE STRENGTH	ASTM D-1621	NOM. 25 LBS/IN^2
TENSILE STRENGTH	ASTM D-1623	NOM. 50 LBS/IN^2
CLOSED CELL CONTENT	ASTM D-6226	> 90% (VOL.)
WATER ABSORPTION	ASTM D-2842	< 2%
WATER VAPOR PERMEANCE	ASTM E-96	< 2 PERM-INCHES
FUNGI RESISTANCE	ASTM C-1338	NO GROWTH
FLAME SPREAD INDEX	ASTM E-84	< 25
SMOKE DEVELOPED INDEX	ASTM E-84	< 450
DIMENSIONAL STABILITY, -20°F	ASTM D-2126	< 5% CHANGE
DIMENSIONAL STABILITY, +200°F	ASTM D-2126	< 10% CHANGE
DIMENSIONAL STABILITY, +158°F & 100%RH	ASTM D-2126	< 10% CHANGE
IGNITION BARRIER	ICC ES AC377 APPENDIX X	PASS NO COATING
THERMAL BARRIER	NFPA 286	PASS DC315 89 FT²/GAL 1 NOBURN PLUS THB 114 FT²/
GLOBAL WARMING POTENTIAL	ASHRAE STANDARD 34	1

*Calculated from 3.5" thick sample.

These values are typical. However values will vary and should not be considered part of the product specifications. It is imperative that the trained applicator read and understand this technical data sheet and SDS to process the material correctly and understand environmental and equipment limitations.

SURFACE BURNING CHARACTERISTICS

Enverge NexSeal LE spray foam is an ASTM E-84 (NFPA 255, UL723) class 1 (class A) spray foam insulation.

- **Flame Spread Index: <25**
- **Smoke Developed Index: <450**
- **Thickness: 4”**

These numerical flame sp ead values are not a true refle tion of how this or any material will perform in actual fi e conditions.

STORAGE AND SHELF LIFE

Store drums at 50°F to 80°F (10°C to 27°C) for optimal shelf life. Excessively high temperatures may reduce shelf life. Cold or very hot chemicals can cause pump cavitation and, therefore, incorrect metering. Store material at 70°F to 90°F for 48 hours prior to application of the product.

A COMPONENT - 12 MONTHS
B COMPONENT - 6 MONTHS

MATERIAL TEMPERATURE

1. Storage recommendations for maximum shelf life:
• 70°to 90°F (21°C to 32°C)
• Humidity <85% do not allow material to freeze.
2. For best results, the resin and iso components should be at 80°F (27°C) prior to use.

SERVICE TEMPERATURES

Enverge NexSeal LE spray foam insulation is designed to be used in ambient temperatures from -40°F to 180°F, 220°F (-40°C to 82°C, 104°C) intermittent. It is strongly recommended that test sprays be conducted before installation for use in extreme temperatures.

SAFETY AND HANDLING INFORMATION

It is critical to read and become familiar with the safety data sheets prior to working with Enverge NexSeal LE spray foam liquid components. During application, respiratory protection is required for the applicator, assistant, or bystanders. For more information consult safety data sheets, www.EnvergeSprayFoam.com or www.spraypolyurethane.org

INDOOR AIR QUALITY

Enverge NexSeal LE is a low VOC emitting material in compliance with the California Department of Public Health (CDPH) standard 01350. This program demands strict certification c iteria and considers safety factors to account for sensitive individuals (such as children and the elderly), and ensures that a product is acceptable for use in environments such as schools and healthcare facilities. It is referenced by both the Collaborative for High Performance Schools (CHPS) and the Leadership in Energy and Environmental Design (LEED) Building Rating System.

THERMAL BARRIERS

Enverge NexSeal LE spray foam must be separated from the interior of the building (occupied space) by an approved 15 minute thermal barrier such as 0.5” inch gypsum board or other equivalent material. Exceptions for the thermal barrier are allowed; for example, sprayfoam applicationin attics and crawlspaces with limited access. Consult local building codes for requirements and restrictions.

VAPOR RETARDER

Enverge NexSeal LE meets the requirement of one perm or less to qualify as a Class III vapor retarder, per the International Code Council and ASHRAE when installed at 2” (50.8 mm) in depth.

LEED® POINT CONTRIBUTIONS

New construction	Homes	Schools
EA CREDIT 1: OPTIMIZE ENERGY PERFORMANCE	EA CREDIT 1.1: PERFORMANCE OF ENERGY STAR HOMES (OR EA 2-10 PATHWAY)	EA CREDIT PREREQUISITE 2: MINIMUM ENERGY PERFORMANCE
MR CREDIT 2: CONSTRUCTION WASTE MANAGEMENT	EA CREDIT 2.1: BASIC INSULATION	EA CREDIT 1: OPTIMIZE ENERGY PERFORMANCE
MR CREDIT 5: REGIONAL MATERIALS	EA CREDIT 3: AIR INFILTRATION	MR CREDIT 5: REGIONAL MATERIALS
IEQ CREDIT 7.1: THERMAL COMFORT	EA CREDITS 5.1 & 5.2: HEATING & COOLING DISTRIBUTION SYSTEM	IEQ CREDIT 4: LOW EMITTING MATERIALS
ID CREDIT 1: INNOVATION IN DESIGN	MR CREDIT 2.2: ENVIRONMENTALLY PREFERABLE PRODUCTS	IEQ CREDIT 7.1: THERMAL COMFORT – DESIGN
	MR CREDIT 3.2: CONSTRUCTION WASTE REDUCTION	IEQ CREDIT 9: ENHANCED ACOUSTICAL PERFORMANCE
	EQ CREDIT 1: ENERGYSTAR WITH INDOOR AIR PACKAGE PATHWAY	IEQ CREDIT 10: MOLD PREVENTION
	EQ CREDIT 10: GARAGE POLLUTANT PROTECTION	ID CREDIT 1: INNOVATION IN DESIGN

LEED® INFORMATION

VOC Compliance:	Low emitting insulation by CA Section 01350
Pre Consumer:	Recycled Content: 9.2%
Post Industrial:	Recycled Content: 0%
Rapidly Renewable Content:	5.2% by ASTM D-6886
Manufacturing Location:	Spring, TX

NOTE: LEED® is a registered trademark of the U.S. Green Building Council

ENVERGE | ONEPASS® HFO
CLOSED CELL SPRAY FOAM

TECHNICAL DATA SHEET
CSI MASTER SPEC #: 072119

PRODUCT USAGE

Enverge® OnePass HFO is a spray-applied, two component, open cell polyurethane foam insulation used to insulate and seal in walls, attics, ceilings, crawlspaces (ventilated in low humidity environments), ducts, and interior applications.

PHYSICAL PROPERTIES

Property	Test Method	Value
APPARENT DENSITY	ASTM D-1622	2.1 +/- 10% LBS/FT3
R-VALUE (AGED)	ASTM C-518	R 7.2 @ 1" (25.4 MM) R 28 @ 4" (10.6MM)
COMPRESSIVE STRENGTH	ASTM D-1621	25 PSI
TENSILE STRENGTH	ASTM D-1623	50 PSI
CLOSED CELL CONTENT	ASTM D-6226	> 90% (VOL.)
WATER ABSORPTION (96 HRS, 2" HEAD, 70-74 °F (21-23 °C)	ASTM D-2842	0.29% BY VOLUME
WATER VAPOR PERMEANCE	ASTM E-96	0.44%
FUNGI RESISTANCE	ASTM C-1338	PASS - NO GROWTH
FLAME SPREAD INDEX	ASTM E-84	< 25
SMOKE DEVELOPED INDEX	ASTM E-84	< 450
DIMENSIONAL STABILITY, +158°F & 100%RH	ASTM D-2126	< 10% CHANGE
GLOBAL WARMING POTENTIAL		1

*Calculated from 3.5" thick sample.

These values are typical. However values will vary and should not be considered part of the product specifications. It is imperative that the trained applicator read and understand this technical data sheet and SDS to process the material correctly and understand environmental and equipment limitations.

LARGE SCALE FIRE TESTING

Test	Performance	Location	Value
AC377	Ignition Barrier	Vertical Surfaces Horizontal or Sloped	UP TO 8" (20.3 CM) / NO COATING REQUIRED UP TO 10"(25.4 CM) NO COATING REQUIRED
NFPA 286	Thermal Barrier	Vertical Surfaces Horizontal or Sloped	UP TO 7.5" (19.1 CM) / DC315-18 MIL WET UP TO 9.5" (24.1 CM) / DC315-18 MIL WET
NFPA 286	Ignition Barrier	Vertical Surfaces Horizontal or Sloped	UP TO 7.5" (19.1 CM) / TPR² FIRESHELL F10E/TB-18 MIL WET Up to 11.25" (24.1 cm) / TPR² Fireshell F10E/TB-18 mil wet

Enverge OnePass HFO meets or exceeds the IBC requirements for exterior walls in type I, II, III, IV and V construction. This includes NFPA 285 and NFPA 259 testing with Intertek Listings (GWL/FIP 30-02, GWL/FIP 30-01).

SURFACE BURNING CHARACTERISTICS

Enverge OnePass HFO meets Class A (Class 1) requirements when tested in accordance with ASTM E84 (UL 723) as defined in NF A 101 and Section 803 of the International Building Code (2009, 2012, 2015).

Flame Spread Index <25
Smoke Developed Index <450

1 Sample tested at 4" (10.2 cm) thickness. May be installed at unlimited thicknesses when covered with 0.5" (12.7 mm) gypsum board.

STORAGE AND SHELF LIFE

Store drums at 50°F to 80°F (10°C to 27°C) for optimal shelf life. Excessively high temperatures may reduce shelf life. Cold or very hot chemicals can cause pump cavitation and, therefore, incorrect metering. Store material at 70°F to 90°F (21°C to 32°C) for 48 hours prior to application of the product.

A COMPONENT - 12 MONTHS
B COMPONENT - 6 MONTHS

MATERIAL TEMPERATURE

1. Storage recommendations for maximum shelf life:
• Temperature 50°F to 80°F (10°C to 27°C)
• Humidity <85% do not allow material to freeze.
2. For best results, the resin and iso components should be at 95°F (35°C) prior to use.

SERVICE TEMPERATURES

Enverge OnePass HFO spray foam insulation is designed to be used in ambient temperatures from -40°F and 200°F (-40°C and 93°C). It is strongly recommended that test sprays be conducted before installation for use in extreme temperatures.

SAFETY AND HANDLING INFORMATION

It is critical to read and become familiar with the safety data sheets prior to working with Enverge OnePass HFO spray foam liquid components. During application, respiratory protection is required for the applicator, assistant, or bystanders. For more information consult safety data sheets, www.EnvergeSprayFoam.com or www.spraypolyurethane.org

THERMAL BARRIERS

Enverge OnePass HFO spray foam must be separated from the interior of the building (occupied space) by an approved 15 minute thermal barrier such as ½" inch gypsum board or other equivalent material. Consult local building codes for requirements and restrictions.

AIR BARRIER PERFORMANCE

Enverge OnePass HFO is an air impermeable insulation and an air barrier material based on testing in accordance with ASTM E2178 at 1" (25.4 mm) depth or more and has passed air barrier assembly testing in accordance with ASTM E2357 and has been evaluated by the Air Barrier Association of America in accordance with ABAA D-115-010.

INDOOR AIR QUALITY

Enverge OnePass HFO is a low VOC emitting material in compliance with the California Department of Public Health (CDPH) standard 01350. This program demands strict certification c iteria and considers safety factors to account for sensitive individuals (such as children and the elderly), and ensures that a product is acceptable for use in environments such as schools and healthcare facilities. It is referenced by both the Collaborative for High Performance Schools (CHPS) and the Leadership in Energy and Environmental Design (LEED) Building Rating System.

VAPOR RETARDER

Enverge OnePass HFO meets the requirement of one perm or less for a Class II vapor retarder per the International Code Council and ASHRAE when installed at 1.6” (11.18 4 cm) in depth. However, the minimum installed thickness recommended by Enverge is 0.75” (1.905 cm)

LEED® INFORMATION

VOC Compliance:	Low emitting insulation by CA Section 01350
Pre Consumer:	Recycled Content: 1.2%
Post Consumer:	Recycled Content: 5.3%
Rapidly Renewable Content:	5.7%
Manufacturing Location:	Waukesha, WI

Qualifies or LEED® Credit 1, Credit 2, Credit 4.1, Credit 4.2, Credit 5.2, and Credit 7

NOTE: LEED® is a registered trademark of the U.S. Green Building Council

SECTION 4

- EVALUATION REPORTS

EASYSEAL® .5
OPEN CELL SPRAY FOAM

SUCRASEAL®
OPEN CELL SPRAY FOAM

NEXSEAL®
CLOSED CELL SPRAY FOAM

NEXSEAL LE®
CLOSED CELL SPRAY FOAM

ONEPASS® HFO
CLOSED CELL SPRAY FOAM

HOLCIM SOLUTIONS AND PRODUCTS US, LLC
26 Century Boulevard
Suite 205
Nashville, Tennessee 37214

ENVERGE® EASYSEAL .5® SPRAY FOAM INSULATION

CSI Section: 07 21 00 Thermal Insulation

1.0 RECOGNITION

Enverge® EasySeal .5® Spray Foam Insulation has been evaluated for use as spray foam insulation complying with IBC Section 2603; IRC Section R316; 2021, 2018, 2015, and 2012 IECC Sections C303, C402, R303, and R402. Enverge® EasySeal .5® Spray Foam Insulation evaluated in this report complies with 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 the Enverge® EasySeal .5® 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. If there are any conflicts between the manufacturer's published installation instructions and this report, the more restrictive governs.

2.2 Except as indicated in Sections 3.3.3 and 3.3.6 of this report or by the applicable code, the insulations shall be separated from the interior of the building by a code-approved thermal barrier.

2.3 As noted in Sections 3.3.3 and 3.3.6 of this report, the 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 that will be installing the insulations shall be certified by Holcim Solutions and Products US, LLC.

2.6 Use of the insulation in areas of "very heavy" termite infestation shall be in accordance with the 2021, 2018, and 2015 IBC Section 2603.8, or 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 IBC Section 2603.2; 2021, 2018 and 2015 IRC Sections N1101.10 and N1101.10.1.1; and 2012 IRC Section N1101.12 and N1101.12.1; or IECC Sections C303.1.1 and C303.1.2, as applicable.

2.8 The insulation produced at 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, Enverge® EasySeal .5® Foam Insulation may be used in wall cavities, floor assemblies, or ceiling assemblies, and in the 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 dwellings under the IRC.

3.2 Design

3.2.1 Air Permeability: When tested in accordance with ASTM E2178 at a minimum thickness of 3.5 inches (89 mm), Enverge® EasySeal .5® 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, and Section R806.5 of the IRC.

3.2.2 Thermal Resistance (R-Values): Enverge® EasySeal .5® 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.

TABLE 1
Thermal Resistance (R-Value) [1, 2]
(°F·ft²·h/BTU)

Thickness (inch)	R-Value
1	3.7
2	7.5
3	11
3.5	13
4	15
5	19
5.5	21
6	23
7	27
7.5	29
8	30
9	34
10	38
11	42
12	46

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 0.5 pcf (16 kg/m³), the Enverge® EasySeal .5® Spray Foam Insulation 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. Thicknesses are not limited for ceiling cavities and wall cavies when covered by a code complying prescriptive thermal barrier, such as minimum ½-inch (12.7 mm) thick gypsum board.

3.3 Installation:

3.3.1 Installation General: Enverge® EasySeal .5® Spray Foam Insulation shall comply with Sections C402.1 or R402.1 of the IECC, as applicable.

The manufacturer's published installation instructions for Enverge® EasySeal .5® Spray Foam Insulation and this report shall be available and strictly adhered to at all times on the job site during installation.

Enverge® EasySeal .5® 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 10 inches (254 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: Enverge® EasySeal .5® 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.

3.3.3 Installation with an Alternative Thermal Barrier Assembly: Enverge® EasySeal .5® Spray Foam Insulation may be installed without a thermal barrier as defined in Section 3.3.2 of this report when installed with a fire protective coating as described in Table 2 of this reort based on testing in accordance with NFPA 286 or UL 1715, as applicable.

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, Enverge® EasySeal .5® 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.

3.3.5 Installation with a Prescriptive Ignition Barrier: Where entry is made only for the service of utilities, Enverge® EasySeal .5® Spray Foam Insulation may be installed at a maximum thickness of 4 inches (102 mm) 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.

3.3.6 Installation with an Alternative Ignition Barrier Assembly: When installation is in accordance with this section, the prescriptive 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.

3.3.6.1 General: When Enverge® EasySeal .5® Spray Foam Insulation is installed in attics and crawl spaces without a prescriptive ignition barrier, the following conditions apply:

a. Entry is only to service utilities in the attic or crawl space and no storage is permitted.
b. Attic or crawl space areas cannot be interconnected.
c. Air from the attic or crawl space cannot be circulated to other parts of the building.
d. 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.

e. In accordance with 2021 and 2018 IBC Section 1202.4, 2015 and 2012 IBC Section 1203.3, or IRC Section R408.1, as applicable, crawl-space ventilation is provided, as applicable.

f. In accordance with IMC (International Mechanical Code®) Section 701, combustion air is provided.

g. Application of Enverge® EasySeal .5® shall be in accordance with Section 3.3.6.2 of this report.

3.3.6.2 Attics and Crawl Spaces: Enverge® EasySeal .5® Spray Foam Insulation may be spray-applied in attics to the underside of roof sheathing, roof rafters, and vertical surfaces, and in crawl spaces to the underside of floors and vertical surfaces as described in Table 3 of this report.

3.3.6.3 Unvented Attics: Enverge® EasySeal .5® 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, and Section 1203.3 of the 2015 IBC, or Section R806.5 of the 2018, 2015, and 2012 IRC, as applicable. A vapor retarder shall be installed as required in Section 1202.3(4) of the 2021 and 2018 IBC and Section 1203.3 (4) of the 2015 IBC in Climate Zones 5, 6, 7, and 8.

4.0 PRODUCT DESCRIPTION

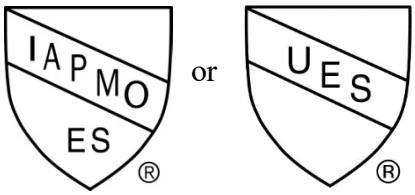
Enverge® EasySeal .5® Spray Foam Insulation is a spray-applied, polyurethane foam plastic and complies as low-density insulation in accordance with Section 3.1.1 and Table 1 of AC377. The insulation is a two-component spray foam plastic with a nominal in-place density of 0.5 pcf (16 kg/m^3).

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

Enverge® EasySeal .5® Spray Foam Insulation containers are identified by the manufacturer's name (Holcim Solutions and Products US, LLC), address and telephone number, product name, use instructions, density flame-spread and smoke-development indices, date of manufacture, the name or logo of the inspection agency, and evaluation report number (ER-492).

The spacer identification may also include the IAPMO Uniform Evaluation Service Mark of Conformity, either of which may also be used as shown below:



IAPMO UES ER-492

6.0 SUBSTANTIATING DATA

6.1 Manufacturer's descriptive literature and installation instructions. Test reports are from laboratories in compliance with ISO/IEC 17025.

6.2 Data in accordance with the Acceptance Criteria for Spray-applied Foam Plastic Insulation, AC377, dated June 2023.

6.3 Report of Flammability Testing in accordance with NFPA 286.

6.4 Report of Air Permeance based on ASTM E2178.

6.5 Report of room fire testing in accordance with UL 1715.

6.6 Data in accordance with IAPMO/ANSI ES1000-2020, Standard for Building Code Compliance of Spray-Applied Polyurethane Foam.

6.7 Data in accordance with 2019 ICC 1100 Standard for Spray-applied Polyurethane Foam Plastic Insulation.

7.0 STATEMENT OF RECOGNITION

This evaluation report describes the results of research completed by IAPMO Uniform Evaluation Service on Enverge® EasySeal .5® Spray Foam Plastic Insulation to assess their conformance to the codes shown in Section 1.0 of this report and documents the product's certification. The product is manufactured at the location noted in Section 2.8 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 (inch)	
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	10	12
Plus ThB[3]	14 mils WFT (9 mils DFT)	0.87 gal/100 ft^2	10	14
60-60A[4]	14 mils WFT (9 mils DFT)	0.87 gal/100 ft^2	10	14

For **SI:** 1 inch = 25.4 mm, 1 gallon = 3.785 L, 1 ft^2 = 0.0929 m^2

[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
Flame Seal IB[3]	4 mils WFT (3 mils DFT)	0.25 gal/100 ft^2	12	18

For **SI:** 1 inch = 25.4 mm, 1 gallon = 3.785 L, 1 ft^2 = 0.0929 m^2

[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.
[3] Flame Seal, LLC, recognized in IAPMO UES ER-600.

FLORIDA SUPPLEMENT

HOLCIM SOLUTIONS AND PRODUCTS US, LLC
26 Century Boulevard
Suite 205
Nashville, Tennessee 37214

ENVERGE® EASYSEAL® SPRAY FOAM INSULATION

CSI Section: 07 21 00 Thermal Insulation

1.0 RECOGNITION

Enverge® EasySeal .5® Spray Foam Insulation evaluated in IAPMO UES Evaluation Report ER-492 is a satisfactory alternative for use in buildings built under the following codes and regulations, including locations in the High-velocity Hurricane Zone:

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

2.0 LIMITATIONS

Use of the Enverge® EasySeal .5® Spray Foam Insulation recognized in this report is subject to the following limitations:

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

2.2 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).

2.3 This supplement expires concurrently with ER-492.

ENERGY STAR SEAL AND INSULATE SUPPLEMENT

HOLCIM SOLUTIONS AND PRODUCTS US, LLC
26 Century Boulevard
Suite 205
Nashville, Tennessee 37214

ENVERGE® EASYSEAL SPRAY FOAM INSULATION

CSI Section: 07 21 00 Thermal Insulation

1.0 PURPOSE

Enverge® EasySeal .5® Spray Foam Insulation has been certified for use as thermal *insulation* under the Seal and Insulate with ENERGY STAR® Program. The *insulation* has been evaluated for thermal resistance, surface burning characteristics (flame spread, andsmoke-development), and complies with the following codes and regulations:

- EPA Definitions and Testing Requirements for Residential Insulation Version 1.0
- 2021 International Building Code® (IBC)
- 2021 International Residential Code® (IRC)
- 2021 International Energy Conservation Code® (IECC)

2.0 DEFINTIONS

2.1 General Definitions

Insulation: Any material mainly used to slow down heat flow. It may be mineral or organic, fibrous, cellular, or reflective (aluminum foil). It may be in rigid, semi-rigid, flexible, or loose-fill form.

Residential Buildings: Single family homes (attached or unattached), multifamily buildings with 4 units or fewer, or multifamily buildings (e.g., condominiums and apartments) with 3 stories or less in height above grade.

2.2 Insulation Product Definitions

Spray or Pour Foam Insulation: A thermal insulating material that is sprayed or poured (as a gel or foamy liquid) into place and expands or sets into a cellular foam and cures at the point of installation through a chemical reaction. Foamed materials include, but are not limited to, polyurethane, polyisocyanurate, phenolic, and cementitious insulation.

Board Insulation: Semi-rigid or rigid insulation preformed into rectangular units having a degree of suppleness particularly related to their geometrical dimensions. Typical materials include, but are not limited to, fiberglass, expanded polystyrene (EPS), extruded polystyrene (XPS), polyisocyanurate, and polyurethane. The product may or may not be faced.

2.3 Insulation Performance Definitions

R-value: The inverse of the time rate of heat flow through a body from one of its bounding surfaces to the other surface for a unit temperature difference between the two surfaces, under steady state conditions, per unit area. For the purposes of this program, Imperial units will only be accepted [i.e., (h·ft2 ·°F)/Btu].

Smoke-Development Index: The characteristic of a material to emit smoke when exposed to flame or fire compared to red oak and inorganic cement.

Flame-Spread Index: The characteristic of a material to resist the spreading of flames when exposed to flame or fire compared to red oak and inorganic cement.

3.0 PRODUCT USE

3.1 General: Enverge® EasySeal .5® Spray Foam Insulation is a *Spray Foam Insulation for use* in *residential buildings.*

3.2 Thermal Resistance: *R-Values* are provided in Table 1 of this report. These R-Values are taken from testing in accordance with ASTM C518 at a mean temperature of 75ºF with a temperature differential of 50°F +/- 10°F.

TABLE 1
Thermal Resistance (R-Value) [1, 2]
(°F·ft²·h/BTU)

Thickness (inch)	R-Value
1	3.7
2	7.5
3	11
3.5	13
4	15
5	19
5.5	21
6	23
7	27
7.5	29
8	30
9	34
10	38
11	42
12	46

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.

3.3 Surface Burning Characteristics: The surface burning characteristics of flame-spread index and smoke-development index are taken from testing in accordance with ASTM E84. At a maximum thickness of 4 inches (102 mm) and a nominal density of 0.5 pcf (8.0 kg/m^3), the Enverge® EasySeal .5® Spray Foam Insulation yields a flame spread index of 25 or less and smoke-developed index of 450 or less in compliance with IBC Section 2603.3 and IRC Section R316.3.

3.4 Installation:

3.4.1 Installation General: Installation shall be in accordance with Section 3.3 of ER-492 and the manufacturer's published installation instructions. Enverge® EasySeal .5® Spray Foam Insulation is mixed and applied on site exclusively by installers approved by Holcim Solutions and Products US.

3.4.2 Personal Protective Equipment (PPE) and Ventilation: Part I – General, Section **F. Safety** of the installation instructions, provides the following information on personal protective equipment and ventilation requirements:

"1. Personal protective equipment (PPE):

a. **Skin:** Wear gloves, coveralls, apron and boots as necessary to prevent contact of liquid components or partially-cured SPF with skin. When handling liquids, gloves should be made of nitrile, neoprene, butyl or PVC.
b. **Eyes:** Protect eyes while handling liquid components or spraying with safety glasses with a side shield, safety goggles, or a face shield. During spray application, eye protection may be provided by a full-face or hood respirator.
c. **Respiration:** Firms engaged in the application of Enverge systems must have a written respiratory protection program for employees engaged in handling or applying.

Enverge Materials. Depending on the situation, respiratory protection may include dust masks, air-purifying respirators (APR), powered air-purifying respirators (PAPR), or supplied-air respirators (SAR).

2. **VENTILATION:** Provide ventilation and other engineering controls to exhaust vapors from work areas and to protect building occupants and other trades."

3.4.3 Occupancy Time After Installation: Part III – Execution, Section **G. Re-entry** of the installation instructions, provides the following guidance on Re-entry:

G. **Re-entry:** "Enverge recommends 24 hours subsequent to application of our spray-applied polyurethane foam insulation (with active ventilation) before homeowners can return. In the case of new construction, the product is cured within an hour of being sprayed and other trades are allowed in the home as soon as the SPF contractor has cleaned up and left the site. We assume this gives about six hours behind spraying.

Engineering controls.

If the application area is contained and is properly ventilated or there is a sealed partition (Engineering Control) enclosing the work area, such as a floor or wall or plastic sheathing, there is no need to vacate adjacent spaces (i.e. floors above/below the work area and/or adjacent units). As long as emissions generated from the work area are safely evacuated to the exterior of the structure and there is no air communication between the adject area and the work area."

3.4.4 Installation Drawings

Installation Drawings follow at the end of this supplement.

4.0 PRODUCT DESCRIPTION

Enverge® EasySeal .5® Spray Foam Insulation is a Spray applied foam plastic insulation.

5.0 IDENTIFICATION

Enverge® EasySeal .5® Spray Foam Insulation products 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 (Enverge® EasySeal .5® Spray Foam Insulation)
d. use instructions
e. density, flame-spread and smoke-development indices
f. date of manufacture or batch/run number
g. thermal resistance values
h. the evaluation report number (ER-492)

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

IAPMO UES ER-492

6.0 SUBSTANTIATING DATA

6.1 Manufacturer's descriptive literature and installation instructions.

6.2 Reports of testing in accordance with the ICC-ES Acceptance Criteria for Spray-applied Foam Plastic Insulation, AC377, datedJune 2023, including Appendix X.

6.3 Reports of Thermal Transmission testing in accordance with ASTM C518.

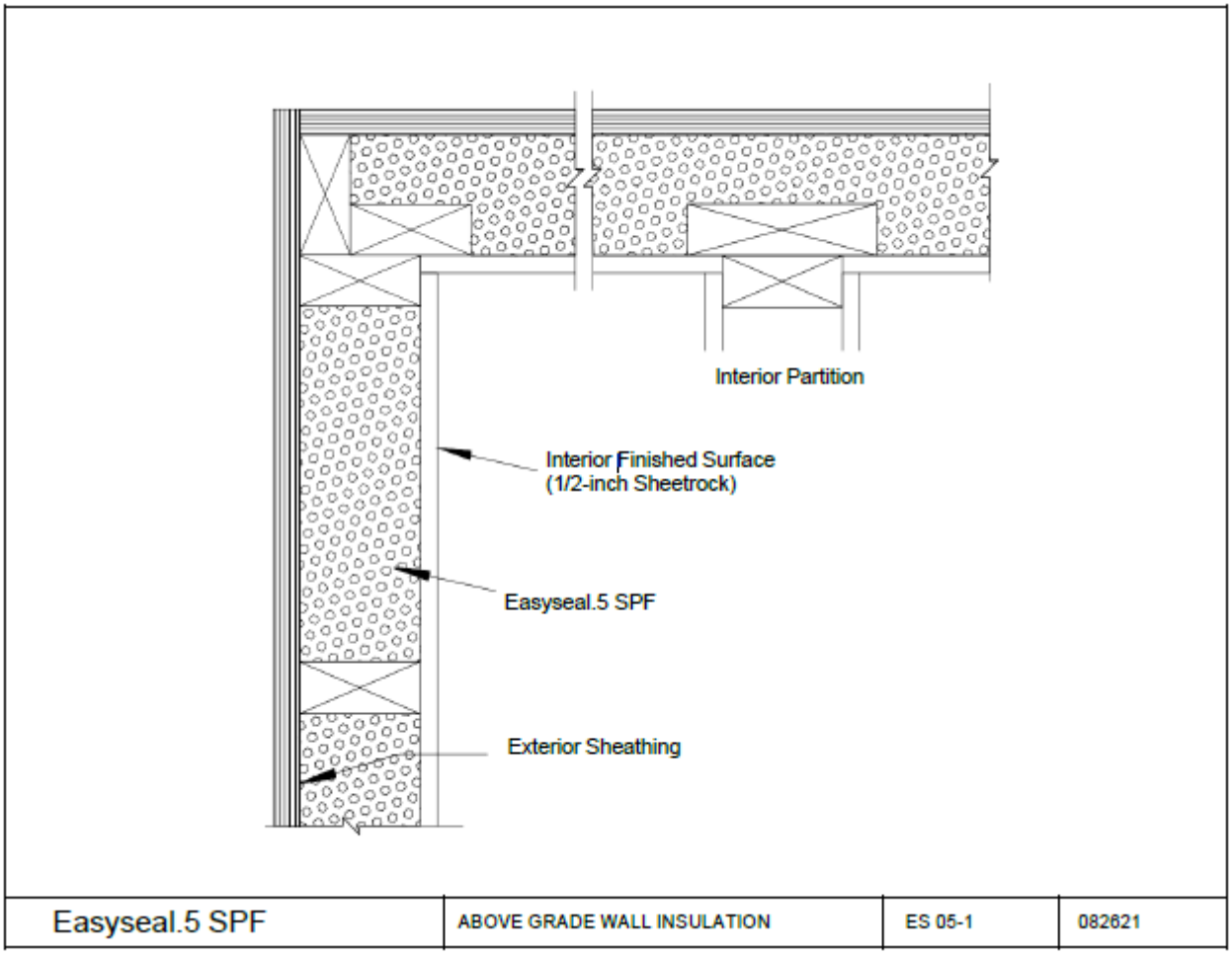
6.4 Reports of testing for Surface Burning Characteristics in accordance with ASTM E84.

6.5 Test results were from a laboratory accredited to the applicable procedure as required by the Conditions and Criteria for Recognition of Insulation Certification Bodies for the ENERGY STAR Program.

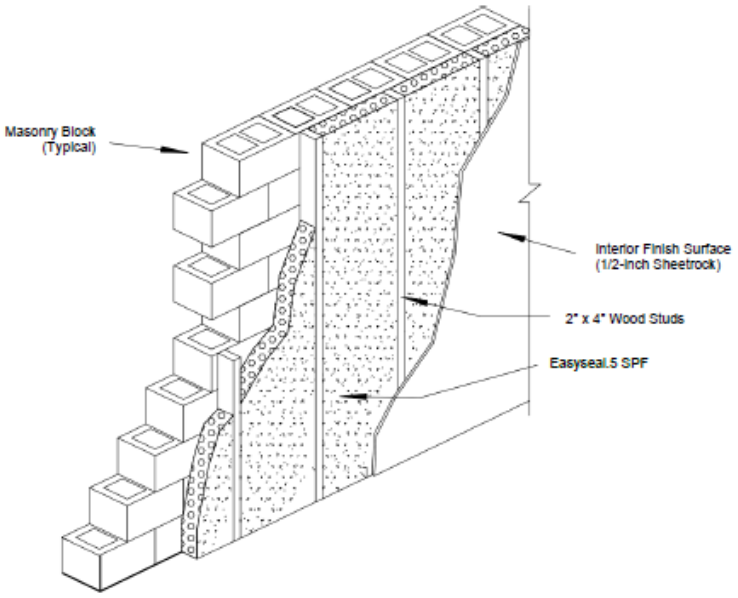
6.6 Enverge® EasySeal .5® SPF Installation Instructions 082521.

6.7 All tests were conducted on insulation samples that were determined to be representative of the product line based on having identical chemical and physical properties. All R-Values are based on Test and conducted at representative thicknesses.

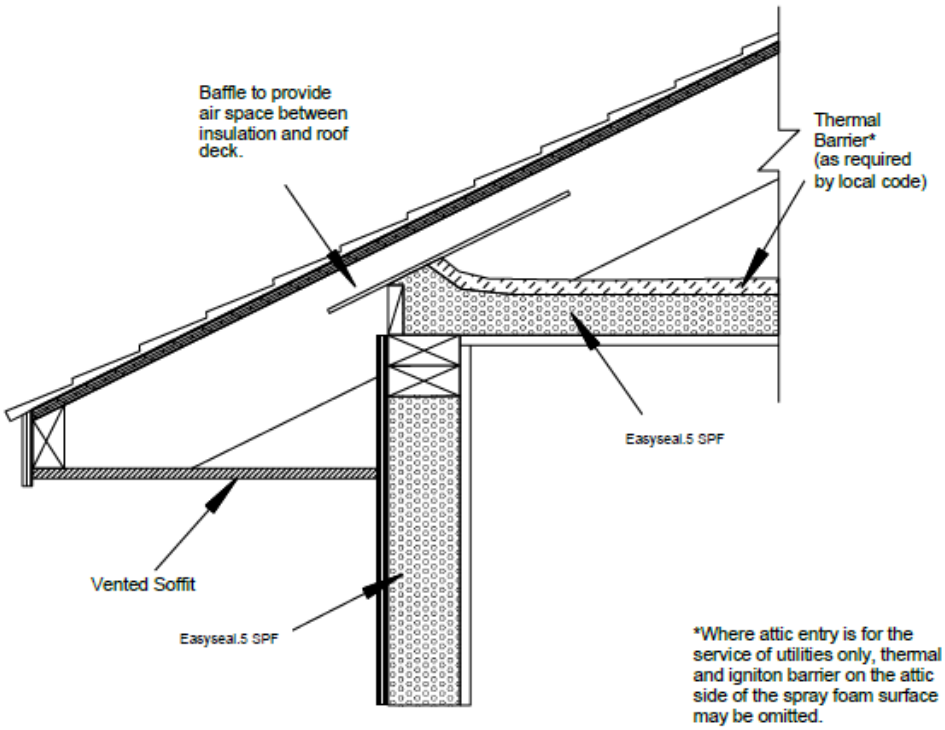
For additional information about this evaluation report please visit www.uniform-es.org or email us at info@uniform-es.org



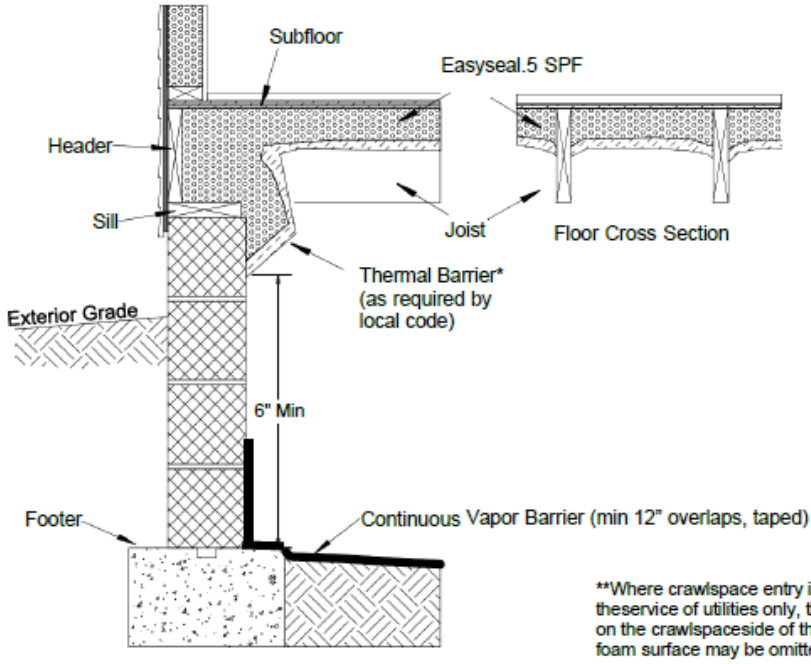
Easyseal.5 SPF	ABOVE GRADE WALL INSULATION	ES 05-1	082621



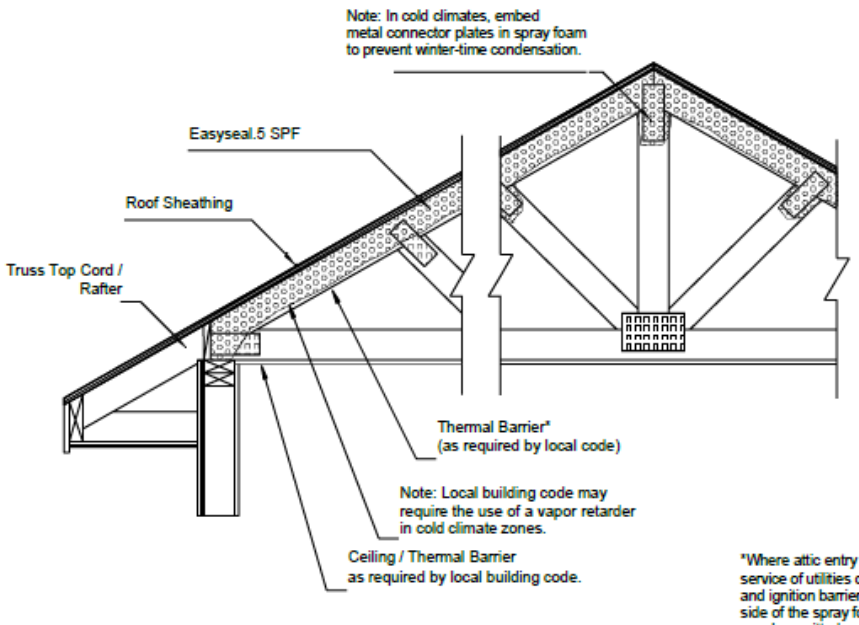
Easyseal.5 SPF	BELOW GRADE WALL INSULATION (Insulation on Interior Side of Wall)	ES 05-2	082621



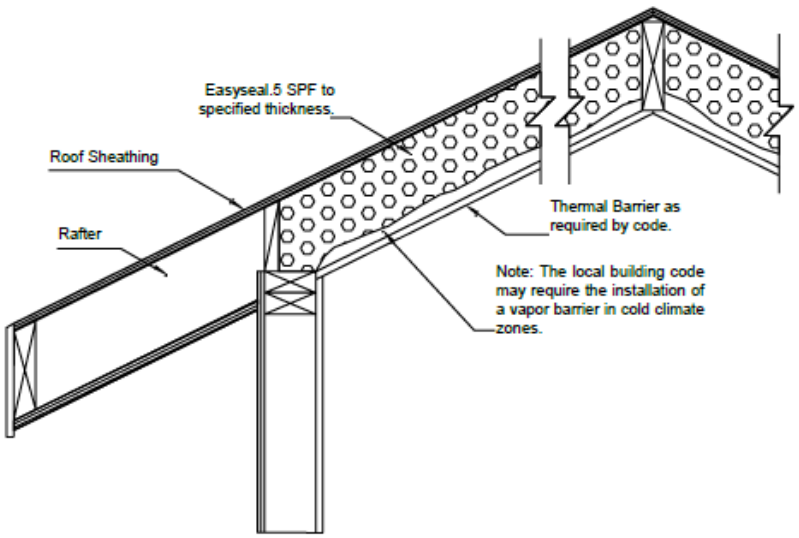
Easyseal.5 SPF	VENTED ATTIC: FLOOR / SOFFIT	ES 05-3	082621



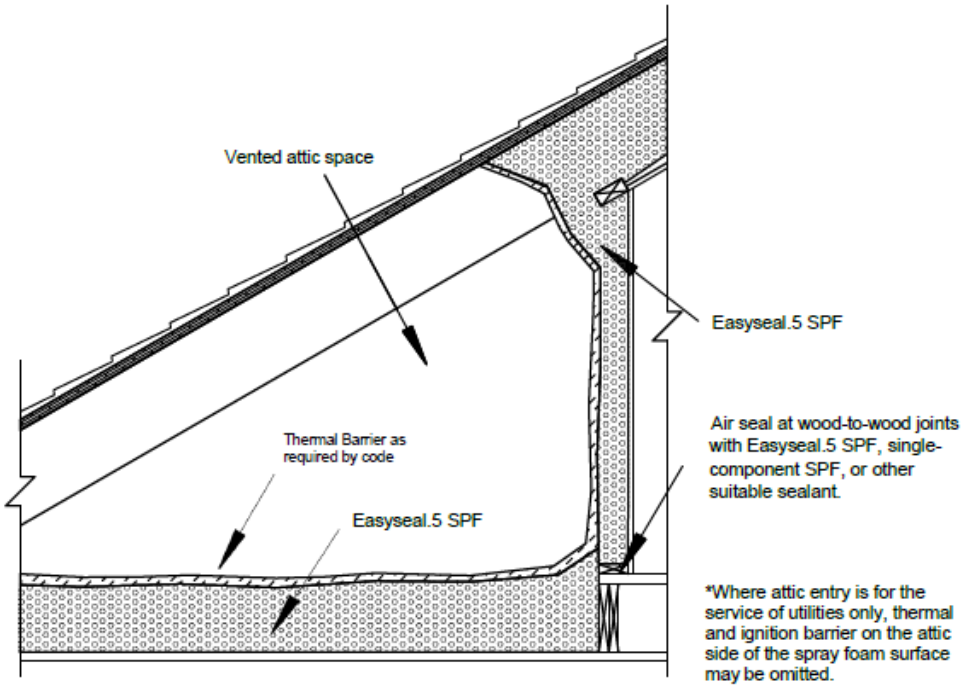
Easyseal.5 SPF	CRAWLSPACE: VENTED (Dry Environments)	ES 05-4	082621



Easyseal.5 SPF	UNVENTED ATTIC / INSULATED ROOF DECK	ES 05-5	082621



Easyseal.5 SPF	CATHEDRAL CEILING	ES 05-6	082621



Easyseal.5 SPF	ATTIC KNEE WALL	ES 05-7	082621

HOLCIM SOLUTIONS AND PRODUCTS US, LLC
26 Century Boulevard
Suite 205
Nashville, Tennessee 37214

ENVERGE® SUCRASEAL® SPRAY FOAM INSULATION

CSI Section:
07 21 00 Thermal Insulation

1.0 RECOGNITION

Enverge® Sucraseal® low density, open cell, polyurethane spray foam insulation described in this report has been evaluated for use as thermal insulation and for use in Type V construction and exterior walls in Types I through IV construction. The physical properties, air permeance, thermal resistance, surface burning characteristics, fire propagation, and attic and crawl space installations were evaluated for compliance with 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)
- 2021 and 2018 International Green Construction Code® (IGCC) (Section 4.4.1)
- 2023 Florida Building Code, Building – attached supplement
- 2023 Florida Building Code, Residential – attached supplement
- 2023 Florida Building Code, Energy Conservation – attached supplement

2.0 LIMITATIONS

Use of Enverge® Sucraseal® 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. If there are any conflicts between the manufacturer's published installation instructions and this report, the more restrictive shall govern.

2.2 In accordance with Sections 4.6.1 and 4.6.2 of this report, the insulation shall be separated from the interior of the building by a code-complying thermal barrier or ignition barrier as appropriate.

2.3 The insulation shall not exceed the nominal density and thickness for the installation conditions described in this report.

2.4 The insulation shall be protected from exposure to weather during application.

2.5 The insulation shall be installed by professional spray polyurethane foam installers approved by Holcim Solutions and Products US or by an ISO 17024 certified body.

2.6 Use of the insulation in areas of "very heavy" termite infestation probability shall be in accordance with IBC Section 2603.8, or IRC Section R318.4, as applicable.

2.7 When required by the applicable code, a vapor retarder shall be installed.

2.8 Labeling and jobsite certification of the insulation and coatings shall comply with the following code sections as applicable:

- IBC Section 2603.2
- IRC Section R316.2
- 2021, 2018, and 2015 IRC Section N1101.10.1.1
- 2012 IRC Section N1101.12.1.1
- IECC Sections C303.1.1.1 or R303.1.1.1

2.9 Foam plastic used in plenums as interior finish or interior trim under the IBC shall comply with Section 2603.7.

2.10 The product recognized in this report is produced by Holcim Solutions and Products US in Spring, Texas, and Waukesha, Wisconsin.

3.0 PRODUCT USE

Enverge® Sucraseal® spray foam insulation complies with IBC Section 2603, IRC Section R316, and IECC Sections C303, C402, R303, and R402. When installed in accordance with Section 4.0 of this report, the foam plastic insulation may be used in wall cavities, floor assemblies or ceiling assemblies, and/or in attics and crawl spaces as nonstructural thermal insulation material. Enverge® Sucraseal® spray foam insulation is used in Type V construction under the IBC and in one- and two-family dwellings under the IRC.

Enverge® Sucraseal® spray foam insulation may be used as air impermeable insulation when installed in accordance with Section 4.4 of this report.

Enverge® Sucraseal® spray-applied polyurethane foam plastic insulation may be used in Types I, II, III, or IV construction when installed in accordance with Section 4.7 of this report.

4.0 PRODUCT DESCRIPTION

4.1 Properties: Enverge® Sucraseal® spray foam insulation is an open cell, spray-applied polyurethane foam plastic insulation in accordance with Section 3.1.1 and Table 1 of AC377. The insulation has a nominal in-place density of 0.5 pcf (8 kg/m^3). The two-component spray foam plastic is produced in the field by combining a polymeric isocyanate (A component) and a polymeric resin (B component).

The polymeric resin shall be stored in 55-gallon (208 L) drums at temperatures between 50°F and 80°F (10°C and 27°C). When Component B is stored in factory-sealed containers at the recommended temperatures, the maximum shelf life is six months.

4.2 Thermal Resistance (R-Values): Enverge® Sucraseal® spray foam insulation has thermal resistance (R-Value) at a mean temperature of 75°F (24°C) as shown in Table 1 of this report.

TABLE 1 – Thermal Resistance (R-Values)[1]

Thickness (inch)	R-Value (°F•ft^2•hr/Btu)
1	4.1
2	7.8
3	11
3.5	13
4	15
5	19
5.5	20
6	22
7	26
7.25	27
8	30
9	33
9.25	34
10	37
11.25	42
12	45
16	60

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-inch and 3.5-inch thicknesses.

4.3 Surface Burning Characteristics: At a maximum thickness of 4 inches (102 mm) and a nominal density of 0.5 pcf (8.0 kg/m^3), the Enverge® Sucraseal® spray foam insulation yields a flame spread index of 25 or less and smoke-developed index of 450 or less when tested in accordance with ASTM E84. Greater thicknesses, depending on the end use, are recognized when installed in accordance with this report.

4.4 Air Permeability: Enverge® Sucraseal® spray foam insulation is classified as air-impermeable insulation when tested in accordance with ASTM E283 at a minimum thickness of 3 inches (76 mm), in accordance with 2021 and 2018 IBC 1202.3, 2015 IBC Section 1203.3, and IRC Section R806.5.

4.4.1 Compliance with the International Green Construction Code: Enverge® Sucraseal® spray foam insulation meets the requirements of Section 701.3.1.1 of the 2021 and 2018 International Green Construction Code when tested in accordance with Section 4.4 of this report.

4.5 Fire-Protective Coatings and Coverings: Fire protective coatings, for use as part of alternative thermal barrier assemblies shall be in accordance with Tables 2 of this report, as applicable, and installed in accordance with Section 4.6 of this report.

4.6 Installation: Enverge® Sucraseal® spray foam insulation shall comply with one of the following requirements:

- IECC Sections C402.1 (prescriptive)
- IECC Section R402.1 (prescriptive)

The manufacturer's published installation instructions for Enverge® Sucraseal® spray foam insulation and this report shall be available on the jobsite during installation. Where conflicts occur, the most restrictive governs.

Enverge® Sucraseal® spray foam insulation shall be spray-applied on the jobsite using equipment specified in the manufacturer's published installation instructions. The insulation is applied in multiple passes at thicknesses shown in the installation instructions up to the maximum insulation thickness specified in this report. The maximum in-service temperature for all areas shall not exceed the maximum temperature stated in the manufacturer's published installation instructions. The insulation shall be sprayed onto a substrate that is protected and clean from any debris or weather-related conditions during and after application and shall not be used in electrical outlets or junction boxes or in contact with rain, water, or soil.

4.6.1 Thermal Barrier

4.6.1.1 Application with a Prescriptive Thermal Barrier: Enverge® Sucraseal® spray foam insulation, at any thickness, in ceiling cavities and in wall cavities shall be separated from the interior by an approved thermal barrier of minimum ½ inch thick (12.7 mm) gypsum wallboard or equivalent 15-minute thermal barrier. The thermal barrier shall comply with and be installed in accordance with Section 2603.4 of the IBC or Section R316.4 of the IRC, as applicable.

4.6.1.2 Alternative Thermal Barrier Assemblies: Enverge® Sucraseal® spray foam insulation may be installed without a prescriptive thermal barrier as defined in Section 4.6.1.1 of this report when installed in accordance with Table 2 of this report.

4.6.2 Installation in Attics or Crawl Spaces: Enverge® Sucraseal® spray foam insulation may be installed in attics or

crawl spaces when installed in accordance with this section (Section 4.6.2). The insulation may be installed in unvented attics and unvented enclosed rafter spaces for use as air-impermeable insulation described in Section 4.4 of this report.

When installed in attics or crawl spaces where entry is made only for the service of utilities, Enverge® Sucraseal® spray foam insulation may be installed in accordance with this section. Enverge® Sucraseal® spray foam insulation need not be surfaced with a thermal barrier; however, such attic and crawl space areas shall be separated from the interior of the building by an ignition barrier in accordance with Section 4. of this report.

4.6.2.1 Installation Using a Prescriptive Ignition Barrier: When installed within attics or crawl spaces where entry is made only for the service of utilities, Enverge® Sucraseal® spray foam insulation shall be covered with a prescriptive ignition barrier in accordance with IBC Section 2603.4.1.6 or IRC Sections R316.5.3 and R316.5.4, as applicable.

Exception: The prescriptive ignition barrier may be omitted when installed in accordance with Section 4.6.2.2 or Section 4.6.2.3 of this report.

4.6.2.2 Installation Using an Alternative Ignition Barrier Assembly: Enverge® Sucraseal® spray foam insulation may be installed in attics and crawl spaces using an alternative ignition barrier assembly provided:

a. Entry is only to service utilities in the attic or crawl space and no storage is permitted.
b. Attic or crawl space areas cannot be interconnected.
c. Air from the attic or crawl space cannot be circulated to other parts of the building.
d. Attic ventilation is provided as required by the 2021 and 2018 edition IBC Section 1202 or IRC Section R806 except where air-impermeable insulation is permitted in unvented attics and shall comply with the following code sections as applicable:

   For Unvented Attics:
   - 2021 and 2018 IBC Section 1202.3
   - 2015 IBC Section 1203.3
   - IRC Section R806.5

   Crawl space ventilation is provided as required by the following code sections as applicable:
   - 2021 and 2018 IBC Section 1202.4
   - 2015 IBC Section 1203.4
   - 2012 IBC Section 1203.3
   - IRC Section R408.1

e. The foam plastic insulation is limited to the maximum thickness and density tested.
f. In accordance with IMC (International Mechanical Code®) Section 701, combustion air is provided.

4.6.2.3 Installation Using an Alternative Ignition Barrier Assembly without Application of Fire-Protective Coatings: Enverge® Sucraseal® spray foam insulation may be spray-applied in attics to the underside of roof sheathing or roof rafters up to a thickness of 12 inches (305 mm), and vertical surfaces up to a maximum thickness of 11.5 inches (292 mm); and may be spray-applied in crawl spaces to the underside of floors up to a maximum thickness of 12 inches (305 mm) and vertical surfaces up to a maximum of 11.5 inches (292 mm) as applicable.

4.7 Application in Types I though IV Construction (IBC):

4.7.1 General: When Enverge® Sucraseal® spray foam insulation is used in exterior walls of Types I, II, III, or IV construction of any height, the insulation shall comply with IBC Section 2603.5 and Section 4.7 of this report.

4.7.2 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 3 of this report. The potential heat of Enverge® Sucraseal® spray foam spray-applied polyurethane foam plastic insulation is 11,251 BTU/lb.

5.0 IDENTIFICATION

The spray foam insulation is identified with the following:

a. Manufacturer's name (Holcim Solutions and Products US)
b. address and telephone number,
c. the product trade name (Enverge® Sucraseal® spray foam insulation)
d. use instructions
e. density, flame-spread and smoke-development indices
f. date of manufacture or batch/run number
g. thermal resistance values
h. the evaluation report number (ER-787)

The IAPMO Uniform Evaluation Service Mark of Conformity may also be used as shown below:

IAPMO UES ER-787

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 Appendix X.

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

6.3 Report of room corner fire testing in accordance with UL 1715.

6.4 Reports of air permeance testing in accordance with ASTM E283.

6.5 Reports of testing and evaluation of flame propagation in accordance with NFPA 285.

6.6 Test reports are from laboratories in conformance with ISO/IEC 17025.

7.0 STATEMENT OF RECOGNITION

This evaluation report describes the results of research completed by IAPMO Uniform Evaluation Service on Enverge® Sucraseal® spray foam insulation to assess its conformance to the codes and standards shown in Section 1.0 of this report and documents the product's certification. Products are manufactured at locations noted in Section 2.10 of this report under a quality control program with periodic inspections 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 (inch)	
TYPE	MINIMUM THICKNESS (mils)	THEORETICAL APPLICATION RATE	WALLS AND VERTICAL SURFACES	CEILING AND OVERHEAD SURFACES
DC315[2]	14 wft 9 (dft)	115 sq. ft./gallon	9	14
Plus ThB[3]	14 wft (9 dft)	115 sq. ft./gallon	9	14
Fireshell F10E[4]	20 wft (14 dft)	80 sq. ft./gallon	11.5	11.5
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 ft^2 = 0.0929 m^2

[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. Tested to the requirements of NFPA 286.

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

[4] ICP Construction, recognized in ESR-3997, tested to the requirements of NFPA 286.

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

TABLE 3 – NFPA 285 COMPLYING EXTERIOR WALL ASSEMBLY – ENVERGE® SUCRASEAL® SPRAY FOAM APPLIED IN WALL CAVITY

Wall Component	Material Description
Base Wall System (BWS) Use either 1, 2, or 3	1) Concrete Walls 2) Concrete Masonry Unit Walls 3) Steel Stud Wall - 1 layer of ⅝-inch Type X gypsum wallboard installed on the interior side of minimum 3⅝-inch deep No. 20 gauge steel studs spaced a maximum of 24 inches on center. Lateral bracing installed minimum every 4 feet vertically or as required.
Fire-Stopping in Stud Cavity at Floor Lines	1) 4-inch 4 pcf mineral wool (friction fit or installed with Z-Clips)
Resilient Channel – For use with BWS 3 above – Use either 1 or 2	1) None 2) Double leg "hat" shaped steel resilient channel installed perpendicular to the wall studs (interior side only) and spaced a maximum of 24 inches on center between steel studs and Type X gypsum wallboard. Entire perimeter of window opening to be framed with resilient channel.
Perimeter Fire Barrier System	Perimeter fire barrier system complying with Section 715.4 of the IBC shall be installed to fill the void between the edge of the concrete floor slab and the interior surface of the exterior wall assembly.
Wall Cavity Insulation Use Item 1, 2 or 3	1) Full wall stud cavity depth or less of Enverge® Sucraseal® spray foam applied using exterior gypsum sheathing as the substrate and covering the width of the cavity and the inside of the steel wall stud framing flange.
Exterior Sheathing for BWS 3 above	Minimum $^{5}/_{8}$-inch-thick Type X exterior gypsum sheathing.
Exterior Wall Covering – Use either 1, 2, or 3	1) Any non-combustible exterior wall covering material. 2) Any non-combustible exterior wall covering system with a combustible water-resistive barrier that has successfully been tested in accordance with NFPA 285. 3) Any combustible exterior wall covering system with or without a combustible water-resistive barrier that has successfully been tested in accordance with NFPA 285.
Flashing of window, door, and other exterior wall penetrations.	As an option, flash around window, door and other exterior penetrations with limited amounts of maximum 12-inch wide acrylic, asphalt or butyl-based flashing tape or liquid applied membrane material.

FLORIDA SUPPLEMENT

HOLCIM SOLUTIONS AND PRODUCTS US, LLC
26 Century Boulevard
Suite 205
Nashville, Tennessee 37214

ENVERGE® SUCRASEAL® SPRAY FOAM INSULATION

CSI Section:
07 21 00 Thermal Insulation

1.0 RECOGNITION

The Enverge® Sucraseal® 0.5 spray-applied foam plastic insulation as evaluated and represented in IAPMO UES Evaluation Report ER-787 and with changes as noted in this supplement is a satisfactory alternative for use in buildings built under the following codes (and regulations) including locations in the High-velocity Hurricane Zone:

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

2.0 LIMITATIONS

Use of Enverge® Sucraseal® spray-applied foam plastic insulation recognized in this report is subject to the following limitations:

2.1 The clearance between the foam insulation installed above grade and exposed earth shall be in accordance with Section 1403.8 and 2603.8 of the FBC, Building or Section R318.7 and R318.8 of the FBC, Residential.

2.2 Verification shall be provided that a quality assurance agency audits the manufacturers 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).

2.3 This supplement expires concurrently with ER-787.

ENERGY STAR – SEAL AND INSULATE SUPPLEMENT

HOLCIM SOLUTIONS AND PRODUCTS US, LLC
26 Century Boulevard
Suite 205
Nashville, Tennessee 37214

ENVERGE® SUCRASEAL® SPRAY FOAM INSULATION

CSI Section:
07 21 00 Thermal Insulation

1.0 PURPOSE

Enverge® Sucraseal® Spray Foam Insulation has been certified for use as thermal *insulation* under the Seal and Insulate with ENERGY STAR® Program. The *insulation* has been evaluated for thermal resistance, surface burning characteristics (flame spread, andsmoke-development), and complies with the following codes and regulations:

- EPA Definitions and Testing Requirements for Residential Insulation Version 1.0
- 2021 International Building Code® (IBC)
- 2021 International Residential Code® (IRC)
- 2021 International Energy Conservation Code® (IECC)

2.0 DEFINTIONS

2.1 General Definitions

Insulation: Any material mainly used to slow down heat flow. It may be mineral or organic, fibrous, cellular, or reflective (aluminum foil). It may be in rigid, semi-rigid, flexible, or loose-fill form.

Residential Buildings: Single family homes (attached or unattached), multifamily buildings with 4 units or fewer, or multifamily buildings (e.g., condominiums and apartments) with 3 stories or less in height above grade.

2.2 Insulation Product Definitions

Spray or Pour Foam Insulation: A thermal insulating material that is sprayed or poured (as a gel or foamy liquid) into place and expands or sets into a cellular foam and curesat the point of installation through a chemical reaction. Foamed materials include, but are not limited to, polyurethane, polyisocyanurate, phenolic, and cementitious insulation.

Board Insulation: Semi-rigid or rigid insulation preformed into rectangular units having a degree of suppleness particularly related to their geometrical dimensions. Typical materials include, but are not limited to, fiberglass, expanded polystyrene (EPS), extruded polystyrene (XPS), polyisocyanurate, and polyurethane. The product may or may not be faced.

2.3 Insulation Performance Definitions

R-value: The inverse of the time rate of heat flow through a body from one of its bounding surfaces to the other surface for a unit temperature difference between the two surfaces, under steady state conditions, per unit area. For the purposes of this program, Imperial units will only be accepted [i.e., (h ft2 °F)/Btu].

Smoke-Development Index: The characteristic of a material to emit smoke when exposed to flame or fire compared to red oak and inorganic cement.

Flame-Spread Index: The characteristic of a material to resist the spreading of flames when exposed to flame or fire compared to red oak and inorganic cement.

3.0 PRODUCT USE

3.1 General: Enverge® Sucraseal® Spray Foam Insulation is a *Spray Foam Insulation for use* in *residential buildings.*

3.2 Thermal Resistance: *R-Values* are provided in Table 1 of this report. These R-Values are taken from testing in accordance with ASTM_at a mean temperature of 75ºF with a temperature differential of 50°F +/- 10°F.

TABLE 1

Thermal Resistance Enverge® Sucraseal® Spray Foam Insulation	
Thickness (inches)	**R-Values ($h \cdot ft^2 \cdot °F/Btu$)**
1	4.1
2	7.8
3	11
3.5	13
4	15
5	19
5.5	20
6	22
7	26
7.25	27
8	30
9	33
9.25	34
10	37
11.25	42
12	45
16	60

For **SI:** 1 inch = 25.4 mm, $1°F \cdot ft^2 \cdot h/Btu = 0.176\ 110\ K \cdot m^2/W$.
[1] R-Values are calculated based on tested K values at 1-inch and 3.5-inch thicknesses.

3.3 Surface Burning Characteristics: The surface burning characteristics of flame-spread index and smoke-development index are taken from testing in accordance with ASTM E84. At a maximum thickness of 4 inches (102 mm) and a nominal density of 0.5 pcf (8.0 kg/m^3), the Enverge® Sucraseal® spray foam insulation yields a flame spread index of 25 or less and smoke-developed index of 450 or less in compliance with IBC Section 2603.3 and IRC Section R316.3.

3.4 Installation:

3.4.1 Installation General: Installation shall be in accordance with ER-787 and the manufacturer's published installation instructions. Enverge® Sucraseal® Spray Foam Insulation is mixed and applied on site exclusively by installers approved by Holcim Solutions and Products US.

3.4.2 Personal Protective Equipment (PPE) and Ventilation. Part I – General, Section **F. Safety**, of the installation instructions, provides the following information on personal protective equipment and ventilation requirements:

"**4**. Personal protective equipment (PPE):
a. Skin: Wear gloves, coveralls, apron and boots as necessary to prevent contact of liquid components or partially-cured SPF with skin. When handling liquid components, gloves should be made of nitrile, neoprene, butyl or PVC.
b. Eyes: Protect eyes while handling liquid components or spraying with safety goggles or safety goggles and a face shield. During spray application, eye protection may be provided by a full-face or hood respirator.
c. Respiration: Firms engaged in the application of Holcim Foam systems must have a written respiratory protection program for employees engaged in handling or applying Holcim Foam materials. Depending on the situation, respiratory protection may include dust masks, air-purifying respirators (APR), powered air-purifying respirators (PAPR), or supplied-air respirators (SAR).
5. VENTILATION: Provide ventilation and other engineering controls to exhaust vapors from work areas and to protect building occupants and other trades."

3.4.3 Occupancy Time After Installation. Part III – Execution, Section G. Re-Entry of the installation instructions, provides the following guidance on Re-Entry:

Section G. Re-entry: "Enverge® Sucraseal® reacts and cures within seconds of application. Re-entry times will vary depending on factors including ventilation. Typically, when ventilation is continued for 24 hours following the conclusion of spray application and re-entry may occur at that time."

3.4.4 Installation Drawings

Installation Drawings follow at the end of this supplement.

4.0 PRODUCT DESCRIPTION

Enverge® Sucraseal® Spray Foam Insulation is a spray applied foam plastic insulation.

5.0 IDENTIFICATION

Enverge® Sucraseal® Spray Foam Insulation products are identified with the following:

a. Manufacturer's name (Holcim Solutions and Products US)
b. address and telephone number,
c. the product trade name (Enverge® Sucraseal® spray foam insulation)
d. use instructions
e. density, flame-spread and smoke-development indices
f. date of manufacture or batch/run number
g. thermal resistance values
h. the evaluation report number (ER-787)

The IAPMO Uniform Evaluation Service Mark of Conformity may also be used as shown below:

IAPMO UES ER-787

6.0 SUBSTANTIATING DATA

6.1 Manufacturer's descriptive literature and installation instructions.

6.2 Reports of testing in accordance with the ICC-ES Acceptance Criteria for Spray-applied Foam Plastic Insulation, AC377, dated February 2020, including Appendix X.

6.3 Reports of Thermal Transmission testing in accordance with ASTM C518.

6.4 Reports of testing for Surface Burning Characteristics in accordance with ASTM E84.

6.5 Test results were from a laboratory accredited to the applicable procedure as required by the Conditions and Criteria for Recognition of Insulation Certification Bodies for the ENERGY STAR Program.

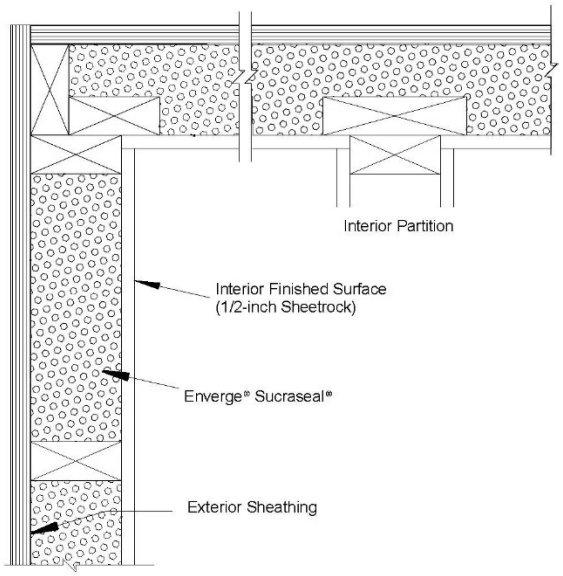
6.6 Enverge® Sucraseal® Foam Insulation Spray Installation Instructions reference numbers 011217 and 040313.

6.7 All tests were conducted on insulation samples that were determined to be representative of the product line based on having identical chemical and physical properties. All

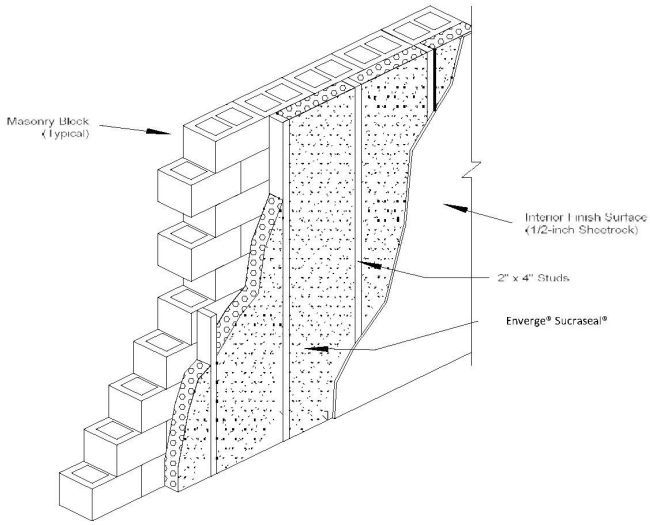
R-Values are based on testing conducted at representative thicknesses.

6.8 This supplement expires concurrently with ER-787.

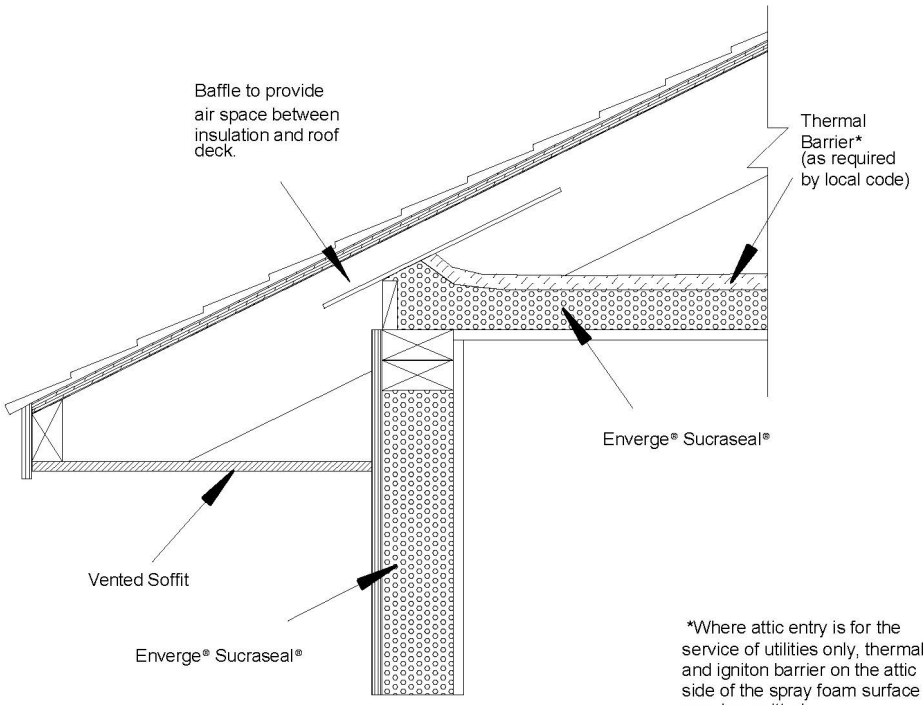
For additional information about this evaluation report please visit www.uniform-es.org or email us at info@uniform-es.org



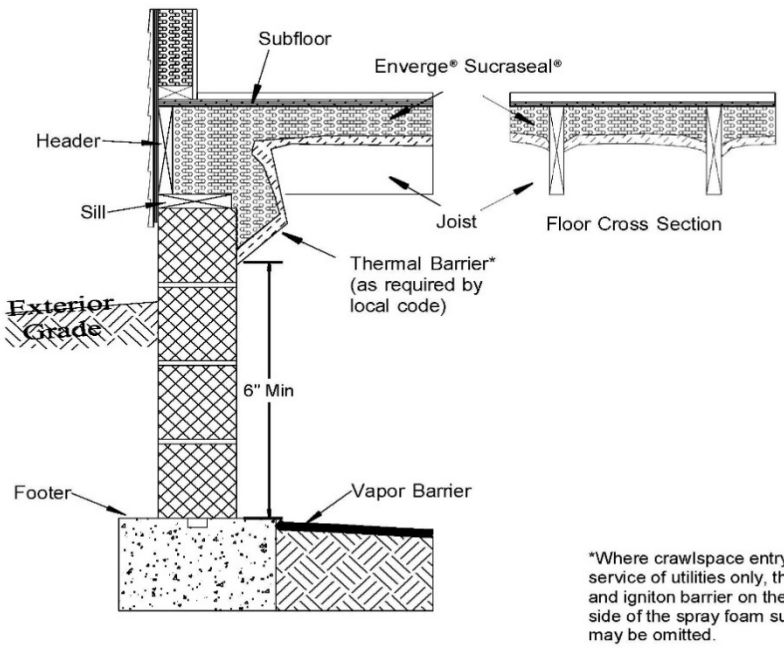
Enverge® Sucraseal®	ABOVE GRADE WALL INSULATION	ESS 05-1	071812



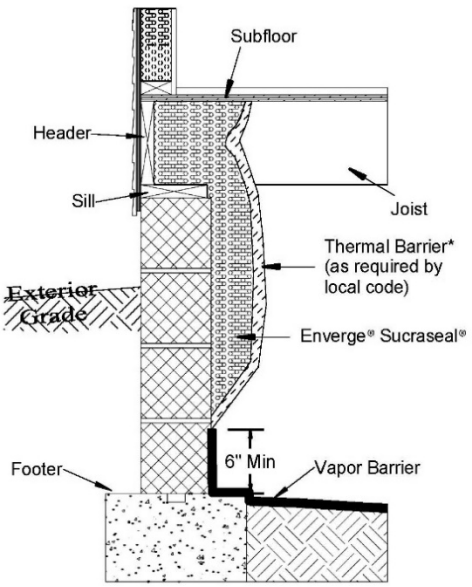
Enverge® Sucraseal®	BELOW GRADE WALL INSULATION (Insulation on Interior Side of Wall)	ESS 05-2	071812



Enverge® Sucraseal®	VENTED ATTIC: FLOOR / SOFFIT	ESS 05-3	071812

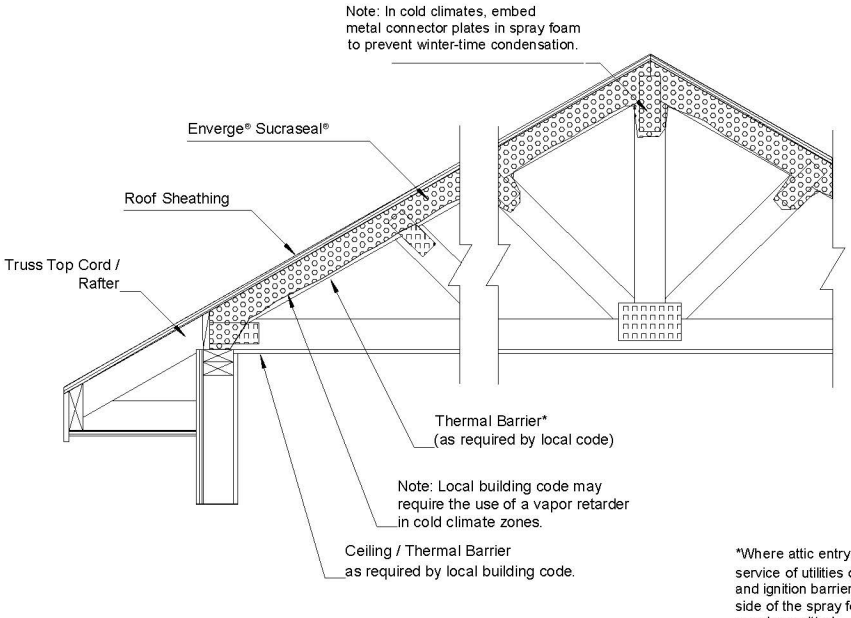


Enverge® Sucraseal®	CRAWLSPACE: VENTED	ESS 05-4	071812



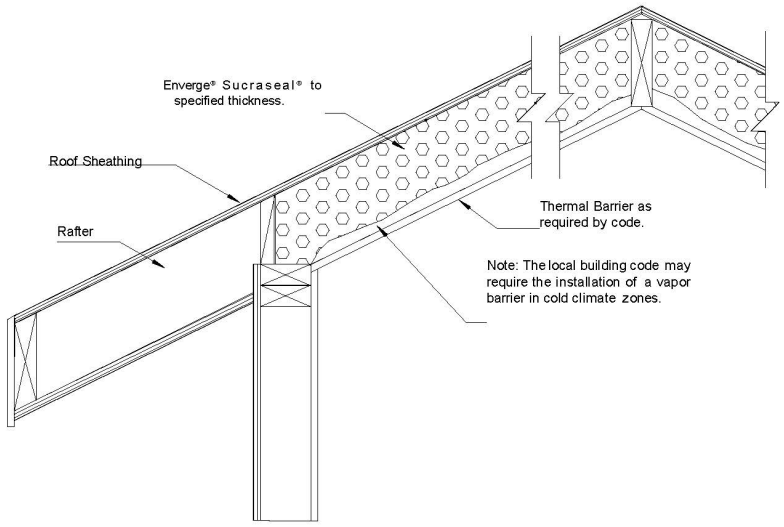
*Where crawlspace entry is for the service of utilities only, thermal and igniton barrier on the crawlspace side of the spray foam surface may be omitted.

Enverge® Sucraseal®	CRAWLSPACE: UNVENTED	ESS 05-5	071812

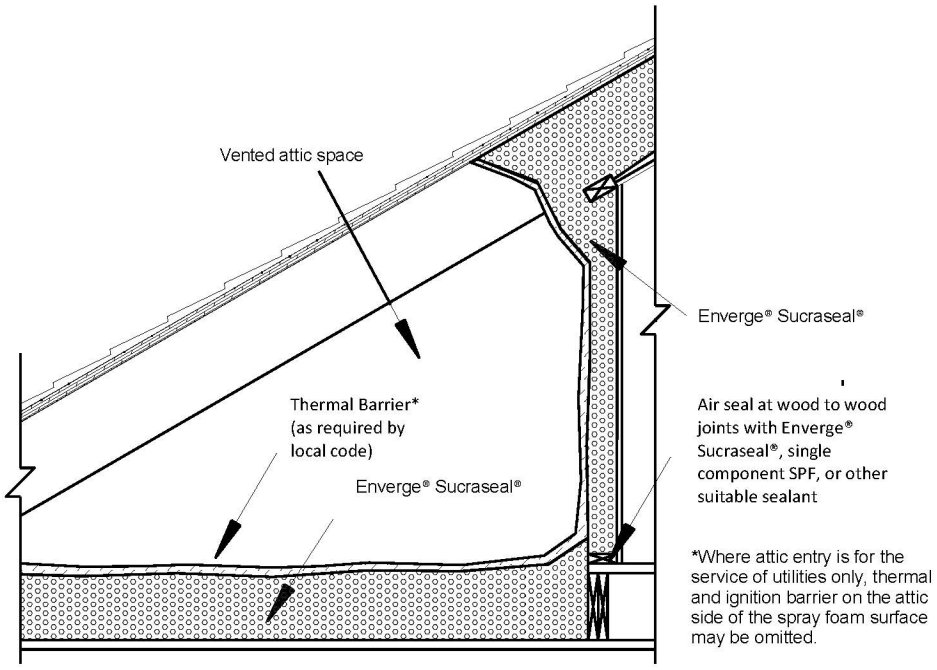


*Where attic entry is for the service of utilities only, thermal and ignition barrier on the attic side of the spray foam surface may be omitted.

Enverge® Sucraseal®	UNVENTED ATTIC / INSULATED ROOF DECK	ESS 05-6	071812



Enverge® Sucraseal®	CATHEDRAL CEILING	ESS 05-7	071912



Enverge® Sucraseal®	ATTIC KNEE WALL	ESS 05-8	040313

EVALUATION REPORT Number: 374

Originally Issued: 01/16/2015 Revised: 04/30/2024 Valid Through: 01/31/2025

HOLCIM SOLUTIONS AND PRODUCTS US, LLC
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ENVERGE® NEXSEAL® 2.0 AND ENVERGE® NEXSEAL® LE SPRAY FOAM INSULATIONS

CSI Section:
07 21 00 Thermal Insulation

1.0 RECOGNITION

Enverge® Nexseal® 2.0 and Enverge® Nexseal® LE Spray Foam Insulations recognized in this report have 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 Enverge® Nexseal® 2.0 and Enverge® Nexseal® LE Spray Foam Insulations have 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 Enverge® Nexseal® 2.0 and Enverge® Nexseal® LE Spray Foam Insulations recognized in this report is subject to the following limitations:

2.1 The insulations shall be installed in accordance with the manufacturer's published installation instructions. They shall also be installed in accordance with this evaluation report and the applicable code, and if there are any conflicts between the manufacturer's published installation instructions and this report, the more restrictive governs.

2.2 Except as indicated in Section 3.3.3 of this report or by the applicable code, the insulations shall be separated from the interior of the building by a code approved thermal barrier.

2.3 As noted in Sections 3.3.3 and 3.3.4 of this report, Enverge® Nexseal® 2.0 and Enverge® Nexseal® LE Spray Foam Insulations shall not exceed the nominal density and thickness.

2.4 During installation, the insulations and the surfaces to which they are applied shall be protected from exposure to weather.

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

2.6 Use of Enverge® Nexseal® 2.0 and Enverge® Nexseal® LE Spray Foam Insulations 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 jobsite certification of the insulations and coatings shall comply with 2021, 2018, and 2015 IRC Section 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 insulations recognized in this report are 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, Enverge® Nexseal® 2.0 and Enverge® Nexseal® LE Spray Foam Insulations 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 insulations are used in Type V-B construction under the IBC and in dwellings under the IRC. The spray-applied foam plastic insulations also may be used in Type I, II, III, or IV construction when installed in accordance with Section 3.4 of this report.

Enverge® Nexseal® 2.0 and Enverge® Nexseal® LE Spray Foam Insulations may be used as air impermeable insulations when installed in accordance with Section 3.2.4 of this report.

3.2 Design:

3.2.1 General. Enverge® Nexseal® 2.0 and Enverge® Nexseal® LE Spray Foam Insulations shall comply with requirements in IECC Sections C402.1 and R402, as applicable.

3.2.2 Thermal Resistance. (R-Values): Envirge® Nexseal® 2.0 and Envirge® Nexseal® LE Spray Foam Insulations have a thermal resistance (R-Value) at a mean temperature of 75°F (24°C) as shown in Table 1 of this report.

TABLE 1 – Thermal Resistance (R-Value)[1,2]
(°F•ft²•h/Btu)

Thickness (inch)	Envirge® Nexseal® 2.0 and Envirge® Nexseal® LE
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 Envirge® Nexseal® 2.0 and Envirge® Nexseal® LE Spray Foam Insulations have 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), Envirge® Nexseal® 2.0 and Envirge® Nexseal® LE Spray Foam Insulations are classified as air-impermeable insulations 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), Envirge® Nexseal® 2.0 and Envirge® Nexseal® LE Spray Foam Insulations have a vapor permeance of less than 1.0 perms [57.4 x 10^{-9} g/(Pa•s•m²)], at a minimum thickness of $1^{5}/_{8}$ inches (41.3 mm) and qualify 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 Envirge® Nexseal® 2.0 and Envirge® Nexseal® LE Spray Foam Insulation and this report shall be available on the jobsite during installation for quality control purposes.

Envirge® Nexseal® 2.0 and Envirge® Nexseal® LE Spray Foam Insulations shall be spray-applied on the jobsite 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 2 inches (50.8 mm) per pass for Envirge® Nexseal® 2.0 and 4 inches (50.8 mm) per pass for Envirge® Nexseal® LE 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: Envirge® Nexseal® 2.0 and Envirge® Nexseal® LE Spray Foam Insulations 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, Envirge® Nexseal® 2.0 and Envirge® Nexseal® LE Spray Foam Insulations 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, Envirge® Nexseal® 2.0 and Envirge® Nexseal® LE Spray Foam Insulations 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 Enverge® Nexseal® 2.0 and Enverge® Nexseal® LE Spray Foam Insulations are 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 m).
- **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, the 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: Enverge® Nexseal® 2.0 and Enverge® Nexseal® LE Spray Foam Insulations 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 Enverge Nexseal® 2.0 and Enverge® Nexseal® LE Spray Foam Insulations does not exceed 11½ inches (292 mm), and when applied to vertical surfaces, the maximum thickness does not exceed 7½ inches (190 mm), the Enverge® Nexseal® 2.0 and Enverge® Nexseal® LE Spray Foam Insulations do not require the application of either an ignition barrier or a fire protective coating.

Optional: If desired, Enverge® Nexseal® 2.0 and Enverge® Nexseal® LE Spray Foam Insulations 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: Enverge® Nexseal® 2.0 and Enverge® Nexseal® LE Spray Foam Insulations 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 Enverge® Nexseal® 2.0 and Enverge® Nexseal® LE Spray Foam Insulations are 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. Enverge® Nexseal® 2.0 and Enverge® Nexseal® LE Spray Foam insulations 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. Enverge® Nexseal® 2.0 and Enverge® Nexseal® LE, 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. Enverge® Nexseal® 2.0 and Enverge® Nexseal® LE, 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

Enverge® Nexseal® 2.0 and Enverge® Nexseal® LE Spray Foam Insulations are spray-applied, polyurethane foam plastic and comply 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/m^3).

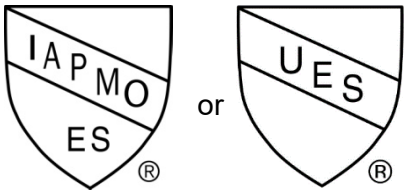
The spray-applied insulation is mixed in the field by combining a polymeric isocyanate (A component) and a resin blend (B component). The liquid components shall be stored in 55-gallon (208 L) drums at temperatures between 50°F and 70°F (10°C and 21°C). When Component A and Component B are stored in 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 (Enverge® Nexseal® 2.0 or Enverge® Nexseal® LE 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-374)
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-374

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 carried out by IAPMO Uniform Evaluation Service on Holcim Solutions and Products US's Enverge® Nexseal® 2.0 and Enverge® Nexseal® LE Spray Foam Insulations 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 (inch)	
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 ft^2 = 0.0929 m^2

[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 ft^2 = 0.0929 m^2

[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**	**1** – Concrete wall **2** – Concrete masonry wall **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 or 24 inches on center. Lateral bracing installed minimum every 4 feet vertically or as required. Wall stud cavities shall be filed at each floor line with minimum 4 pcf density mineral wool (e.g. Thermafiber) friction fit between steel wall studs.
Resilient Channel when used with **BWS 3** above	Double-leg 'hat' shaped steel resilient channel, minimum 30 gage, installed perpendicular to the wall studs (interior side only) and spaced a maximum of 24-inches on center between steel studs and Type X gypsum wallboard. Entire perimeter of window opening to be framed with resilient channel.
Perimeter Fire Barrier System	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**	**1** – None **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] **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] **4** – Fiberglass batt insulation (faced or unfaced) **5** – Mineral wool insulation (faced or unfaced)
Exterior Sheathing Use either **1**, **2** or **3**	**1** – None (for BWS 1 or 2 above) **2** – ½-inch thick exterior gypsum sheathing (for BWS 3 above) **3** – $^5/_8$-inch-thick Type X exterior type gypsum sheathing (for BWS 3 above)
Exterior Insulation	Maximum 4-inch thick Enverge® Nexseal® 2.0 and Enverge® Nexseal® LE Spray Foam Insulation [3]
Exterior Wall Covering[2] Use either **1**, **2**, **3**, **4** or **5**	**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. **2** - Stucco - minimum ¾-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. **3** – Minimum 2-inch- thick natural stone. Joints shall be mortared (non-open jointed). **4** – Minimum 1½-inch thick concrete masonry unit, pre-cast concrete or artificial cast stone. Joints shall be mortared. **5** – Minimum 1¼-inch thick terra cotta. Joints shall be mortared.
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/m^3; 1 BTU/ft^2 = 0.01128 mJ/m^2

[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 Enverge® Nexseal® 2.0 and Enverge® Nexseal® LE Spray Foam Insulation is 2,066 Btu/ft^2 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/ft^2 per inch of thickness when tested in accordance with NFPA 259.

FLORIDA SUPPLEMENT

HOLCIM SOLUTIONS AND PRODUCTS US, LLC
BUILDING ENVELOPE DIVISION
26 Century Boulevard
Suite 205
Nashville, Tennessee 37214

ENVERGE® NEXSEAL® 2.0 AND ENVERGE® NEXSEAL® LE SPRAY FOAM INSULATIONS

CSI Section: 07 21 00 Thermal Insulation

1.0 RECOGNITION

Enverge® Nexseal® 2.0 and Enverge® Nexseal® LE Spray Foam Insulations evaluated in IAPMO UES Evaluation Report ER-374 are 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 Enverge® Nexseal® 2.0 and Enverge® Nexseal® LE Spray Foam Insulations shall comply with the provisions applicable to the 2021 IBC or 2021 IRC as described in ER-374 unless noted otherwise in this supplement.

2.2 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.

2.3 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).

2.4 This supplement expires concurrently with ER-374.

EVALUATION REPORT Number: 859

Originally Issued: 02/14/2023 Revised: 05/07/2024 Valid Through: 02/28/2025

HOLCIM SOLUTIONS AND PRODUCTS US, LLC
26 Century Boulevard
Suite 205
Nashville, Tennessee 37214

EnvergeOnePass™ INSULATION

CSI Section:
07 21 00 Thermal Insulation

1.0 RECOGNITION

EnvergeOnePass™ 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™ 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™ 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™ 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™ 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™ 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 insulations also may be used in Type I, II, III, or IV construction when installed in accordance with Section 3.4 of this report.

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

3.2.2 Thermal Resistance. (R-Values): EnvergeOnePass™ 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.

TABLE 1 – Thermal Resistance (R-Value)[1,2]
(°F•ft²•h/Btu)

Thickness (inch)	EnvergeOnePass™
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/m^3), the EnvergeOnePass™ 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™ 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™ Spray Foam Insulation has a vapor permeance of less than 1.0 perms [57.4 x 10^{-9} g/(Pa•s•m^2)], at a minimum thickness of 1 $^5/_8$ 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™ Spray Foam Insulation and this report shall be available on the jobsite during installation for quality control purposes.

EnvergeOnePass™ 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™ 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™ 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™ 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™ 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 m).
- **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, the 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™ 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™ 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™ Spray Foam Insulation does not require the application of either an ignition barrier or a fire protective coating.

Optional: If desired, EnvergeOnePass™ 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™ 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™ 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™ 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™, 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™, 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™ 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/m^3).

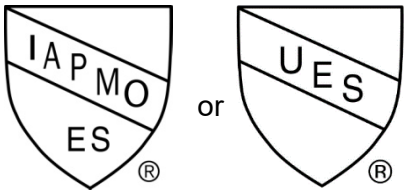
The spray-applied insulation is mixed in the field by combining a polymeric isocyanate (A component) and a resin blend (B component). The liquid components shall be stored in 55-gallon (208 L) drums at temperatures between 50°F and 70°F (10°C and 21°C). When Component A and Component B are stored in 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™ 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™ 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 ft^2 = 0.0929 m^2

[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 ft^2 = 0.0929 m^2

[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**	**1** – Concrete wall **2** – Concrete masonry wall **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.
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**	**1** – None **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] **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] **4** – Fiberglass batt insulation (faced or unfaced) **5** – Mineral wool insulation (faced or unfaced)
Exterior Sheathing Use either **1**, **2** or **3**	**1** – None (for BWS 1 or 2 above) **2** – ½-inch thick exterior gypsum sheathing (for BWS 3 above) **3** – $^5/_8$-inch-thick Type X exterior type gypsum sheathing (for BWS 3 above)
Exterior Insulation	Maximum 4-inch thick Enverge OnePass™ Spray Foam Insulation [3]
Exterior Wall Covering[2] Use either **1**, **2**, **3**, **4** or **5**	**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. **2** - Stucco - minimum ¾-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. **3** – Minimum 2-inch- thick natural stone. Joints shall be mortared (non-open jointed). **4** – Minimum 1½-inch thick concrete masonry unit, pre-cast concrete or artificial cast stone. Joints shall be mortared. **5** – Minimum 1¼-inch thick terra cotta. Joints shall be mortared.
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/m^3; 1 BTU/ft^2 = 0.01128 mJ/m^2

[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™ Spray Foam Insulation is 2,066 Btu/ft^2 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/ft^2 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™ INSULATION

CSI Section:
07 21 00 Thermal Insulation

1.0 RECOGNITION

The EnvergeOnePass™ Spray Foam Insulations evaluated in IAPMO UES Evaluation Report ER-859 are satisfactory alternatives 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™ Spray Foam Insulation recognized in this supplement is subject to the following limitations:

2.2 EnvergeOnePass™ 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.

SECTION 5

- SAFETY DATA SHEETS

EASYSEAL® .5
OPEN CELL SPRAY FOAM

SUCRASEAL®
OPEN CELL SPRAY FOAM

NEXSEAL®
CLOSED CELL SPRAY FOAM

NEXSEAL LE®
CLOSED CELL SPRAY FOAM

ONEPASS® HFO
CLOSED CELL SPRAY FOAM

SAFETY DATA SHEET

1. Identification

Product identifier	**ENVERGE Open Cell Spray Foam - Part A Isocyanate**
Other means of identification	
Product code	ISO-OC-2500
Recommended use	Industrial use.
Recommended restrictions	None known.
Manufacturer/Importer/Supplier/Distributor information	
Distributed by	Holcim Solutions and Products US, LLC
Address	26 Century Boulevard, Suite 205 Nashville, TN 37214 ENVERGE™ is a Holcim Solutions and Products US, LLC brand.
Website	envergesprayfoam.com
Email	contactSPF-us@holcim.com
Telephone Number	(713) 239-0252
Emergency Telephone Number	For Chemical Emergency, Spill, Leak, Fire, Exposure, or Incident: CHEMTREC within USA and Canada: 1-800-424-9300 CHEMTREC outside USA and Canada: +1 703-527-3887 (collect calls accepted)

2. Hazard(s) identification

Physical hazards	Not classified.	
Health hazards	Acute toxicity, inhalation	Category 4
	Skin corrosion/irritation	Category 2
	Serious eye damage/eye irritation	Category 2
	Sensitization, respiratory	Category 1
	Sensitization, skin	Category 1
	Specific target organ toxicity, single exposure	Category 3 respiratory tract irritation
	Specific target organ toxicity, repeated exposure (inhalation)	Category 2 (respiratory system)
OSHA defined hazards	Not classified.	

Label elements

Signal word	Danger
Hazard statement	Causes skin irritation. May cause an allergic skin reaction. Causes serious eye irritation. Harmful if inhaled. May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause respiratory irritation. May cause damage to organs (respiratory system) through prolonged or repeated exposure by inhalation.
Precautionary statement	
Prevention	Do not breathe mist/vapors. Wash thoroughly after handling. Use only outdoors or in a well-ventilated area. Contaminated work clothing must not be allowed out of the workplace. Wear protective gloves/protective clothing/eye protection/face protection. In case of inadequate ventilation wear respiratory protection.

Response	If on skin: Wash with plenty of water. If inhaled: Remove person to fresh air and keep comfortable for breathing. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a poison center/doctor if you feel unwell. If skin irritation or rash occurs: Get medical advice/attention. If eye irritation persists: Get medical advice/attention. If experiencing respiratory symptoms: Call a poison center/doctor. Take off contaminated clothing and wash it before reuse.
Storage	Store in a well-ventilated place. Keep container tightly closed. Store locked up.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC)	None known.
Supplemental information	None.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Polymethylene polyphenylene isocyanate	9016-87-9	40 - 60
Methylene Diphenyl Diisocyanate	101-68-8	25 - 45
o-(p-Isocyanatobenzyl)phenyl isocyanate	5873-54-1	1 - 5

Impurities

Chemical name	Common name and synonyms	CAS number	%
Siloxanes and silicones, Di-me, me hydrogen, reaction products with polyethylene-polypropylene glycol monoacetate allyl ether		68037-64-9	< 0.5
Chlorobenzene		108-90-7	< 0.01
Phenyl Isocyanate		103-71-9	< 0.01
Octamethylcyclotetrasiloxane		556-67-2	< 0.002

Composition comments

Occupational Exposure Limits for impurities are listed in Section 8.
All concentrations are in percent by weight unless otherwise indicated.
Any concentration shown as a range is to protect confidentiality or is due to batch variation.

4. First-aid measures

Inhalation

Remove victim to fresh air and keep at rest in a position comfortable for breathing. Oxygen or artificial respiration if needed. Do not use mouth-to-mouth method if victim inhaled the substance. Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. If experiencing respiratory symptoms: Call a poison center or doctor/physician.

Skin contact

Remove contaminated clothing immediately and wash skin with soap and water. In case of eczema or other skin disorders: Seek medical attention and take along these instructions. Wash contaminated clothing before reuse.

Eye contact

Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if irritation develops and persists.

Ingestion

Rinse mouth. Get medical attention if symptoms occur.

Most important symptoms/effects, acute and delayed

Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. May cause respiratory irritation. Coughing. Difficulty in breathing. Skin irritation. May cause redness and pain. May cause an allergic skin reaction. Dermatitis. Rash. Prolonged exposure may cause chronic effects.

Indication of immediate medical attention and special treatment needed

Provide general supportive measures and treat symptomatically. Keep victim warm. Keep victim under observation. Symptoms may be delayed.

General information

IF exposed or concerned: Get medical advice/attention. If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Wash contaminated clothing before reuse.

5. Fire-fighting measures

Suitable extinguishing media

Powder. Carbon dioxide (CO2).

Unsuitable extinguishing media

Water.

Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed such as: Carbon oxides. Nitrogen Oxides (NOx). Hydrogen cyanide.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	In case of fire and/or explosion do not breathe fumes. Move containers from fire area if you can do so without risk.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	No unusual fire or explosion hazards noted.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Do not breathe mist/vapors. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	The product is immiscible with water and will sediment in water systems. Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water. Small Spills: Wipe up with absorbent material. Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use. Put material in suitable, covered, labeled containers. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not breathe mist/vapors. Avoid contact with eyes, skin, and clothing. Persons already sensitized to diisocyanates may develop allergic reactions when using this product. Avoid prolonged exposure. Should be handled in closed systems, if possible. Use only outdoors or in a well-ventilated area. Wear appropriate personal protective equipment. Observe good industrial hygiene practices.
Conditions for safe storage, including any incompatibilities	Store locked up. Store in tightly closed container. Store in a well-ventilated place. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Table Z-1 Permissible Exposure Limits (PEL) for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value
Methylene Diphenyl Diisocyanate (CAS 101-68-8)	Ceiling	0.2 mg/m3
		0.02 ppm

Impurities	Type	Value
Chlorobenzene (CAS 108-90-7)	PEL	350 mg/m3
		75 ppm

US. ACGIH Threshold Limit Values (TLV)

Components	Type	Value
Methylene Diphenyl Diisocyanate (CAS 101-68-8)	TWA	0.005 ppm

Impurities	Type	Value
Chlorobenzene (CAS 108-90-7)	TWA	10 ppm
Phenyl Isocyanate (CAS 103-71-9)	STEL	0.015 ppm

US. ACGIH Threshold Limit Values (TLV)

Impurities	Type	Value
	TWA	0.005 ppm

NIOSH. Immediately Dangerous to Life or Health (IDLH) Values, as amended

Components	Type	Value
Methylene Diphenyl Diisocyanate (CAS 101-68-8)	IDLH	75 mg/m3

Impurities	Type	Value
Chlorobenzene (CAS 108-90-7)	IDLH	1.3 %
		1000 ppm

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
Methylene Diphenyl Diisocyanate (CAS 101-68-8)	Ceiling	0.2 mg/m3
		0.02 ppm
	TWA	0.05 mg/m3
		0.005 ppm

US. OARS. Workplace Environmental Exposure Level (WEEL) Guide

Impurities	Type	Value
Octamethylcyclotetrasiloxane (CAS 556-67-2)	TWA	10 ppm

Biological limit values

ACGIH Biological Exposure Indices (BEI)

Impurities	Value	Determinant	Specimen	Sampling Time
Chlorobenzene (CAS 108-90-7)	20 mg/g	p-Chlorophenol, with hydrolysis	Creatinine in urine	*

* - For sampling details, please see the source document.

Exposure guidelines

US ACGIH Threshold Limit Values: Skin designation

Phenyl Isocyanate (CAS 103-71-9) Danger of cutaneous absorption

Appropriate engineering controls Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Should be handled in closed systems, if possible. Provide eyewash station and safety shower.

Individual protection measures, such as personal protective equipment

Eye/face protection Wear approved chemical safety goggles.

Skin protection

Hand protection Wear appropriate chemical resistant gloves. Use disposable gloves protecting against isocyanates along with cotton gloves closest to the skin. Suitable gloves can be recommended by the glove supplier.

Skin protection

Other Wear appropriate chemical resistant clothing. Use of an impervious apron is recommended.

Respiratory protection If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. Chemical respirator with organic vapor cartridge. Use a positive-pressure air-supplied respirator if there is any potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air-purifying respirators may not provide adequate protection. Appropriate respirator selection should be made by a qualified professional.

Thermal hazards Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations	Observe any medical surveillance requirements. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Contaminated work clothing should not be allowed out of the workplace.

9. Physical and chemical properties

Appearance	
Physical state	Liquid.
Form	Liquid.
Color	Brown.
Odor	Musty, Slightly sweet.
Odor threshold	Not available.
pH	Not applicable as the product is insoluble in water.
Melting point/freezing point	Not determined.
Initial boiling point and boiling range	406.4 °F (208 °C)
Flash point	388.4 °F (198 °C) Closed Cup
Evaporation rate	Not available.
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Explosive limit - lower (%)	Not determined.
Explosive limit - upper (%)	Not determined.
Vapor pressure	< 0.0001 mm Hg (77 °F (25 °C))
Vapor density	Not determined.
Relative density	1.234 (77 °F (25 °C))
Solubility(ies)	
Solubility (water)	Insoluble in water.
Partition coefficient (n-octanol/water)	Not applicable, product is a mixture.
Auto-ignition temperature	Not determined.
Decomposition temperature	Not determined.
Viscosity	> 150 - < 250 mPa·s (77 °F (25 °C))
Other information	
Density	10.279 lb/gal
Explosive properties	Not explosive.
Kinematic viscosity	Not determined.
Oxidizing properties	Not oxidizing.

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport. Diisocyanates react with many materials and the rate of reaction increases with temperature as well as increased contact; these reactions can become violent. Contact is increased with stirring or if the other material mixes with the diisocyanate. Diisocyanates are not soluble in water and sink to the bottom, but react slowly at the interface. The reaction forms carbon dioxide gas and a layer of solid polyurea. Reaction with water will generate carbon dioxide and heat.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use. Product will undergo hazardous polymerization at temperatures above 399 °FF (204 °CC).
Conditions to avoid	Moisture. Humidity. Contact with incompatible materials.
Incompatible materials	Acids. Strong oxidizing agents. Alkaline metals. Alcohols. Phenols. Copper. Copper alloys. Galvanized metals. Water. Amines. Strong bases.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Inhalation	Harmful if inhaled. May cause damage to organs through prolonged or repeated exposure by inhalation. May cause allergy or asthma symptoms or breathing difficulties if inhaled.
Skin contact	Causes skin irritation. May cause an allergic skin reaction.
Eye contact	Causes serious eye irritation.
Ingestion	May cause discomfort if swallowed.
Symptoms related to the physical, chemical and toxicological characteristics	Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. May cause respiratory irritation. Coughing. Difficulty in breathing. Skin irritation. May cause redness and pain. May cause an allergic skin reaction. Dermatitis. Rash.

Information on toxicological effects

Acute toxicity Harmful if inhaled.

Components	Species	Test Results
Methylene Diphenyl Diisocyanate (CAS 101-68-8)		
Acute		
Inhalation		
LC50	Rat	> 2.24 mg/l, 1 Hours
Polymethylene polyphenylene isocyanate (CAS 9016-87-9)		
Acute		
Dermal		
LD50	Rabbit	> 10000 mg/kg
Inhalation		
Mist		
LC50	Rat	> 490 mg/m3, 4 Hours
Oral		
LD50	Rat	> 10000 mg/kg

Impurities	Species	Test Results
Octamethylcyclotetrasiloxane (CAS 556-67-2)		
Acute		
Dermal		
LD50	Rat	> 2400 mg/kg
Inhalation		
LC50	Rat	> 36 mg/l, 4 Hours
Oral		
LD50	Rat	> 4800 mg/kg

Skin corrosion/irritation	Causes skin irritation.
Serious eye damage/eye irritation	Causes serious eye irritation.

Respiratory or skin sensitization

ACGIH sensitization

Phenyl isocyanate (CAS 103-71-9)	Dermal sensitization Respiratory sensitization

Respiratory sensitization	May cause allergy or asthma symptoms or breathing difficulties if inhaled.
Skin sensitization	May cause an allergic skin reaction.
Germ cell mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Carcinogenicity	Not classifiable as to carcinogenicity to humans.

IARC Monographs. Overall Evaluation of Carcinogenicity

Methylene Diphenyl Diisocyanate (CAS 101-68-8)	3 Not classifiable as to carcinogenicity to humans.
o-(p-Isocyanatobenzyl)phenyl isocyanate (CAS 5873-54-1)	3 Not classifiable as to carcinogenicity to humans.

Polymethylene polyphenylene isocyanate (CAS 9016-87-9)	3 Not classifiable as to carcinogenicity to humans.

NTP Report on Carcinogens

Not listed.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

Reproductive toxicity	This product is not expected to cause reproductive or developmental effects.
Specific target organ toxicity - single exposure	May cause respiratory irritation.
Specific target organ toxicity - repeated exposure	May cause damage to organs (respiratory system) through prolonged or repeated exposure by inhalation.
Aspiration hazard	Not an aspiration hazard.
Chronic effects	Prolonged inhalation may be harmful. May cause damage to organs through prolonged or repeated exposure.

12. Ecological information

Ecotoxicity	The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.
Persistence and degradability	No data is available on the degradability of this product.

Bioaccumulative potential

Partition coefficient n-octanol / water (log Kow)

Methylene Diphenyl Diisocyanate (CAS 101-68-8)	5.22

Mobility in soil	The product is insoluble in water.
Other adverse effects	No data available.

13. Disposal considerations

Disposal instructions	Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Dispose of contents/container in accordance with local/regional/national/international regulations.
Local disposal regulations	Dispose in accordance with all applicable regulations.
Hazardous waste code	The waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Waste from residues / unused products	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
Contaminated packaging	Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not established.

15. Regulatory information

US federal regulations	This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Octamethylcyclotetrasiloxane (CAS 556-67-2)	1.0 % One-Time Export Notification only.

TSCA Chemical Action Plans, Chemicals of Concern

Methylene Diphenyl Diisocyanate (CAS 101-68-8)	Methylene Diphenyl Diisocyanate (MDI) And Related Compounds Action Plan [RIN 2070-ZA15]

o-(p-Isocyanatobenzyl)phenyl isocyanate (CAS 5873-54-1)	Methylene Diphenyl Diisocyanate (MDI) And Related Compounds Action Plan [RIN 2070-ZA15]
Polymethylene polyphenylene isocyanate (CAS 9016-87-9)	Methylene Diphenyl Diisocyanate (MDI) And Related Compounds Action Plan [RIN 2070-ZA15]

CERCLA Hazardous Substance List (40 CFR 302.4)

Chlorobenzene (CAS 108-90-7)	Listed.
Methylene Diphenyl Diisocyanate (CAS 101-68-8)	Listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

Toxic Substances Control Act (TSCA) All components of the mixture on the TSCA 8(b) inventory are designated “active”.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical Yes

Classified hazard categories
Acute toxicity (any route of exposure)
Skin corrosion or irritation
Serious eye damage or eye irritation
Respiratory or skin sensitization
Specific target organ toxicity (single or repeated exposure)

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
Methylene Diphenyl Diisocyanate	101-68-8	25 - 45
Polymethylene polyphenylene isocyanate	9016-87-9	40 - 60

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Chlorobenzene (CAS 108-90-7)
Methylene Diphenyl Diisocyanate (CAS 101-68-8)

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

US state regulations

US. Massachusetts RTK - Substance List

Chlorobenzene (CAS 108-90-7)
Methylene Diphenyl Diisocyanate (CAS 101-68-8)

US. New Jersey Worker and Community Right-to-Know Act

Chlorobenzene (CAS 108-90-7)
Methylene Diphenyl Diisocyanate (CAS 101-68-8)
o-(p-Isocyanatobenzyl)phenyl isocyanate (CAS 5873-54-1)
Phenyl Isocyanate (CAS 103-71-9)
Polymethylene polyphenylene isocyanate (CAS 9016-87-9)

US. Pennsylvania Worker and Community Right-to-Know Law

Chlorobenzene (CAS 108-90-7)
Methylene Diphenyl Diisocyanate (CAS 101-68-8)

US. Rhode Island RTK

Chlorobenzene (CAS 108-90-7)
Methylene Diphenyl Diisocyanate (CAS 101-68-8)

California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins. For more information go to www.P65Warnings.ca.gov.

US. California. Candidate Chemicals List. Safer Consumer Products Regulations (Cal. Code Regs, tit. 22, 69502.3, subd. (a))

Chlorobenzene (CAS 108-90-7)
Methylene Diphenyl Diisocyanate (CAS 101-68-8)

o-(p-Isocyanatobenzyl)phenyl isocyanate (CAS 5873-54-1)
Octamethylcyclotetrasiloxane (CAS 556-67-2)
Polymethylene polyphenylene isocyanate (CAS 9016-87-9)

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Industrial Chemicals (AICIS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
Taiwan	Taiwan Chemical Substance Inventory (TCSI)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 15-November-2023

Revision date -

Version # 01

HMIS® ratings Health: 2*
Flammability: 0
Physical hazard: 0

Disclaimer Holcim Solutions and Products US, LLC cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.

SAFETY DATA SHEET

1. Identification

Product identifier	**ENVERGE Closed Cell Spray Foam - Part A Isocyanate**
Other means of identification	
Product code	ISO-CC-500
Recommended use	Industrial use.
Recommended restrictions	None known.
Manufacturer/Importer/Supplier/Distributor information	
Distributed by	Holcim Solutions and Products US, LLC
Address	26 Century Boulevard, Suite 205 Nashville, TN 37214 ENVERGE™ is a Holcim Solutions and Products US, LLC brand.
Website	envergesprayfoam.com
Email	contactSPF-us@holcim.com
Telephone Number	(713) 239-0252
Emergency Telephone Number	For Chemical Emergency, Spill, Leak, Fire, Exposure, or Incident: CHEMTREC within USA and Canada: 1-800-424-9300 CHEMTREC outside USA and Canada: +1 703-527-3887 (collect calls accepted)

2. Hazard(s) identification

Physical hazards	Not classified.	
Health hazards	Acute toxicity, inhalation	Category 4
	Skin corrosion/irritation	Category 2
	Serious eye damage/eye irritation	Category 2
	Sensitization, respiratory	Category 1
	Sensitization, skin	Category 1
	Specific target organ toxicity, single exposure	Category 3 respiratory tract irritation
	Specific target organ toxicity, repeated exposure (inhalation)	Category 2 (respiratory system)
OSHA defined hazards	Not classified.	

Label elements

Signal word	Danger
Hazard statement	Causes skin irritation. May cause an allergic skin reaction. Causes serious eye irritation. Harmful if inhaled. May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause respiratory irritation. May cause damage to organs (respiratory system) through prolonged or repeated exposure by inhalation.
Precautionary statement	
Prevention	Do not breathe mist/vapors. Wash thoroughly after handling. Use only outdoors or in a well-ventilated area. Contaminated work clothing must not be allowed out of the workplace. Wear protective gloves/protective clothing/eye protection/face protection. In case of inadequate ventilation wear respiratory protection.

Response	If on skin: Wash with plenty of water. If inhaled: Remove person to fresh air and keep comfortable for breathing. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a poison center/doctor if you feel unwell. If skin irritation or rash occurs: Get medical advice/attention. If eye irritation persists: Get medical advice/attention. If experiencing respiratory symptoms: Call a poison center/doctor. Take off contaminated clothing and wash it before reuse.
Storage	Store in a well-ventilated place. Keep container tightly closed. Store locked up.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC)	None known.
Supplemental information	None.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Polymethylene polyphenylene isocyanate	9016-87-9	40 - 60
Methylene Diphenyl Diisocyanate	101-68-8	25 - 45
o-(p-Isocyanatobenzyl)phenyl isocyanate	5873-54-1	1 - 5

Impurities

Chemical name	Common name and synonyms	CAS number	%
Chlorobenzene		108-90-7	< 0.01
Phenyl Isocyanate		103-71-9	< 0.01

Composition comments

Occupational Exposure Limits for impurities are listed in Section 8.
All concentrations are in percent by weight unless otherwise indicated.
Any concentration shown as a range is to protect confidentiality or is due to batch variation.

4. First-aid measures

Inhalation

Remove victim to fresh air and keep at rest in a position comfortable for breathing. Oxygen or artificial respiration if needed. Do not use mouth-to-mouth method if victim inhaled the substance. Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. If experiencing respiratory symptoms: Call a poison center or doctor/physician.

Skin contact

Remove contaminated clothing immediately and wash skin with soap and water. In case of eczema or other skin disorders: Seek medical attention and take along these instructions. Wash contaminated clothing before reuse.

Eye contact

Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if irritation develops and persists.

Ingestion

Rinse mouth. Get medical attention if symptoms occur.

Most important symptoms/effects, acute and delayed

Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. May cause respiratory irritation. Coughing. Difficulty in breathing. Skin irritation. May cause redness and pain. May cause an allergic skin reaction. Dermatitis. Rash. Prolonged exposure may cause chronic effects.

Indication of immediate medical attention and special treatment needed

Provide general supportive measures and treat symptomatically. Keep victim warm. Keep victim under observation. Symptoms may be delayed.

General information

IF exposed or concerned: Get medical advice/attention. If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Wash contaminated clothing before reuse.

5. Fire-fighting measures

Suitable extinguishing media

Powder. Carbon dioxide (CO2).

Unsuitable extinguishing media

Water.

Specific hazards arising from the chemical

During fire, gases hazardous to health may be formed such as: Carbon oxides. Nitrogen Oxides (NOx). Hydrogen cyanide.

Special protective equipment and precautions for firefighters

Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

Fire fighting equipment/instructions	In case of fire and/or explosion do not breathe fumes. Move containers from fire area if you can do so without risk.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	No unusual fire or explosion hazards noted.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Do not breathe mist/vapors. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	The product is immiscible with water and will sediment in water systems. Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water. Small Spills: Wipe up with absorbent material. Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use. Put material in suitable, covered, labeled containers. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not breathe mist/vapors. Avoid contact with eyes, skin, and clothing. Persons already sensitized to diisocyanates may develop allergic reactions when using this product. Avoid prolonged exposure. Should be handled in closed systems, if possible. Use only outdoors or in a well-ventilated area. Wear appropriate personal protective equipment. Observe good industrial hygiene practices.
Conditions for safe storage, including any incompatibilities	Store locked up. Store in tightly closed container. Store in a well-ventilated place. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Table Z-1 Permissible Exposure Limits (PEL) for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value
Methylene Diphenyl Diisocyanate (CAS 101-68-8)	Ceiling	0.2 mg/m3
		0.02 ppm

Impurities	Type	Value
Chlorobenzene (CAS 108-90-7)	PEL	350 mg/m3
		75 ppm

US. ACGIH Threshold Limit Values (TLV)

Components	Type	Value
Methylene Diphenyl Diisocyanate (CAS 101-68-8)	TWA	0.005 ppm

Impurities	Type	Value
Chlorobenzene (CAS 108-90-7)	TWA	10 ppm
Phenyl Isocyanate (CAS 103-71-9)	STEL	0.015 ppm
	TWA	0.005 ppm

NIOSH. Immediately Dangerous to Life or Health (IDLH) Values, as amended

Components	Type	Value
Methylene Diphenyl Diisocyanate (CAS 101-68-8)	IDLH	75 mg/m3

Impurities	Type	Value
Chlorobenzene (CAS 108-90-7)	IDLH	1.3 %
		1000 ppm

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
Methylene Diphenyl Diisocyanate (CAS 101-68-8)	Ceiling	0.2 mg/m3
		0.02 ppm
	TWA	0.05 mg/m3
		0.005 ppm

Biological limit values

ACGIH Biological Exposure Indices (BEI)

Impurities	Value	Determinant	Specimen	Sampling Time
Chlorobenzene (CAS 108-90-7)	20 mg/g	p-Chlorophenol, with hydrolysis	Creatinine in urine	*

* - For sampling details, please see the source document.

Exposure guidelines

US ACGIH Threshold Limit Values: Skin designation

Phenyl Isocyanate (CAS 103-71-9) Danger of cutaneous absorption

Appropriate engineering controls Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Should be handled in closed systems, if possible. Provide eyewash station and safety shower.

Individual protection measures, such as personal protective equipment

Eye/face protection Wear approved chemical safety goggles.

Skin protection

Hand protection Wear appropriate chemical resistant gloves. Use disposable gloves protecting against isocyanates along with cotton gloves closest to the skin. Suitable gloves can be recommended by the glove supplier.

Skin protection

Other Wear appropriate chemical resistant clothing. Use of an impervious apron is recommended.

Respiratory protection If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. Chemical respirator with organic vapor cartridge. Use a positive-pressure air-supplied respirator if there is any potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air-purifying respirators may not provide adequate protection. Appropriate respirator selection should be made by a qualified professional.

Thermal hazards Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations Observe any medical surveillance requirements. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Contaminated work clothing should not be allowed out of the workplace.

9. Physical and chemical properties

Appearance

Physical state Liquid.

Form Liquid.

Color	Brown.
Odor	Musty, Slightly sweet.
Odor threshold	Not available.
pH	Not applicable as the product is insoluble in water.
Melting point/freezing point	Not determined.
Initial boiling point and boiling range	406.4 °F (208 °C)
Flash point	388.4 °F (198 °C) Closed Cup
Evaporation rate	Not available.
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Explosive limit - lower (%)	Not determined.
Explosive limit - upper (%)	Not determined.
Vapor pressure	< 0.0001 mm Hg (77 °F (25 °C))
Vapor density	Not determined.
Relative density	1.234 (77 °F (25 °C))
Solubility(ies)	
Solubility (water)	Insoluble in water.
Partition coefficient (n-octanol/water)	Not applicable, product is a mixture.
Auto-ignition temperature	Not determined.
Decomposition temperature	Not determined.
Viscosity	> 150 - < 250 mPa·s (77 °F (25 °C))
Other information	
Density	10.279 lb/gal
Explosive properties	Not explosive.
Kinematic viscosity	Not determined.
Oxidizing properties	Not oxidizing.

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport. Diisocyanates react with many materials and the rate of reaction increases with temperature as well as increased contact; these reactions can become violent. Contact is increased with stirring or if the other material mixes with the diisocyanate. Diisocyanates are not soluble in water and sink to the bottom, but react slowly at the interface. The reaction forms carbon dioxide gas and a layer of solid polyurea. Reaction with water will generate carbon dioxide and heat.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use. Product will undergo hazardous polymerization at temperatures above 399 °FF (204 °CC).
Conditions to avoid	Moisture. Humidity. Contact with incompatible materials.
Incompatible materials	Acids. Strong oxidizing agents. Alkaline metals. Alcohols. Phenols. Copper. Copper alloys. Galvanized metals. Water. Amines. Strong bases.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Inhalation	Harmful if inhaled. May cause damage to organs through prolonged or repeated exposure by inhalation. May cause allergy or asthma symptoms or breathing difficulties if inhaled.
Skin contact	Causes skin irritation. May cause an allergic skin reaction.
Eye contact	Causes serious eye irritation.
Ingestion	May cause discomfort if swallowed.

Symptoms related to the physical, chemical and toxicological characteristics Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. May cause respiratory irritation. Coughing. Difficulty in breathing. Skin irritation. May cause redness and pain. May cause an allergic skin reaction. Dermatitis. Rash.

Information on toxicological effects

Acute toxicity Harmful if inhaled.

Components	Species	Test Results
Methylene Diphenyl Diisocyanate (CAS 101-68-8)		
Acute		
Inhalation		
LC50	Rat	> 2.24 mg/l, 1 Hours
Polymethylene polyphenylene isocyanate (CAS 9016-87-9)		
Acute		
Dermal		
LD50	Rabbit	> 10000 mg/kg
Inhalation		
Mist		
LC50	Rat	> 490 mg/m3, 4 Hours
Oral		
LD50	Rat	> 10000 mg/kg

Skin corrosion/irritation Causes skin irritation.

Serious eye damage/eye irritation Causes serious eye irritation.

Respiratory or skin sensitization

ACGIH sensitization

Phenyl isocyanate (CAS 103-71-9)	Dermal sensitization Respiratory sensitization

Respiratory sensitization May cause allergy or asthma symptoms or breathing difficulties if inhaled.

Skin sensitization May cause an allergic skin reaction.

Germ cell mutagenicity No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Carcinogenicity Not classifiable as to carcinogenicity to humans.

IARC Monographs. Overall Evaluation of Carcinogenicity

Methylene Diphenyl Diisocyanate (CAS 101-68-8)	3 Not classifiable as to carcinogenicity to humans.
o-(p-Isocyanatobenzyl)phenyl isocyanate (CAS 5873-54-1)	3 Not classifiable as to carcinogenicity to humans.
Polymethylene polyphenylene isocyanate (CAS 9016-87-9)	3 Not classifiable as to carcinogenicity to humans.

NTP Report on Carcinogens

Not listed.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

Reproductive toxicity This product is not expected to cause reproductive or developmental effects.

Specific target organ toxicity - single exposure May cause respiratory irritation.

Specific target organ toxicity - repeated exposure May cause damage to organs (respiratory system) through prolonged or repeated exposure by inhalation.

Aspiration hazard Not an aspiration hazard.

Chronic effects Prolonged inhalation may be harmful. May cause damage to organs through prolonged or repeated exposure.

12. Ecological information

Ecotoxicity The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Persistence and degradability No data is available on the degradability of this product.

Bioaccumulative potential

Partition coefficient n-octanol / water (log Kow)

Methylene Diphenyl Diisocyanate (CAS 101-68-8)	5.22

Mobility in soil The product is insoluble in water.

Other adverse effects No data available.

13. Disposal considerations

Disposal instructions Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Dispose of contents/container in accordance with local/regional/national/international regulations.

Local disposal regulations Dispose in accordance with all applicable regulations.

Hazardous waste code The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Waste from residues / unused products Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

Contaminated packaging Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not established.

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

TSCA Chemical Action Plans, Chemicals of Concern

Methylene Diphenyl Diisocyanate (CAS 101-68-8)	Methylene Diphenyl Diisocyanate (MDI) And Related Compounds Action Plan [RIN 2070-ZA15]
o-(p-Isocyanatobenzyl)phenyl isocyanate (CAS 5873-54-1)	Methylene Diphenyl Diisocyanate (MDI) And Related Compounds Action Plan [RIN 2070-ZA15]
Polymethylene polyphenylene isocyanate (CAS 9016-87-9)	Methylene Diphenyl Diisocyanate (MDI) And Related Compounds Action Plan [RIN 2070-ZA15]

CERCLA Hazardous Substance List (40 CFR 302.4)

Chlorobenzene (CAS 108-90-7)	Listed.
Methylene Diphenyl Diisocyanate (CAS 101-68-8)	Listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

Toxic Substances Control Act (TSCA) All components of the mixture on the TSCA 8(b) inventory are designated “active”.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical Yes

Classified hazard categories	Acute toxicity (any route of exposure) Skin corrosion or irritation Serious eye damage or eye irritation Respiratory or skin sensitization Specific target organ toxicity (single or repeated exposure)

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
Methylene Diphenyl Diisocyanate	101-68-8	25 - 45
Polymethylene polyphenylene isocyanate	9016-87-9	40 - 60

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Chlorobenzene (CAS 108-90-7)
Methylene Diphenyl Diisocyanate (CAS 101-68-8)

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

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Safe Drinking Water Act (SDWA) Not regulated.

US state regulations

US. Massachusetts RTK - Substance List

Chlorobenzene (CAS 108-90-7)
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US. New Jersey Worker and Community Right-to-Know Act

Chlorobenzene (CAS 108-90-7)
Methylene Diphenyl Diisocyanate (CAS 101-68-8)
o-(p-Isocyanatobenzyl)phenyl isocyanate (CAS 5873-54-1)
Phenyl Isocyanate (CAS 103-71-9)
Polymethylene polyphenylene isocyanate (CAS 9016-87-9)

US. Pennsylvania Worker and Community Right-to-Know Law

Chlorobenzene (CAS 108-90-7)
Methylene Diphenyl Diisocyanate (CAS 101-68-8)

US. Rhode Island RTK

Chlorobenzene (CAS 108-90-7)
Methylene Diphenyl Diisocyanate (CAS 101-68-8)

California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins. For more information go to www.P65Warnings.ca.gov.

US. California. Candidate Chemicals List. Safer Consumer Products Regulations (Cal. Code Regs, tit. 22, 69502.3, subd. (a))

Chlorobenzene (CAS 108-90-7)
Methylene Diphenyl Diisocyanate (CAS 101-68-8)
o-(p-Isocyanatobenzyl)phenyl isocyanate (CAS 5873-54-1)
Polymethylene polyphenylene isocyanate (CAS 9016-87-9)

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Industrial Chemicals (AICIS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
Taiwan	Taiwan Chemical Substance Inventory (TCSI)	Yes

Country(s) or region	Inventory name	On inventory (yes/no)*
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 14-November-2023

Revision date -

Version # 01

HMIS® ratings Health: 2*
Flammability: 0
Physical hazard: 0

Disclaimer Holcim Solutions and Products US, LLC cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.

SAFETY DATA SHEET

1. Identification

Product identifier	**ENVERGE Closed Cell Spray Foam - Part A Isocyanate**
Other means of identification	
Product code	ISO-CC-2500
Recommended use	Industrial use.
Recommended restrictions	None known.
Manufacturer/Importer/Supplier/Distributor information	
Distributed by	Holcim Solutions and Products US, LLC
Address	26 Century Boulevard, Suite 205 Nashville, TN 37214 ENVERGE™ is a Holcim Solutions and Products US, LLC brand.
Website	envergesprayfoam.com
Email	contactSPF-us@holcim.com
Telephone Number	(713) 239-0252
Emergency Telephone Number	For Chemical Emergency, Spill, Leak, Fire, Exposure, or Incident: CHEMTREC within USA and Canada: 1-800-424-9300 CHEMTREC outside USA and Canada: +1 703-527-3887 (collect calls accepted)

2. Hazard(s) identification

Physical hazards	Not classified.	
Health hazards	Acute toxicity, inhalation	Category 4
	Skin corrosion/irritation	Category 2
	Serious eye damage/eye irritation	Category 2
	Sensitization, respiratory	Category 1
	Sensitization, skin	Category 1
	Specific target organ toxicity, single exposure	Category 3 respiratory tract irritation
	Specific target organ toxicity, repeated exposure (inhalation)	Category 2 (respiratory system)
OSHA defined hazards	Not classified.	

Label elements

Signal word	Danger
Hazard statement	Causes skin irritation. May cause an allergic skin reaction. Causes serious eye irritation. Harmful if inhaled. May cause allergy or asthma symptoms or breathing difficulties if inhaled. May cause respiratory irritation. May cause damage to organs (respiratory system) through prolonged or repeated exposure by inhalation.
Precautionary statement	
Prevention	Do not breathe mist/vapors. Wash thoroughly after handling. Use only outdoors or in a well-ventilated area. Contaminated work clothing must not be allowed out of the workplace. Wear protective gloves/protective clothing/eye protection/face protection. In case of inadequate ventilation wear respiratory protection.

Response	If on skin: Wash with plenty of water. If inhaled: Remove person to fresh air and keep comfortable for breathing. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Call a poison center/doctor if you feel unwell. If skin irritation or rash occurs: Get medical advice/attention. If eye irritation persists: Get medical advice/attention. If experiencing respiratory symptoms: Call a poison center/doctor. Take off contaminated clothing and wash it before reuse.
Storage	Store in a well-ventilated place. Keep container tightly closed. Store locked up.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC)	None known.
Supplemental information	None.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Polymethylene polyphenylene isocyanate	9016-87-9	40 - 60
Methylene Diphenyl Diisocyanate	101-68-8	25 - 45
o-(p-Isocyanatobenzyl)phenyl isocyanate	5873-54-1	1 - 5

Impurities

Chemical name	Common name and synonyms	CAS number	%
Chlorobenzene		108-90-7	< 0.01
Phenyl Isocyanate		103-71-9	< 0.01

Composition comments

Occupational Exposure Limits for impurities are listed in Section 8.
All concentrations are in percent by weight unless otherwise indicated.
Any concentration shown as a range is to protect confidentiality or is due to batch variation.

4. First-aid measures

Inhalation

Remove victim to fresh air and keep at rest in a position comfortable for breathing. Oxygen or artificial respiration if needed. Do not use mouth-to-mouth method if victim inhaled the substance. Induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. If experiencing respiratory symptoms: Call a poison center or doctor/physician.

Skin contact

Remove contaminated clothing immediately and wash skin with soap and water. In case of eczema or other skin disorders: Seek medical attention and take along these instructions. Wash contaminated clothing before reuse.

Eye contact

Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if irritation develops and persists.

Ingestion

Rinse mouth. Get medical attention if symptoms occur.

Most important symptoms/effects, acute and delayed

Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. May cause respiratory irritation. Coughing. Difficulty in breathing. Skin irritation. May cause redness and pain. May cause an allergic skin reaction. Dermatitis. Rash. Prolonged exposure may cause chronic effects.

Indication of immediate medical attention and special treatment needed

Provide general supportive measures and treat symptomatically. Keep victim warm. Keep victim under observation. Symptoms may be delayed.

General information

IF exposed or concerned: Get medical advice/attention. If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Wash contaminated clothing before reuse.

5. Fire-fighting measures

Suitable extinguishing media

Powder. Carbon dioxide (CO2).

Unsuitable extinguishing media

Water.

Specific hazards arising from the chemical

During fire, gases hazardous to health may be formed such as: Carbon oxides. Nitrogen Oxides (NOx). Hydrogen cyanide.

Special protective equipment and precautions for firefighters

Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

Fire fighting equipment/instructions	In case of fire and/or explosion do not breathe fumes. Move containers from fire area if you can do so without risk.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	No unusual fire or explosion hazards noted.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Do not breathe mist/vapors. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	The product is immiscible with water and will sediment in water systems. Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water. Small Spills: Wipe up with absorbent material. Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use. Put material in suitable, covered, labeled containers. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not breathe mist/vapors. Avoid contact with eyes, skin, and clothing. Persons already sensitized to diisocyanates may develop allergic reactions when using this product. Avoid prolonged exposure. Should be handled in closed systems, if possible. Use only outdoors or in a well-ventilated area. Wear appropriate personal protective equipment. Observe good industrial hygiene practices.
Conditions for safe storage, including any incompatibilities	Store locked up. Store in tightly closed container. Store in a well-ventilated place. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Table Z-1 Permissible Exposure Limits (PEL) for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value
Methylene Diphenyl Diisocyanate (CAS 101-68-8)	Ceiling	0.2 mg/m3
		0.02 ppm

Impurities	Type	Value
Chlorobenzene (CAS 108-90-7)	PEL	350 mg/m3
		75 ppm

US. ACGIH Threshold Limit Values (TLV)

Components	Type	Value
Methylene Diphenyl Diisocyanate (CAS 101-68-8)	TWA	0.005 ppm

Impurities	Type	Value
Chlorobenzene (CAS 108-90-7)	TWA	10 ppm
Phenyl Isocyanate (CAS 103-71-9)	STEL	0.015 ppm
	TWA	0.005 ppm

NIOSH. Immediately Dangerous to Life or Health (IDLH) Values, as amended

Components	Type	Value
Methylene Diphenyl Diisocyanate (CAS 101-68-8)	IDLH	75 mg/m3

Impurities	Type	Value
Chlorobenzene (CAS 108-90-7)	IDLH	1.3 %
		1000 ppm

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
Methylene Diphenyl Diisocyanate (CAS 101-68-8)	Ceiling	0.2 mg/m3
		0.02 ppm
	TWA	0.05 mg/m3
		0.005 ppm

Biological limit values

ACGIH Biological Exposure Indices (BEI)

Impurities	Value	Determinant	Specimen	Sampling Time
Chlorobenzene (CAS 108-90-7)	20 mg/g	p-Chlorophenol, with hydrolysis	Creatinine in urine	*

* - For sampling details, please see the source document.

Exposure guidelines

US ACGIH Threshold Limit Values: Skin designation

Phenyl Isocyanate (CAS 103-71-9) Danger of cutaneous absorption

Appropriate engineering controls Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Should be handled in closed systems, if possible. Provide eyewash station and safety shower.

Individual protection measures, such as personal protective equipment

Eye/face protection Wear approved chemical safety goggles.

Skin protection

Hand protection Wear appropriate chemical resistant gloves. Use disposable gloves protecting against isocyanates along with cotton gloves closest to the skin. Suitable gloves can be recommended by the glove supplier.

Skin protection

Other Wear appropriate chemical resistant clothing. Use of an impervious apron is recommended.

Respiratory protection If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. Chemical respirator with organic vapor cartridge. Use a positive-pressure air-supplied respirator if there is any potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air-purifying respirators may not provide adequate protection. Appropriate respirator selection should be made by a qualified professional.

Thermal hazards Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations Observe any medical surveillance requirements. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Contaminated work clothing should not be allowed out of the workplace.

9. Physical and chemical properties

Appearance

Physical state Liquid.

Form Liquid.

Color	Brown.
Odor	Musty, Slightly sweet.
Odor threshold	Not available.
pH	Not applicable as the product is insoluble in water.
Melting point/freezing point	Not determined.
Initial boiling point and boiling range	406.4 °F (208 °C)
Flash point	388.4 °F (198 °C) Closed Cup
Evaporation rate	Not available.
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Explosive limit - lower (%)	Not determined.
Explosive limit - upper (%)	Not determined.
Vapor pressure	< 0.0001 mm Hg (77 °F (25 °C))
Vapor density	Not determined.
Relative density	1.234 (77 °F (25 °C))
Solubility(ies)	
Solubility (water)	Insoluble in water.
Partition coefficient (n-octanol/water)	Not applicable, product is a mixture.
Auto-ignition temperature	Not determined.
Decomposition temperature	Not determined.
Viscosity	> 150 - < 250 mPa·s (77 °F (25 °C))
Other information	
Density	10.279 lb/gal
Explosive properties	Not explosive.
Kinematic viscosity	Not determined.
Oxidizing properties	Not oxidizing.

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport. Diisocyanates react with many materials and the rate of reaction increases with temperature as well as increased contact; these reactions can become violent. Contact is increased with stirring or if the other material mixes with the diisocyanate. Diisocyanates are not soluble in water and sink to the bottom, but react slowly at the interface. The reaction forms carbon dioxide gas and a layer of solid polyurea. Reaction with water will generate carbon dioxide and heat.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use. Product will undergo hazardous polymerization at temperatures above 399 °FF (204 °CC).
Conditions to avoid	Moisture. Humidity. Contact with incompatible materials.
Incompatible materials	Acids. Strong oxidizing agents. Alkaline metals. Alcohols. Phenols. Copper. Copper alloys. Galvanized metals. Water. Amines. Strong bases.
Hazardous decomposition products	No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Inhalation	Harmful if inhaled. May cause damage to organs through prolonged or repeated exposure by inhalation. May cause allergy or asthma symptoms or breathing difficulties if inhaled.
Skin contact	Causes skin irritation. May cause an allergic skin reaction.
Eye contact	Causes serious eye irritation.
Ingestion	May cause discomfort if swallowed.

Symptoms related to the physical, chemical and toxicological characteristics Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. May cause respiratory irritation. Coughing. Difficulty in breathing. Skin irritation. May cause redness and pain. May cause an allergic skin reaction. Dermatitis. Rash.

Information on toxicological effects

Acute toxicity Harmful if inhaled.

Components	Species	Test Results
Methylene Diphenyl Diisocyanate (CAS 101-68-8)		
Acute		
Inhalation		
LC50	Rat	> 2.24 mg/l, 1 Hours
Polymethylene polyphenylene isocyanate (CAS 9016-87-9)		
Acute		
Dermal		
LD50	Rabbit	> 10000 mg/kg
Inhalation		
Mist		
LC50	Rat	> 490 mg/m3, 4 Hours
Oral		
LD50	Rat	> 10000 mg/kg

Skin corrosion/irritation Causes skin irritation.

Serious eye damage/eye irritation Causes serious eye irritation.

Respiratory or skin sensitization

ACGIH sensitization

Phenyl isocyanate (CAS 103-71-9)	Dermal sensitization Respiratory sensitization

Respiratory sensitization May cause allergy or asthma symptoms or breathing difficulties if inhaled.

Skin sensitization May cause an allergic skin reaction.

Germ cell mutagenicity No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Carcinogenicity Not classifiable as to carcinogenicity to humans.

IARC Monographs. Overall Evaluation of Carcinogenicity

Methylene Diphenyl Diisocyanate (CAS 101-68-8)	3 Not classifiable as to carcinogenicity to humans.
o-(p-Isocyanatobenzyl)phenyl isocyanate (CAS 5873-54-1)	3 Not classifiable as to carcinogenicity to humans.
Polymethylene polyphenylene isocyanate (CAS 9016-87-9)	3 Not classifiable as to carcinogenicity to humans.

NTP Report on Carcinogens

Not listed.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

Reproductive toxicity This product is not expected to cause reproductive or developmental effects.

Specific target organ toxicity - single exposure May cause respiratory irritation.

Specific target organ toxicity - repeated exposure May cause damage to organs (respiratory system) through prolonged or repeated exposure by inhalation.

Aspiration hazard Not an aspiration hazard.

Chronic effects Prolonged inhalation may be harmful. May cause damage to organs through prolonged or repeated exposure.

12. Ecological information

Ecotoxicity The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Persistence and degradability No data is available on the degradability of this product.

Bioaccumulative potential

Partition coefficient n-octanol / water (log Kow)

Methylene Diphenyl Diisocyanate (CAS 101-68-8)	5.22

Mobility in soil The product is insoluble in water.

Other adverse effects No data available.

13. Disposal considerations

Disposal instructions Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Dispose of contents/container in accordance with local/regional/national/international regulations.

Local disposal regulations Dispose in accordance with all applicable regulations.

Hazardous waste code The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Waste from residues / unused products Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

Contaminated packaging Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not established.

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

TSCA Chemical Action Plans, Chemicals of Concern

Methylene Diphenyl Diisocyanate (CAS 101-68-8)	Methylene Diphenyl Diisocyanate (MDI) And Related Compounds Action Plan [RIN 2070-ZA15]
o-(p-Isocyanatobenzyl)phenyl isocyanate (CAS 5873-54-1)	Methylene Diphenyl Diisocyanate (MDI) And Related Compounds Action Plan [RIN 2070-ZA15]
Polymethylene polyphenylene isocyanate (CAS 9016-87-9)	Methylene Diphenyl Diisocyanate (MDI) And Related Compounds Action Plan [RIN 2070-ZA15]

CERCLA Hazardous Substance List (40 CFR 302.4)

Chlorobenzene (CAS 108-90-7)	Listed.
Methylene Diphenyl Diisocyanate (CAS 101-68-8)	Listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

Toxic Substances Control Act (TSCA) All components of the mixture on the TSCA 8(b) inventory are designated “active”.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical Yes

Classified hazard categories	Acute toxicity (any route of exposure) Skin corrosion or irritation Serious eye damage or eye irritation Respiratory or skin sensitization Specific target organ toxicity (single or repeated exposure)

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
Methylene Diphenyl Diisocyanate	101-68-8	25 - 45
Polymethylene polyphenylene isocyanate	9016-87-9	40 - 60

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Chlorobenzene (CAS 108-90-7)
Methylene Diphenyl Diisocyanate (CAS 101-68-8)

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

US state regulations

US. Massachusetts RTK - Substance List

Chlorobenzene (CAS 108-90-7)
Methylene Diphenyl Diisocyanate (CAS 101-68-8)

US. New Jersey Worker and Community Right-to-Know Act

Chlorobenzene (CAS 108-90-7)
Methylene Diphenyl Diisocyanate (CAS 101-68-8)
o-(p-Isocyanatobenzyl)phenyl isocyanate (CAS 5873-54-1)
Phenyl Isocyanate (CAS 103-71-9)
Polymethylene polyphenylene isocyanate (CAS 9016-87-9)

US. Pennsylvania Worker and Community Right-to-Know Law

Chlorobenzene (CAS 108-90-7)
Methylene Diphenyl Diisocyanate (CAS 101-68-8)

US. Rhode Island RTK

Chlorobenzene (CAS 108-90-7)
Methylene Diphenyl Diisocyanate (CAS 101-68-8)

California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins. For more information go to www.P65Warnings.ca.gov.

US. California. Candidate Chemicals List. Safer Consumer Products Regulations (Cal. Code Regs, tit. 22, 69502.3, subd. (a))

Chlorobenzene (CAS 108-90-7)
Methylene Diphenyl Diisocyanate (CAS 101-68-8)
o-(p-Isocyanatobenzyl)phenyl isocyanate (CAS 5873-54-1)
Polymethylene polyphenylene isocyanate (CAS 9016-87-9)

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Industrial Chemicals (AICIS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
Taiwan	Taiwan Chemical Substance Inventory (TCSI)	Yes

Country(s) or region	Inventory name	On inventory (yes/no)*
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 14-November-2023

Revision date -

Version # 01

HMIS® ratings Health: 2*
Flammability: 0
Physical hazard: 0

Disclaimer Holcim Solutions and Products US, LLC cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.

SAFETY DATA SHEET

1. Identification

Product identifier	**ENVERGE EasySeal 0.5 (4600) - Part B Polyol - Open Cell**
Other means of identification	
Product code	F4600-OC
Recommended use	Component for the manufacture of polyurethane polymers.
Recommended restrictions	For professional use only. Uses other than the recommended use.
Manufacturer/Importer/Supplier/Distributor information	
Distributed by	Holcim Solutions and Products US, LLC
Address	26 Century Boulevard, Suite 205 Nashville, TN 37214 ENVERGE™ is a Holcim Solutions and Products US, LLC brand.
Website	envergesprayfoam.com
Email	contactSPF-us@holcim.com
Telephone Number	(713) 239-0252
Emergency Telephone Number	For Chemical Emergency, Spill, Leak, Fire, Exposure, or Incident: CHEMTREC within USA and Canada: 1-800-424-9300 CHEMTREC outside USA and Canada: +1 703-527-3887 (collect calls accepted)

2. Hazard(s) identification

Physical hazards	Not classified.	
Health hazards	Acute toxicity, oral	Category 4
	Skin corrosion/irritation	Category 2
	Serious eye damage/eye irritation	Category 1
Environmental hazards	Hazardous to the aquatic environment, acute hazard	Category 3
	Hazardous to the aquatic environment, long-term hazard	Category 3
OSHA defined hazards	Not classified.	

Label elements

Signal word	Danger
Hazard statement	Harmful if swallowed. Causes skin irritation. Causes serious eye damage. Harmful to aquatic life with long lasting effects.
Precautionary statement	
Prevention	Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Avoid release to the environment. Wear eye protection/face protection. Wear protective gloves.
Response	If swallowed: Call a poison center/doctor if you feel unwell. Rinse mouth. Immediately call a poison center/doctor. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash it before reuse.
Storage	Not assigned.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazard(s) not otherwise classified (HNOC)	None known.
Supplemental information	None.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
4-Nonylphenol branched, ethoxylated	127087-87-0	10 - 30
Tris(2-chloro-1-methylethyl) Phosphate	13674-84-5	10 - 30
Bis(2-dimethylamino-ethyl)oxide	3033-62-3	1 - 5
Dimethylaminoethoxyethanol	1704-62-7	1 - 5

Composition comments All concentrations are in percent by weight unless otherwise indicated. Any concentration shown as a range is to protect confidentiality or is due to batch variation.

4. First-aid measures

Inhalation Move to fresh air. Call a physician if symptoms develop or persist.

Skin contact Remove contaminated clothing. Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention. Wash contaminated clothing before reuse.

Eye contact Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention immediately.

Ingestion Rinse mouth. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Get medical advice/attention if you feel unwell.

Most important symptoms/effects, acute and delayed Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. Skin irritation. May cause redness and pain.

Indication of immediate medical attention and special treatment needed Provide general supportive measures and treat symptomatically. Keep victim warm. Keep victim under observation. Symptoms may be delayed.

General information Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance.

5. Fire-fighting measures

Suitable extinguishing media Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).

Unsuitable extinguishing media Do not use water jet as an extinguisher, as this will spread the fire.

Specific hazards arising from the chemical During fire, gases hazardous to health may be formed such as: Carbon oxides. Nitrogen oxides.

Special protective equipment and precautions for firefighters Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

Fire fighting equipment/instructions Move containers from fire area if you can do so without risk.

Specific methods Use standard firefighting procedures and consider the hazards of other involved materials.

General fire hazards No unusual fire or explosion hazards noted.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.

Methods and materials for containment and cleaning up

Prevent product from entering drains.

Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water.

Small Spills: Absorb spillage with suitable absorbent material. Clean surface thoroughly to remove residual contamination.

Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.

Environmental precautions

Avoid release to the environment. Inform appropriate managerial or supervisory personnel of all environmental releases. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling

Do not get this material in contact with eyes. Do not taste or swallow. Avoid contact with eyes, skin, and clothing. Avoid prolonged exposure. When using, do not eat, drink or smoke. Provide adequate ventilation. Wear appropriate personal protective equipment. Wash hands thoroughly after handling. Avoid release to the environment. Observe good industrial hygiene practices.

Conditions for safe storage, including any incompatibilities

Store in tightly closed container. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

US. ACGIH Threshold Limit Values (TLV)

Components	Type	Value
Bis(2-dimethylamino-ethyl)oxide (CAS 3033-62-3)	STEL	0.15 ppm
	TWA	0.05 ppm

Biological limit values

No biological exposure limits noted for the ingredient(s).

Exposure guidelines

US - California OELs: Skin designation

Bis(2-dimethylamino-ethyl)oxide (CAS 3033-62-3) Can be absorbed through the skin.

US ACGIH Threshold Limit Values: Skin designation

Bis(2-dimethylamino-ethyl)oxide (CAS 3033-62-3) Danger of cutaneous absorption

Appropriate engineering controls

Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Eye wash facilities and emergency shower must be available when handling this product.

Individual protection measures, such as personal protective equipment

Eye/face protection

Wear approved chemical safety goggles. Face shield is recommended.

Skin protection

Hand protection

Wear appropriate chemical resistant gloves. Examples of preferred glove barrier materials include: Butyl rubber. Nitrile butyl rubber (NBR). Neoprene. Suitable gloves can be recommended by the glove supplier.

Skin protection

Other

Wear appropriate chemical resistant clothing. Use of an impervious apron is recommended.

Respiratory protection

If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. Chemical respirator with organic vapor cartridge and full facepiece.

Thermal hazards

Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations

Observe any medical surveillance requirements. Keep away from food and drink. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Contaminated work clothing should not be allowed out of the workplace.

9. Physical and chemical properties

Appearance	
Physical state	Liquid.
Form	Slightly viscous liquid.
Color	Light brown.
Odor	Amine.
Odor threshold	Not available.
pH	10
Melting point/freezing point	Not determined.
Initial boiling point and boiling range	Not determined.
Flash point	> 200 °F (> 93.33 °C) Closed Cup
Evaporation rate	Not determined.
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Explosive limit - lower (%)	Not determined.
Explosive limit - upper (%)	Not determined.
Vapor pressure	Not determined.
Vapor density	Not determined.
Relative density	1.09 (77 °F (25 °C))
Solubility(ies)	
Solubility (water)	Soluble.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not determined.
Decomposition temperature	Not determined.
Viscosity	183 cps (77 °F (25 °C))
Other information	
Density	9.09 lb/gal (77 °F (25 °C))
Explosive properties	Not explosive.
Oxidizing properties	Not oxidizing.
VOC	Not determined.

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
Conditions to avoid	Avoid temperatures exceeding the flash point. Contact with incompatible materials.
Incompatible materials	Strong oxidizing agents. Isocyanates.
Hazardous decomposition products	No hazardous decomposition products are known. In the event of fire: See Section 5.

11. Toxicological information

Information on likely routes of exposure

Inhalation	Prolonged inhalation may be harmful.
Skin contact	Causes skin irritation.
Eye contact	Causes serious eye damage.
Ingestion	Harmful if swallowed.
Symptoms related to the physical, chemical and toxicological characteristics	Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. Coughing. Skin irritation. May cause redness and pain.

Information on toxicological effects

Acute toxicity Harmful if swallowed.

Components	Species	Test Results
Bis(2-dimethylamino-ethyl)oxide (CAS 3033-62-3)		
Acute		
Dermal		
LD50	Rabbit	315 mg/kg
Inhalation		
Vapor		
LC50	Rat	4 mg/l, 4 hours
Oral		
LD50	Rat	609 - 677 mg/kg
Dimethylaminoethoxyethanol (CAS 1704-62-7)		
Acute		
Dermal		
LD50	Rabbit	1653 mg/kg
Inhalation		
Vapor		
LC50	Rat	> 0.39 mg/l, 4 hours
Oral		
LD50	Rat	2150 - 3830 mg/kg

Skin corrosion/irritation Causes skin irritation.

Serious eye damage/eye irritation Causes serious eye damage.

Respiratory or skin sensitization

Respiratory sensitization Not a respiratory sensitizer.

Skin sensitization This product is not expected to cause skin sensitization.

Germ cell mutagenicity No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Carcinogenicity Not classifiable as to carcinogenicity to humans.

IARC Monographs. Overall Evaluation of Carcinogenicity

Not listed.

NTP Report on Carcinogens

Not listed.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

Reproductive toxicity This product is not expected to cause reproductive or developmental effects.

Specific target organ toxicity - single exposure Not classified.

Specific target organ toxicity - repeated exposure Not classified.

Aspiration hazard Not an aspiration hazard.

Chronic effects Prolonged inhalation may be harmful.

12. Ecological information

Ecotoxicity Harmful to aquatic life with long lasting effects.

Components		Species	Test Results
Bis(2-dimethylamino-ethyl)oxide (CAS 3033-62-3)			
Aquatic			
Acute			
Algae	EC50	Pseudokirchneriella subcapitata	24 mg/l, 72 hours
Crustacea	EC50	Daphnia magna	102 mg/l, 48 hours

Components		Species	Test Results
Fish	LC50	Danio rerio	131 mg/l, 96 hours

Dimethylaminoethoxyethanol (CAS 1704-62-7)

Aquatic			
Acute			
Algae	EC50	Pseudokirchneriella subcapitata	160 mg/l, 72 hours
Crustacea	EC50	Daphnia magna	> 100 mg/l, 48 hours
Fish	LC50	Leuciscus idus	320 mg/l, 96 hours

Persistence and degradability No data is available on the degradability of this product.

Bioaccumulative potential

Mobility in soil No data available.

Other adverse effects No data available.

13. Disposal considerations

Disposal instructions Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national/international regulations.

Local disposal regulations Dispose in accordance with all applicable regulations.

Hazardous waste code The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Waste from residues / unused products Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner.

Contaminated packaging Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not established.

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

TSCA Chemical Action Plans, Chemicals of Concern

4-Nonylphenol branched, ethoxylated (CAS 127087-87-0)	Nonylphenol (NP) and Nonylphenol Ethoxylates (NPEs) Action Plan

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

Toxic Substances Control Act (TSCA) All components of the mixture on the TSCA 8(b) inventory are designated “active”.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical Yes

Classified hazard categories
Acute toxicity (any route of exposure)
Skin corrosion or irritation
Serious eye damage or eye irritation

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
4-Nonylphenol branched, ethoxylated	127087-87-0	10 - 30

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Contains component(s) regulated under the Safe Drinking Water Act.

US state regulations

US. Massachusetts RTK - Substance List

Not regulated.

US. New Jersey Worker and Community Right-to-Know Act

4-Nonylphenol branched, ethoxylated (CAS 127087-87-0)
Bis(2-dimethylamino-ethyl)oxide (CAS 3033-62-3)

US. Pennsylvania Worker and Community Right-to-Know Law

Not listed.

US. Rhode Island RTK

Not regulated.

California Proposition 65

WARNING: This product can expose you to chemicals including Ethylene Oxide and 1,4-Dioxane, which are known to the State of California to cause cancer, and Ethylene Oxide and Ethylene glycol, which are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

California Proposition 65 - CRT: Listed date/Carcinogenic substance

1,4-Dioxane (CAS 123-91-1) Listed: January 1, 1988
Ethylene Oxide (CAS 75-21-8) Listed: July 1, 1987

California Proposition 65 - CRT: Listed date/Developmental toxin

Ethylene glycol (CAS 107-21-1) Listed: June 19, 2015
Ethylene Oxide (CAS 75-21-8) Listed: August 7, 2009

California Proposition 65 - CRT: Listed date/Female reproductive toxin

Ethylene Oxide (CAS 75-21-8) Listed: February 27, 1987

California Proposition 65 - CRT: Listed date/Male reproductive toxin

Ethylene Oxide (CAS 75-21-8) Listed: August 7, 2009

US. California. Candidate Chemicals List. Safer Consumer Products Regulations (Cal. Code Regs, tit. 22, 69502.3, subd. (a))

4-Nonylphenol branched, ethoxylated (CAS 127087-87-0)
Tris(2-chloro-1-methylethyl) Phosphate (CAS 13674-84-5)

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Industrial Chemicals (AICIS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
Taiwan	Taiwan Chemical Substance Inventory (TCSI)	Yes

Country(s) or region	Inventory name	On inventory (yes/no)*
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 08-December-2023

Revision date -

Version # 01

HMIS® ratings Health: 3
Flammability: 0
Physical hazard: 0
Personal protection: B

Disclaimer Holcim Solutions and Products US, LLC cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.

SAFETY DATA SHEET

1. Identification

Product identifier	**ENVERGE SucraSeal (4700) - Part B Polyol - Open Cell**
Other means of identification	
Product code	F4700-OC
Recommended use	Component for the manufacture of polyurethane polymers.
Recommended restrictions	For professional use only. Uses other than the recommended use.
Manufacturer/Importer/Supplier/Distributor information	
Distributed by	Holcim Solutions and Products US, LLC
Address	26 Century Boulevard, Suite 205 Nashville, TN 37214 ENVERGE™ is a Holcim Solutions and Products US, LLC brand.
Website	envergesprayfoam.com
Email	contactSPF-us@holcim.com
Telephone Number	(713) 239-0252
Emergency Telephone Number	For Chemical Emergency, Spill, Leak, Fire, Exposure, or Incident: CHEMTREC within USA and Canada: 1-800-424-9300 CHEMTREC outside USA and Canada: +1 703-527-3887 (collect calls accepted)

2. Hazard(s) identification

Physical hazards	Not classified.	
Health hazards	Acute toxicity, oral	Category 4
	Skin corrosion/irritation	Category 2
	Serious eye damage/eye irritation	Category 1
Environmental hazards	Hazardous to the aquatic environment, acute hazard	Category 3
	Hazardous to the aquatic environment, long-term hazard	Category 3
OSHA defined hazards	Not classified.	

Label elements

Signal word	Danger
Hazard statement	Harmful if swallowed. Causes skin irritation. Causes serious eye damage. Harmful to aquatic life with long lasting effects.
Precautionary statement	
Prevention	Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Avoid release to the environment. Wear eye protection/face protection. Wear protective gloves.
Response	If swallowed: Call a poison center/doctor if you feel unwell. Rinse mouth. Immediately call a poison center/doctor. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash it before reuse.
Storage	Store away from incompatible materials.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazard(s) not otherwise classified (HNOC)	None known.
Supplemental information	None.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Tris(2-chloro-1-methylethyl) Phosphate	13674-84-5	10 - 30
4-Nonylphenol branched, ethoxylated	127087-87-0	1 - 5
Dimethylaminoethoxyethanol	1704-62-7	1 - 5
N'-[3-(Dimethylamino)propyl]-N,N-dimethylpropane-1,3-diamine	6711-48-4	1 - 5
N,N,N',N'-tetramethyl-2,2'-oxybis(ethylamine)	3033-62-3	1 - 5

Composition comments All concentrations are in percent by weight unless otherwise indicated. Any concentration shown as a range is to protect confidentiality or is due to batch variation.

4. First-aid measures

Inhalation Move to fresh air. Call a physician if symptoms develop or persist.

Skin contact Remove contaminated clothing. Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention. Wash contaminated clothing before reuse.

Eye contact Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention immediately.

Ingestion Rinse mouth. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Get medical advice/attention if you feel unwell.

Most important symptoms/effects, acute and delayed Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. Coughing. Skin irritation. May cause redness and pain.

Indication of immediate medical attention and special treatment needed Provide general supportive measures and treat symptomatically. Keep victim warm. Keep victim under observation. Symptoms may be delayed.

General information Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance.

5. Fire-fighting measures

Suitable extinguishing media Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).

Unsuitable extinguishing media Do not use water jet as an extinguisher, as this will spread the fire.

Specific hazards arising from the chemical During fire, gases hazardous to health may be formed such as: Carbon oxides. Nitrogen oxides.

Special protective equipment and precautions for firefighters Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

Fire fighting equipment/instructions Move containers from fire area if you can do so without risk.

Specific methods Use standard firefighting procedures and consider the hazards of other involved materials.

General fire hazards No unusual fire or explosion hazards noted.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.

Methods and materials for containment and cleaning up

Prevent product from entering drains.

Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water.

Small Spills: Absorb spillage with suitable absorbent material. Clean surface thoroughly to remove residual contamination.

Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.

Environmental precautions

Avoid release to the environment. Inform appropriate managerial or supervisory personnel of all environmental releases. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling

Do not get this material in contact with eyes. Do not taste or swallow. Avoid contact with eyes, skin, and clothing. Avoid prolonged exposure. When using, do not eat, drink or smoke. Provide adequate ventilation. Wear appropriate personal protective equipment. Wash hands thoroughly after handling. Avoid release to the environment. Observe good industrial hygiene practices.

Conditions for safe storage, including any incompatibilities

Store in tightly closed container. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

US. ACGIH Threshold Limit Values (TLV)

Components	Type	Value
N,N,N',N'-tetramethyl-2,2'-oxybis(ethylamine) (CAS 3033-62-3)	STEL	0.15 ppm
	TWA	0.05 ppm

Biological limit values

No biological exposure limits noted for the ingredient(s).

Exposure guidelines

US - California OELs: Skin designation

N,N,N',N'-tetramethyl-2,2'-oxybis(ethylamine) (CAS 3033-62-3) — Can be absorbed through the skin.

US ACGIH Threshold Limit Values: Skin designation

N,N,N',N'-tetramethyl-2,2'-oxybis(ethylamine) (CAS 3033-62-3) — Danger of cutaneous absorption

Appropriate engineering controls

Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Eye wash facilities and emergency shower must be available when handling this product.

Individual protection measures, such as personal protective equipment

Eye/face protection

Wear approved chemical safety goggles. Face shield is recommended.

Skin protection

Hand protection

Wear appropriate chemical resistant gloves. Examples of preferred glove barrier materials include: Butyl rubber. Nitrile butyl rubber (NBR). Neoprene. Suitable gloves can be recommended by the glove supplier.

Skin protection

Other

Wear appropriate chemical resistant clothing. Use of an impervious apron is recommended.

Respiratory protection

If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. Chemical respirator with organic vapor cartridge and full facepiece.

Thermal hazards

Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations

Observe any medical surveillance requirements. Keep away from food and drink. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Contaminated work clothing should not be allowed out of the workplace.

9. Physical and chemical properties

Appearance

Physical state	Liquid.
Form	Slightly viscous liquid.
Color	Light brown.
Odor	Amine.
Odor threshold	Not available.
pH	10
Melting point/freezing point	Not determined.
Initial boiling point and boiling range	Not determined.
Flash point	> 200 °F (> 93.33 °C) Closed Cup
Evaporation rate	Not determined.
Flammability (solid, gas)	Not applicable.

Upper/lower flammability or explosive limits

Explosive limit - lower (%)	Not determined.
Explosive limit - upper (%)	Not determined.
Vapor pressure	Not determined.
Vapor density	Not determined.
Relative density	1.09 (77 °F (25 °C))

Solubility(ies)

Solubility (water)	Soluble.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not determined.
Decomposition temperature	Not determined.
Viscosity	183 cps (77 °F (25 °C))

Other information

Density	10.34 lb/gal (77 °F (25 °C))
Explosive properties	Not explosive.
Oxidizing properties	Not oxidizing.
VOC	Not determined.

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
Conditions to avoid	Avoid temperatures exceeding the flash point. Contact with incompatible materials.
Incompatible materials	Strong oxidizing agents. Isocyanates.
Hazardous decomposition products	No hazardous decomposition products are known. In the event of fire: See Section 5.

11. Toxicological information

Information on likely routes of exposure

Inhalation	Prolonged inhalation may be harmful.
Skin contact	Causes skin irritation.
Eye contact	Causes serious eye damage.
Ingestion	Harmful if swallowed.
Symptoms related to the physical, chemical and toxicological characteristics	Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. Coughing. Skin irritation. May cause redness and pain.

Information on toxicological effects

Acute toxicity Harmful if swallowed.

Components	Species	Test Results
Dimethylaminoethoxyethanol (CAS 1704-62-7)		
Acute		
Dermal		
LD50	Rabbit	1653 mg/kg
Inhalation		
Vapor		
LC50	Rat	> 0.39 mg/l, 4 hours
Oral		
LD50	Rat	2150 - 3830 mg/kg
N,N,N',N'-tetramethyl-2,2'-oxybis(ethylamine) (CAS 3033-62-3)		
Acute		
Dermal		
LD50	Rabbit	315 mg/kg
Inhalation		
Vapor		
LC50	Rat	4 mg/l, 4 hours
Oral		
LD50	Rat	609 - 677 mg/kg

Skin corrosion/irritation Causes skin irritation.

Serious eye damage/eye irritation Causes serious eye damage.

Respiratory or skin sensitization

Respiratory sensitization Not a respiratory sensitizer.

Skin sensitization This product is not expected to cause skin sensitization.

Germ cell mutagenicity No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Carcinogenicity Not classifiable as to carcinogenicity to humans.

IARC Monographs. Overall Evaluation of Carcinogenicity

Not listed.

NTP Report on Carcinogens

Not listed.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

Reproductive toxicity This product is not expected to cause reproductive or developmental effects.

Specific target organ toxicity - single exposure Not classified.

Specific target organ toxicity - repeated exposure Not classified.

Aspiration hazard Not an aspiration hazard.

Chronic effects Prolonged inhalation may be harmful.

12. Ecological information

Ecotoxicity Harmful to aquatic life with long lasting effects.

Components		Species	Test Results
Dimethylaminoethoxyethanol (CAS 1704-62-7)			
Aquatic			
Acute			
Algae	EC50	Pseudokirchneriella subcapitata	160 mg/l, 72 hours
Crustacea	EC50	Daphnia magna	> 100 mg/l, 48 hours

Components		Species	Test Results
Fish	LC50	Leuciscus idus	320 mg/l, 96 hours

N,N,N',N'-tetramethyl-2,2'-oxybis(ethylamine) (CAS 3033-62-3)

Aquatic			
Acute			
Algae	EC50	Pseudokirchneriella subcapitata	24 mg/l, 72 hours
Crustacea	EC50	Daphnia magna	102 mg/l, 48 hours
Fish	LC50	Danio rerio	131 mg/l, 96 hours

Persistence and degradability No data is available on the degradability of this product.

Bioaccumulative potential

Mobility in soil No data available.

Other adverse effects No data available.

13. Disposal considerations

Disposal instructions Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national/international regulations.

Local disposal regulations Dispose in accordance with all applicable regulations.

Hazardous waste code The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Waste from residues / unused products Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner.

Contaminated packaging Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not established.

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

TSCA Chemical Action Plans, Chemicals of Concern

4-Nonylphenol branched, ethoxylated (CAS 127087-87-0)	Nonylphenol (NP) and Nonylphenol Ethoxylates (NPEs) Action Plan

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

Toxic Substances Control Act (TSCA) All components of the mixture on the TSCA 8(b) inventory are designated “active”.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical Yes

Classified hazard categories
Acute toxicity (any route of exposure)
Skin corrosion or irritation
Serious eye damage or eye irritation

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
4-Nonylphenol branched, ethoxylated	127087-87-0	1 - 5

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Contains component(s) regulated under the Safe Drinking Water Act.

US state regulations

US. Massachusetts RTK - Substance List

Not regulated.

US. New Jersey Worker and Community Right-to-Know Act

4-Nonylphenol branched, ethoxylated (CAS 127087-87-0)
N,N,N',N'-tetramethyl-2,2'-oxybis(ethylamine) (CAS 3033-62-3)

US. Pennsylvania Worker and Community Right-to-Know Law

Not listed.

US. Rhode Island RTK

Not regulated.

California Proposition 65

WARNING: This product can expose you to chemicals including Ethylene Oxide and 1,4-Dioxane, which are known to the State of California to cause cancer, and Ethylene Oxide and Ethylene glycol, which are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

California Proposition 65 - CRT: Listed date/Carcinogenic substance

1,4-Dioxane (CAS 123-91-1) Listed: January 1, 1988
Ethylene Oxide (CAS 75-21-8) Listed: July 1, 1987

California Proposition 65 - CRT: Listed date/Developmental toxin

Ethylene glycol (CAS 107-21-1) Listed: June 19, 2015
Ethylene Oxide (CAS 75-21-8) Listed: August 7, 2009

California Proposition 65 - CRT: Listed date/Female reproductive toxin

Ethylene Oxide (CAS 75-21-8) Listed: February 27, 1987

California Proposition 65 - CRT: Listed date/Male reproductive toxin

Ethylene Oxide (CAS 75-21-8) Listed: August 7, 2009

US. California. Candidate Chemicals List. Safer Consumer Products Regulations (Cal. Code Regs, tit. 22, 69502.3, subd. (a))

4-Nonylphenol branched, ethoxylated (CAS 127087-87-0)
Tris(2-chloro-1-methylethyl) Phosphate (CAS 13674-84-5)

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Industrial Chemicals (AICIS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
Taiwan	Taiwan Chemical Substance Inventory (TCSI)	Yes

Country(s) or region	Inventory name	On inventory (yes/no)*
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 08-December-2023

Revision date -

Version # 01

HMIS® ratings Health: 3
Flammability: 0
Physical hazard: 0
Personal protection: B

Disclaimer Holcim Solutions and Products US, LLC cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.

SAFETY DATA SHEET

1. Identification

Product identifier	**ENVERGE NexSeal 2.0 (1760R) - Part B Polyol - Closed Cell**
Other means of identification	
Product code	F1760R-CC
Recommended use	Component for the manufacture of polyurethane polymers.
Recommended restrictions	For professional use only.
Manufacturer/Importer/Supplier/Distributor information	
Distributed by	Holcim Solutions and Products US, LLC
Address	26 Century Boulevard, Suite 205 Nashville, TN 37214 ENVERGE™ is a Holcim Solutions and Products US, LLC brand.
Website	envergesprayfoam.com
Email	contactSPF-us@holcim.com
Telephone Number	(713) 239-0252
Emergency Telephone Number	For Chemical Emergency, Spill, Leak, Fire, Exposure, or Incident: CHEMTREC within USA and Canada: 1-800-424-9300 CHEMTREC outside USA and Canada: +1 703-527-3887 (collect calls accepted)

2. Hazard(s) identification

Physical hazards	Not classified.	
Health hazards	Acute toxicity, oral	Category 4
	Skin corrosion/irritation	Category 2
	Serious eye damage/eye irritation	Category 2A
	Sensitization, skin	Category 1
	Reproductive toxicity	Category 2
	Specific target organ toxicity, repeated exposure	Category 2 (kidney)
Environmental hazards	Hazardous to the aquatic environment, acute hazard	Category 3
	Hazardous to the aquatic environment, long-term hazard	Category 3
OSHA defined hazards	Not classified.	

Label elements

Signal word	Warning
Hazard statement	Harmful if swallowed. Causes skin irritation. May cause an allergic skin reaction. Causes serious eye irritation. Suspected of damaging fertility or the unborn child. May cause damage to organs (kidney) through prolonged or repeated exposure. Harmful to aquatic life with long lasting effects.
Precautionary statement	
Prevention	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not breathe mist/vapors. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Contaminated work clothing must not be allowed out of the workplace. Avoid release to the environment. Wear protective gloves/protective clothing/eye protection/face protection.

Response	If swallowed: Call a poison center/doctor if you feel unwell. Rinse mouth. If on skin: Wash with plenty of water. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If exposed or concerned: Get medical advice/attention. If skin irritation or rash occurs: Get medical advice/attention. If eye irritation persists: Get medical advice/attention. Take off contaminated clothing and wash it before reuse.
Storage	Store locked up.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC)	None known.
Supplemental information	None.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Diethylene glycol	111-46-6	10 - 15
4-Nonylphenol branched, ethoxylated	127087-87-0	1 - 5
Tris(2-chloro-1-methylethyl) Phosphate	13674-84-5	1 - 5
Ethylene glycol	107-21-1	0.5 - 1.5
dimethyltin bis(ethylhexyl mercaptoacetate)	57583-35-4	0.1 - 0.5

Composition comments All concentrations are in percent by weight unless otherwise indicated.
Components not listed are either non-hazardous or are below reportable limits.

4. First-aid measures

Inhalation	Move to fresh air. Call a physician if symptoms develop or persist.
Skin contact	Remove contaminated clothing immediately and wash skin with soap and water. In case of eczema or other skin disorders: Seek medical attention and take along these instructions. Wash contaminated clothing before reuse.
Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if irritation develops and persists.
Ingestion	Rinse mouth. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Get medical advice/attention if you feel unwell.
Most important symptoms/effects, acute and delayed	Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Skin irritation. May cause redness and pain. May cause an allergic skin reaction. Dermatitis. Rash. Edema. Prolonged exposure may cause chronic effects.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically. Keep victim warm. Keep victim under observation. Symptoms may be delayed.
General information	IF exposed or concerned: Get medical advice/attention. If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance. Wash contaminated clothing before reuse.

5. Fire-fighting measures

Suitable extinguishing media	Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).
Unsuitable extinguishing media	Do not use water jet as an extinguisher, as this will spread the fire.
Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed such as: Carbon oxides. Nitrogen oxides.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	Move containers from fire area if you can do so without risk.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	No unusual fire or explosion hazards noted.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Do not breathe mist/vapors. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.

Methods and materials for containment and cleaning up

Prevent product from entering drains.

Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water.

Small Spills: Absorb spillage with suitable absorbent material. Clean surface thoroughly to remove residual contamination.

Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.

Environmental precautions

Avoid release to the environment. Inform appropriate managerial or supervisory personnel of all environmental releases. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling

Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not breathe mist/vapors. Do not get this material in contact with eyes. Do not taste or swallow. Avoid contact with eyes, skin, and clothing. Avoid prolonged exposure. When using, do not eat, drink or smoke. Pregnant or breastfeeding women must not handle this product. Should be handled in closed systems, if possible. Provide adequate ventilation. Wear appropriate personal protective equipment. Wash hands thoroughly after handling. Avoid release to the environment. Observe good industrial hygiene practices. Persons susceptible to allergic reactions should not handle this product.

Conditions for safe storage, including any incompatibilities

Store locked up. Store in tightly closed container. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Table Z-1 Permissible Exposure Limits (PEL) for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value
dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4)	PEL	0.1 mg/m3

US. ACGIH Threshold Limit Values (TLV)

Components	Type	Value	Form
dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4)	STEL	0.2 mg/m3	
	TWA	0.1 mg/m3	
Ethylene glycol (CAS 107-21-1)	STEL	10 mg/m3	Aerosol, inhalable.
		50 ppm	Vapor fraction
	TWA	25 ppm	Vapor fraction

NIOSH. Immediately Dangerous to Life or Health (IDLH) Values, as amended

Components	Type	Value
dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4)	IDLH	25 mg/m3

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4)	TWA	0.1 mg/m3

US. OARS. Workplace Environmental Exposure Level (WEEL) Guide

Components	Type	Value
Diethylene glycol (CAS 111-46-6)	TWA	10 mg/m3

Biological limit values No biological exposure limits noted for the ingredient(s).

Exposure guidelines

US - California OELs: Skin designation

dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4) Can be absorbed through the skin.

US - Minnesota Haz Subs: Skin designation applies

dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4) Skin designation applies.

US - Tennessee OELs: Skin designation

dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4) Can be absorbed through the skin.

US ACGIH Threshold Limit Values: Skin designation

dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4) Danger of cutaneous absorption

US. NIOSH: Pocket Guide to Chemical Hazards

dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4) Can be absorbed through the skin.

Appropriate engineering controls Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Eye wash facilities and emergency shower must be available when handling this product.

Individual protection measures, such as personal protective equipment

Eye/face protection Wear approved chemical safety goggles. Face shield is recommended.

Skin protection

Hand protection Wear appropriate chemical resistant gloves. Examples of preferred glove barrier materials include: Butyl rubber. Nitrile butyl rubber (NBR). Neoprene. Suitable gloves can be recommended by the glove supplier.

Skin protection

Other Wear appropriate chemical resistant clothing. Use of an impervious apron is recommended.

Respiratory protection If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. Chemical respirator with organic vapor cartridge and full facepiece.

Thermal hazards Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations Observe any medical surveillance requirements. Keep away from food and drink. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Contaminated work clothing should not be allowed out of the workplace.

9. Physical and chemical properties

Appearance

Physical state Liquid.

Form Slightly viscous liquid.

Color Light brown.

Odor Amine.

Odor threshold Not available.

pH 10

Melting point/freezing point Not determined.

Initial boiling point and boiling range Not determined.

Flash point > 200 °F (> 93.33 °C) Closed Cup

Evaporation rate	Not determined.
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Explosive limit - lower (%)	Not determined.
Explosive limit - upper (%)	Not determined.
Vapor pressure	Not determined.
Vapor density	Not determined.
Relative density	1.23 (77 °F (25 °C))
Solubility(ies)	
Solubility (water)	Slightly soluble.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not determined.
Decomposition temperature	Not determined.
Viscosity	569 cps (77 °F (25 °C))
Other information	
Density	10.26 lb/gal (77 °F (25 °C))
Explosive properties	Not explosive.
Oxidizing properties	Not oxidizing.

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
Conditions to avoid	Avoid temperatures exceeding the flash point. Contact with incompatible materials.
Incompatible materials	Strong oxidizing agents. Isocyanates.
Hazardous decomposition products	No hazardous decomposition products are known. In the event of fire: See Section 5.

11. Toxicological information

Information on likely routes of exposure

Inhalation	Prolonged inhalation may be harmful.
Skin contact	Causes skin irritation. May cause an allergic skin reaction.
Eye contact	Causes serious eye irritation.
Ingestion	Harmful if swallowed.
Symptoms related to the physical, chemical and toxicological characteristics	Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Skin irritation. May cause redness and pain. May cause an allergic skin reaction. Dermatitis. Rash. Edema.

Information on toxicological effects

Acute toxicity Harmful if swallowed.

Components	Species	Test Results
1,2-Benzenedicarboxylic acid, 3,4,5,6-tetrabromo-, mixed esters with diethylene glycol and propylene glycol (CAS 77098-07-8)		
Acute		
Dermal		
LD50	Rabbit	> 20000 mg/kg
Inhalation		
Vapor		
LC50	Rat	> 0.008 mg/l
Oral		
LD50	Rat	> 10000 mg/kg

Components	Species	Test Results
Diethylene glycol (CAS 111-46-6)		
Acute		
Dermal		
LD50	Rabbit	11890 mg/kg
Ethylene glycol (CAS 107-21-1)		
Acute		
Dermal		
LD50	Rabbit	9530 mg/kg

Skin corrosion/irritation Causes skin irritation.

Serious eye damage/eye irritation Causes serious eye irritation.

Respiratory or skin sensitization

Respiratory sensitization Not a respiratory sensitizer.

Skin sensitization May cause an allergic skin reaction.

Germ cell mutagenicity No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Carcinogenicity Not classifiable as to carcinogenicity to humans.

IARC Monographs. Overall Evaluation of Carcinogenicity

Not listed.

NTP Report on Carcinogens

Not listed.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

Reproductive toxicity Suspected of damaging fertility or the unborn child.

Specific target organ toxicity - single exposure Not classified.

Specific target organ toxicity - repeated exposure May cause damage to organs (kidney) through prolonged or repeated exposure.

Aspiration hazard Not an aspiration hazard.

Chronic effects Prolonged inhalation may be harmful. May cause damage to organs through prolonged or repeated exposure.

12. Ecological information

Ecotoxicity Harmful to aquatic life with long lasting effects.

Components		Species	Test Results
1,2-Benzenedicarboxylic acid, 3,4,5,6-tetrabromo-, mixed esters with diethylene glycol and propylene glycol (CAS 77098-07-8)			
Aquatic			
Acute			
Fish	LC50	Lepomis macrochirus	12 mg/l, 96 hours
Ethylene glycol (CAS 107-21-1)			
Aquatic			
Acute			
Crustacea	EC50	Ceriodaphnia dubia	10000 mg/l, 48 Hours
Fish	LC50	Oncorhynchus mykiss	24591 mg/l, 96 Hours
Chronic			
Crustacea	NOEC	Ceriodaphnia dubia	3469 mg/l, 7 days
Fish	NOEC	Oncorhynchus mykiss	14692 mg/l, 12 days

Persistence and degradability No data is available on the degradability of this product.

Bioaccumulative potential No data available for this product.

Partition coefficient n-octanol / water (log Kow)

Diethylene glycol (CAS 111-46-6)	-1.47
Ethylene glycol (CAS 107-21-1)	-1.36

Mobility in soil No data available.

Other adverse effects No data available.

13. Disposal considerations

Disposal instructions Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national/international regulations.

Local disposal regulations Dispose in accordance with all applicable regulations.

Hazardous waste code The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Waste from residues / unused products Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner.

Contaminated packaging Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not established.

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

TSCA Chemical Action Plans, Chemicals of Concern

4-Nonylphenol branched, ethoxylated (CAS 127087-87-0)	Nonylphenol (NP) and Nonylphenol Ethoxylates (NPEs) Action Plan

CERCLA Hazardous Substance List (40 CFR 302.4)

Ethylene glycol (CAS 107-21-1)	Listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

Toxic Substances Control Act (TSCA) All components of the mixture on the TSCA 8(b) inventory are designated “active”.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical Yes

Classified hazard categories
Acute toxicity (any route of exposure)
Skin corrosion or irritation
Serious eye damage or eye irritation
Respiratory or skin sensitization
Reproductive toxicity
Specific target organ toxicity (single or repeated exposure)

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
4-Nonylphenol branched, ethoxylated	127087-87-0	1 - 5
Ethylene glycol	107-21-1	0.5 - 1.5

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Ethylene glycol (CAS 107-21-1)

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Contains component(s) regulated under the Safe Drinking Water Act.

US state regulations

US. Massachusetts RTK - Substance List

Ethylene glycol (CAS 107-21-1)

US. New Jersey Worker and Community Right-to-Know Act

4-Nonylphenol branched, ethoxylated (CAS 127087-87-0)
Ethylene glycol (CAS 107-21-1)

US. Pennsylvania Worker and Community Right-to-Know Law

Diethylene glycol (CAS 111-46-6)
Ethylene glycol (CAS 107-21-1)

US. Rhode Island RTK

Diethylene glycol (CAS 111-46-6)
dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4)
Ethylene glycol (CAS 107-21-1)

California Proposition 65

WARNING: This product can expose you to chemicals including Ethylene Oxide and 1,4-Dioxane, which are known to the State of California to cause cancer, and Ethylene Oxide and Ethylene glycol, which are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

California Proposition 65 - CRT: Listed date/Carcinogenic substance

1,4-Dioxane (CAS 123-91-1)	Listed: January 1, 1988
Ethylene Oxide (CAS 75-21-8)	Listed: July 1, 1987

California Proposition 65 - CRT: Listed date/Developmental toxin

Ethylene glycol (CAS 107-21-1)	Listed: June 19, 2015
Ethylene Oxide (CAS 75-21-8)	Listed: August 7, 2009

California Proposition 65 - CRT: Listed date/Female reproductive toxin

Ethylene Oxide (CAS 75-21-8)	Listed: February 27, 1987

California Proposition 65 - CRT: Listed date/Male reproductive toxin

Ethylene Oxide (CAS 75-21-8)	Listed: August 7, 2009

US. California. Candidate Chemicals List. Safer Consumer Products Regulations (Cal. Code Regs, tit. 22, 69502.3, subd. (a))

4-Nonylphenol branched, ethoxylated (CAS 127087-87-0)
Ethylene glycol (CAS 107-21-1)
Tris(2-chloro-1-methylethyl) Phosphate (CAS 13674-84-5)

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Industrial Chemicals (AICIS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	No
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	No
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
Taiwan	Taiwan Chemical Substance Inventory (TCSI)	Yes

Country(s) or region	Inventory name	On inventory (yes/no)*
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 04-December-2023

Revision date -

Version # 01

HMIS® ratings Health: 2*
Flammability: 0
Physical hazard: 0

Disclaimer Holcim Solutions and Products US, LLC cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.

SAFETY DATA SHEET

1. Identification

Product identifier	**ENVERGE NexSeal LE (1660R) - Part B Polyol - Closed Cell**
Other means of identification	
Product code	F1660R-CC
Recommended use	Component for the manufacture of polyurethane polymers.
Recommended restrictions	For professional use only. Uses other than the recommended use.
Manufacturer/Importer/Supplier/Distributor information	
Distributed by	Holcim Solutions and Products US, LLC
Address	26 Century Boulevard, Suite 205 Nashville, TN 37214 ENVERGE™ is a Holcim Solutions and Products US, LLC brand.
Website	envergesprayfoam.com
Email	contactSPF-us@holcim.com
Telephone Number	(713) 239-0252
Emergency Telephone Number	For Chemical Emergency, Spill, Leak, Fire, Exposure, or Incident: CHEMTREC within USA and Canada: 1-800-424-9300 CHEMTREC outside USA and Canada: +1 703-527-3887 (collect calls accepted)

2. Hazard(s) identification

Physical hazards	Not classified.	
Health hazards	Acute toxicity, oral	Category 4
	Skin corrosion/irritation	Category 2
	Serious eye damage/eye irritation	Category 1
	Sensitization, skin	Category 1
	Reproductive toxicity	Category 2
	Specific target organ toxicity, repeated exposure	Category 2 (kidney)
Environmental hazards	Hazardous to the aquatic environment, acute hazard	Category 3
	Hazardous to the aquatic environment, long-term hazard	Category 3
OSHA defined hazards	Not classified.	

Label elements

Signal word	Danger
Hazard statement	Harmful if swallowed. Causes skin irritation. May cause an allergic skin reaction. Causes serious eye damage. Suspected of damaging fertility or the unborn child. May cause damage to organs (kidney) through prolonged or repeated exposure. Harmful to aquatic life with long lasting effects.
Precautionary statement	
Prevention	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not breathe mist/vapors. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Contaminated work clothing must not be allowed out of the workplace. Avoid release to the environment. Wear protective gloves/protective clothing/eye protection/face protection.

Response	If swallowed: Call a poison center/doctor if you feel unwell. Rinse mouth. If on skin: Wash with plenty of water. Immediately call a poison center/doctor. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If skin irritation or rash occurs: Get medical advice/attention. Take off contaminated clothing and wash it before reuse.
Storage	Store locked up.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC)	None known.
Supplemental information	None.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Diethylene glycol	111-46-6	10 - 15
4-Nonylphenol branched, ethoxylated	127087-87-0	1 - 5
Tris(2-chloro-1-methylethyl) Phosphate	13674-84-5	1 - 5
Ethylene glycol	107-21-1	0.5 - 1.5
dimethyltin bis(ethylhexyl mercaptoacetate)	57583-35-4	0.1 - 0.5

Composition comments All concentrations are in percent by weight unless otherwise indicated.
Components not listed are either non-hazardous or are below reportable limits.

4. First-aid measures

Inhalation	Move to fresh air. Call a physician if symptoms develop or persist.
Skin contact	Remove contaminated clothing immediately and wash skin with soap and water. In case of eczema or other skin disorders: Seek medical attention and take along these instructions. Wash contaminated clothing before reuse.
Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention immediately.
Ingestion	Rinse mouth. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Get medical advice/attention if you feel unwell.
Most important symptoms/effects, acute and delayed	Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. Skin irritation. May cause redness and pain. May cause an allergic skin reaction. Dermatitis. Rash. Edema. Prolonged exposure may cause chronic effects.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically. Keep victim warm. Keep victim under observation. Symptoms may be delayed.
General information	IF exposed or concerned: Get medical advice/attention. If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance. Wash contaminated clothing before reuse.

5. Fire-fighting measures

Suitable extinguishing media	Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).
Unsuitable extinguishing media	Do not use water jet as an extinguisher, as this will spread the fire.
Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed such as: Carbon oxides. Nitrogen oxides.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	Move containers from fire area if you can do so without risk.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	No unusual fire or explosion hazards noted.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Do not breathe mist/vapors. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.

Methods and materials for containment and cleaning up

Prevent product from entering drains.

Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water.

Small Spills: Absorb spillage with suitable absorbent material. Clean surface thoroughly to remove residual contamination.

Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.

Environmental precautions

Avoid release to the environment. Inform appropriate managerial or supervisory personnel of all environmental releases. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling

Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not breathe mist/vapors. Do not get this material in contact with eyes. Do not taste or swallow. Avoid contact with eyes, skin, and clothing. Avoid prolonged exposure. When using, do not eat, drink or smoke. Pregnant or breastfeeding women must not handle this product. Should be handled in closed systems, if possible. Provide adequate ventilation. Wear appropriate personal protective equipment. Wash hands thoroughly after handling. Avoid release to the environment. Observe good industrial hygiene practices. Persons susceptible to allergic reactions should not handle this product.

Conditions for safe storage, including any incompatibilities

Store locked up. Store in tightly closed container. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Table Z-1 Permissible Exposure Limits (PEL) for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value
dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4)	PEL	0.1 mg/m3

US. ACGIH Threshold Limit Values (TLV)

Components	Type	Value	Form
dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4)	STEL	0.2 mg/m3	
	TWA	0.1 mg/m3	
Ethylene glycol (CAS 107-21-1)	STEL	10 mg/m3	Aerosol, inhalable.
		50 ppm	Vapor fraction
	TWA	25 ppm	Vapor fraction

NIOSH. Immediately Dangerous to Life or Health (IDLH) Values, as amended

Components	Type	Value
dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4)	IDLH	25 mg/m3

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4)	TWA	0.1 mg/m3

US. OARS. Workplace Environmental Exposure Level (WEEL) Guide

Components	Type	Value
Diethylene glycol (CAS 111-46-6)	TWA	10 mg/m3

Biological limit values No biological exposure limits noted for the ingredient(s).

Exposure guidelines

US - California OELs: Skin designation

dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4) Can be absorbed through the skin.

US - Minnesota Haz Subs: Skin designation applies

dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4) Skin designation applies.

US - Tennessee OELs: Skin designation

dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4) Can be absorbed through the skin.

US ACGIH Threshold Limit Values: Skin designation

dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4) Danger of cutaneous absorption

US. NIOSH: Pocket Guide to Chemical Hazards

dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4) Can be absorbed through the skin.

Appropriate engineering controls Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Eye wash facilities and emergency shower must be available when handling this product.

Individual protection measures, such as personal protective equipment

Eye/face protection Wear approved chemical safety goggles. Face shield is recommended.

Skin protection

Hand protection Wear appropriate chemical resistant gloves. Examples of preferred glove barrier materials include: Butyl rubber. Nitrile butyl rubber (NBR). Neoprene. Suitable gloves can be recommended by the glove supplier.

Skin protection

Other Wear appropriate chemical resistant clothing. Use of an impervious apron is recommended.

Respiratory protection If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. Chemical respirator with organic vapor cartridge and full facepiece.

Thermal hazards Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations Observe any medical surveillance requirements. Keep away from food and drink. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Contaminated work clothing should not be allowed out of the workplace.

9. Physical and chemical properties

Appearance

Physical state Liquid.

Form Slightly viscous liquid.

Color Light brown.

Odor Amine.

Odor threshold Not available.

pH 10

Melting point/freezing point Not determined.

Initial boiling point and boiling range Not determined.

Flash point > 200 °F (> 93.33 °C) Closed Cup

Evaporation rate	Not determined.
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Explosive limit - lower (%)	Not determined.
Explosive limit - upper (%)	Not determined.
Vapor pressure	Not determined.
Vapor density	Not determined.
Relative density	1.23 (77 °F (25 °C))
Solubility(ies)	
Solubility (water)	Slightly soluble.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not determined.
Decomposition temperature	Not determined.
Viscosity	569 cps (77 °F (25 °C))
Other information	
Density	10.26 lb/gal (77 °F (25 °C))
Explosive properties	Not explosive.
Oxidizing properties	Not oxidizing.

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
Conditions to avoid	Avoid temperatures exceeding the flash point. Contact with incompatible materials.
Incompatible materials	Strong oxidizing agents. Isocyanates.
Hazardous decomposition products	No hazardous decomposition products are known. In the event of fire: See Section 5.

11. Toxicological information

Information on likely routes of exposure

Inhalation	Prolonged inhalation may be harmful.
Skin contact	Causes skin irritation. May cause an allergic skin reaction.
Eye contact	Causes serious eye irritation.
Ingestion	Harmful if swallowed.
Symptoms related to the physical, chemical and toxicological characteristics	Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Skin irritation. May cause redness and pain. May cause an allergic skin reaction. Dermatitis. Rash. Edema.

Information on toxicological effects

Acute toxicity Harmful if swallowed.

Components	Species	Test Results
1,2-Benzenedicarboxylic acid, 3,4,5,6-tetrabromo-, mixed esters with diethylene glycol and propylene glycol (CAS 77098-07-8)		
Acute		
Dermal		
LD50	Rabbit	> 20000 mg/kg
Inhalation		
Vapor		
LC50	Rat	> 0.008 mg/l
Oral		
LD50	Rat	> 10000 mg/kg

Components	Species	Test Results
Diethylene glycol (CAS 111-46-6)		
Acute		
Dermal		
LD50	Rabbit	11890 mg/kg
Ethylene glycol (CAS 107-21-1)		
Acute		
Dermal		
LD50	Rabbit	9530 mg/kg

Skin corrosion/irritation Causes skin irritation.

Serious eye damage/eye irritation Causes serious eye irritation.

Respiratory or skin sensitization

Respiratory sensitization Not a respiratory sensitizer.

Skin sensitization May cause an allergic skin reaction.

Germ cell mutagenicity No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Carcinogenicity Not classifiable as to carcinogenicity to humans.

IARC Monographs. Overall Evaluation of Carcinogenicity

Not listed.

NTP Report on Carcinogens

Not listed.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

Reproductive toxicity Suspected of damaging fertility or the unborn child.

Specific target organ toxicity - single exposure Not classified.

Specific target organ toxicity - repeated exposure May cause damage to organs (kidney) through prolonged or repeated exposure.

Aspiration hazard Not an aspiration hazard.

Chronic effects Prolonged inhalation may be harmful. May cause damage to organs through prolonged or repeated exposure.

12. Ecological information

Ecotoxicity Harmful to aquatic life with long lasting effects.

Components		Species	Test Results
1,2-Benzenedicarboxylic acid, 3,4,5,6-tetrabromo-, mixed esters with diethylene glycol and propylene glycol (CAS 77098-07-8)			
Aquatic			
Acute			
Fish	LC50	Lepomis macrochirus	12 mg/l, 96 hours
Ethylene glycol (CAS 107-21-1)			
Aquatic			
Acute			
Crustacea	EC50	Ceriodaphnia dubia	10000 mg/l, 48 Hours
Fish	LC50	Oncorhynchus mykiss	24591 mg/l, 96 Hours
Chronic			
Crustacea	NOEC	Ceriodaphnia dubia	3469 mg/l, 7 days
Fish	NOEC	Oncorhynchus mykiss	14692 mg/l, 12 days

Persistence and degradability No data is available on the degradability of this product.

Bioaccumulative potential No data available for this product.

Partition coefficient n-octanol / water (log Kow)

Diethylene glycol (CAS 111-46-6)	-1.47
Ethylene glycol (CAS 107-21-1)	-1.36

Mobility in soil	No data available.
Other adverse effects	No data available.

13. Disposal considerations

Disposal instructions	Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national/international regulations.
Local disposal regulations	Dispose in accordance with all applicable regulations.
Hazardous waste code	The waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Waste from residues / unused products	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner.
Contaminated packaging	Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code	Not established.

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

TSCA Chemical Action Plans, Chemicals of Concern

4-Nonylphenol branched, ethoxylated (CAS 127087-87-0)	Nonylphenol (NP) and Nonylphenol Ethoxylates (NPEs) Action Plan

CERCLA Hazardous Substance List (40 CFR 302.4)

Ethylene glycol (CAS 107-21-1)	Listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

Toxic Substances Control Act (TSCA)	All components of the mixture on the TSCA 8(b) inventory are designated “active”.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical	Yes
Classified hazard categories	Acute toxicity (any route of exposure) Skin corrosion or irritation Serious eye damage or eye irritation Respiratory or skin sensitization Reproductive toxicity Specific target organ toxicity (single or repeated exposure)

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
4-Nonylphenol branched, ethoxylated	127087-87-0	1 - 5
Ethylene glycol	107-21-1	0.5 - 1.5

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Ethylene glycol (CAS 107-21-1)

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Contains component(s) regulated under the Safe Drinking Water Act.

US state regulations

US. Massachusetts RTK - Substance List

Ethylene glycol (CAS 107-21-1)

US. New Jersey Worker and Community Right-to-Know Act

4-Nonylphenol branched, ethoxylated (CAS 127087-87-0)
Ethylene glycol (CAS 107-21-1)

US. Pennsylvania Worker and Community Right-to-Know Law

Diethylene glycol (CAS 111-46-6)
Ethylene glycol (CAS 107-21-1)

US. Rhode Island RTK

Diethylene glycol (CAS 111-46-6)
dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4)
Ethylene glycol (CAS 107-21-1)

California Proposition 65

WARNING: This product can expose you to chemicals including Ethylene Oxide and 1,4-Dioxane, which are known to the State of California to cause cancer, and Ethylene Oxide and Ethylene glycol, which are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

California Proposition 65 - CRT: Listed date/Carcinogenic substance

1,4-Dioxane (CAS 123-91-1)	Listed: January 1, 1988
Ethylene Oxide (CAS 75-21-8)	Listed: July 1, 1987

California Proposition 65 - CRT: Listed date/Developmental toxin

Ethylene glycol (CAS 107-21-1)	Listed: June 19, 2015
Ethylene Oxide (CAS 75-21-8)	Listed: August 7, 2009

California Proposition 65 - CRT: Listed date/Female reproductive toxin

Ethylene Oxide (CAS 75-21-8)	Listed: February 27, 1987

California Proposition 65 - CRT: Listed date/Male reproductive toxin

Ethylene Oxide (CAS 75-21-8)	Listed: August 7, 2009

US. California. Candidate Chemicals List. Safer Consumer Products Regulations (Cal. Code Regs, tit. 22, 69502.3, subd. (a))

4-Nonylphenol branched, ethoxylated (CAS 127087-87-0)
Ethylene glycol (CAS 107-21-1)
Tris(2-chloro-1-methylethyl) Phosphate (CAS 13674-84-5)

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Industrial Chemicals (AICIS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	No
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	No
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
Taiwan	Taiwan Chemical Substance Inventory (TCSI)	Yes

Country(s) or region	Inventory name	On inventory (yes/no)*
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 08-December-2023

Revision date -

Version # 01

HMIS® ratings Health: 3*
Flammability: 0
Physical hazard: 0

Disclaimer Holcim Solutions and Products US, LLC cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.

SAFETY DATA SHEET

ENVERGE

1. Identification

Product identifier **ENVERGE OnePass (1860R) - Part B Polyol - Closed Cell**

Other means of identification

Product code F1860R-CC

Recommended use Component for the manufacture of polyurethane polymers.

Recommended restrictions For professional use only. Uses other than the recommended use.

Manufacturer/Importer/Supplier/Distributor information

Distributed by Holcim Solutions and Products US, LLC

Address 26 Century Boulevard, Suite 205
Nashville, TN 37214
ENVERGE™ is a Holcim Solutions and Products US, LLC brand.

Website envergesprayfoam.com

Email contactSPF-us@holcim.com

Telephone Number (713) 239-0252

Emergency Telephone Number For Chemical Emergency, Spill, Leak, Fire, Exposure, or Incident:

CHEMTREC within USA and Canada: 1-800-424-9300
CHEMTREC outside USA and Canada: +1 703-527-3887 (collect calls accepted)

2. Hazard(s) identification

Physical hazards Not classified.

Health hazards	Acute toxicity, oral	Category 4
	Skin corrosion/irritation	Category 2
	Serious eye damage/eye irritation	Category 1
	Sensitization, skin	Category 1
	Reproductive toxicity	Category 2
	Specific target organ toxicity, repeated exposure	Category 2 (kidney)
Environmental hazards	Hazardous to the aquatic environment, acute hazard	Category 3
	Hazardous to the aquatic environment, long-term hazard	Category 3

OSHA defined hazards Not classified.

Label elements

Signal word Danger

Hazard statement Harmful if swallowed. Causes skin irritation. May cause an allergic skin reaction. Causes serious eye damage. Suspected of damaging fertility or the unborn child. May cause damage to organs (kidney) through prolonged or repeated exposure. Harmful to aquatic life with long lasting effects.

Precautionary statement

Prevention Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not breathe mist/vapors. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Contaminated work clothing must not be allowed out of the workplace. Avoid release to the environment. Wear protective gloves/protective clothing/eye protection/face protection.

Response	If swallowed: Call a poison center/doctor if you feel unwell. Rinse mouth. If on skin: Wash with plenty of water. Immediately call a poison center/doctor. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If skin irritation or rash occurs: Get medical advice/attention. Take off contaminated clothing and wash it before reuse.
Storage	Store locked up.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC)	None known.
Supplemental information	None.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Diethylene glycol	111-46-6	10 - 15
Tris(2-chloro-1-methylethyl) Phosphate	13674-84-5	5 - 10
4-Nonylphenol branched, ethoxylated	127087-87-0	1 - 5
Ethylene glycol	107-21-1	1 - 5
Tertiary amine catalyst	NA	1 - 5
dimethyltin bis(ethylhexyl mercaptoacetate)	57583-35-4	0.1 - 1

Composition comments All concentrations are in percent by weight unless otherwise indicated.
Components not listed are either non-hazardous or are below reportable limits. Any concentration shown as a range is to protect confidentiality or is due to batch variation.

4. First-aid measures

Inhalation	Move to fresh air. Call a physician if symptoms develop or persist.
Skin contact	Remove contaminated clothing immediately and wash skin with soap and water. In case of eczema or other skin disorders: Seek medical attention and take along these instructions. Wash contaminated clothing before reuse.
Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention immediately.
Ingestion	Rinse mouth. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Get medical advice/attention if you feel unwell.
Most important symptoms/effects, acute and delayed	Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. Skin irritation. May cause redness and pain. May cause an allergic skin reaction. Dermatitis. Rash. Edema. Prolonged exposure may cause chronic effects.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically. Keep victim warm. Keep victim under observation. Symptoms may be delayed.
General information	IF exposed or concerned: Get medical advice/attention. If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance. Wash contaminated clothing before reuse.

5. Fire-fighting measures

Suitable extinguishing media	Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).
Unsuitable extinguishing media	Do not use water jet as an extinguisher, as this will spread the fire.
Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed such as: Carbon oxides. Nitrogen oxides.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	Move containers from fire area if you can do so without risk.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.

General fire hazards No unusual fire or explosion hazards noted.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Do not breathe mist/vapors. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.

Methods and materials for containment and cleaning up Prevent product from entering drains.

Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water.

Small Spills: Absorb spillage with suitable absorbent material. Clean surface thoroughly to remove residual contamination.

Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.

Environmental precautions Avoid release to the environment. Inform appropriate managerial or supervisory personnel of all environmental releases. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not breathe mist/vapors. Do not get this material in contact with eyes. Do not taste or swallow. Avoid contact with eyes, skin, and clothing. Avoid prolonged exposure. When using, do not eat, drink or smoke. Pregnant or breastfeeding women must not handle this product. Should be handled in closed systems, if possible. Provide adequate ventilation. Wear appropriate personal protective equipment. Wash hands thoroughly after handling. Avoid release to the environment. Observe good industrial hygiene practices. Persons susceptible to allergic reactions should not handle this product.

Conditions for safe storage, including any incompatibilities Store locked up. Store in tightly closed container. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Table Z-1 Permissible Exposure Limits (PEL) for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value
dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4)	PEL	0.1 mg/m3
Dipropylene glycol, monomethyl ether (CAS 34590-94-8)	PEL	600 mg/m3
		100 ppm

US. ACGIH Threshold Limit Values (TLV)

Components	Type	Value	Form
dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4)	STEL	0.2 mg/m3	
	TWA	0.1 mg/m3	
Dipropylene glycol, monomethyl ether (CAS 34590-94-8)	TWA	50 ppm	
Ethylene glycol (CAS 107-21-1)	STEL	10 mg/m3	Aerosol, inhalable.
		50 ppm	Vapor fraction
	TWA	25 ppm	Vapor fraction

NIOSH. Immediately Dangerous to Life or Health (IDLH) Values, as amended

Components	Type	Value
dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4)	IDLH	25 mg/m3
Dipropylene glycol, monomethyl ether (CAS 34590-94-8)	IDLH	1.1 %
		600 ppm

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4)	TWA	0.1 mg/m3
Dipropylene glycol, monomethyl ether (CAS 34590-94-8)	STEL	900 mg/m3
		150 ppm
	TWA	600 mg/m3
		100 ppm

US. OARS. Workplace Environmental Exposure Level (WEEL) Guide

Components	Type	Value
Diethylene glycol (CAS 111-46-6)	TWA	10 mg/m3

Biological limit values No biological exposure limits noted for the ingredient(s).

Exposure guidelines

US - California OELs: Skin designation

dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4)	Can be absorbed through the skin.
Dipropylene glycol, monomethyl ether (CAS 34590-94-8)	Can be absorbed through the skin.

US - Minnesota Haz Subs: Skin designation applies

dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4)	Skin designation applies.

US - Tennessee OELs: Skin designation

dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4)	Can be absorbed through the skin.
Dipropylene glycol, monomethyl ether (CAS 34590-94-8)	Can be absorbed through the skin.

US ACGIH Threshold Limit Values: Skin designation

dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4)	Danger of cutaneous absorption

US. NIOSH: Pocket Guide to Chemical Hazards

dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4)	Can be absorbed through the skin.
Dipropylene glycol, monomethyl ether (CAS 34590-94-8)	Can be absorbed through the skin.

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Dipropylene glycol, monomethyl ether (CAS 34590-94-8)	Can be absorbed through the skin.

Appropriate engineering controls Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Eye wash facilities and emergency shower must be available when handling this product.

Individual protection measures, such as personal protective equipment

Eye/face protection Wear approved chemical safety goggles. Face shield is recommended.

Skin protection

Hand protection Wear appropriate chemical resistant gloves. Examples of preferred glove barrier materials include: Butyl rubber. Nitrile butyl rubber (NBR). Neoprene. Suitable gloves can be recommended by the glove supplier.

Skin protection	
Other	Wear appropriate chemical resistant clothing. Use of an impervious apron is recommended.
Respiratory protection	If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. Chemical respirator with organic vapor cartridge and full facepiece.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
General hygiene considerations	Observe any medical surveillance requirements. Keep away from food and drink. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Contaminated work clothing should not be allowed out of the workplace.

9. Physical and chemical properties

Appearance	
Physical state	Liquid.
Form	Slightly viscous liquid.
Color	Light brown.
Odor	Amine.
Odor threshold	Not available.
pH	10
Melting point/freezing point	Not determined.
Initial boiling point and boiling range	Not determined.
Flash point	> 200 °F (> 93.33 °C) Closed Cup
Evaporation rate	Not determined.
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Explosive limit - lower (%)	Not determined.
Explosive limit - upper (%)	Not determined.
Vapor pressure	Not determined.
Vapor density	Not determined.
Relative density	1.23 (77 °F (25 °C))
Solubility(ies)	
Solubility (water)	Slightly soluble.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not determined.
Decomposition temperature	Not determined.
Viscosity	569 cps (77 °F (25 °C))
Other information	
Density	10.26 lb/gal (77 °F (25 °C))
Explosive properties	Not explosive.
Oxidizing properties	Not oxidizing.

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
Conditions to avoid	Avoid temperatures exceeding the flash point. Contact with incompatible materials.
Incompatible materials	Strong oxidizing agents. Isocyanates.
Hazardous decomposition products	No hazardous decomposition products are known. In the event of fire: See Section 5.

11. Toxicological information

Information on likely routes of exposure

Inhalation	Prolonged inhalation may be harmful.
Skin contact	Causes skin irritation. May cause an allergic skin reaction.
Eye contact	Causes serious eye damage.
Ingestion	Harmful if swallowed.
Symptoms related to the physical, chemical and toxicological characteristics	Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. Skin irritation. May cause redness and pain. May cause an allergic skin reaction. Dermatitis. Rash. Edema.

Information on toxicological effects

Acute toxicity Harmful if swallowed.

Components	Species	Test Results
1,2-Benzenedicarboxylic acid, 3,4,5,6-tetrabromo-, mixed esters with diethylene glycol and propylene glycol (CAS 77098-07-8)		
Acute		
Dermal		
LD50	Rabbit	> 20000 mg/kg
Inhalation		
Vapor		
LC50	Rat	> 0.008 mg/l
Oral		
LD50	Rat	> 10000 mg/kg
Diethylene glycol (CAS 111-46-6)		
Acute		
Dermal		
LD50	Rabbit	11890 mg/kg
Dipropylene glycol, monomethyl ether (CAS 34590-94-8)		
Acute		
Dermal		
LD50	Rabbit	9.5 g/kg
Ethylene glycol (CAS 107-21-1)		
Acute		
Dermal		
LD50	Rabbit	9530 mg/kg

Skin corrosion/irritation	Causes skin irritation.
Serious eye damage/eye irritation	Causes serious eye damage.

Respiratory or skin sensitization

Respiratory sensitization	Not a respiratory sensitizer.
Skin sensitization	May cause an allergic skin reaction.
Germ cell mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Carcinogenicity	Not classifiable as to carcinogenicity to humans.

IARC Monographs. Overall Evaluation of Carcinogenicity

Not listed.

NTP Report on Carcinogens

Not listed.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

Reproductive toxicity	Suspected of damaging fertility or the unborn child.
Specific target organ toxicity - single exposure	Not classified.

Specific target organ toxicity - repeated exposure	May cause damage to organs (kidney) through prolonged or repeated exposure.
Aspiration hazard	Not an aspiration hazard.
Chronic effects	Prolonged inhalation may be harmful. May cause damage to organs through prolonged or repeated exposure.

12. Ecological information

Ecotoxicity Harmful to aquatic life with long lasting effects.

Components		Species	Test Results
1,2-Benzenedicarboxylic acid, 3,4,5,6-tetrabromo-, mixed esters with diethylene glycol and propylene glycol (CAS 77098-07-8)			
Aquatic			
Acute			
Fish	LC50	Lepomis macrochirus	12 mg/l, 96 hours
Dipropylene glycol, monomethyl ether (CAS 34590-94-8)			
Aquatic			
Acute			
Crustacea	LC50	Daphnia magna	1919 mg/l, 48 hours
Fish	LC50	Pimephales promelas	> 10000 mg/l, 96 hours
Chronic			
Crustacea	NOAEL	Daphnia magna	0.5 mg/l, 22 days
Ethylene glycol (CAS 107-21-1)			
Aquatic			
Acute			
Crustacea	EC50	Ceriodaphnia dubia	10000 mg/l, 48 Hours
Fish	LC50	Oncorhynchus mykiss	24591 mg/l, 96 Hours
Chronic			
Crustacea	NOEC	Ceriodaphnia dubia	3469 mg/l, 7 days
Fish	NOEC	Oncorhynchus mykiss	14692 mg/l, 12 days

Persistence and degradability No data is available on the degradability of this product.

Bioaccumulative potential

Partition coefficient n-octanol / water (log Kow)	
Diethylene glycol (CAS 111-46-6)	-1.47
Ethylene glycol (CAS 107-21-1)	-1.36

Mobility in soil No data available.

Other adverse effects No data available.

13. Disposal considerations

Disposal instructions	Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national/international regulations.
Local disposal regulations	Dispose in accordance with all applicable regulations.
Hazardous waste code	The waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Waste from residues / unused products	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner.
Contaminated packaging	Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not established.

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

TSCA Chemical Action Plans, Chemicals of Concern

4-Nonylphenol branched, ethoxylated (CAS 127087-87-0)	Nonylphenol (NP) and Nonylphenol Ethoxylates (NPEs) Action Plan

CERCLA Hazardous Substance List (40 CFR 302.4)

Ethylene glycol (CAS 107-21-1)	Listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

Toxic Substances Control Act (TSCA) All components of the mixture on the TSCA 8(b) inventory are designated “active”.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical Yes

Classified hazard categories

Acute toxicity (any route of exposure)
Skin corrosion or irritation
Serious eye damage or eye irritation
Respiratory or skin sensitization
Reproductive toxicity
Specific target organ toxicity (single or repeated exposure)

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
4-Nonylphenol branched, ethoxylated	127087-87-0	1 - 5
Ethylene glycol	107-21-1	1 - 5

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Ethylene glycol (CAS 107-21-1)

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Contains component(s) regulated under the Safe Drinking Water Act.

US state regulations

US. Massachusetts RTK - Substance List

Dipropylene glycol, monomethyl ether (CAS 34590-94-8)
Ethylene glycol (CAS 107-21-1)

US. New Jersey Worker and Community Right-to-Know Act

4-Nonylphenol branched, ethoxylated (CAS 127087-87-0)
Dipropylene glycol, monomethyl ether (CAS 34590-94-8)
Ethylene glycol (CAS 107-21-1)

US. Pennsylvania Worker and Community Right-to-Know Law

Diethylene glycol (CAS 111-46-6)
Dipropylene glycol, monomethyl ether (CAS 34590-94-8)
Ethylene glycol (CAS 107-21-1)

US. Rhode Island RTK

Diethylene glycol (CAS 111-46-6)
dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4)
Dipropylene glycol, monomethyl ether (CAS 34590-94-8)
Ethylene glycol (CAS 107-21-1)

California Proposition 65

WARNING: This product can expose you to chemicals including Ethylene Oxide and 1,4-Dioxane, which are known to the State of California to cause cancer, and Ethylene Oxide and Ethylene glycol, which are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

California Proposition 65 - CRT: Listed date/Carcinogenic substance

1,4-Dioxane (CAS 123-91-1)	Listed: January 1, 1988
Ethylene Oxide (CAS 75-21-8)	Listed: July 1, 1987

California Proposition 65 - CRT: Listed date/Developmental toxin

Ethylene glycol (CAS 107-21-1)	Listed: June 19, 2015
Ethylene Oxide (CAS 75-21-8)	Listed: August 7, 2009

California Proposition 65 - CRT: Listed date/Female reproductive toxin

Ethylene Oxide (CAS 75-21-8)	Listed: February 27, 1987

California Proposition 65 - CRT: Listed date/Male reproductive toxin

Ethylene Oxide (CAS 75-21-8)	Listed: August 7, 2009

US. California. Candidate Chemicals List. Safer Consumer Products Regulations (Cal. Code Regs, tit. 22, 69502.3, subd. (a))

4-Nonylphenol branched, ethoxylated (CAS 127087-87-0)
Ethylene glycol (CAS 107-21-1)
Tris(2-chloro-1-methylethyl) Phosphate (CAS 13674-84-5)

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Industrial Chemicals (AICIS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
Taiwan	Taiwan Chemical Substance Inventory (TCSI)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date	07-December-2023
Revision date	-
Version #	01
HMIS® ratings	Health: 3* Flammability: 0 Physical hazard: 0
Disclaimer	Holcim Solutions and Products US, LLC cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.

SAFETY DATA SHEET

1. Identification

Product identifier	**ENVERGE OnePass (1860W) Winter - Part B Polyol - Closed Cell**
Other means of identification	
Product code	F1860W-CC
Recommended use	Component for the manufacture of polyurethane polymers.
Recommended restrictions	For professional use only. Uses other than the recommended use.
Manufacturer/Importer/Supplier/Distributor information	
Distributed by	Holcim Solutions and Products US, LLC
Address	26 Century Boulevard, Suite 205 Nashville, TN 37214 ENVERGE™ is a Holcim Solutions and Products US, LLC brand.
Website	envergesprayfoam.com
Email	contactSPF-us@holcim.com
Telephone Number	(713) 239-0252
Emergency Telephone Number	For Chemical Emergency, Spill, Leak, Fire, Exposure, or Incident: CHEMTREC within USA and Canada: 1-800-424-9300 CHEMTREC outside USA and Canada: +1 703-527-3887 (collect calls accepted)

2. Hazard(s) identification

Physical hazards	Not classified.	
Health hazards	Acute toxicity, oral	Category 4
	Skin corrosion/irritation	Category 2
	Serious eye damage/eye irritation	Category 1
	Sensitization, skin	Category 1
	Reproductive toxicity	Category 2
	Specific target organ toxicity, repeated exposure	Category 2 (kidney)
Environmental hazards	Hazardous to the aquatic environment, acute hazard	Category 3
	Hazardous to the aquatic environment, long-term hazard	Category 3
OSHA defined hazards	Not classified.	

Label elements

Signal word	Danger
Hazard statement	Harmful if swallowed. Causes skin irritation. May cause an allergic skin reaction. Causes serious eye damage. Suspected of damaging fertility or the unborn child. May cause damage to organs (kidney) through prolonged or repeated exposure. Harmful to aquatic life with long lasting effects.
Precautionary statement	
Prevention	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not breathe mist/vapors. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Contaminated work clothing must not be allowed out of the workplace. Avoid release to the environment. Wear protective gloves/protective clothing/eye protection/face protection.

Response	If swallowed: Call a poison center/doctor if you feel unwell. Rinse mouth. If on skin: Wash with plenty of water. Immediately call a poison center/doctor. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If skin irritation or rash occurs: Get medical advice/attention. Take off contaminated clothing and wash it before reuse.
Storage	Store locked up.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.
Hazard(s) not otherwise classified (HNOC)	None known.
Supplemental information	None.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Diethylene glycol	111-46-6	10 - 15
Tris(2-chloro-1-methylethyl) Phosphate	13674-84-5	5 - 10
4-Nonylphenol branched, ethoxylated	127087-87-0	1 - 5
Ethylene glycol	107-21-1	1 - 5
Tertiary amine catalyst	-	1 - 5
dimethyltin bis(ethylhexyl mercaptoacetate)	57583-35-4	0.1 - 1

Composition comments All concentrations are in percent by weight unless otherwise indicated.
Components not listed are either non-hazardous or are below reportable limits. Any concentration shown as a range is to protect confidentiality or is due to batch variation.

4. First-aid measures

Inhalation	Move to fresh air. Call a physician if symptoms develop or persist.
Skin contact	Remove contaminated clothing immediately and wash skin with soap and water. In case of eczema or other skin disorders: Seek medical attention and take along these instructions. Wash contaminated clothing before reuse.
Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention immediately.
Ingestion	Rinse mouth. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Get medical advice/attention if you feel unwell.
Most important symptoms/effects, acute and delayed	Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. Skin irritation. May cause redness and pain. May cause an allergic skin reaction. Dermatitis. Rash. Edema. Prolonged exposure may cause chronic effects.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically. Keep victim warm. Keep victim under observation. Symptoms may be delayed.
General information	IF exposed or concerned: Get medical advice/attention. If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance. Wash contaminated clothing before reuse.

5. Fire-fighting measures

Suitable extinguishing media	Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).
Unsuitable extinguishing media	Do not use water jet as an extinguisher, as this will spread the fire.
Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed such as: Carbon oxides. Nitrogen oxides.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	Move containers from fire area if you can do so without risk.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.

General fire hazards No unusual fire or explosion hazards noted.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Wear appropriate protective equipment and clothing during clean-up. Do not breathe mist/vapors. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.

Methods and materials for containment and cleaning up Prevent product from entering drains.

Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water.

Small Spills: Absorb spillage with suitable absorbent material. Clean surface thoroughly to remove residual contamination.

Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.

Environmental precautions Avoid release to the environment. Inform appropriate managerial or supervisory personnel of all environmental releases. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not breathe mist/vapors. Do not get this material in contact with eyes. Do not taste or swallow. Avoid contact with eyes, skin, and clothing. Avoid prolonged exposure. When using, do not eat, drink or smoke. Pregnant or breastfeeding women must not handle this product. Should be handled in closed systems, if possible. Provide adequate ventilation. Wear appropriate personal protective equipment. Wash hands thoroughly after handling. Avoid release to the environment. Observe good industrial hygiene practices. Persons susceptible to allergic reactions should not handle this product.

Conditions for safe storage, including any incompatibilities Store locked up. Store in tightly closed container. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Table Z-1 Permissible Exposure Limits (PEL) for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value
dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4)	PEL	0.1 mg/m3
Dipropylene glycol, monomethyl ether (CAS 34590-94-8)	PEL	600 mg/m3
		100 ppm

US. ACGIH Threshold Limit Values (TLV)

Components	Type	Value	Form
dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4)	STEL	0.2 mg/m3	
	TWA	0.1 mg/m3	
Dipropylene glycol, monomethyl ether (CAS 34590-94-8)	TWA	50 ppm	
Ethylene glycol (CAS 107-21-1)	STEL	10 mg/m3	Aerosol, inhalable.
		50 ppm	Vapor fraction
	TWA	25 ppm	Vapor fraction

NIOSH. Immediately Dangerous to Life or Health (IDLH) Values, as amended

Components	Type	Value
dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4)	IDLH	25 mg/m3
Dipropylene glycol, monomethyl ether (CAS 34590-94-8)	IDLH	1.1 %
		600 ppm

US. NIOSH: Pocket Guide to Chemical Hazards

Components	Type	Value
dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4)	TWA	0.1 mg/m3
Dipropylene glycol, monomethyl ether (CAS 34590-94-8)	STEL	900 mg/m3
		150 ppm
	TWA	600 mg/m3
		100 ppm

US. OARS. Workplace Environmental Exposure Level (WEEL) Guide

Components	Type	Value
Diethylene glycol (CAS 111-46-6)	TWA	10 mg/m3

Biological limit values No biological exposure limits noted for the ingredient(s).

Exposure guidelines

US - California OELs: Skin designation

dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4)	Can be absorbed through the skin.
Dipropylene glycol, monomethyl ether (CAS 34590-94-8)	Can be absorbed through the skin.

US - Minnesota Haz Subs: Skin designation applies

dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4)	Skin designation applies.

US - Tennessee OELs: Skin designation

dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4)	Can be absorbed through the skin.
Dipropylene glycol, monomethyl ether (CAS 34590-94-8)	Can be absorbed through the skin.

US ACGIH Threshold Limit Values: Skin designation

dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4)	Danger of cutaneous absorption

US. NIOSH: Pocket Guide to Chemical Hazards

dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4)	Can be absorbed through the skin.
Dipropylene glycol, monomethyl ether (CAS 34590-94-8)	Can be absorbed through the skin.

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Dipropylene glycol, monomethyl ether (CAS 34590-94-8)	Can be absorbed through the skin.

Appropriate engineering controls Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Eye wash facilities and emergency shower must be available when handling this product.

Individual protection measures, such as personal protective equipment

Eye/face protection Wear approved chemical safety goggles. Face shield is recommended.

Skin protection

Hand protection Wear appropriate chemical resistant gloves. Examples of preferred glove barrier materials include: Butyl rubber. Nitrile butyl rubber (NBR). Neoprene. Suitable gloves can be recommended by the glove supplier.

Skin protection	
Other	Wear appropriate chemical resistant clothing. Use of an impervious apron is recommended.
Respiratory protection	If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. Chemical respirator with organic vapor cartridge and full facepiece.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
General hygiene considerations	Observe any medical surveillance requirements. Keep away from food and drink. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants. Contaminated work clothing should not be allowed out of the workplace.

9. Physical and chemical properties

Appearance	
Physical state	Liquid.
Form	Slightly viscous liquid.
Color	Light brown.
Odor	Amine.
Odor threshold	Not available.
pH	10
Melting point/freezing point	Not determined.
Initial boiling point and boiling range	Not determined.
Flash point	> 200 °F (> 93.33 °C) Closed Cup
Evaporation rate	Not determined.
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Explosive limit - lower (%)	Not determined.
Explosive limit - upper (%)	Not determined.
Vapor pressure	Not determined.
Vapor density	Not determined.
Relative density	1.23 (77 °F (25 °C))
Solubility(ies)	
Solubility (water)	Slightly soluble.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not determined.
Decomposition temperature	Not determined.
Viscosity	569 cps (77 °F (25 °C))
Other information	
Density	10.26 lb/gal (77 °F (25 °C))
Explosive properties	Not explosive.
Oxidizing properties	Not oxidizing.

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
Conditions to avoid	Avoid temperatures exceeding the flash point. Contact with incompatible materials.
Incompatible materials	Strong oxidizing agents. Isocyanates.
Hazardous decomposition products	No hazardous decomposition products are known. In the event of fire: See Section 5.

11. Toxicological information

Information on likely routes of exposure

Inhalation	Prolonged inhalation may be harmful.
Skin contact	Causes skin irritation. May cause an allergic skin reaction.
Eye contact	Causes serious eye damage.
Ingestion	Harmful if swallowed.
Symptoms related to the physical, chemical and toxicological characteristics	Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. Skin irritation. May cause redness and pain. May cause an allergic skin reaction. Dermatitis. Rash. Edema.

Information on toxicological effects

Acute toxicity Harmful if swallowed.

Components	Species	Test Results
1,2-Benzenedicarboxylic acid, 3,4,5,6-tetrabromo-, mixed esters with diethylene glycol and propylene glycol (CAS 77098-07-8)		
Acute		
Dermal		
LD50	Rabbit	> 20000 mg/kg
Inhalation		
Vapor		
LC50	Rat	> 0.008 mg/l
Oral		
LD50	Rat	> 10000 mg/kg
Diethylene glycol (CAS 111-46-6)		
Acute		
Dermal		
LD50	Rabbit	11890 mg/kg
Dipropylene glycol, monomethyl ether (CAS 34590-94-8)		
Acute		
Dermal		
LD50	Rabbit	9.5 g/kg
Ethylene glycol (CAS 107-21-1)		
Acute		
Dermal		
LD50	Rabbit	9530 mg/kg

Skin corrosion/irritation	Causes skin irritation.
Serious eye damage/eye irritation	Causes serious eye damage.

Respiratory or skin sensitization

Respiratory sensitization	Not a respiratory sensitizer.
Skin sensitization	May cause an allergic skin reaction.
Germ cell mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Carcinogenicity	Not classifiable as to carcinogenicity to humans.

IARC Monographs. Overall Evaluation of Carcinogenicity

Not listed.

NTP Report on Carcinogens

Not listed.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

Reproductive toxicity	Suspected of damaging fertility or the unborn child.
Specific target organ toxicity - single exposure	Not classified.

Specific target organ toxicity - repeated exposure May cause damage to organs (kidney) through prolonged or repeated exposure.

Aspiration hazard Not an aspiration hazard.

Chronic effects Prolonged inhalation may be harmful. May cause damage to organs through prolonged or repeated exposure.

12. Ecological information

Ecotoxicity Harmful to aquatic life with long lasting effects.

Components		Species	Test Results
1,2-Benzenedicarboxylic acid, 3,4,5,6-tetrabromo-, mixed esters with diethylene glycol and propylene glycol (CAS 77098-07-8)			
Aquatic			
Acute			
Fish	LC50	Lepomis macrochirus	12 mg/l, 96 hours
Dipropylene glycol, monomethyl ether (CAS 34590-94-8)			
Aquatic			
Acute			
Crustacea	LC50	Daphnia magna	1919 mg/l, 48 hours
Fish	LC50	Pimephales promelas	> 10000 mg/l, 96 hours
Chronic			
Crustacea	NOAEL	Daphnia magna	0.5 mg/l, 22 days
Ethylene glycol (CAS 107-21-1)			
Aquatic			
Acute			
Crustacea	EC50	Ceriodaphnia dubia	10000 mg/l, 48 Hours
Fish	LC50	Oncorhynchus mykiss	24591 mg/l, 96 Hours
Chronic			
Crustacea	NOEC	Ceriodaphnia dubia	3469 mg/l, 7 days
Fish	NOEC	Oncorhynchus mykiss	14692 mg/l, 12 days

Persistence and degradability No data is available on the degradability of this product.

Bioaccumulative potential

Partition coefficient n-octanol / water (log Kow)	
Diethylene glycol (CAS 111-46-6)	-1.47
Ethylene glycol (CAS 107-21-1)	-1.36

Mobility in soil No data available.

Other adverse effects No data available.

13. Disposal considerations

Disposal instructions Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Do not allow this material to drain into sewers/water supplies. Do not contaminate ponds, waterways or ditches with chemical or used container. Dispose of contents/container in accordance with local/regional/national/international regulations.

Local disposal regulations Dispose in accordance with all applicable regulations.

Hazardous waste code The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Waste from residues / unused products Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner.

Contaminated packaging Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not established.

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

TSCA Chemical Action Plans, Chemicals of Concern

4-Nonylphenol branched, ethoxylated (CAS 127087-87-0)	Nonylphenol (NP) and Nonylphenol Ethoxylates (NPEs) Action Plan

CERCLA Hazardous Substance List (40 CFR 302.4)

Ethylene glycol (CAS 107-21-1)	Listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not listed.

Toxic Substances Control Act (TSCA) All components of the mixture on the TSCA 8(b) inventory are designated “active”.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical Yes

Classified hazard categories
Acute toxicity (any route of exposure)
Skin corrosion or irritation
Serious eye damage or eye irritation
Respiratory or skin sensitization
Reproductive toxicity
Specific target organ toxicity (single or repeated exposure)

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
4-Nonylphenol branched, ethoxylated	127087-87-0	1 - 5
Ethylene glycol	107-21-1	1 - 5

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Ethylene glycol (CAS 107-21-1)

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Contains component(s) regulated under the Safe Drinking Water Act.

US state regulations

US. Massachusetts RTK - Substance List

Dipropylene glycol, monomethyl ether (CAS 34590-94-8)
Ethylene glycol (CAS 107-21-1)

US. New Jersey Worker and Community Right-to-Know Act

4-Nonylphenol branched, ethoxylated (CAS 127087-87-0)
Dipropylene glycol, monomethyl ether (CAS 34590-94-8)
Ethylene glycol (CAS 107-21-1)

US. Pennsylvania Worker and Community Right-to-Know Law

Diethylene glycol (CAS 111-46-6)
Dipropylene glycol, monomethyl ether (CAS 34590-94-8)
Ethylene glycol (CAS 107-21-1)

US. Rhode Island RTK

Diethylene glycol (CAS 111-46-6)
dimethyltin bis(ethylhexyl mercaptoacetate) (CAS 57583-35-4)
Dipropylene glycol, monomethyl ether (CAS 34590-94-8)
Ethylene glycol (CAS 107-21-1)

California Proposition 65

WARNING: This product can expose you to chemicals including Ethylene Oxide and 1,4-Dioxane, which are known to the State of California to cause cancer, and Ethylene Oxide and Ethylene glycol, which are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

California Proposition 65 - CRT: Listed date/Carcinogenic substance

1,4-Dioxane (CAS 123-91-1)	Listed: January 1, 1988
Ethylene Oxide (CAS 75-21-8)	Listed: July 1, 1987

California Proposition 65 - CRT: Listed date/Developmental toxin

Ethylene glycol (CAS 107-21-1)	Listed: June 19, 2015
Ethylene Oxide (CAS 75-21-8)	Listed: August 7, 2009

California Proposition 65 - CRT: Listed date/Female reproductive toxin

Ethylene Oxide (CAS 75-21-8)	Listed: February 27, 1987

California Proposition 65 - CRT: Listed date/Male reproductive toxin

Ethylene Oxide (CAS 75-21-8)	Listed: August 7, 2009

US. California. Candidate Chemicals List. Safer Consumer Products Regulations (Cal. Code Regs, tit. 22, 69502.3, subd. (a))

4-Nonylphenol branched, ethoxylated (CAS 127087-87-0)
Ethylene glycol (CAS 107-21-1)
Tris(2-chloro-1-methylethyl) Phosphate (CAS 13674-84-5)

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Industrial Chemicals (AICIS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
Taiwan	Taiwan Chemical Substance Inventory (TCSI)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date	07-December-2023
Revision date	08-December-2023
Version #	02
HMIS® ratings	Health: 3* Flammability: 0 Physical hazard: 0
Disclaimer	Holcim Solutions and Products US, LLC cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.

SECTION 6

- CSI MASTER SPECIFICATIONS

EASYSEAL® .5
OPEN CELL SPRAY FOAM

SUCRASEAL®
OPEN CELL SPRAY FOAM

NEXSEAL®
CLOSED CELL SPRAY FOAM

NEXSEAL LE®
CLOSED CELL SPRAY FOAM

ONEPASS® HFO
CLOSED CELL SPRAY FOAM

ENVERGE | EASYSEAL .5® OPEN CELL SPRAY FOAM

COMMERCIAL CONSTRUCTION GUIDE SPECIFICATION (CSI)

This construction specification utilizes Construction Specifiers Institute (CSI) format. The specification is specific to **Enverge EasySeal .5®** spray polyurethane foam insulation product specifications and is designed to be used by professionals as a guide specification. This specification should be adopted for each project.

USGBC Leadership in Energy and Environmental Design (LEED) Point Contributions:

New Construction	Homes	Schools
EA Credit 1: Optimize Energy Performance	EA Credit 1.1: Performance of ENERGY STAR Homes (or EA 2-10 Pathway)	EA Credit Prerequisite 2: Minimum Energy Performance
MR Credit 2: Construction Waste Management	EA Credit 2.1: Basic Insulation	EA Credit 1: Optimize Energy Performance
MR Credit 5: Regional Materials	EA Credit 3: Air Infiltration	MR Credit 5: Regional Materials
IEQ Credit 7.1: Thermal Comfort	EA Credits 5.1 & 5.2: Heating & Cooling distribution system	IEQ Credit 4: Low Emitting Materials
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	EQ Credit 1: ENERGYSTAR with Indoor Air Package Pathway	IEQ Credit 10: Mold Prevention
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SECTION 07 21 29
SPRAYED INSULATION

PART 1 – GENERAL

1.0 SCOPE OF WORK

Furnish all labor, materials, tools and equipment necessary for the application of a spray polyurethane team building envelope insulation system, including accessory items, subject to the general provisions of the contract.

1.1 SUMMARY

This guide discusses the application of seamless sprayed in place polyurethane foam for use as a building envelope insulation system.

1.2 RELATED DOCUMENTS

A. Rough Carpentry Section 06100
B. Insulation, Other Section 07200
C. Thermal Barrier Section 07220
D. Vapor Retarder Section 06100
E. Mechanical Division 15
F. Electrical Division 16

1.3 REFERENCES

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D. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
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G. ASTM G 21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi
H. ASTM D 6866 - Standard Test Methods for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis
I. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components
J. NFPA 259 - Standard Test Method for Potential Heat of Building Materials
K. UL 263 (ASTM E119) - Standard for Fire Tests of Building Construction and Materials
L. California's Environmental Specification 01350 for Building Materials
M. International Code Council Acceptance Criteria for Spray Foam Insulation, AC 377
N. International Residential Code
O. International Building Code
P. International Energy Conservation Code
Q. International Green Building Code
R. American Society of Heating, Refrigerating and Air-Conditioning Engineers Handbook
S. USGBC Leadership in Energy and Environmental Design

1.4 SUBMITTALS

A. Manufacturers to provide published data sheets or letter of certification that their products comply with this specification
B. Shop drawings, if required
C. Manufacturer's application or installation instructions
D. Contractor/applicator certification from spray polyurethane foam supplier or Spray Polyurethane Foam Alliance
E. International Code Council Evaluation Services Report
F. International Code Council Evaluation Services Verified Attribute Report
G. US EPA Seal and Insulate Report
H. NAHB Green Certificate
I. VOC Certificate
J. Materials Safety Data Sheets (MSDS)
K. Field Quality Control Procedures to be utilized by the contractor/applicator to insure proper preparation

1.5 QUALITY ASSURANCE

Contractor Qualifications: The contractor should provide information concerning projects similar in nature to the one proposed, including location and person to be contacted. Some manufacturers of sprayed polyurethane foam systems have approval programs and/or licensing methods that could be required.

1.6 DELIVERY, STORAGE AND HANDLING

A. For optimal shelf life store materials between 50 to 90°F and 50% relative humidity
B. Store materials above 65°F for 48 hours before use.
C. Do not store in direct sunlight and out of inclement weather.
D. Keep containers tightly closed, under dry air or nitrogen blanket, when not in use.

1.6 PROJECT CONDITIONS

A. Substrates must be clean, dry and free of debris, oil, grease or other contaminants that could interfere with adhesion.
B. For best results apply spray polyurethane foam insulation when ambient conditions are above 40°F and relative humidity less than 80%. For conditions with low temperature or high humidity, special job preparation measures should be implemented. These measures include warming the environment, drying the substrates and/or removing humidity, for example by air movement.
C. Substrate moisture content should be verified before application of spray polyurethane foam insulation.

1.7 SEQUENCING

A. Install insulation after rough plumbing and electrical completed and inspected and other wall penetrations completed.
B. Install insulation after sealant foams/caulks around penetrations in walls/ceilings are in place.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. **Enverge®**
B. Substitutions – Not permitted

2.2 MATERIALS

A. **Enverge EasySeal .5®** spray polyurethane foam insulation
B. Nominal core density: 0.5 lbs/ft^3, ASTM D 1622
C. Open cell content: > 90%, ASTM D 6226
D. Moisture vapor transmission: Report value, ASTM E 96
E. Surface Burning Characteristics: Maximum flame spread/smoke developed rating of 5/450, ASTM E 84
F. R-value: Average R-value of 3.7 per inch, ASTM C 518 at 75°F mean temperature.
G. Air leakage: < 0.02 L/s-m^2, ASTM E 283
H. Rapidly renewable content: ≥ 17% in cured foam, ASTM D 6866
I. Fungi Resistance: Zero rating, ASTM G 21
J. Dimensional Stability (200°F dry): < 5% volume change, ASTM D 2126
K. Dimensional Stability (-40°F): < 5% volume change, ASTM D 2126
L. Dimensional Stability (158F & 100% RH): < 5% volume change, ASTM D 2126
M. Resistance to Ignition: Pass without intumescent coating, ICC ES AC 377, Appendix X
N. Standard Heat Potential of Building Materials: BTU/lb, NFPA 259
O. Standard of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components: Compliance, NFPA 285
P. Fire resistance rating: Pass walls (U305) and ceilings (P522), UL263/ASTM E119
Q. Volatile Organic Compounds: Pass Office, Single family residence & Classroom Requirements, California Section 01350

2.3 ACCESSORIES

A. Sealant Foam: CF 124 Filler Foam by Hilti or equivalent.
B. Joint Sealer: Single component polyurethane type; Sikaflex 1a by Sika Corp. or equivalent.

PART 3 – EXECUTION

3.1 PREPARATION

A. Clean surfaces to receive insulation; remove dirt, dust, and debris by blowing with compressed air or vacuuming.
B. Protect adjacent and underlying surfaces from accidental application using plastic sheeting and masking tape.
C. Apply filler foam or joint sealer around door and window frames, openings, and perimeter to contain insulation.
D. Cover gaps greater than 2 inches with seam tape or gypsum backer board, then spray insulation over opening.
E. Protect heat emitting fixtures/penetrations with gypsum board or mineral fiber insulation, see spray foam manufacturers' recommendations.

3.2 APPLICATION

A. The spray polyurethane foam components (A) and (B) shall be processed in accordance with the manufacturers' installation instructions.
B. The polyurethane foam shall be sprayed within the manufacturer's guidelines for temperature, humidity, and other atmospheric conditions.
C. The polyurethane foam shall be sprayed in minimum 1/2 inch thick passes (lifts) with the overall thickness to be a nominal [___] inches in walls, [___] inches in ceilings/roofs [___] inches in subfloors/crawlspaces.

3.3 SUBSTRATE PREPARATION CONSIDERATIONS

A. WOOD:
1. Plywood shall contain no more than 18% water, as measured in accordance with ASTM D-4449 and 4444-84.
2. Most untreated and unpainted wood surfaces need not be primed. The spray polyurethane foam can be applied directly to the dry wood. Priming may be required in certain instances. See the spray polyurethane foam manufacturer for specific details.
B. STEEL:
1. Primed: If the primed metal surface is free of loose scale, rust, weathered or chalking paint. It can be cleaned using vacuum equipment and hand or power tools to remove loose dirt. Grease, oil, or other contaminants shall be removed with proper cleaning solutions.
2. Previously Painted: Clean the painted metal surface using hand or power tools to remove loose scale and dirt. Grease, oil, and other surface contaminants can be cleaned using a power wash technique.
3. Galvanized: When required, clean galvanized steel as recommended by the primer manufacturer.
4. Unpainted Steel: Clean as recommended by primer manufacturer in order to prepare the steel surface for the primer.
C. CONCRETE AND MASONRY: Must be cured, and loose dirt and any other contaminants removed.
D. SHEATHING BOARD: Most sheathing boards need not be primed prior to the application of sprayed-in-place polyurethane foam.

3.4 PRIMERS

When required, the primer shall be applied to the properly prepared substrate in accordance with the manufacturer's guidelines so as to achieve a minimum thickness of dry mils. Many primers require a curing time of 24 hours prior to application of spray polyurethane foam or other products.

3.5 VAPOR RETARDERS

A. When required, a vapor retarder shall be applied to the substrate to be insulated or to the finished spray polyurethane foam insulation. The predominant direction of the vapor drive determines the location of the vapor retarder relative to the spray polyurethane foam.
B. The vapor retarder shall be applied in accordance with manufacturer's specifications so as to achieve the desired perm rating per ASTM E-96, Method E.

3.5 THERMAL BARRIERS

A. The spray polyurethane foam must be separated from the interior (occupied) space by a 15-minute rated thermal barrier. The thermal barrier must be applied in accordance with manufacturer guidelines.
B. Exception to the thermal barrier requirement is allowed when testing in compliance with interior finish (NFPA 286) is demonstrated.
C. Exception to the thermal barrier requirement is allowed in attics/crawlspaces where entrance is allowed only for the services of utilities and the spray polyurethane foam insulation is covered by a prescribed barrier to ignition. Ignition barriers are prescribed in IRC and IBC R314 and Chapter 26, respectively.

3.6 IGNITION BARRIERS

A. The prescribed ignition barrier in attics and crawlspaces may be omitted when the spray foam has conducted end use configuration testing and analysis per IBC Section 2603.96 and IRC Section R316.6, to qualify without a prescriptive ignition barrier or intumescent coating in unvented attics conforming with IBC Section 1202.37 or IRC Section R806.5. Restrictions in this application apply, consult local building codes.

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COMMERCIAL CONSTRUCTION GUIDE SPECIFICATION (CSI)

This construction specification utilizes Construction Specifiers Institute (CSI) format. The specification is specific to **Enverge SucraSeal®** spray polyurethane foam insulation product specifications and is designed to be used by professionals as a guide specification. This specification should be adopted for each project.

USGBC Leadership in Energy and Environmental Design (LEED) Point Contributions:

New Construction	Homes	Schools
EA Credit 1: Optimize Energy Performance	EA Credit 1.1: Performance of ENERGY STAR Homes (or EA 2-10 Pathway)	EA Credit Prerequisite 2: Minimum Energy Performance
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SECTION 07 21 29
SPRAYED INSULATION

PART 1 – GENERAL

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PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. **Enverge®**
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ENVERGE | NEXSEAL® CLOSED CELL SPRAY FOAM

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SECTION 07 21 29
SPRAYED INSULATION

PART 1 – GENERAL

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D. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
E. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials.
F. ASTM E 2178 - Standard Test Method for Air Permeance of Building Materials
G. ASTM E 2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
H. ASTM C 1305 - Standard Test Method for Crack Bridging Ability of Liquid-Applied Waterproofing Membrane.
I. ASTM D 4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
J. ASTM C 1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings
K. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components
L. NFPA 259 - Standard Test Method for Potential Heat of Building Materials
M. ANSI/UL 263 (ASTM E119) - Standard for Fire Tests of Building Construction and Materials
N. California Department of Public Health Standard Method V1.1
O. International Code Council Acceptance Criteria for Spray Foam Insulation, AC 377
P. International Residential Code
Q. International Building Code
R. International Energy Conservation Code
S. International Green Building Code

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D. Contractor/applicator certification from spray polyurethane foam supplier or Spray Polyurethane Foam Alliance
E. International Association of Plumbing and Mechanical Officials (IAPMO) Evaluation Services Report
F. VOC Certificate
G. Safety Data Sheets (SDS)
H. Field Quality Control Procedures to be utilized by the contractor/applicator to insure proper preparation

1.5 QUALITY ASSURANCE

Contractor Qualifications: The contractor should provide information concerning projects similar in nature to the one proposed, including location and person to be contacted. Some manufacturers of sprayed polyurethane foam systems have approval programs and/or licensing methods that could be required.

1.6 DELIVERY, STORAGE AND HANDLING

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B. Store materials above 65°F for 48 hours before use.
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D. Keep containers tightly closed, under dry air or nitrogen blanket, when not in use.

1.6 PROJECT CONDITIONS

A. Substrates must be clean, dry and free of debris, oil, grease or other contaminants that could interfere with adhesion.
B. For best results apply spray polyurethane foam insulation when ambient conditions are above 40°F and relative humidity less than 80%. For conditions with low temperature or high humidity, special job preparation measures should be implemented. These measures include warming the environment, drying the substrates and/or removing humidity, for example by air movement.
C. Substrate moisture content should be verified before application of spray polyurethane foam insulation.

1.7 SEQUENCING

A. Install insulation after rough plumbing and electrical completed and inspected and other wall penetrations completed.
B. Install insulation after sealant foams/caulks around penetrations in walls/ceilings are in place.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. **Envirge®**
B. Substitutions – Not permitted

2.2 MATERIALS

A. **Envirge NexSeal®** spray polyurethane foam insulation
B. Nominal core density: 2 lbs/ft^3, ASTM D 1622
C. Closed cell content: >90%, ASTM D 6226
D. Moisture vapor transmission: < 2 perm-inches, ASTM E 96
E. Surface Burning Characteristics: Maximum flame spread/smoke developed rating of 25 / 450, respectively, ASTM E 84
F. R-value: Average R-value of 7.2 per inch, ASTM C 518 at 75°F mean temperature.
G. Air leakage: < 0.02 L/s-m^2, ASTM E 2178
H. Air assembly leakage: <0.002 L/s-m^2, ASTM E 2357
I. Crack Bridging: Pass, No cracking, splitting, pinholes or any other condition in the area of the joint, ASTM C 1305
J. Pull-Off Strength: Concrete > 16 psi, Gypsum Board > 16 psi or facer failure, CMU > 16 psi, ASTM D 4541
K. Fungi Resistance: Pass, ASTM C 1338
L. One-hour fire resistance rated wall: UL Design U305, ASNI/UL 263
M. Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components: Pass, NFPA 285
N. Dimensional Stability (200°F dry): < 15% volume change, ASTM D 2126
O. Dimensional Stability (-40°F): < 15% volume change, ASTM D 2126
P. Dimensional Stability (158F & 100% RH): < 15% volume change, ASTM D 2126
Q. Resistance to Ignition: Pass without intumescent coating, ICC ES AC 377, Appendix X
R. Standard Heat Potential of Building Materials: 2006 Btu / ft^2 per inch of thickness, NFPA 259
S. Standard of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components: Compliance, NFPA 285
T. Volatile Organic Compounds: Pass Office, Classroom and Home Requirements, California Department of Public Health Standard Method V1.1

2.3 ACCESSORIES

A. Sealant Foam: CF 124 Filler Foam by Hilti or equivalent.
B. Joint Sealer: Single component polyurethane type; Sikaflex 1a by Sika Corp. or equivalent.

PART 3 – EXECUTION

3.1 PREPARATION

A. Clean surfaces to receive insulation; remove dirt, dust, and debris by blowing with compressed air or vacuuming.
B. Protect adjacent and underlying surfaces from accidental application using plastic sheeting and masking tape.
C. Apply filler foam or joint sealer around door and window frames, openings, and perimeter to contain insulation.

D. Cover gaps greater than 2 inches with seam tape or gypsum backer board, then spray insulation over opening.
E. Protect heat emitting fixtures/penetrations with gypsum board or mineral fiber insulation, see spray foam manufacturers' recommendations.

3.2 APPLICATION

A. The spray polyurethane foam components (A) and (B) shall be processed in accordance with the manufacturers' installation instructions.
B. The polyurethane foam shall be sprayed within the manufacturer's guidelines for temperature, humidity, and other atmospheric conditions.
C. The polyurethane foam shall be sprayed in minimum 1/2 inch thick passes (lifts) with the overall thickness to be a nominal [___] inches in walls, [___] inches in ceilings/roofs [___] inches in subfloors/crawlspaces.

3.3 SUBSTRATE PREPARATION CONSIDERATIONS

A. WOOD:
1. Plywood shall contain no more than 18% water, as measured in accordance with ASTM D-4449 and 4444-84.
2. Most untreated and unpainted wood surfaces need not be primed. The spray polyurethane foam can be applied directly to the dry wood. Priming may be required in certain instances. See the spray polyurethane foam manufacturer for specific details.
B. STEEL:
1. Primed: If the primed metal surface is free of loose scale, rust, weathered or chalking paint. It can be cleaned using vacuum equipment and hand or power tools to remove loose dirt. Grease, oil, or other contaminants shall be removed with proper cleaning solutions.
2. Previously Painted: Clean the painted metal surface using hand or power tools to remove loose scale and dirt. Grease, oil, and other surface contaminants can be cleaned using a power wash technique.
3. Galvanized: When required, clean galvanized steel as recommended by the primer manufacturer.
4. Unpainted Steel: Clean as recommended by primer manufacturer in order to prepare the steel surface for the primer.
C. CONCRETE AND MASONRY: Must be cured, and loose dirt and any other contaminants removed.
D. SHEATHING BOARD: Most sheathing boards need not be primed prior to the application of sprayed-in-place polyurethane foam.

3.4 PRIMERS

When required, the primer shall be applied to the properly prepared substrate in accordance with the manufacturer's guidelines so as to achieve a minimum thickness of dry mils. Many primers require a curing time of 24 hours prior to application of spray polyurethane foam or other products, see manufacturers recommendations.

3.5 VAPOR RETARDERS

A. When required, a vapor retarder shall be applied to the substrate to be insulated or to the finished spray polyurethane foam insulation. The predominant direction of the vapor drive determines the location of the vapor retarder relative to the spray polyurethane foam.

B. The vapor retarder shall be applied in accordance with manufacturer's specifications so as to achieve the desired perm rating per ASTM E-96, Method E.

3.5 THERMAL BARRIERS

A. The spray polyurethane foam must be separated from the interior (occupied) space by a 15-minute rated thermal barrier. The thermal barrier must be applied in accordance with manufacturer guidelines.
B. Exception to the thermal barrier requirement is allowed when testing in compliance with interior finish (NFPA 286) is demonstrated.
C. Exception to the thermal barrier requirement is allowed in attics/crawlspaces where entrance is allowed only for the services of utilities and the spray polyurethane foam insulation is covered by a prescribed barrier to ignition. Ignition barriers are prescribed in IRC and IBC R314 and Chapter 26, respectively.

3.6 IGNITION BARRIERS

A. The prescribed ignition barrier in attics and crawlspaces may be omitted when the spray foam has conducted end use configuration testing and analysis per IBC Section 2603.96 and IRC Section R316.6, to qualify without a prescriptive ignition barrier or intumescent coating in unvented attics conforming with IBC Section 1202.37 or IRC Section R806.5. Restrictions in this application apply, consult local building codes.

ENVERGE | ONEPASS® HFO CLOSED CELL SPRAY FOAM

COMMERCIAL CONSTRUCTION GUIDE SPECIFICATION (CSI)

This construction specification utilizes Construction Specifiers Institute (CSI) format. The specification is specific to **Enverge OnePass®** spray polyurethane foam insulation product specifications and is designed to be used by professionals as a guide specification. This specification should be adopted for each project.

USGBC Leadership in Energy and Environmental Design (LEED) Point Contributions:

New Construction	Homes	Schools
EA Credit 1: Optimize Energy Performance	EA Credit 1.1: Performance of ENERGY STAR Homes (or EA 2-10 Pathway)	EA Credit Prerequisite 2: Minimum Energy Performance
MR Credit 2: Construction Waste Management	EA Credit 2.1: Basic Insulation	EA Credit 1: Optimize Energy Performance
MR Credit 5: Regional Materials	EA Credit 3: Air Infiltration	MR Credit 5: Regional Materials
IEQ Credit 7.1: Thermal Comfort	EA Credits 5.1 & 5.2: Heating & Cooling distribution system	IEQ Credit 4: Low Emitting Materials
ID Credit 1: Innovation in Design	MR Credit 2.2: Environmentally Preferable Products	IEQ Credit 7.1: Thermal Comfort – Design
	MR Credit 3.2: Construction Waste Reduction	IEQ Credit 9: Enhanced Acoustical Performance
	EQ Credit 1: ENERGYSTAR with Indoor Air Package Pathway	IEQ Credit 10: Mold Prevention
	EQ Credit 10: Garage Pollutant Protection	ID Credit 1: Innovation in Design

ENVERGE® | ONEPASS® HFO CLOSED CELL SPRAY FOAM

Enverge®
26 Century Blvd Suite 205
Nashville, TN 37214

Tel: 713-239-0252
Fax: 281-767-5013

EnvergeSprayFoam.com

SECTION 07 21 29
SPRAYED INSULATION

PART 1 – GENERAL

1.0 SCOPE OF WORK

Furnish all labor, materials, tools and equipment necessary for the application of a spray polyurethane team building envelope insulation system, including accessory items, subject to the general provisions of the contract.

1.1 SUMMARY

This guide discusses the application of seamless sprayed in place polyurethane foam for use as a building envelope insulation system.

1.2 RELATED DOCUMENTS

A. Unit Masonry Division 6 Section 042000
B. Metal Decking Division 5 Section 053100
C. Rough Carpentry Division 6 Section 061000
D. Thermal Insulation, Other Division 7 Section 072100
E. Foamed-In-Place Division 7 Section 072119
F. Waterproofing Division 7 Section 071400
G. Weather Barriers Division 7 Section 072500
H. Fireproofing Division 7 Section 078100
I. Metal Support System Division 9 Section 09110
J. Gypsum Board Division 9 Section 09250

1.3 REFERENCES

A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials. (Also known as, NFPA 255, and UL 723)
C. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
D. ASTM E283 - Standard Test Method for Determining Rate of Air Leakage Through
E. Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
F. ASTM D1621 - Standard Test Method for Compressive Properties Of Rigid Cellular Plastics.
G. ASTM D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics.
H. ASTM D2126 - Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging
I. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials
J. ASTM E2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
K. NFPA 259 - Standard Test Method for Potential Heat of Building Materials
L. NFPA 285 - STANDARD FIRE TEST METHOD FOR EVALUATION OF FIRE PROPAGATION CHARACTERISTICS OF EXTERIOR NON-LOAD-BEARING WALL ASSEMBLIES CONTAINING COMBUSTIBLE COMPONENTS
M. NFPA 286 - Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Wall and Ceiling Interior Finish.

T. American Society of Heating, Refrigerating and Air-Conditioning Engineers Handbook
U. USGBC Leadership in Energy and Environmental Design (LEED)

1.4 SUBMITTALS

A. Manufacturers to provide published data sheets or letter of certification that their products comply with this specification
B. Shop drawings, if required
C. Manufacturer's application or installation instructions
D. Contractor/applicator certification from spray polyurethane foam supplier or Spray Polyurethane Foam Alliance
E. International Association of Plumbing and Mechanical Officials (IAPMO) Evaluation Services Report
F. VOC Certificate
G. Safety Data Sheets (SDS)
H. Field Quality Control Procedures to be utilized by the contractor/applicator to insure proper preparation

1.5 QUALITY ASSURANCE

Contractor Qualifications: The contractor should provide information concerning projects similar in nature to the one proposed, including location and person to be contacted. Some manufacturers of sprayed polyurethane foam systems have approval programs and/or licensing methods that could be required.

1.6 DELIVERY, STORAGE AND HANDLING

A. For optimal shelf life store materials between 50 to 90°F and 50% relative humidity
B. Store materials above 65°F for 48 hours before use.
C. Do not store in direct sunlight and out of inclement weather.
D. Keep containers tightly closed, under dry air or nitrogen blanket, when not in use.

1.6 PROJECT CONDITIONS

A. Substrates must be clean, dry and free of debris, oil, grease or other contaminants that could interfere with adhesion.
B. For best results apply spray polyurethane foam insulation when ambient conditions are above 40°F and relative humidity less than 80%. For conditions with low temperature or high humidity, special job preparation measures should be implemented. These measures include warming the environment, drying the substrates and/or removing humidity, for example by air movement.
C. Substrate moisture content should be verified before application of spray polyurethane foam insulation.

1.7 SEQUENCING

A. Install insulation after rough plumbing and electrical completed and inspected and other wall penetrations completed.
B. Install insulation after sealant foams/caulks around penetrations in walls/ceilings are in place.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. **Enverge®**
B. Substitutions – Not permitted

2.2 MATERIALS

A. **Enverge OnePass®** spray polyurethane foam insulation
B. Nominal core density: 2**.1** lbs/ft^3, ASTM D 1622
C. Closed cell content: >90%, ASTM D 6226
D. Moisture vapor transmission: .44%, ASTM E 96
E. Surface Burning Characteristics: Maximum flame spread/smoke developed rating of 25 / 450, respectively, ASTM E 84
F. R-value: Average R-value of 7.2 per inch, ASTM C 518 at 75°F mean temperature.
G. Air leakage: < 0.02 L/s-m^2, ASTM E 2178
H. Air assembly leakage: <0.002 L/s-m^2, ASTM E 2357
I. Crack Bridging: Pass, No cracking, splitting, pinholes or any other condition in the area of the joint, ASTM C 1305
J. Pull-Off Strength: Concrete > 16 psi, Gypsum Board > 16 psi or facer failure, CMU > 16 psi, ASTM D 4541
K. Fungi Resistance: Pass, ASTM C 1338
L. One-hour fire resistance rated wall: UL Design U305, ASNI/UL 263
M. Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components: Pass, NFPA 285
N. Dimensional Stability (200°F dry): < 15% volume change, ASTM D 2126
O. Dimensional Stability (-40°F): < 15% volume change, ASTM D 2126
P. Dimensional Stability (158F & 100% RH): < 10% volume change, ASTM D 2126
Q. Resistance to Ignition: Pass without intumescent coating, ICC ES AC 377, Appendix X
R. Standard Heat Potential of Building Materials: 2006 Btu / ft^2 per inch of thickness, NFPA 259
S. Standard of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components: Compliance, NFPA 285
T. Volatile Organic Compounds: Pass Office, Classroom and Home Requirements, California Department of Public Health Standard Method V1.1

2.3 ACCESSORIES

A. Sealant Foam: CF 124 Filler Foam by Hilti or equivalent.
B. Joint Sealer: Single component polyurethane type; Sikaflex 1a by Sika Corp. or equivalent.

PART 3 – EXECUTION

3.1 PREPARATION

A. Clean surfaces to receive insulation; remove dirt, dust, and debris by blowing with compressed air or vacuuming.
B. Protect adjacent and underlying surfaces from accidental application using plastic sheeting and masking tape.
C. Apply filler foam or joint sealer around door and window frames, openings, and perimeter to contain insulation.

D. Cover gaps greater than 2 inches with seam tape or gypsum backer board, then spray insulation over opening.
E. Protect heat emitting fixtures/penetrations with gypsum board or mineral fiber insulation, see spray foam manufacturers' recommendations.

3.2 APPLICATION

A. The spray polyurethane foam components (A) and (B) shall be processed in accordance with the manufacturers' installation instructions.
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C. The polyurethane foam shall be sprayed in minimum 1/2 inch thick passes (lifts) with the overall thickness to be a nominal [___] inches in walls, [___] inches in ceilings/roofs [___] inches in subfloors/crawlspaces.

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2. Previously Painted: Clean the painted metal surface using hand or power tools to remove loose scale and dirt. Grease, oil, and other surface contaminants can be cleaned using a power wash technique.
3. Galvanized: When required, clean galvanized steel as recommended by the primer manufacturer.
4. Unpainted Steel: Clean as recommended by primer manufacturer in order to prepare the steel surface for the primer.
C. CONCRETE AND MASONRY: Must be cured, and loose dirt and any other contaminants removed.
D. SHEATHING BOARD: Most sheathing boards need not be primed prior to the application of sprayed-in-place polyurethane foam.

3.4 PRIMERS

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3.5 VAPOR RETARDERS

A. When required, a vapor retarder shall be applied to the substrate to be insulated or to the finished spray polyurethane foam insulation. The predominant direction of the vapor drive determines the location of the vapor retarder relative to the spray polyurethane foam.

B. The vapor retarder shall be applied in accordance with manufacturer's specifications so as to achieve the desired perm rating per ASTM E-96, Method E.

3.5 THERMAL BARRIERS

A. The spray polyurethane foam must be separated from the interior (occupied) space by a 15-minute rated thermal barrier. The thermal barrier must be applied in accordance with manufacturer guidelines.
B. Exception to the thermal barrier requirement is allowed when testing in compliance with interior finish (NFPA 286) is demonstrated.
C. Exception to the thermal barrier requirement is allowed in attics/crawlspaces where entrance is allowed only for the services of utilities and the spray polyurethane foam insulation is covered by a prescribed barrier to ignition. Ignition barriers are prescribed in IRC and IBC R314 and Chapter 26, respectively.

3.6 IGNITION BARRIERS

A. The prescribed ignition barrier in attics and crawlspaces may be omitted when the spray foam has conducted end use configuration testing and analysis per IBC Section 2603.96 and IRC Section R316.6, to qualify without a prescriptive ignition barrier or intumescent coating in unvented attics conforming with IBC Section 1202.37 or IRC Section R806.5. Restrictions in this application apply, consult local building codes.

SECTION 7

- ENVIRONMENTAL CERTIFICATIONS

CERTIFICATE
OF COMPLIANCE

GREENGUARD

PRODUCT CERTIFIED FOR
LOW CHEMICAL EMISSIONS
UL.COM/GG
UL 2818

GOLD

Enverge®

Nexseal®

334955-420
Certificate Number

10 Jul 2024 - 12 Apr 2025
Certificate Period

Certified
Status

UL 2818 - 2022 Gold Standard for Chemical Emissions for Building Materials, Finishes and Furnishings

Building products and interior finishes are determined compliant in accordance with California Department of Public Health (CDPH) Standard Method V1.2-2017 using an Office and Classroom Environment.

Product tested in accordance with UL 2821 test method to show compliance to emission limits on UL 2818. Section 7.1 and 7.2.

GREENGUARD Gold Certification Criteria for Building Products and Interior Finishes

Criteria	CAS Number	Maximum Allowable Predicted Concentration	Units
TVOC (A)	-	0.22	mg/m³
Formaldehyde	50-00-0	9 (7.3 ppb)	µg/m³
Total Aldehydes (B)	-	0.043	ppm
4-Phenylcyclohexene	4994-16-5	6.5	µg/m³
Particle Matter less than 10 µm (C)	-	20	µg/m³
1-Methyl-2-pyrrolidinone (D)	872-50-4	160	µg/m³
Individual VOCs (E)	-	1/2 CREL or 1/100th TLV	-

(A) Defined to be the total response of measured VOCs falling within the C_6 – C_{16} range, with responses calibrated to a toluene surrogate. Maximum allowable predicted TVOC concentrations for GREENGUARD Gold (0.22 mg/m³) fall in the range of 0.5 mg/m³ or less, as specified in CDPH Standard Method v1.2.

(B) The sum of all measured normal aldehydes from formaldehyde through nonanal, plus benzaldehyde, individually calibrated to a compound specific standard. Heptanal through nonanal are measured via TD/GC/MS analysis and the remaining aldehydes are measured using HPLC/UV analysis.

(C) Particle emission requirement only applicable to HVAC Duct Products with exposed surface area in air streams (a forced air test with specific test method) and for wood finishing (sanding) systems.

(D) Based on the CA Prop 65 Maximum Allowable Dose Level for inhalation of 3,200 µg/day and an inhalation rate of 20 m³/day

(E) Allowable levels for chemicals not listed are derived from the lower of 1/2 the California Office of Environmental Health Hazard Assessment (OEHHA) Chronic Reference Exposure Level (CREL) as required per the CDPH/EHLB/Standard Method v1.2 and BIFMA level credit 7.6.2 and 1/100th of the Threshold Limit Value (TLV) industrial work place standard (Reference: American Conference of Government Industrial Hygienists, 6500 Glenway, Building D-7, and Cincinnati, OH 45211-4438).

CERTIFICATE
OF COMPLIANCE

GREENGUARD

PRODUCT CERTIFIED FOR
LOW CHEMICAL EMISSIONS
UL.COM/GG
UL 2818

GOLD

Enverge®

Nexseal LE®

334956-420
Certificate Number

10 Jul 2024 - 12 Apr 2025
Certificate Period

Certified
Status

UL 2818 - 2022 Gold Standard for Chemical Emissions for Building Materials, Finishes and Furnishings

Building products and interior finishes are determined compliant in accordance with California Department of Public Health (CDPH) Standard Method V1.2-2017 using an Office and Classroom Environment.

Product tested in accordance with UL 2821 test method to show compliance to emission limits on UL 2818. Section 7.1 and 7.2.

GREENGUARD Gold Certification Criteria for Building Products and Interior Finishes

Criteria	CAS Number	Maximum Allowable Predicted Concentration	Units
TVOC (A)	-	0.22	mg/m³
Formaldehyde	50-00-0	9 (7.3 ppb)	µg/m³
Total Aldehydes (B)	-	0.043	ppm
4-Phenylcyclohexene	4994-16-5	6.5	µg/m³
Particle Matter less than 10 µm (C)	-	20	µg/m³
1-Methyl-2-pyrrolidinone (D)	872-50-4	160	µg/m³
Individual VOCs (E)	-	1/2 CREL or 1/100th TLV	-

(A) Defined to be the total response of measured VOCs falling within the C_6 – C_{16} range, with responses calibrated to a toluene surrogate. Maximum allowable predicted TVOC concentrations for GREENGUARD Gold (0.22 mg/m³) fall in the range of 0.5 mg/m³ or less, as specified in CDPH Standard Method v1.2.

(B) The sum of all measured normal aldehydes from formaldehyde through nonanal, plus benzaldehyde, individually calibrated to a compound specific standard. Heptanal through nonanal are measured via TD/GC/MS analysis and the remaining aldehydes are measured using HPLC/UV analysis.

(C) Particle emission requirement only applicable to HVAC Duct Products with exposed surface area in air streams (a forced air test with specific test method) and for wood finishing (sanding) systems.

(D) Based on the CA Prop 65 Maximum Allowable Dose Level for inhalation of 3,200 µg/day and an inhalation rate of 20 m³/day

(E) Allowable levels for chemicals not listed are derived from the lower of 1/2 the California Office of Environmental Health Hazard Assessment (OEHHA) Chronic Reference Exposure Level (CREL) as required per the CDPH/EHLB/Standard Method v1.2 and BIFMA level credit 7.6.2 and 1/100th of the Threshold Limit Value (TLV) industrial work place standard (Reference: American Conference of Government Industrial Hygienists, 6500 Glenway, Building D-7, and Cincinnati, OH 45211-4438).

CERTIFICATE
OF COMPLIANCE

GREENGUARD

PRODUCT CERTIFIED FOR
LOW CHEMICAL EMISSIONS
UL.COM/GG
UL 2818

GOLD

Enverge®

EnvergeOnePassTM

334957-420
Certificate Number

10 Jul 2024 - 12 Apr 2025
Certificate Period

Certified
Status

UL 2818 - 2022 Gold Standard for Chemical Emissions for Building Materials, Finishes and Furnishings

Building products and interior finishes are determined compliant in accordance with California Department of Public Health (CDPH) Standard Method V1.2-2017 using an Office and Classroom Environment.

Product tested in accordance with UL 2821 test method to show compliance to emission limits on UL 2818. Section 7.1 and 7.2.

GREENGUARD Gold Certification Criteria for Building Products and Interior Finishes

Criteria	CAS Number	Maximum Allowable Predicted Concentration	Units
TVOC (A)	-	0.22	mg/m³
Formaldehyde	50-00-0	9 (7.3 ppb)	µg/m³
Total Aldehydes (B)	-	0.043	ppm
4-Phenylcyclohexene	4994-16-5	6.5	µg/m³
Particle Matter less than 10 µm (C)	-	20	µg/m³
1-Methyl-2-pyrrolidinone (D)	872-50-4	160	µg/m³
Individual VOCs (E)	-	1/2 CREL or 1/100th TLV	-

(A) Defined to be the total response of measured VOCs falling within the C_6 – C_{16} range, with responses calibrated to a toluene surrogate. Maximum allowable predicted TVOC concentrations for GREENGUARD Gold (0.22 mg/m³) fall in the range of 0.5 mg/m³ or less, as specified in CDPH Standard Method v1.2.

(B) The sum of all measured normal aldehydes from formaldehyde through nonanal, plus benzaldehyde, individually calibrated to a compound specific standard. Heptanal through nonanal are measured via TD/GC/MS analysis and the remaining aldehydes are measured using HPLC/UV analysis.

(C) Particle emission requirement only applicable to HVAC Duct Products with exposed surface area in air streams (a forced air test with specific test method) and for wood finishing (sanding) systems.

(D) Based on the CA Prop 65 Maximum Allowable Dose Level for inhalation of 3,200 µg/day and an inhalation rate of 20 m³/day

(E) Allowable levels for chemicals not listed are derived from the lower of 1/2 the California Office of Environmental Health Hazard Assessment (OEHHA) Chronic Reference Exposure Level (CREL) as required per the CDPH/EHLB/Standard Method v1.2 and BIFMA level credit 7.6.2 and 1/100th of the Threshold Limit Value (TLV) industrial work place standard (Reference: American Conference of Government Industrial Hygienists, 6500 Glenway, Building D-7, and Cincinnati, OH 45211-4438).

COMPLIANCE TESTED by berkeley analytical

VOC Emission Test Certificate

Product Name: SES 0.5 Spray Foam

Product Sample Information	
Company:	SES Foam LLC
Company Website:	www.sesfoam.com
Product Type:	Thermal Insulation
Date Produced:	4/12/2017

Certificate Information	
Certificate No:	170504-02
Certified By:	Raja S. Tannous, Laboratory Director
Date:	May 4, 2017

Reference Standard: California Department of Public Health CDPH/EHLB/Standard Method Version 1.2, 2017 (Emission testing method for CA Specification 01350)

Acceptance Criteria and Results Demonstrating Compliance of Product Sample to Referenced Standard:

Exposure Scenario[1]	Individual VOCs of Concern[2]		Formaldehyde[3]		TVOC[4]
	Criterion	Compliant?	Criterion	Compliant?	Range
School Classroom	≤½ Chronic REL	YES	≤9.0 µg/m^3	YES	> 0.5 - 4.9 mg/m^3
Private Office	≤½ Chronic REL	YES	≤9.0 µg/m^3	YES	> 0.5 - 4.9 mg/m^3
Single Family Residence	≤½ Chronic REL	YES	≤9.0 µg/m^3	YES	> 0.5 - 4.9 mg/m^3

Product Coverage[5]: Not applicable

1. Exposure scenarios & product quantities for classroom & office are defined in Tables 4-2 – 4-5 (CDPH Std. Mtd. V1.2-2017)
2. Maximum allowable concentrations of individual target VOCs are specified in Table 4-1 (*ibid*.)
3. Maximum allowable formaldehyde concentration is ≤9 µg/m^3, effective Jan 1, 2012; previous limit was ≤16.5 µg/m^3 (ibid.)
4. Informative only; predicted TVOC Range in three categories, i.e., ≤0.5 mg/m^3, >0.5 – 4.9 mg/m^3, and ≥5.0 mg/m^3
5. Informative and applicable only to tests of wet-applied products; grams of sample applied per square meter of substrate

Standards & Codes Recognizing CDPH Standard Method V1.2 (partial list)

- USGBC LEED Version 4, BD&C, ID&C
- The WELL Building Standard
- ANSI/GBI 01, Green Building Assessment Protocol
- Green Guide for Healthcare V2.2

Narrative: SES Foam LLC selected a sample representative of its SES 0.5 spray foam - product and submitted it on 4/12/2017 for testing. Berkeley Analytical measured and evaluated the emissions of VOCs from this sample following CDPH/EHLB/Standard Method V1.2-2017. The results of the test are presented in Berkeley Analytical report, 640-004-01A-May0417.

Berkeley Analytical is an independent, third-party laboratory specializing in the analysis of organic chemicals emitted by and contained in building products, finishes, furniture, and consumer products. We are an ISO/IEC 17025 accredited laboratory (IAS, TL-383); all standards used in performing this test are in Berkeley Analytical's scope of accreditation.

COMPLIANCE TESTED by berkeley analytical

VOC Emission Test Certificate

Product Name: Sucraseal 0.5 lb Spray Foam Insulation

Product Sample Information	
Manufacturer:	SES Foam LLC
Manf. Website:	www.sesfoam.com
CSI Category & No.:	Sprayed Insulation (07 21 29)
Date Produced:	7/29/2015

Certificate Information	
Certificate No:	150820-02
Certified By:	Raja S. Tannous, Laboratory Director
Date:	August 20, 2015

Reference Standard: California Department of Public Health CDPH/EHLB/Standard Method Version 1.1, 2010 (Emission testing method for CA Specification 01350)

Acceptance Criteria and Results Demonstrating Compliance of Product Sample to Referenced Standard:

Exposure Scenario[1]	Individual VOCs of Concern[2]		Formaldehyde[3]		TVOC[4]
	Criterion	Compliant?	Criterion	Compliant?	Range
School Classroom	≤½ Chronic REL	YES	≤9.0 µg/m^3	YES	≤ 0.5 mg/m^3
Private Office	≤½ Chronic REL	YES	≤9.0 µg/m^3	YES	≤ 0.5 mg/m^3
Single Family Residence	≤½ Chronic REL	YES	≤9.0 µg/m^3	YES	≤ 0.5 mg/m^3

Product Coverage[5]: Not applicable

1. Exposure scenarios & product quantities for classroom & office are defined in Tables 4-2 – 4-5 (CDPH Std. Mtd. V1.1-2010)
2. Maximum allowable concentrations of individual target VOCs are specified in Table 4-1 (*ibid*.)
3. Maximum allowable formaldehyde concentration is ≤9 µg/m^3, effective Jan 1, 2012; previous limit was ≤16.5 µg/m^3 (ibid.)
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5. Informative and applicable only to tests of wet-applied products; grams of sample applied per square meter of substrate

Standards & Codes Recognizing CDPH Standard Method V1.1 (partial list)

- USGBC LEED CI, NC, Schools, Healthcare, 2009
- USGBC LEED Version 4, BD&C, ID&C, 2013
- Collaborative for High Performance Schools (CHPS), National Core Criteria, 2013
- Green Guide for Healthcare, V2.2, 2007
- ANSI/GBI 01-2010, Green Building Assessment Protocol

Narrative: SES Foam LLC selected a sample representative of its Sucraseal 0.5 lb Spray Foam Insulation product and submitted it on 7/30/2015 for testing. Berkeley Analytical measured and evaluated the emissions of VOCs from this sample following CDPH/EHLB/Standard Method V1.1-2010. The results of the test are presented in Berkeley Analytical report, 640-002-02A-Aug2015.

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