CARLISLE
SPRAY FOAM INSULATION

SealTite™ PRO

SealTite PRO HFO
MEDIUM-DENSITY, CLOSED-CELL SPRAY POLYURETHANE FOAM INSULATION

SUBMITTAL PACKET

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CARLISLE SPRAY FOAM INSULATION

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CLOSED CELL FOAM
SealTite™ PRO HFO

SealTite PRO HFO is a two-component, medium density, one to one by volume spray-applied polyurethane foam. SealTite PRO HFO is an insulation system designed for use in commercial and residential applications. Use in lieu of more traditional forms of insulating materials such as fiberglass, cellulose or other loose fill products. Typical areas where SealTite PRO HFO is applied are exterior and interior walls, vented attics, unvented attic assemblies and between floors.

TYPICAL PHYSICAL PROPERTIES:

Property	SealTite	Test
R-Value	7.2 @ 1" 25 @ 3.5"	ASTM C-518
Core Density	2.0 LB / Cubic Foot	ASTM D-1622
Water Vapor Transmission	1.0 perms @ 1"	ASTM E-96
Air Impermeable	< 0.02 (L/s-m^2) @ 1"	ASTM E-2178
Tensile Strength (PSI)	39	ASTM D-1623
Dimensional Stability	< 1%	ASTM D-2126
Compressive Strength	31	ASTM D-1621
Closed Cell Content	> 96%	ASTM D-6226
Water Absorption	< 1.5% by volume	ASTM D-2842
Fungi Resistance	Zero Rating	ASTM C-1338

Building Code Certifications / Fire Test Data		
Evaluation Service Report	IAMPO	UES-720
Building Types	Approved	I, II, III, IV, V-B: Nonstructural Insulation material
Flame Spread	ASTM E84	Class I < 25
Smoke Development	ASTM E84	Class I < 450
ASTM E 2768	30-minute Ignition Resistant Material	Class A FSI ≤ 10 SDI ≤ 300 Flame Front ≤ 10 ft.
ASTM C 1029	Spray Applied Polyurethane Thermal Insulation	Meets or Exceeds Type II
NFPA 286 (UL 1715)	Pass: Can be used without a 15-minute thermal barrier when covered with one of the approved intumescent coatings as shown on page 2.	
AC377 Appendix X	Pass: Complies with the applicable requirements of ICC-ES AC377 Appendix X for use in attics and crawlspaces without a prescriptive ignition barrier.	
NFPA 285	Pass: Standard fire test method for evaluation of fire propagation characteristics of exterior non-load bearing wall assemblies containing combustible components.	
Greenguard Gold	GOLD: UL 2818 – 2013 Standard for Chemical Emissions for Building Materials, Finishes and furnishings.	

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THERMAL BARRIER:

Current International Building Code (IBC) and International Residential Code (IRC) require that spray polyurethane foam be separated from the building interior by a Code prescribed 15-minute thermal barrier or a Code-approved alternative. Gypsum board at a minimum thickness of ½" is a Code-prescribed 15-minute thermal barrier. The following products when installed per manufacturer specifications are alternative thermal barrier assemblies containing SealTite PRO HFO:

DC315™ manufactured by: International Fireproof Technology, Inc	Application Rates: 14 Wet Mils – 9 Dry Mils
Flame Control 60-60A manufactured by: Flame Control Coatings Inc	Application Rates: 14 Wet Mils – 9 Dry Mils
Fireshell F10E manufactured by: ICP Construction	Application Rates: 14 Wet Mils – 8 Dry Mils
Plus ThB manufactured by: No Burn Inc.	Application Rates: 14 Wet Mils – 9 Dry Mils

IGNITION BARRIER:

SealTite PRO HFO meets the requirements of ICC-ES AC377 and Appendix X for use in attics and crawlspaces without the use of a prescriptive ignition barrier or Intumescent Coating under the following conditions.

a	Entry is only to service utilities in the attic or crawlspace and no storage is permitted.
b	Attic or crawlspace areas cannot be connected.
c	Air from the attic or crawlspace cannot be circulated to other parts of the building.
d	In accordance with IBC Section 1203.3 or IRC Section R408.1, under floor (crawlspace) ventilation is provided as applicable.
e	In accordance with IBC 1203.2 or IRC Section R806, attic ventilation is provided as applicable.
f	In accordance with 2012 and 2009 IMC (International Mechanical Code®) Section 701, or 2006 IMC Sections 701 and 703, combustion air is provided.
g	The foam plastic insulation is limited to the maximum thickness and density tested.
h	The installed coverage rate of coatings, if part of the insulation system shall be equal or greater than that tested.

GENERAL PROPERTIES: SealTite PRO HFO is a 2.0 pcf density closed cell insulating material. SealTite PRO HFO is designed for use where insulation systems require superior air barrier characteristics along with the ability to minimize moisture infiltration. SealTite PRO HFO has a 7.2 per inch R-value rating while providing structural enhancement due to its semi-rigid nature when cured. When properly installed by a professional application company SealTite PRO HFO quickly expands to fill the cracks, crevices, gaps and voids that exist in every structure. In addition, SealTite PRO HFO will conform to the curves, irregular surfaces and spaces to form a superior thermal envelope around your entire structure.

EQUIPMENT AND COMPONENT RATIOS: The mix ratio is 1 to 1 by volume. The pre-heater temperatures should be set between 105°F – 135°F and able to maintain +/- 5°F.

VAPOR RETARDER: When installed at a minimum thickness of 1" SealTite PRO HFO is considered a vapor retarder. Consult local building code officials for specific requirements. Climate zone tables are available in current IBC and IRC publications.

APPLICATION GUIDELINES: Polyurethane foam systems should be processed through commercially available spray equipment designed for that purpose by a qualified professional applicator. Consult the current Carlisle Spray Foam Insulation application guidelines for SealTite PRO HFO (Grade: Summer or Winter) prior to installation. It is the responsibility of the professional applicator to thoroughly understand all equipment technical information and safe operating procedures that pertain to a spray polyurethane foam application.

MATERIAL HANDLING: Due to the reactive nature of these components respiratory protection is mandatory. The vapors and liquid aerosols present during application and for a short period thereafter must be considered – and appropriate protective measures taken – to minimize potential risks from overexposure through inhalation, skin, or eye contact. These protective measures include adequate ventilation, safety training for installers and other workers, use of appropriate personal protective equipment, and a medical surveillance program. It is imperative that the applicator read and become familiar with all available information on proper use and handling of spray polyurethane foam. Additional information is available at www.carlislesfi.com or by contacting the Technical Services department of Carlisle Spray Foam Insulation.

PROPER STORAGE OF RAW MATERIALS: Shelf life is Six (6) months from date of manufacture when stored indoors, in the original unopened containers and between the temperatures of 50° – 80°F.

TECHNICAL ASSISTANCE: For additional assistance please contact the Technical Services department of Carlisle Spray Foam Insulation at (844) 922-2355.

DISCLAIMER: To the best of our knowledge, all technical data contained herein is true and accurate as of the date of issuance and subject to change without prior notice. User must contact Carlisle Spray Foam Insulation to verify correctness before specifying or ordering. We guarantee our products to conform to the quality control standards established by Carlisle Spray Foam Insulation. We assume no responsibility for coverage, performance or injuries resulting from use. Liability, if any, is limited to replacement of the product. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY CARLISLE SPRAY FOAM INSULATION EXPRESSED OR IMPLIED; STATUTORY, BY OPERATION OF LAW, OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

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CARLISLE SPRAY FOAM INSULATION

APPLICATION GUIDE

CLOSED CELL FOAM
SealTite™ PRO HFO

SealTite PRO HFO is suitable for application to most construction materials including but not limited to wood, masonry, concrete, and metal. All surfaces to be sprayed with foam should be clean, dry, and free of dew or frost. All metal to which the foam is to be applied must be free of oil, grease, etc. See spray process section for pass thickness. Allow ten minutes between each pass or until the surface temperature reaches 100°F or ambient to allow for cooling. Multiple layers can be applied to reach the desired thickness and R-value. As with all spray polyurethane foam systems, improper application techniques should be avoided. Examples of improper techniques include, but are not limited to, excessive thickness of spray polyurethane foam, off ratio material and spraying into or under rising foam. Potential results of improperly installed spray polyurethane foam include dangerously high reaction temperatures that may result in fire and offensive odors that may or may not dissipate. Improperly installed foam must be removed and replaced with properly installed spray polyurethane foam. It is the responsibility of the applicator to thoroughly understand all equipment technical information and safe operating procedures that pertain to a spray polyurethane foam application.

Application Parameters

Storage Temperature	50°F – 80°F
In Use Temperature	70°F – 80°F
Ambient Air Temperature	30°F – 120°F Based on Grade Used
Substrate Temperature	30°F – 120°F Based on Grade Used
Moisture Content of Substrate	Less Than 19%
Maximum Lift Per Pass	Not to Exceed 4"

Ambient/Substrate Temperatures

Regular Grade	50°F – 120°F
Winter Grade	30°F – 70°F

*Wind Chill or other conditions may influence your decision on which grade of material you might apply. Physical properties will stay the same.

Product	Pass	Max Lift
SealTite PRO HFO	Single	4"
	Double	3" + 2.5"

Mixing Requirements

Resin (B side)	**DO NOT MIX**

Processing Requirements

All material must be a minimum of 70°F before dispensing.

Equipment Settings

Pre-Heaters: (A) Component - Iso	105°F – 135°F
Pre-Heaters: (B) Component - Resin	105°F – 135°F
Hose Heat	105°F – 135°F
Fluid Pressure	1,000 – 1,500 psi - Dynamic
Mixing Ratio	1:1 By Volume
Recommended Mix Chamber/ Module Size:	10 – 15 Lbs./Minute (i.e. 01-GRACO AR4242)

These are recommended "Initial" Settings. Settings may vary based on the type of equipment used and the substrate temperatures at the time of the application.

APPLICATION GUIDELINES: Polyurethane foam systems should be processed through commercially available spray equipment designed for that purpose by a qualified professional applicator. The proportioning equipment must be capable of maintaining all designated ratios, temperature settings, etc. as shown in the settings chart. The gun should be of the internal mix type, which provides thorough blending of the two components. The equipment shall be of the heated airless type capable of maintaining 160°F at the gun by use of both primary heaters and heated hoses. The use of 2:1 transfer pumps is recommended for supplying the liquid components to the Proportioner. It is the responsibility of the professional applicator to thoroughly understand all equipment technical information and safe operating procedures that pertain to a spray polyurethane foam application.

PROPER STORAGE OF RAW MATERIALS: Shelf life is six (6) months from date of manufacture when stored in original unopened containers at 50°F to 80°F. Store in a dry and well-ventilated area.

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Raw materials must be kept warm. Cold chemicals can cause poor mixing, pump cavitation, or other process problems due to higher viscosity at lower temperatures. The material will need to be conditioned between 70°F to 80°F for 48 hours before use. Avoid storing drums on concrete or metal floors in cold (winter) conditions. Do not store in direct sunlight. Keep drums tightly closed when not in use.

MATERIAL HANDLING: Due to the reactive nature of these components respiratory protection is mandatory. The vapors and liquid aerosols present during application and for a short period thereafter must be considered – and appropriate protective measures taken – to minimize potential risks from overexposure through inhalation, skin, or eye contact. These protective measures include adequate ventilation, safety training for installers and other workers, use of appropriate personal protective equipment, and a medical surveillance program. It is imperative that the applicator read and become familiar with all available information on proper use and handling of spray polyurethane foam. Additional Information is available at carlislesfi.com or by contacting the Technical Services dept. of Carlisle Spray Foam Insulation.

PERSONAL PROTECTION EQUIPMENT: Spraying of polyurethane foam results in the atomizing of the components to a fine mist. Inhalation and exposure to the atomized particles must be avoided.

Spraying of polyurethane foam results in the atomizing of the components to a fine mist. Inhalation and exposure to the atomized droplets must be avoided. Applicators must use personal protective equipment recommended by the Center for Polyurethanes Industry for use in high-pressure spray foam application. Precautions include, but are not limited to:

a. Full-face mask or hood with fresh air source
b. Fabric coveralls
c. Non-permeable gloves
d. Solvent-resistant gloves when handling new materials and cleaning solvents.

WARNING: EXPOSURE MAY OCCUR EVEN WHEN NO NOTICEABLE ODOR IS ENCOUNTERED.

Applicators must use personal protective equipment recommended by the Center for Polyurethanes Industry for use in high-pressure spray foam application. Please visit www.spraypolyurethane.org for additional information on appropriate personal protection equipment selection and use.

SAFE HANDLING OF LIQUID COMPONENTS: When removing bungs from containers use caution, contents may be under pressure. Loosen the small bung first and let any built-up gas escape before completely removing. Avoid prolonged breathing of vapors. For further information refer to "MDI-Based Polyurethane Foam Systems: Guidelines for Safe Handling and Disposal" publication AX-119 published by the Alliance For The Polyurethanes Industry, Arlington, VA.

DISSIMILAR RESINS: When changing the "B" side (resin) to another type of spray polyurethane foam it is very important that the supply hoses and pumps are completely drained. Any resin on the drum pump must be completely removed prior to insertion into the drum of the new material. Mixing of dissimilar product types (particularly closed cell into open cell) will contaminate the resin in the new drum. It is the responsibility of the applicator to follow this guideline to avoid contaminating the resin.

MECHANICAL VENTILATION REQUIREMENTS: Carlisle Spray Foam Insulation requires that a mechanical ventilation system be utilized in a workplace where SealTite spray polyurethane foam is applied. The requirement for this ventilation system is at a minimum ventilation rate during spray application and for a period of 24 hours after the spray application is complete. The mechanical ventilation system to be used in the workspace needs to be able to exhaust air directly to the exterior of the building at a minimum rate of 0.3 Air Changes per Hour (ACH). The volume of the workspace would need to be determined for system design. If, for example, the volume of the workspace is 4,000 ft^3 then the minimum capacity of the ventilation system equals 4,000 ft^3 x 0.3 ACH = 1,200 ft^3/h = 20 ft^3/min (cfm).

Note that 0.3 ACH is a minimum ventilation rate at which most commercial ventilation fans can easily achieve. It is recommended that this level be exceeded. More ventilation utilized in the workspace the better.

Further information can be found in the "Guidance on Ventilation During Installation of Interior Applications of High-Pressure Spray Polyurethane Foam" available from the American Chemistry Council, Spray Foam Coalition.

SPRAY PROCESS: This spray system may be applied in passes of uniform thickness from a minimum of one half (½) inch to a maximum of four (4) inches. SealTite PRO HFO shall not be sprayed at more than 4" in a single pass, or at a multiple pass of 3" + 2.5" to equal a combined 5.5. Additional passes after double pass will need recommended cooling time. If this thickness is exceeded, it will adversely affect the quality and physical properties of the finished product and the internal temperature building up within the foam may cause charring or thermal degradation. Under certain conditions, applications exceeding this thickness may cause spontaneous combustion of the foam to occur, even hours after product was applied.

For Sealtite PRO HFO you want a .5–1 second brown time when spraying a dot on your substrate. If you spray a dot on the substrate and the chemical hits as white foam you are too hot and loosing your blowing agent into the air, reducing yield. Turn your temps down in 2–3 degree increments until you have a consistent .5–1 second brown time. If you spray a test dot on your substrate and the chemical hits as brown and runny before turning into white foam, then you are too cold. Bring your temps up in 2–3 degree increments until you have your correct brown time.

Allow ten minutes between each pass or until surface temperature reaches 100°F or ambient to allow for cooling. Multiple layers can be applied to reach the desired thickness and R-value.

As with all spray polyurethane foam systems, improper application techniques should be avoided. Examples of improper techniques include, but are not limited to, excessive thickness of spray polyurethane foam, off ratio material and spraying into or under rising foam. Potential results of improperly installed spray polyurethane foam include dangerously high reaction temperatures that may result in fire and offensive odors that may or may not dissipate.

Polyurethane foam not applied at the correct equipment settings and application parameters (off-ratio) will result in polyurethane foam with poor physical and adhesion properties. Any polyurethane foam applied off-ratio must be completely removed and replaced with properly installed spray polyurethane foam.

CARLISLE SPRAY FOAM INSULATION

CLOSED CELL FOAM
SealTite PRO HFO

It is the responsibility of the applicator to thoroughly understand all equipment technical information and safe operating procedures that pertain to a spray polyurethane foam application.

Spray polyurethane foam insulation is combustible. High intensity heat sources such as welding or cutting torches must not be used in close proximity to any polyurethane foam. Large masses of spray polyurethane foam should be removed to an outside safe area, cut into smaller pieces, and allowed to cool before discarding into a trash receptacle.

ENVIRONMENTAL AND SUBSTRATES CONDITIONS: Applicators must recognize and anticipate climatic conditions prior to application. Ambient air, substrate temperature and moisture are all critical determinants of foam quality. Variations in ambient air and substrate temperature will influence the chemical reaction of the two components, directly affecting the expansion rate, amount of rise, yield, adhesion and the resultant physical properties of the foam insulation.

It is the foam applicator's responsibility to ensure the system is being applied within physical parameters. Proper applications may require adjustments to one or more of the following: spray techniques, substrate, application, or job site temperature.

SealTite PRO HFO is suitable for application to most construction materials including wood, masonry, concrete, and metal. All surfaces to be sprayed with foam should be clean, dry and free of dew or frost. Metal substrate must be free of any surface residue such as oil, grease, etc.

Substrate temperature at the time of the SealTite PRO HFO application should be between 30°F to 120°F, the warmer the surface, the better the adhesion. For temperatures outside of these ranges the applicator must contact the Carlisle Spray Foam Insulation technical services department prior to application.

The presence of moisture will greatly affect the physical characteristics of the polyurethane foam. The moisture content of the substrate should not exceed 19%. Polyurethane foam cannot be applied to any substrate that has surface moisture such as rain, condensation, dew, frost, etc. The moisture acts as a blowing agent that will react with the “A” side of the system. This can result in off-ratio polyurethane foam with poor physical and adhesion properties. Any polyurethane foam applied during these conditions must be completely removed and the substrate allowed to thoroughly dry prior to a new application.

Cold weather temperature application may require changing of spray technique, material temperatures, application temperatures, substrate preparation and environmental conditioning. Consult a SealTite Technical Representative for details.

PROXIMITY TO HEAT SOURCES: Keep a minimum distance of three (3) inches between SealTite PRO HFO and heat sources such as combustion appliance flues, recessed light fixtures, insulation contact rated (IC) light fixtures, fireplace flues, etc.

FINISHED FOAM PROTECTION: The finished surface of the sprayed polyurethane foam should be protected from the adverse effects of direct exposure of ultraviolet light from the sun. This exposure will cause dusting and discoloration. Protective coatings designed for use with polyurethane foams are available from Carlisle Spray Foam Insulation.

SKIN EXPOSURE: Immediately remove any clothing soiled by the product. Immediately wash skin with water and soap and rinse thoroughly. Remove breathing apparatus only after contaminated clothing have been completely removed. In case of irregular breathing or respiratory arrest provide artificial respiration. First Aid responders should pay attention to self-protection and use the recommended protective clothing.

INHALATION: Supply fresh air or oxygen; call for doctor.

EYE CONTACT: Immediately rinse opened eye for several minutes under running water. Consult a doctor and the SDS sheet for proper treatment.

AFTER SWALLOWING: Immediately call a doctor. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person.

ENVIRONMENTAL PRECAUTIONS: Inform the relevant authorities if the product has caused environmental pollution. Do not allow material to enter sewers/ surface or ground water systems.

MATERIAL SPILL CONTAINMENT AND CLEAN UP: Isolate area. Keep unnecessary and unprotected personnel from entering the area. Spilled material may cause slipping hazard. Ensure adequate ventilation. Contain spilled material if possible. Absorb with materials such as: dirt, sand, sawdust. Collect in suitable and properly labeled containers. Contact local and state government for proper cleanup and disposal procedures.

WASTE DISPOSAL: Dispose of raw chemical in a licensed disposal facility. Do not discharge into waterways or sewer systems. Contact Chemtrec (800) 424-9300 or Clean Harbors (800) 444-4244.

CONTAINER DISPOSAL: Steel drums must be emptied (as defined by RCRA, Section 261.7 or state regulations that may be more stringent) and can be sent to a licensed drum re-conditioner for reuse, a scrap metal dealer, or an approved landfill. Drums destined for a scrap dealer or landfill must be punctured or crushed to prevent reuse.

TECHNICAL ASSISTANCE: For additional assistance please contact the Technical Services dept. of Carlisle Spray Foam Insulation at (844) 922-2355.

DISCLAIMER: To the best of our knowledge, all technical data contained herein is true and accurate as of the date of issuance and subject to change without prior notice. User must contact Carlisle Spray Foam Insulation to verify correctness before specifying or ordering. We guarantee our products to conform to the quality control standards established by Carlisle Spray Foam Insulation. We assume no responsibility for coverage, performance or injuries resulting from use. Liability, if any, is limited to replacement of the product. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY CARLISLE SPRAY FOAM INSULATION. EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW, OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

INSULATION CONTRACTORS ASSOCIATION OF AMERICA ICAA

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CARLISLE SPRAY FOAM INSULATION

WALL ASSEMBLY GUIDE

NFPA 285

Per Chapter 26 of the International Building Code, the wall assembly shall be tested in accordance with and comply with the acceptance criteria of NFPA 285. The listed assemblies in this document have met that criteria.

SEALTITE™ PRO SPRAY FOAM INSULATION AS THE CAVITY INSULATION

BASE WALL SYSTEM **Use item 1, 2, or 3**	1. Concrete Wall 2. Concrete Masonry Wall 3. Steel Stud Wall – 1-layer ⅝ inch thick type X gypsum wallboard on the interior, installed on minimum 3⅝ inch deep, 20-gauge steel studs, spaced a maximum of 24 inches on center
FLOOR LINE FIRE STOPPING	4-inch 4 pcf mineral wool (friction fit or installed with Z-Clips)
CAVITY INSULATION **Use item 1 or 2**	1. None 2. Full stud cavity depth or less of Carlisle **SealTite™ PRO High Yield, SealTite PRO Open Cell, SealTite PRO No Mix, SealTite PRO No Trim 21, SealTite PRO OCX, SealTite PRO Closed Cell, SealTite PRO One Zero, SealTite PRO HFO**
EXTERIOR SHEATHING	Minimum ½ inch thick exterior-type gypsum sheathing
WEATHER RESISTANT BARRIER OVER BASE WALL **Use item 1 or 2** **Note: Approvals from IAPMO, DrJ Engineering, ICC-ES, Intertek, UL, or other qualified 3rd parties may be used**	1. None 2. Any WRB/AVB barrier that has been approved to be used in an NFPA 285 compliant assembly paired with mineral wool, polyisocyanurate, EPS or XPS insulation or no exterior insulation for claddings approved for that WRB. See note for approval agencies
EXTERIOR INSULATION **Use item 1, 2, or 3** **Note: Approvals from IAPMO, DrJ Engineering, ICC-ES, Intertek, UL, or other qualified 3rd parties may be used**	1. None – only where the cladding is listed to be approved with specific WRBs (see Note 1) 2. 2-inch thick (min.) 4 pcf mineral fiber insulation allowed for use with any WRB on the base wall surface (see Note 1) 3. Any polyisocyanurate, EPS or XPS insulation that has been approved (see note) to be used in an NFPA 285 compliant assembly paired with the WRBs in Item 2 above and claddings in Item 2 below (see Note 2)

CARLISLE SPRAY FOAM INSULATION

NFPA 285

EXTERIOR CLADDING **Use item 1 or 2** **Note: Approvals from IAPMO, DrJ Engineering, ICC-ES, Intertek, UL, or other qualified 3rd parties may be used**	1. Claddings below may only be used with noncombustible exterior insulation Item 2 above (mineral fiber) a. Any noncombustible cladding, such as brick, stone, terra cotta, fiber cement, concrete, sheet metal, etc. b. Combustible cladding – use any cladding that has been successfully tested by the panel manufacturer (or fabricator) via the NFPA 285 test method (see Note 2) 2. Claddings below may be used with any approved (see note) combustible exterior insulation item 3 above Any cladding (combustible or noncombustible) that has been approved to be used in an NFPA 285 compliant assembly paired with approved polyisocyanurate, EPS, XPS, or SPF insulation. Each insulation must be specifically approved for the exact cladding types listed in the approval (see Note 2) IMPORTANT: See the next item (Window/Door perimeter details for specific insulation types that require unique detailing
WINDOW/DOOR PERIMETERS	Must use approved design for specific system being considered (see note) Note: EPS and XPS require specific door/window header and jamb details to be compliant with NFPA 285. Polyisocyanurate and SPF may or may not require specific header/jamb details. See approvals from IAPMO, DrJ Engineering, ICC-ES, Intertek, UL, or other qualified 3rd parties for the particular header/jamb detail required for each insulation type

Note 1: Examples for use with no exterior insulation or with mineral wool insulation per the table above

Cladding Lists 1 and 2 below are for use with no exterior insulation. However, this will expose the substrate to moisture, in which case a WRB must be added to the system. For these applications, WRBs approved for use with each cladding must be used

1. Any combustible cladding that has passed NFPA 285 testing (examples below)
   a. NFPA 285 approved MCM/ACM Metal/Aluminum Composite building panels
   b. NFPA 285 approved stone/aluminum honeycomb composite
   c. NFPA 285 approved HPL High-Pressure Laminate Panels
2. Any noncombustible cladding such as (but not limited to)
   a. **Brick** – Nominal 4-inch clay brick or veneer
   b. **Stucco** – ¾ inch exterior cement plaster and lath. A secondary water-resistive barrier can be installed between the insulation and lath. The secondary WRB may not be full coverage asphalt or butyl based self-adhering membranes
   c. **Natural Stone** (granite, limestone, marble, sandstone) – 2-inch thick
   d. **Artificial Cast Stone** – 1½-inch thick
   e. **Terra Cotta Cladding** – 1¼-inch thick
   f. **¼-Inch Thick Glass Fiber-Reinforced Concrete Panels** (installed per manufacturer instructions)
   g. **Concrete** – 2-inch-thick
   h. **CMU blocks** – 4-inch-thick
   i. **Sheet Metals** such as aluminum, copper or zinc – any thickness

Note 2: Combustible WRB/Insulation/Cladding

If the base wall is covered with a combustible WRB/Insulation and various claddings (combustible or noncombustible), each insulation/WRB/cladding combination allowed must have explicitly been tested or approved to be used with each other. Approvals from IAPMO, DrJ Engineering, ICC-ES, Intertek, UL, or other qualified 3rd parties may be used.

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CARLISLE SPRAY FOAM INSULATION

WALL ASSEMBLY GUIDE

NFPA 285

Per Chapter 26 of the International Building Code, the wall assembly shall be tested in accordance with and comply with the acceptance criteria of NFPA 285. The listed assemblies in this document have met that criteria.

SEALTITE™ PRO SPRAY FOAM INSULATION AS EXTERIOR AND/OR CAVITY INSULATION

BASE WALL SYSTEM **Use item 1, 2, 3, or 4**	1. Concrete Wall 2. Concrete Masonry Wall 3. Steel Stud Wall – 1-layer ⅝ inch thick type X gypsum wallboard on the interior, installed on minimum 3 inch deep, 20-gauge steel studs, spaced a maximum of 24 inches on center 4. Fire Retardant Treated (FRT) Stud Wall – 1-layer ⅝ inch thick type X gypsum wallboard on the interior, installed on 2x4 (min.) Fire Retardant Treated studs spaced a maximum of 24 inches on center
FLOOR LINE FIRE STOPPING **Use item 1 or 2**	1. 4 inch 4 pcf mineral wool (friction fit or installed with Z-Clips) 2. Fire Retardant Treated (FRT) lumber – 1.5-inch-thick (min.) FRT firestop may only be used with FRT framing
CAVITY INSULATION **Use items 1, 2, or 3 when steel framing is used. Use item 1 or 3 when FRT framing is used.**	1. None 2. Full stud cavity depth or less of Carlisle **SealTite™ PRO High Yield, SealTite PRO Open Cell, SealTite PRO No Mix, SealTite PRO No Trim 21, SealTite PRO OCX, SealTite PRO Closed Cell, SealTite PRO One Zero, SealTite PRO HFO** 3. Any Noncombustible or fiberglass insulation (faced or unfaced)
EXTERIOR SHEATHING	Minimum ½ inch thick exterior type gypsum sheathing
EXTERIOR INSULATION **Item 1 limited to cladding types 1 – 7**	1. 4 in. max. **SealTite PRO Closed Cell, SealTite PRO One Zero, SealTite PRO HFO** 2. 3.5 in. max. **SealTite PRO Closed Cell, SealTite PRO One Zero, SealTite PRO HFO**

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CARLISLE SPRAY FOAM INSULATION

NFPA 285

WALLS WITH CARLISLE SPRAY FOAM INSULATION ON THE EXTERIOR

EXTERIOR CLADDING

Items 1 – 7 are allowed to be used without the DC315 coating system.

Use any of Items 1 – 20 when exterior SPF is coated with IFTI DC315 (16 mil WFT) with topcoat paint (8 mils WFT Sherwin Williams Sher-Cryl or equivalent)

For Items 8 – 20, Air Gap cannot Exceed 2½ inches. All claddings non-open joint. Panel claddings may use vertical or horizontal Z girt attachment. Panel claddings may be vertical or horizontal

1. **Brick** – Nominal 4-inch clay brick or veneer with a maximum 2-inch air gap behind the brick. Brick Ties/ Anchors 24-inch OC (max.)
2. **Precast Concrete Panels** – min. 1½ in. thick using any standard non-open joint installation technique such as shiplap, with max. 2 in. air gap behind the cladding
3. **Concrete Masonry Units** – Min. 2 in. thick with max 2 in. air gap between exterior wall insulation and concrete masonry units
4. **Stucco** – Stucco – min. ¾ in. thick exterior cement plaster and lath with approved WRB over exterior insulation
5. **Natural Stone** (granite, limestone, marble, sandstone) – 2-inch (min.) using any standard non-open joint installation technique
6. **Artificial Cast Stone** – 1½ inch (min.) using any standard non-open joint installation technique.
7. **Terra Cotta Cladding** – 1¼ inch (min.) using any standard non-open joint installation technique
8. **Aluminum Cladding** – 0.030 in. min. thickness – non-open joint
9. **Steel Cladding** – 0.0149 in. min. thickness – non-open joint
10. **Copper Cladding** – 0.0216 in. min. thickness – non-open joint
11. **Zinc Cladding** – 0.040 in. min. thickness – non-open joint
12. **Terreal Zephir Evolution Rainscreen System** (or similar terra cotta), minimum 9⁄16-in. thick – non-open joint
13. **¼ In. Min. Fiber Cement Cladding** – non-open joint
14. **SwissPearl Carat Panels** – 0.315 in. min. thickness – non-open joint
15. **FunderMax M.Look** (min. ¼ in.) – non-open joint
16. **Concrete** – min. 1 in. thick - non-open joint
17. **CMU** – min. 1 in. thick – non-open joint
18. **Stone Veneer** – minimum 1 in. thick – non-open joint
19. **One Coat Stucco** – ⅜ in. (min.) exterior cement plaster and lath – non-open joint
20. **Thin Brick** adhered (with non-combustible mortar) to stucco base (min. ¾ in.) – non-open joint

WINDOW/DOOR PERIMETERS/ FLASHINGS

The window opening perimeters shall be per UL Design Listings EWS0013, EWS0029, or EWS0054, as applicable

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CARLISLE SPRAY FOAM INSULATION

WALL ASSEMBLY GUIDE

Premier+ NFPA 285

Per Chapter 26 of the International Building Code, the wall assembly shall be tested in accordance with and comply with the acceptance criteria of NFPA 285. The listed assemblies in this document have met those criteria.

CARLISLE PREMIER+ WALL SYSTEM

BASE WALL SYSTEM **Use item 1, 2, 3, or 4**	1. Concrete Wall 2. Concrete Masonry Wall 3. Steel stud wall - 1-layer ⅝" type X gypsum wallboard on the interior, installed on 3 ⅝" (min.), 25-gauge steel studs, spaced a maximum of 24" on center with lateral bracing every 4 feet 4. Fire retardant-treated wood (FRTW) stud wall - 1-layer ⅝" type X gypsum wallboard on the interior installed on minimum 2" x 4" (nominal dimension) FRTW studs spaced a maximum of 24" on center with lateral bracing as required by code
FLOOR LINE FIRE STOPPING **Use item 1 or 2**	1. Any approved mineral fiber-based safing insulation in each stud cavity at the floor line (safing thickness must match stud cavity depth) 2. Solid FRTW fire blocking at floor line following building code requirements for Type III Construction FRT firestop may only be used with FRT framing
CAVITY INSULATION	**SealTite PRO Closed Cell** - 1½" (min.) up to full cavity thickness **SealTite PRO One Zero** - 1½" (min.) up to full cavity thickness **SealTite PRO HFO** - 1½" (min.) up to full cavity thickness
EXTERIOR SHEATHING	None
EXTERIOR INSULATION **Use items 1 – 3 for all cladding types** **Items 4 – 8 limited to cladding types 1 – 6**	1. Hunter Panels Xci Foil (Class A) - 3½" (max.) 2. Hunter Panels Xci-286 - 3½" (max.) 3. CCW R2+ SHEATHE - 3½" (max.) 4. Hunter Panels Xci Foil (Class A) - 4" (max.) 5. Hunter Panels Xci-286 - 4" (max.) 6. CCW R2+ SHEATHE - 4" (max.) 7. Hunter Panels Xci CG or Xci CG (Class A) - 4" (max.) 8. CCW R2+ MATTE or R2+ MATTE (Class A) - 4" (max.)
WEATHER RESISTANT BARRIER OVER EXTERIOR INSULATION **Use any item 1 – 9** **For a complete list of approved WRB's contact CSFI Technical Service Department**	1. None 2. Hunter Xci VP-SA WRB 3. Carlisle Fire Resist 705 RS 4. Fire Resist Barithane VP 5. Fire Resist 705 VP (with 702 WB, CAV-GRIP®, or Low-VOC Travel-Tack Adhesives) 6. Fire Resist 705 FR-A (with CCW 702, 702LV, 702 WB, CAV-GRIP, and Low-VOC Travel Tack Adhesives) 7. Fire Resist Barritech VP

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CARLISLE SPRAY FOAM INSULATION

Premier+ NFPA 285

CARLISLE PREMIER+ WALL SYSTEM

WEATHER RESISTANT BARRIER OVER EXTERIOR INSULATION CONTINUED	8. Fire Resist Barritech NP (or NP LT) 9. Henry Air-Bloc 21 S, AB 33MR, AB 31MR, AB 17MR, AB 16MR The exterior insulation may be used with or without CavClear® Masonry Mat over the insulation with a maximum 1" air gap between the CavClear and the cladding. When CavClear is used, this may only be used with Cladding 1 – 6 or with thin brick/thin stone adhered to stucco as long as total thickness is ¾" min.
EXTERIOR CLADDING **Use any item 1 – 17** **Item 7 may use any tested/approved installation technique** **Items 8, 9, or 12 may use any standard installation technique**	**1. Brick** - 4" (nom.) clay or concrete brick or veneer with maximum 2" air gap behind the brick, brick ties/ anchors 24" (max.) O.C. **2. Stucco** - ¾" (min.) exterior cement plaster and lath **3. Limestone** - 2" (min.) using any standard non-open joint installation technique such as shiplap **4. Natural stone** (granite, limestone, marble, sandstone) - 2" (min.) using any standard non-open joint installation technique such as grouted/mortared stone **5. Artificial cast stone** - 1½" (min.) complying with ICC-ES AC 51 using any standard non-open joint installation technique such as shiplap **6. Terracotta cladding** - 1¼" (min.) solid or equivalent by weight using any standard non-open joint installation technique such as shiplap **7. Metal composite material (MCM)** - any MCM that has successfully passed NFPA 285 **8. Metal building panels** - uninsulated sheet metal building panels including steel, copper, aluminum, or zinc (zinc not permitted for use with Hunter Panels Xci-CG or CCW R2+ MATTE) **9. Fiber-cement siding, porcelain, or ceramic tile** - ¼" (min.) uninsulated and mechanically attached **10. Composite building panels** - Stone, porcelain, ceramic/aluminum honeycomb composite building panels that have successfully passed NFPA 285 criteria **11. Autoclaved-aerated-concrete (AAC) panels** - any AAC panels that have successfully passed NFPA 285 criteria **12. Terra cotta cladding** - ½" (min.) rain-screen terracotta with ventilated shiplap **13. One coat stucco** - ½" (min.) - any one coat stucco which meets AC11 acceptance criteria or is approved for use in Types I-IV construction or has been tested per NFPA 285 or stays in place when tested per ASTM E119 (stucco exposed to fire) for at least 30 minutes **14. Thin brick** or **cultured stone** - ¾" (min.) in thin-set adhesive and metal lath tested to ASTM E119 (brick exposed to furnace) and remains in place for a minimum of 30 minutes or has passed an NFPA 285 test **15. Glen Gery Thin Tech Elite Series Masonry Veneer or TABS II Panel System** - ½" thick bricks using TABS Wall Adhesive or Brick It MCS & CI Panel Systems **16. Stone Veneer** - 1¼" (min.) using any standard installation technique **17. FunderMax M.Look** - ¼" (min.) using any standard installation technique

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Note 1: The following adhesives may be used to attach the polyiosyanurate (polyiso) insulation

1) LM 800 XL or BarriBond or BarriBond XL: adhesive applied discontinuously at a rate of ⅜" thick by 3" diameter dabs, 16" O.C.

2) CAV-GRIP or Low-VOC Travel-Tack aerosol adhesive: applied per manufacturers' instructions

Note 2: The following may be used as a gap-filler between insulation panels:

a. ICP HandiFoam Fireblock

b. TVM Fireblock

c. DuPont Great Stuff PRO Gaps & Cracks Insulating Foam

Note 3: These detailing materials may be used over the polyiso insulation and can be used alone or with any approved WRB for the assembly

1) Board joint treatments:

a. BarriBond or Barribond XL: 2" x 40 mil ribbon

b. 4" DCH Reinforcing Fabric embedded in Fire-Resist VP/NP/NP LT or Fire-Resist Barrithane VP

c. 4" Foil-GRIP 1402*

d. 4" AlumaGRIP 701*

2) Termination mastic for flashing/membrane: 1" x 40 mil ribbon or tooled ⅜" bead of Sure-Seal® Lap Sealant, LM 800 XL, BarriBond, or BarriBond XL

3) Detail flashing: 3" on each side at openings, terminations, penetrations, transitions, and angle changes

a. Fire Resist 705 FR-A/XLT*

b. Sure-Seal PS Elastoform* or Sure-Seal PS Cover Strip*

c. LiquiFiber or DCH Reinforcing Fabric embedded in Barritech VP/NP/NP LT

d. 40-mil application of BarriBond, BarriBond XL, or Barrithane VP

*Prepare the surface as recommended by Carlisle using CCW-702, CCW-702 LV, CCW-702 WB, CCW-715, Low VOC Travel-Tack, CAV-GRIP, HP-250 Primer, or Low-VOC EPDM Primer per the instructions on Product Data Sheets

Note 4: In the NFPA 285 test, flashings for fenestration, including through-wall flashing (TWF), are not considered part of the WRB (Ref: 2015 IBC Sec. 1403.5 and 2018 IBC Sec. 1402.5). Therefore, suitable combustible or non-combustible flashings are permitted for wall assemblies as required in Building Code (Ref: 2015 IBC Sec. 1405.4 and 2018 IBC Sec. 1404.4).

Through Wall Flashing (TWF) is permitted for use in wall assemblies clad with masonry or stone at the base of wall, head of wall, relieving angle, window head, windowsill, and at other interruptions in the exterior cavity. TWF shall be applied at a maximum of 8" onto the back-up wall and terminate at daylight or onto a drip edge. The following TWF products may be used:

1) CCW-705 TWF/XLT*

2) Pre-Kleened EPDM TWF loose-laid or adhered with Sure-Seal 90-8-30A Bonding Adhesive or Sure-Seal Low-VOC Bonding Adhesive

3) Metal TWF by others

Note 5: BRT-801 tape may be used over Fire-Resist 705 RS at membrane splices, terminations, and penetrations. Fire-Resist 705 RS and the substrate may be treated with CCW-702, CCW-702 LV, CCW-702 WB, or Low-VOC Travel-Tack to promote adhesion of BRT-801.

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CARLISLE SPRAY FOAM INSULATION

MATERIAL COMPATIBILITY SHEET

Spray-Applied Polyurethane Foam

All SealTite PRO spray-applied polyurethane foam insulation products are compatible with and readily adhere to many common building materials including but not limited to:

- Gypsum Board
- PEX Tubing[1]
- Polyvinyl Chloride (PVC)
- Polyisocyanurate Board
- OSB
- Common Blow-in Insulation
- Acrylonitrile Butadiene Styrene (ABS)
- SealTite PRO Open Cell Products applied to SealTite PRO Closed Cell Products
- One Component Polyurethane Foams
- Exterior Gypsum Board
- Concrete Masonry Unity (CMU)
- Polyethylene
- Polypropylene
- Chlorinated Polyvinylchloride (CPVC)[2]
- Common Electrical Wiring
- Galvanized Metal
- Common Batt Insulation
- Steel Studs
- Wood Studs
- Concrete
- Aluminum
- Copper
- Stainless Steel
- Carbon Steel
- Plywood
- Vinyl
- Spray-applied fire-resistive materials (SFRM)

COMMON LOW VOLTAGE WIRING[3]

Romex Brand SIMpull Type NM-B
Coaxial cables: RG6
Ethernet cables: Cat5E & Cat6
Fire Alarm Cable: 16AWG/2, 14AWG/2, 18AWG/4

SealTite™ PRO

RECOMMENDED APPLICATION PROCEDURE FOR TEMPERATURE SENSITIVE MATERIALS:

1) PEX Tubing	1st Pass	2nd Pass
SealTite PRO Open Cell, High Yield, and No Mix	No Limit	–
SealTite PRO OCX and No Trim 21	6"	No Limit
SealTite PRO Closed Cell Products	0.5"	2"

Note: Some PEX tubing connector manufactures do not allow their PPSU based connectors to contact SPF. In this situation, CSFI recommends wrapping the PPSU connector with minimum 4 mils of polyethylene prior to SPF application.

2) Chlorinated Polyvinylchloride (CPVC)	1st Pass	2nd Pass +
SealTite PRO Open Cell, High Yield, and No Mix	No Limit	–
SealTite PRO OCX, and No Trim 21	6"	No Limit
SealTite PRO Closed Cell Products	0.5"	2"

3) Common Low Voltage Wiring	1st Pass	2nd Pass +
SealTite PRO Open Cell Products	3.5"	6"
SealTite PRO Closed Cell Products	0.5"	2"

Disclaimer: It is the responsibility of the applicator to ensure equipment and ambient/substrate conditions are appropriate for SPF application. It is the responsibility of the applicator and/or construction manager ultimately to prove product suitability. Sufficient time must be allowed for SPF to cool between passes. For more information please refer to product Technical Data Sheets and Application Guides.

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CARLISLE SPRAY FOAM INSULATION

Spray-Applied Polyurethane Foam

Carlisle Coatings & Waterproofing (CCW) and Henry® Products Compatible with SealTite PRO Spray-Applied Polyurethane Foam Insulation

Through-Wall Flashing Installed with Unit Masonry	Sec 04 05 23	CCW-705 TWF, Blueskin TWF Pre-Kleened™ EPDM TWF CCW-705 TWF XLT
Adhered Sheet Blindside Waterproofing	Sec 07 13 00	MiraPLY™-H MiraPLY-V Blueskin PreSeal 320 Blueskin PreSeal 435
Sheet Waterproofing	Sec 07 13 00	CCW Sure-Seal® 60-Mil EPDM CCW-711 70 CCW-711 90 MiraDRI® 860 ULT MiraDRI 860/861 Henry WP200
Cold Fluid-Applied Waterproofing	Sec 07 14 16	MiraSEAL™ CCW-703 V Barricoat® CCW-570 System Henry Pumadeq system Henry Prodeq System Henry CM100 Aqua-Bloc WB Aqua-Bloc 2P
Sheet Wall Membranes & Flashings	Sec 07 27 13	CCW-705, Blueskin SA CCW-705 XLT, Blueskin SA LT Fire Resist™ 705 FR-A, Blueskin Metal-Clad Fire Resist 705 FR-A XLT, Blueskin Metal-Clad LT Aluma-GRIP™ 701, Blueskin Butyl-Flash, SURE-SEAL P/S Elastoform Foil-GRIP™ 1402
	Sec 07 27 26	Fire Resist 705 VP, Blueskin VP160
Fluid-Applied Wall Membranes & Flashings	Sec 07 27 26	Fire Resist Barritech VP, Air-Bloc 17MR, Air-Bloc 33MR Fire Resist Barritech NP™ Fire Resist Barritech NP LT, Air-Bloc 16MR Fire Resist Barrithane VP, Air-Bloc All Weather STPE Barriseal® Barribond, Barribond HP, Air-Bloc LF Barribond XL
Hot Fluid-Applied Waterproofing	Sec 07 14 13	CCW-500 Henry 790-11

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SEALTITE™ PRO HFO

Carlisle Spray Foam Insulation is a leading manufacturer of spray polyurethane foam systems in North America. Previously marketed under Accella Polyurethane Systems, Bayer Material Science and Covestro - Carlisle Spray Foam Insulation is a fully integrated, spray foam insulation provider, backed by the technology resources - and grounded on the corporate stability - of a century-old icon in the building ecosystem - Carlisle Construction Materials. Our SealTite™ PRO product line of spray foam building insulation solutions is the superior insulation choice for your next project. Compared to traditional fibrous insulation products, SealTite PRO spray foam insulation can be used in both interior and exterior applications to achieve superior performance by providing four levels of protection in one: Thermal, Air, Water, and Vapor.

Carlisle Spray Foam Insulation is focused on developing spray foam insulation solutions to help architects design safe, resilient, energy efficient buildings with low environmental impacts. When planning a project, you need to know more than the technical information about the products you are specifying. Our SealTite PRO products lead the spray foam industry with the most listed Underwriters Laboratory (UL) hourly fire rated designs and the most extensive NFPA 285 compliant wall assemblies. Our commitment to SERVICE BEYOND THE SPEC SHEET provides the assurance that the products you recommend and ultimately specify are thoroughly tested for performance, designed to meet today's demanding building codes, and backed by expert service.

Carlisle Spray Foam Insulation is the only spray foam manufacturer that provides everything needed to completely seal and protect the building envelop. Together with other CCM brands such as Hunter Panels, Insulfoam, CCW, Henry, and PAC-CLAD, CSFI offers designers the most flexibility and design options to create high performance building envelope solutions from a single source ensuring material compatibility and total system performance.

THERMAL INSULATION
SECTION 07 21 19
FOAMED-IN-PLACE INSULATION

Specifier Notes: This Section covers Carlisle Spray Foam Insulation's "**SealTite PRO HFO**" closed-cell, spray-applied, polyurethane foam (SPF) insulation. "**SealTite PRO HFO**" is available in two grades "Regular" and "Winter" for warm and cold weather applications. Consult Carlisle Spray Foam Insulation (CSFI) for assistance in editing this Section for the specific application.

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Closed-cell, spray-applied, polyurethane foam plastic (SPF) insulation.

1.2 RELATED SECTIONS

ATTENTION SPECIFIER: Edit the following list of related sections as required for the Project. Limit the list to sections with specific information that the reader might expect to find in this Section but is specified elsewhere.

A. Section 06 16 00 – Sheathing for polyisocyanurate-foam exterior sheathing.
B. Section 07 21 00 – Thermal Insulation for foam-plastic board insulation.
C. Section 07 26 00 – Vapor Barrier.
D. Section 07 27 00 – Air Barriers.
E. Section 07 57 00 – Coated Foamed Roofing.
F. Section 07 80 00 – Fireproofing
G. Section 07 84 00 – Thermal Barrier
H. Section 09 25 00 – Gypsum Board
I. Section 09 96 46 – Intumescent Painting.

1.3 REFERENCES

ATTENTION SPECIFIER: Delete any references listed below that may not be required by the final version of this project specification.

A. American Society for Testing and Materials (ASTM) International:

1. ASTM C 518 – Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
2. ASTM D 1621 – Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
3. ASTM D 1622 / D 1622M – Standard Test Method for Apparent Density of Rigid Cellular Plastics.
4. ASTM D 1623 – Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.
5. ASTM D 2126 – Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
6. ASTM D 2842 – Standard Test Method for Water Absorption of Rigid Cellular Plastics.
7. ASTM D 6226 –Standard Test Method for Open Cell Content of Rigid Cellular Plastics
8. ASTM E 84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
9. ASTM E 96 / E 96M – Standard Test Methods for Water Vapor Transmission of Materials.
10. ASTM E 2178 – Standard Test Method for Air Permeance of Building Materials.
11. ASTM C 1338 – Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings
12. ASTM E 2768 – Standard Test Method for Extended Duration Surface Burning Characteristics of Building Materials

B. National Fire Protection Association (NFPA):

1. NFPA 259: Standard Test Method for Potential Heat of Building Materials
2. NFPA 286: Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth

C. ICC Evaluation Service (ICC-ES):

1. ICC-ES AC377 - Acceptance Criteria for Spray-Applied Foam Plastic Insulation.

D. International Association of Plumbing and Mechanical Officials (IAPMO):

1. IAPMO Evaluation Report UES-720 – SealTite PRO HFO Spray-Applied Polyurethane Foam Plastic Insulation. (www.uniform-es.org).

E. Spray Polyurethane Foam Alliance (SPFA).
F. Underwriters Laboratory (UL):

1. UL 263 – Fire Tests of Building Construction and Material.
2. UL 1715 - Fire Test of Interior Finish Material.
3. UL 2818 – 2013 Gold Standard for Chemical Emissions for Building Materials, Finishes and Furnishings.

1.4 SUBMITTALS

ATTENTION SPECIFIER: Edit submittal requirements as required for the Project. Delete submittals not required.

A. Comply with Division 01.
B. Product Data: Submit manufacturer's product technical data sheets, including surface preparation and application instructions.
C. Manufacturer's Certification:

1. Submit manufacturer's certification that materials comply with specified requirements and are suitable for intended application.
2. Submit manufacturer's certification from Spray Polyurethane Foam Alliance Professional Certification Program (SPFA PCP) as Accredited Supplier Company.
3. Submit manufacturer's Authorized Contractor Certificate for the installer.
4. Submit manufacturer's Hydrofluorocarbon (HFC) compliance statement.

D. Product Evaluation Reports: Submit manufacturer's product evaluation reports from accredited evaluation service.
E. Environmental Product Declaration (EPD): Submit product specific EPD.
F. Warranty Documentation: Submit manufacturer's standard warranty.

1.5 QUALITY ASSURANCE

A. Manufacturer's Qualifications:

1. Manufacturer regularly engaged, for a minimum of 10 years, in the manufacturing of polyurethane foam insulation of similar type to that specified.
2. Spray foam insulation products manufactured by an ISO 9001:2015 certified company.
3. Spray foam insulation products manufactured by an ISO 14001:2015 certified company.
4. SPFA Professional Certification Program as Accredited Supplier Company.

B. Applicator's Qualifications:

1. Applicator regularly engaged, for a minimum of 5 years, in application of spray polyurethane foam insulation of similar type to that specified.
2. Authorized by manufacturer to install their products.
3. Use persons trained by manufacturer in polyurethane foam insulation application or certified by SPFA Professional Certification Program.

1.6 PRE-INSTALLATION CONFERENCE

ATTENTION SPECIFIER: Edit preinstallation meetings as required for the Project. Delete if not required.

A. Convene preinstallation meeting [1 week] [2 weeks] before start of work of this Section.
B. Require attendance of parties directly affecting Work of this Section, including Contractor, Architect, applicator, and manufacturer's representative.
C. Review the Following:

1. Materials.
2. Protection of in-place conditions.
3. Surface preparation.
4. Application.
5. Field quality control.
6. Cleaning.
7. Protection.
8. Coordination with other Work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name, manufacturer, safety information, net weight of contents, expiration date and HFC compliance statement.
B. Storage and Handling Requirements:

1. Store and handle materials in accordance with manufacturer's instructions.
2. Keep materials in manufacturer's original, unopened containers and packaging until application.
3. Store materials in clean, dry area indoors.
4. Store materials at 70°F - 80°F (21°C - 27°C) a minimum of 48 hours before use.
5. Store materials out of direct sunlight.
6. Protect materials from freezing.
7. Protect materials during storage, handling, and application to prevent contamination or damage.
8. Remove empty containers from the job site daily.

1.8 PROJECT CONDITIONS

ATTENTION SPECIFIER: Edit the following paragraph for the grade of polyurethane foam insulation specified in Part 2 of this Section.

A. Ambient and Substrate Temperatures:

1. SealTite PRO HFO - Regular: Between 50°F and 120°F (10°C and 49°C).
2. SealTite PRO HFO - Winter: Between 25°F and 70°F (-4°C and 21°C).

B. Moisture: Do not apply polyurethane foam insulation when moisture in form of rain, snow, ice, fog, frost, or dew is expected during application.
C. Relative Humidity: Do not apply polyurethane foam insulation when relative humidity over 85% is expected during application.
D. Wind: Do not apply polyurethane foam insulation with wind speed above 12 mph.
E. Do not apply polyurethane foam insulation under ambient conditions outside manufacturer's limits.
F. Ventilate insulation application areas and protect workers in accordance with the *Spray Foam Coalition's Guidance on best practices for the installation of Spray Polyurethane Foam*.
G. Protect adjacent surfaces, windows, equipment, and site areas from damage by overspray.

1.9 WARRANTY

A. Manufacturer's Warranty: Manufacturer warrants that the spray polyurethane foam insulation, when installed by authorized applicators and applied in accordance with the published application instructions, will perform as stated on the Product Technical Data Sheet.

1. This warranty is in effect throughout the life of the building provided the original purchaser submits the warranty registration form within 30 days of occupancy.
2. Manufacturer's sole responsibility under this Limited Lifetime Warranty shall be to repair or replace any defective Product at the cost of the material only.
3. Manufacturer shall not be responsible for labor costs, or any other costs whatsoever related to, or in connection with the removal or installation of either the original or replacement product.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Manufacturer: Carlisle Spray Foam Insulation, 100 Enterprise Dr.; Cartersville, GA 30120; Phone: 844-922-2355; Website: https://www.carlislesfi.com

ATTENTION SPECIFIER: Specify if substitutions will be permitted.

B. Substitutions: [Not permitted] [Comply with Division 01].

2.2 FOAMED-IN-PLACE INSULATION

A. Basis of Design: "SealTite PRO HFO" spray-applied polyurethane foam (SPF) insulation.
B. Description: Two-component, HFO blown, Closed-Cell, Medium-Density, Spray-Applied Polyurethane Foam Plastic Insulation: ASTM C1029, Type II.
C. Standards Compliance.

1. Acceptance Criteria: ICC-ES AC 377.
2. Evaluation Report: IAPMO UES-720.
3. Greenguard Gold.

D. Typical Physical Properties.

1. Air Leakage Rate, ASTM E 2178:

    a. Less than 0.02 L/s-m^2 (0.004 ft^3/min-ft^2) at 1 inch.
    b. Less than 0.01 L/s-m^2 at 2 inches.
    c. Less than 0.008 L/s-m^2 at 3 inches.

2. Water Vapor Transmission (Permeance), ASTM E 96 Procedure A: 1.0 perms at 1 inch.
3. Core Density, ASTM D 1622: 2.0 pcf, nominal.
4. R-Value, Aged, ASTM C 518:

    a. 7.2 (ft^2·°F·h/BTU) at 1 inch.
    b. 22 at 3 inches.
    c. 25 at 3.5 inches.
    d. 40 at 5.5 inches.

5. Compressive Strength, ASTM D 1621: 31 psi, nominal.
6. Tensile Strength, ASTM D 1623: 39 psi, nominal.
7. Water Absorption, ASTM D 2842: Less than 1.5 percent.
8. Dimensional Stability, ASTM D 2126, Change in Volume:

    a. 28 days at -4°F (-20°C) at Ambient Humidity: Less than 1%.
    b. 28 days at 175°F (80°C) at Ambient Humidity: Less than 3%.
    c. 28 days at 160°F (70°C) and 97% Relative Humidity: Less than 6%.

9. Closed Cell Content, ASTM D 6226: Greater than 96 percent.
10. Surface Burning Characteristics, ASTM E 84, 4 Inches:

    a. Flame Spread Index: Less than 25.
    b. Smoke Developed Index: Less than 450.

11. Extended Duration Surface Burning Characteristics, ASTM E 2768

    a. Flame Spread Index: Less than or equal to 10.
    b. Smoke Developed Index: Less than or equal to 300.

12. Fungi Resistance, ASTM C 1338: No Growth.
13. Potential Heat of Combustion, NFPA 259:

    a. 11,024 (btu/lb) [25,643 (kJ/kg)].
    b. 1,984 (btu/ft^2) per inch.

E. Compliance with State Environmental Regulations.

1. Global Warming Potential: Less than or equal to one (1).
2. Ozone Depletion Potential: Zero (0).

F. Toxicity and Hazardous Materials.

1. UL Greenguard Certification for low-chemical emissions in accordance with UL 2818: Greenguard Gold.
2. Product containing no added urea-formaldehyde.
3. PBDE-free product.
4. Free of flammable blowing agents.
5. Does not contain Hydrofluorocarbons (HFCs)
6. Does not contain brominated flame retardants.
7. Free of trans-1,2-Dichloroethene, TDCE, 1,2-Dichloroethene, 1,2-DCE, and trans-dichloroethylene.

2.3 ACCESSORIES

ATTENTION SPECIFIER: Consult Manufacturer for substrate conditions requiring application of a primer. Delete if not required.

A. Primer: Material recommended by insulation manufacturer where required for adhesion of insulation to substrates.

ATTENTION SPECIFIER: Include "Thermal Barrier" intumescent coating if required to separate spray foam from occupied spaces. Delete options not required.

B. Thermal Barrier (Fire Resistive) Intumescent Coatings: Fire-protective intumescent coating formulated for application over polyurethane foam plastics, compatible with insulation, and passes NFPA 286 or UL 1715 testing as part of an approved assembly.

1. DC315 as manufactured by International Fireproof Technology, Inc.
2. No-Burn Plus ThB as manufactured by No-Burn, Inc.
3. Flame Control 60-60A as manufactured by Flame Control Coatings, Inc.
4. Fireshell F10E as manufactured by ICP Construction.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas to receive polyurethane foam insulation.
B. Notify Architect of conditions that would adversely affect application.
C. Do not begin surface preparation or application until unacceptable conditions are corrected.

3.2 PREPARATION

A. Protection of In-Place Conditions:

1. Protect adjacent surfaces from contact with overspray.
2. Protect electrical outlet and junction boxes from contact with polyurethane foam insulation.

B. Surface Preparation:

1. Prepare surfaces in accordance with manufacturer's instructions.

2. Remove dirt, dust, debris, oil, grease, rust, loose scale, ice, frost, moisture, and other surface contaminants which could adversely affect application of polyurethane foam insulation.

3.3 APPLICATION

A. Spray-apply polyurethane foam insulation in accordance with manufacturer's instructions at locations indicated on the Drawings.
B. Material Temperature: Maintain materials in containers at 65°F to 85°F (18°C to 29°C) while in use.
C. Ensure substrates are dry during application.
D. Insulation Thickness:

1. Maximum Pass Thickness: 4 inches.
2. Total Thickness: Indicated on the Drawings.

E. Apply polyurethane foam insulation to uniform thickness without voids, pinholes, cracks, and crevices.

ATTENTION SPECIFIER: Include the following paragraph if polyurethane foam insulation is to be covered with intumescent coating.

F. Intumescent Coating:

1. Cover polyurethane foam insulation with intumescent coating at locations indicated on the Drawings.
2. Apply intumescent coating as specified in Section 09 96 46.

3.4 FIELD QUALITY CONTROL

ATTENTION SPECIFIER: Specify field quality control for application of polyurethane foam insulation as required for the Project.

A. Inspect completed application of polyurethane foam insulation, including:

1. Total thickness.
2. Free of voids, pinholes, cracks, and crevices.
3. Adhesion to substrate.

3.5 CLEANING

A. Promptly clean surfaces that receive overspray of polyurethane foam insulation.
B. Do not use harsh cleaning materials or methods that could damage surfaces.

3.6 PROTECTION

A. Protect Work of this Section from damage during construction.

END OF SECTION

SealTite PRO

ENVIRONMENTAL, HEALTH, AND SAFETY

Carlisle Spray Foam Insulation Safety Data Sheet

1. Identification of Substance:

Product Name: POLYURETHANE FOAM A-COMPONENT

Supplier Identification:
Carlisle Spray Foam Insulation

Address:
2500 Adie Road
Maryland Heights, MO 63043

Telephone:
314-872-8700

24-Hr. Emergency Phone Number:
CHEMTREC (800) 424-9300
INTERNATIONAL: +1-(703) 527-3887

Product Use: Polyurethane isocyanate component

2. Hazards Identification

GHS Ratings:

Inhalation Toxicity	Acute Tox. 4	Gases>2500+<=5000ppm, Vapors>10+<=20mg/l, Dusts&mists>1+<=5mg/l
Skin corrosive	2	Reversible adverse effects in dermal tissue, Draize score: >= 2.3 < 4.0 or persistent inflammation
Eye corrosive	2A	Eye irritant: Subcategory 2A, Reversible in 21 days
Respiratory sensitizer	1	Respiratory sensitizer
Skin sensitizer	1	Skin sensitizer
Organ toxin single exposure	3	Transient target organ effects- Narcotic effects- Respiratory tract irritation
Organ toxin repeated exposure	1	Significant toxicity in humans- Reliable, good quality human case studies or epidemiological studies Presumed significant toxicity in humans- Animal studies with significant and/or severe toxic effects relevant to humans at generally low exposure (guidanc

GHS Hazards

H315	Causes skin irritation
H317	May cause an allergic skin reaction
H319	Causes serious eye irritation
H332	Harmful if inhaled
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled
H335	May cause respiratory irritation
H336	May cause drowsiness or dizziness
H372	Causes damage to organs through prolonged or repeated exposure

GHS Precautions

P260	Do not breathe dust/fume/gas/mist/vapors/spray
P261	Avoid breathing dust/fume/gas/mist/vapors/spray
P264	Wash hands thoroughly after handling
P270	Do not eat, drink or smoke when using this product
P271	Use only outdoors or in a well-ventilated area
P272	Contaminated work clothing should not be allowed out of the workplace

P280	Wear protective gloves/protective clothing/eye protection/face protection
P285	In case of inadequate ventilation wear respiratory protection
P312	Call a POISON CENTER or doctor/physician if you feel unwell
P314	Get Medical advice/attention if you feel unwell
P321	Specific treatment is urgent (see Section 4 First Aid measures)
P362	Take off contaminated clothing and wash before reuse
P363	Wash contaminated clothing before reuse
P302+P352	IF ON SKIN: Wash with soap and water
P304+P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
P304+P341	IF INHALED: If breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing
P305+P351+P338	IF IN EYES: Rinse continuously with water for several minutes. Remove contact lenses if present and easy to do – continue rinsing
P332+P313	If skin irritation occurs: Get medical advice/attention
P333+P313	If skin irritation or a rash occurs: Get medical advice/attention
P337+P313	Get medical advice/attention
P342+P311	Call a POISON CENTER or doctor/physician
P405	Store locked up
P403+P233	Store in a well ventilated place. Keep container tightly closed
P501	Dispose of contents/container in accordance with existing federal, state, and local environmental control laws.

Signal Word: Danger

Acute Health Effects:
Eyes: Severe irritation, tearing, swelling, and possible damage to cornea.
Skin: Irritation, redness, swelling, skin sensitization, rash, scaling, and blistering.
Inhalation: Mucous membrane and respiratory tract irritation, tightness of chest, isocyanate sensitization.
Ingestion: Irritating and corrosive to mouth, stomach, and digestive tract.

Conditions Aggravated by Exposure: Asthma, respiratory disorders, skin disorders, and eye disorders.

Chronic Health Effects: Isocyanates may cause skin and respiratory sensitivity in some individuals. Sensitized individuals may react to very low levels diisocyanates below the PEL. Sensitized people who continue to work with diisocyanates may develop symptoms sooner after each exposure. Limited evidence of possible carcinogenic effects. Possible other harmful target organ effects.

3. Composition/Data on Components:

Chemical Name	CAS number	Weight Concentration %
Isocyanic acid, polymethylenepolyphenylene ester	9016-87-9	50.00% - 60.00%
4,4'-Methylenediphenyl diisocyanate	101-68-8	30.00% - 40.00%
Benzene, 1-isocyanato-2-[(4-isocyanatophenyl)methyl]-	5873-54-1	1.00% - 5.00%

4. First Aid Measures:

After Inhalation: May cause severe irritation to upper respiratory tract and lungs, respiratory sensitization, decreased lung capacity.

Remove from exposure area to fresh air. Administer oxygen or artificial respiration as needed. Obtain medical attention.

After Eye Contact: Rinse opened eye for at least 15 minutes under running water.
Remove contact lenses if present and easy to do so, and continue rinsing. If irritation persists contact physician

After Skin Contact: Remove contaminated clothing. Clean affected area with soap and plenty of water. Call a physician if irritation or rash develops.

After Swallowing: Do not induce vomiting. If conscious, give 1 to 2 cups of milk or water to drink. Consult a physician at once.

Notes to Physician: Treat symptomatically. Following severe exposure the patient should be kept under medical observation for a least 48 hours.

5. Fire Fighting Measures:

Flash Point: 230 C (446 F)

LEL: N/A UEL: N/A

Upper and Lower Explosive Limits listed if known.

Suitable Extinguishing Agents: Water spray, CO2, Foam, Dry chemical

Information about Protection against Explosions and Fires: During the incipient stage of a fire, containers should be kept cool by spraying with water (i.e., water suppression system) on the outside of container. Water spray will help prevent containers from overheating. Use cold-water spray to cool fire-exposed containers to minimize risk of rupture. Large fires can be extinguished with high volumes of water, such as from a fire hose applied from a safe distance. Closed containers may rupture when exposed to extreme heat due to build-up of pressure from thermal degradation and/or carbon dioxide generation.

Section 5 pertains to fire-fighting measures and reactivity is addressed in section 10.

Dangerous Products of Decomposition: Oxides of carbon, oxides of nitrogen, isocyanates, and traces of HCN.

Protective Equipment: Full emergency equipment with self-contained breathing apparatus and full protective clothing should be worn by firefighters.

6. Accidental Release Measures:

Person-Related Safety Precautions: Evacuate all non-essential personnel. Avoid contact with skin. Do not breathe aerosols or vapors.

Measures for Environmental Protection: Cover and contain spill with absorbent material. Place waste in open container. Remove to well ventilated area and dilute with ammonia solution (water 90%, concentrated ammonia 8%, detergent 2%). Collect for proper disposal according to local, state, and federal regulations.

Small Spills: Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal. Wipe up with absorbent material (e g. cloth, fleece) clean surface thoroughly to remove residual contamination.

Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Use a non-combustible material like vermiculite, sand or earth to soak up the product and place

Into a container for later disposal. Following product recovery, flush area with water.

7. Handling and Storage:

Information for Safe Handling: Do not breathe fumes, vapors or mists. Use only with adequate ventilation. Avoid contact with skin or eyes. Immediately report spills or leaks.

Storage Requirements: Store containers in a dry, well ventilated area. Keep containers tightly closed and prevent moisture contamination. Do not re-seal the container if contamination is suspected. Store between 60ºF and 100ºF.

Regulatory Requirements: Store according to all local, state, and federal regulations.

8. Exposure Controls and Personal Protection:

Chemical Name / CAS No.	OSHA Exposure Limits	ACGIH Exposure Limits	Other Exposure Limits
Isocyanic acid, polymethylenepolyphenylene ester 9016-87-9	Not Established	Not Established	Not Established
4,4'-Methylenediphenyl diisocyanate 101-68-8	0.005 ppm TWA 0.02 ppm STEL	0.005 ppm TWA (listed under Methylene bisphenyl isocyanate (MDI))	NIOSH: 0.005 ppm TWA (listed under Methylene bisphenyl isocyanate); 0.05 mg/m3 TWA 0.020 ppm Ceiling (10 min); 0.2 mg/m3 Ceiling (10 min)
Benzene, 1-isocyanato-2-[(4-isocyanatophenyl)methyl]- 5873-54-1	Not Established	Not Established	Not Established

Engineering Controls: Use local exhaust ventilation to maintain airborne concentrations below the TLV, especially if heating or spraying. Use only in a well ventilated area to keep vapors below exposure limits. Use local exhaust ventilation if necessary.

General Protective and Hygienic Measures: Usual precautionary measures should be adhered to when handling chemicals.

Personal Protective Equipment:
Respiratory Protection: Do not inhale vapors. Use NIOSH approved respiratory protection if TLV/PEL is exceeded. Do not enter storage area unless adequately ventilated.
Hand Protection: Protective butyl rubber or nitrile rubber gloves.
Eye Protection: Chemical safety goggles.
Body Protection: Impervious protective work clothing. Launder separately.

Contaminated Gear: Observe local requirements. Dispose of in accordance with local/state/federal regulations.

9. Physical and Chemical Properties:

Physical properties listed where known.

Appearance: Brown liquid	**Odor:** Musty

Vapor Pressure: N/A	**Odor threshold:** N/A
Vapor Density: N/A	**pH:** N/A
Specific Gravity 1.23	**Melting point:** N/A
Freezing point: N/A	**Solubility:** N/A
Boiling range: N/A	**Flash point:** 446°F,230°C
Evaporation rate: N/A	**Flammability:** N/A
Explosive Limits: N/A	**Partition coefficient (n-octanol/water):** N/A
Autoignition temperature: 240°C	**Decomposition temperature:** N/A

10. Stability and Reactivity:

Chemical Incompatible Materials: MDI will react with a wide range of common chemicals. During use of this product in the work environment, protect the product from contamination such as inadvertent contact with water, amines, strong bases and alcohols. For example, allowing water inside an MDI container will lead to the generation of carbon dioxide gas and result in the development of excess pressure if the container is tightly re-sealed.

Hazardous Polymerization: Not expected to occur under normal conditions.

Dangerous Products of Decomposition: Oxides of carbon, oxides of nitrogen, hydrocarbons, isocyanates, and traces of HCN.

11. Toxicological Information:

Mixture Toxicity

Inhalation Toxicity LC50: 2mg/L

Component Toxicity

9016-87-9	Isocyanic acid, polymethylenepolyphenylene ester Dermal LD50: 490 mg/L (Rat) Inhalation LC50: 490 mg/m3 (Rat)
101-68-8	4,4'-Methylenediphenyl diisocyanate Dermal LD50: 0 mg/L (Rat) Inhalation LC50: 369 mg/m3 (Rat)

Individual Toxicity Values Listed if Known

Acute Toxicity:
Eyes: Severe irritation, tearing, swelling, and possible damage to cornea.
Skin: Irritation, redness, swelling, skin sensitization, rash, scaling, and blistering.

Inhalation: Mucous membrane and respiratory tract irritation, tightness of chest, isocyanate sensitization.

Ingestion: Irritating and corrosive to mouth, stomach, and digestive tract.

Chronic Effects: Isocyanates may cause skin and respiratory sensitivity in some individuals. Sensitized individuals may react to very low levels diisocyanates below the PEL. Sensitized people who continue to work with diisocyanates may develop symptoms sooner after each exposure. Limited

evidence of possible carcinogenic effects.

Routes of Entry: Inhalation, Ingestion, skin contact, eye contact.
Target Organs: Respiratory tract, eyes, skin.
Chemicals with Known or Possible Carcinogenic Effects:

CAS Number	Description	% Weight	Carcinogen Rating
None			None

12. Ecological Information:

General Information: Based on experience, no adverse effects are to be expected if correct disposal procedures have been followed as indicated in section 13.

Individual component ecotoxicity listed if known.

Component Ecotoxicity	
4,4'-Methylenediphenyl diisocyanate	24 Hr LC50 Brachydanio rerio: >500 mg/L 24 Hr EC50 Daphnia magna: >500 mg/L

13. Disposal Considerations:

Recommendation: Observe local requirements. Dispose of in accordance with local/state/federal regulations.

Empty Container Precautions: Empty containers retain product residue; observe all precautions for product. Do not heat or cut empty container with electric or gas torch because highly toxic vapors and gases are formed. Do not reuse without thorough commercial cleaning and reconditioning. If container is to be disposed, ensure all product residues are removed and container is empty prior to disposal. Contact the Reusable Industrial Packaging Association (RIPA) at 301-577-3786 to find a drum re-conditioner in North America (www.reusablepackaging.org).

14. Transport Information:

DOT Regulated Components:

4,4' Methylene Diphenyl Diisocyanate
Reportable Quantity: 5000 lbs

When in individual containers of less than the substance RQ, this material ships as non-regulated. Containers above RQ ship as:

Agency	Proper Shipping Name	UN Number	Packing Group	Hazard Class
DOT	Environmentally Hazardous Substance, N.O.S. (Contains Diphenylmethane Diisocyanate)	3082	III	9

15. Regulatory Information:

OSHA HAZARD COMMUNICATION STANDARD: This material is classified as hazardous in accordance with OSHA 29 CFR 1910.1200.

SARA 311/312 Hazard Categories: Acute health hazard, chronic health hazard

WARNING: This product can expose you to chemicals listed below, which are known to the State of California to cause cancer, birth defects, or reproductive harm. For more information, visit www.P65Warnings.ca.gov

- None

Massachusetts Right To Know List:

4,4'-Methylenediphenyl diisocyanate 101-68-8 30 to 40 %

New Jersey Right To Know List:

Isocyanic acid, polymethylenepolyphenylene ester 9016-87-9 50 to 60 %

Pennsylvania Right To Know List:

4,4'-Methylenediphenyl diisocyanate 101-68-8 30 to 40 %

SARA 302 Extremely Hazardous Substances:

- None

Chemicals subject to SARA 313 Reporting:

4,4'-Methylenediphenyl diisocyanate 101-68-8 30 to 40 % Emissions
Isocyanic acid, polymethylenepolyphenylene ester 9016-87-9 50 to 60 % Emissions

Country	Regulation	All Components Listed
Canada	Canada DSL	Yes
US	Toxic Substances Control Act	Yes

16. Other Information:

Safety Data Sheet issued by Product Safety Department

This information is furnished without warranty, expressed or implied, except that it is accurate to the best knowledge of Carlisle Spray Foam Insulation. The data on these sheets relates only to the specific material designated herein. Carlisle Spray Foam Insulation assumes no legal responsibility for use or reliance upon this data. It is the user's responsibility to ensure that their activities comply with federal, state, or local laws.

Date revised: 2018-12-07 Reviewer Revision 0
Date Prepared: 12/7/2018

Carlisle Spray Foam Insulation Safety Data Sheet

1. Identification of Substance:

Product Name: SealTite PRO HFO

Supplier Identification:
Carlisle Spray Foam Insulation

Address:
100 Enterprise Dr.
Cartersville, GA 30120

Telephone:
(770) 607-0755

24-Hr. Emergency Phone Number:
CHEMTREC (800) 424-9300
INTERNATIONAL: +1-(703) 527-3887

Product Use: Polyurethane polyol component

2. Hazards Identification:

GHS Ratings:

Skin corrosive	2	Reversible adverse effects in dermal tissue, Draize score: >= 2.3 < 4.0 or persistent inflammation
Eye corrosive	2A	Eye irritant: Subcategory 2A, Reversible in 21 days
Reproductive toxin	1B	Presumed, Based on experimental animals
Organ toxin repeated exposure	2	Presumed to be harmful to human health- Animal studies with significant toxic effects relevant to humans at generally moderate exposure (guidance)- Human evidence in exceptional cases

GHS Hazards

H315	Causes skin irritation
H319	Causes serious eye irritation
H360	May damage fertility or the unborn child
H373	May cause damage to organs through prolonged or repeated exposure

GHS Precautions

P201	Obtain special instructions before use
P202	Do not handle until all safety precautions have been read and understood
P260	Do not breathe dust/fume/gas/mist/vapors/spray
P264	Wash hands thoroughly after handling
P280	Wear protective gloves/protective clothing/eye protection/face protection
P281	Use personal protective equipment as required
P314	Get Medical advice/attention if you feel unwell
P321	Specific treatment is urgent (see Section 4 First Aid measures)
P362	Take off contaminated clothing and wash before reuse
P302+P352	IF ON SKIN: Wash with soap and water
P305+P351+P338	IF IN EYES: Rinse continuously with water for several minutes. Remove contact lenses if present and easy to do – continue rinsing
P308+P313	IF exposed or concerned: Get medical advice/attention
P332+P313	If skin irritation occurs: Get medical advice/attention
P337+P313	If eye irritation persists: Get medical advice/attention.
P405	Store locked up

P501	Dispose of contents/container in accordance with existing federal, state, and local environmental control laws.

Signal Word: Danger

Acute Toxicity:
Eyes: Irritating to eyes.
Skin: Irritating to skin.
Inhalation: Not expected to be a route of exposure.
Ingestion: Harmful if swallowed. Consult physician.

Chronic Effects: Possible harmful target organ effects

3. Composition/Data on Components:

Chemical Name	CAS number	Weight Concentration %
2-Propanol, 1-chloro-, phosphate (3:1)	13674-84-5	10.00% - 20.00%
(E)-1-Chloro-3,3,3-trifluoroprop-1-ene	102687-65-0	5.00% - 10.00%
Oxirane, 2-methyl-, polymer with oxirane, ether with 2,6-bis[[bis(2-hydroxyethyl)amino]methyl]-4-branched	940912-28-7	1.00% - 5.00%
Diethylene glycol	111-46-6	1.00% - 5.00%
2-Butoxyethanol	111-76-2	1.00% - 5.00%
Amine Catalyst	Trade Secret	1.00% - 5.00%
Ethylene glycol	107-21-1	1.00% - 5.00%
Butanedioic acid	110-15-6	1.00% - 5.00%
Triethylene glycol	112-27-6	1.00% - 5.00%

4. First Aid Measures:

Inhalation: If inhaled and symptoms ensue, move to fresh air. If breathing is difficult, give oxygen.

After Eye Contact: Rinse opened eye for at least 15 minutes under running water. Remove contact lenses if present and easy to do so, and continue rinsing. If irritation persists, contact physician

After Skin Contact: Clean affected area with soap and plenty of water.

After Swallowing: Consult physician.

Notes to Physician: Treat symptomatically.

5. Fire Fighting Measures:

Flash Point: 143 C (289 F)

LEL: N/A UEL: N/A

Upper and Lower Explosive Limits listed if known.

Suitable Extinguishing Agents: Water spray, CO2, Foam, Dry chemical.

Information about Protection against Explosions and Fires: Keep away from flames and sources of heat. Closed containers may rupture when exposed to extreme heat.

Dangerous Products of Decomposition: Oxides of carbon, oxides of nitrogen, oxides of phosphorus, hydrocarbons, traces of HCN, hydrogen chloride gas, hydrogen fluoride.

Protective Equipment: Firefighters should wear a pressure demand self-contained breathing apparatus and protective clothing.

6. Accidental Release Measures:

Person-Related Safety Precautions: Use appropriate personal protective equipment during clean up. Evacuate and keep unnecessary people out of spill area. Avoid contact with skin and eyes.

Measures for Environmental Protection: Cover and contain spill with absorbent material. Collect for proper disposal according to local, state, and federal regulations.

Small Spills: Absorb with earth, sand or other absorbent material and transfer to containers for later disposal. Wipe up with absorbent material (e g. cloth, fleece) clean surface thoroughly to remove residual contamination.

Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Use an absorbent material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Following product recovery, flush area with water.

7. Handling and Storage:

Information for Safe Handling: Avoid contact with eyes, skin, or inhalation.

Storage Requirements: Store in dry, well-ventilated area. Keep containers tightly closed. Store between 50°F-80°F. Material may settle.

Regulatory Requirements: Obey all local, state, and federal requirements.

8. Exposure Controls and Personal Protection:

Chemical Name / CAS No.	OSHA Exposure Limits	ACGIH Exposure Limits	Other Exposure Limits

2-Propanol, 1-chloro-, phosphate (3:1) 13674-84-5	Not Established	Not Established	Not Established
(E)-1-Chloro-3,3,3-trifluoroprop-1-ene 102687-65-0	Not Established	Not Established	WEEL:OARS - Workplace Environmental Exposure Level (WEEL) Guides 800 ppm
Oxirane, 2-methyl-, polymer with oxirane, ether with 2,6-bis[[bis(2-hydroxyethyl)amino]methyl]-4-branched nonylphenol 940912-28-7	Not Established	Not Established	Not Established
Diethylene glycol 111-46-6	Not Established	Not Established	Not Established
2-Butoxyethanol 111-76-2	50 ppm TWA; 240 mg/m3 TWA	20 ppm TWA	NIOSH: 5 ppm TWA; 24 mg/m3 TWA
Amine Catalyst Trade Secret	Not Established	Not Established	Not Established
Ethylene glycol 107-21-1	50 ppm Cieling	100 mg/m3 Ceiling (aerosol only)	Not Established
Butanedioic acid 110-15-6	Not Established	Not Established	Not Established
Triethylene glycol 112-27-6	Not Established	Not Established	Not Established

Engineering Controls: No specific measures required if proper PPE precautions are followed.

General Protective and Hygienic Measures: Usual precautionary measures should be adhered to when handling chemicals.

Respiratory Protection: In spray applications, an organic vapor/particulate respirator or air supplied unit is necessary.
Protection of Hands: Protective chemical resistant gloves.
Eye Protection: Chemical resistant goggles must be worn.
Body Protection: Protective work clothing. Launder separately.

Contaminated Gear: Observe local requirements. Dispose of in accordance with local/state/federal regulations.

9. Physical and Chemical Properties:

Physical properties listed where known.

Appearance: Amber liquid	**Odor:** Amine odor
Vapor Pressure: N/A	**Odor threshold:** N/A
Vapor Density: N/A	**pH:** N/A
Specific Gravity 1.21	**Melting point:** N/A
Freezing point: N/A	**Solubility:** N/A

Boiling range: 19 - 342°C	**Flash point:** 289°F,143°C
Evaporation rate: N/A	**Flammability:** N/A
Explosive Limits: N/A	**Partition coefficient (n-octanol/water):** N/A
Autoignition temperature: 229°C	**Decomposition temperature:** N/A

10. Stability and Reactivity:

Chemical Incompatible Materials: Avoid contact with isocyanates and strong oxidizing agents.

Hazardous Polymerization: Not expected to occur.

Dangerous Products of Decomposition: Oxides of carbon, oxides of nitrogen, oxides of phosphorus, hydrocarbons, traces of HCN, hydrogen chloride gas, hydrogen fluoride

11. Toxicological Information:

Mixture Toxicity

Oral Toxicity LD50: 2,817mg/kg
Inhalation Toxicity LC50: 24mg/L

Component Toxicity

13674-84-5	2-Propanol, 1-chloro-, phosphate (3:1) Oral LD50: 500 mg/kg (Rat) Dermal LD50: 1,230 mg/kg (Rabbit) Inhalation LC50: 5 mg/L (Rat)
111-46-6	Diethylene glycol Oral LD50: 1,120 mg/kg (Rat) Dermal LD50: 5,000 mg/kg (Rabbit) Inhalation LC50: 5 mg/L (Rat)
111-76-2	2-Butoxyethanol Oral LD50: 1,414 mg/kg (Rat) Dermal LD50: 2,000 mg/kg (Rabbit) Inhalation LC50: 3 mg/L (Rat)
107-21-1	Ethylene glycol Oral LD50: 2,000 mg/kg (Rat) Dermal LD50: 3,500 mg/kg (Rat) Inhalation LC50: 3 mg/kg (Rat)

Individual Toxicity Values Listed if Known

Acute Toxicity:
Eyes: Irritating to eyes.
Skin: Irritating to skin.
Inhalation: Not expected to be a route of exposure.
Ingestion: Harmful if swallowed. Consult physician.

Chronic Effects: Possible harmful target organ effects.

Routes of Entry: Ingestion, skin contact, eye contact.
Target Organs: Skin, eyes, reproductive system, kidneys
Chemicals with Known or Possible Carcinogenic Effects:

CAS Number	Description	% Weight	Carcinogen Rating
None			None

12. Ecological Information:

General Information: Based on experience, no adverse effects are to be expected if correct disposal procedures have been followed as indicated in section 13.

Individual component ecotoxicity listed if known.

Component Ecotoxicity	
2-Propanol, 1-chloro-, phosphate (3:1)	96 Hr LC50 Brachydanio rerio: 56.2 mg/L [static]; 96 Hr LC50 Pimephales promelas: 98 mg/L [static]; 96 Hr LC50 Poecilia reticulata: 30 mg/L [static] 48 Hr EC50 Daphnia magna: 63 mg/L 72 Hr EC50 Desmodesmus subspicatus: 45 mg/L; 96 Hr EC50 Pseudokirchneriella subcapitata: 4 mg/L
(E)-1-Chloro-3,3,3-trifluoroprop-1-ene	96 hr LC50 Oncorhynchus mykiss (rainbow trout): 38 mg/l 48 hr EC50 Daphnia magna: 82 mg/l 72 hr EC50 Algae: 107 mg/l
Diethylene glycol	96 Hr LC50 Pimephales promelas: 75200 mg/L [flow-through] 48 Hr EC50 Daphnia magna: 84000 mg/L
2-Butoxyethanol	96 Hr LC50 Lepomis macrochirus: 1490 mg/L [static]; 96 Hr LC50 Lepomis macrochirus: 2950 mg/L 48 Hr EC50 Daphnia magna: >1000 mg/L
Amine Catalyst	EC50: 100 mg/L
Ethylene glycol	96 Hr LC50 Oncorhynchus mykiss: 41000 mg/L; 96 Hr LC50 Oncorhynchus mykiss: 14 - 18 mL/L [static]; 96 Hr LC50 Lepomis macrochirus: 27540 mg/L [static]; 96 Hr LC50 Oncorhynchus mykiss: 40761 mg/L [static]; 96 Hr LC50 Pimephales promelas: 40000 - 60000 mg/L [static]; 96 Hr LC50 Poecilia reticulata: 16000 mg/L [static] 48 Hr EC50 Daphnia magna: 46300 mg/L 96 Hr EC50 Pseudokirchneriella subcapitata: 6500 - 13000 mg/L
Triethylene glycol	96 Hr LC50 Pimephales promelas: 56200 - 63700 mg/L [flow-through]; 96 Hr LC50 Lepomis macrochirus: 10000 mg/L [static]; 96 Hr LC50 Lepomis macrochirus: 61000 mg/L [flow-through] 48 Hr EC50 Daphnia magna: 42426 mg/L

13. Disposal Considerations:

Recommendation: Observe local requirements. Dispose of in accordance with local/state/federal environmental control laws.

Empty Container Precautions: Empty containers retain product residue; observe all precautions for product. Do not heat or cut empty container with electric or gas torch because highly toxic vapors and gases are formed. Do not reuse without thorough commercial cleaning and reconditioning. If container is to be disposed, ensure all product residues are removed and container is empty prior to disposal. Contact the Reusable Industrial Packaging Association (RIPA) at 301-577-3786 to find a drum re-conditioner in North America (www.reusablepackaging.org).

14. Transport Information:

DOT Regulated Components:

This product is not regarded as dangerous goods according to the national and international regulations on the transport of dangerous goods unless specifically cited below:

Agency	Proper Shipping Name	UN Number	Packing Group	Hazard Class
	None			

15. Regulatory Information:

OSHA HAZARD COMMUNICATION STANDARD: This material is classified as hazardous in accordance with OSHA 29 CFR 1910.1200.

SARA 311/312 Hazard Categories: Acute health hazard, chronic health hazard.

WARNING: This product can expose you to chemicals listed below, which are known to the State of California to cause cancer, birth defects, or reproductive harm. For more information, visit www.P65Warnings.ca.gov

Diethanolamine 111-42-2 < 1 PPM CARC
Formaledhyde 50-00-0 < 1 PPM CARC
Ethylene glycol 107-21-1 1 to 5 % DEVELOPMENTAL

Massachusetts Right To Know List:

Ethylene glycol 107-21-1 1 to 5 %
2-Butoxyethanol 111-76-2 1 to 5 %

New Jersey Right To Know List:

Ethylene glycol 107-21-1 1 to 5 %
2-Butoxyethanol 111-76-2 1 to 5 %
(E)-1-Chloro-3,3,3-trifluoroprop-1-ene 102687-65-0 5 to 10 %

Pennsylvania Right To Know List:

Triethylene glycol 112-27-6 1 to 5 %
Ethylene glycol 107-21-1 1 to 5 %
2-Butoxyethanol 111-76-2 1 to 5 %
Diethylene glycol 111-46-6 1 to 5 %
(E)-1-Chloro-3,3,3-trifluoroprop-1-ene 102687-65-0 5 to 10 %

SARA 302 Extremely Hazardous Substances:

- None

Chemicals subject to SARA 313 Reporting:

Ethylene glycol 107-21-1 1 to 5 % Emissions
2-Butoxyethanol 111-76-2 1 to 5 % Emissions

Country	Regulation	All Components Listed
Canada	Canada DSL	Yes
US	Toxic Substances Control Act	Yes

16. Other Information:

Safety Data Sheet issued by Product Safety Department

This information is furnished without warranty, expressed or implied, except that it is accurate to the best knowledge of Carlisle Spray Foam Insulation. The data on these sheets relates only to the specific material designated herein. Carlisle Spray Foam Insulation assumes no legal responsibility for use or reliance upon this data. It is the user's responsibility to ensure that their activities comply with federal, state, or local laws.

Date revised: 2022-03-15 Reviewer Revision 2

Date Prepared: 3/15/2022

Carlisle Spray Foam Insulation Safety Data Sheet

1. Identification of Substance:

Product Name: RIGID POLYURETHANE/ POLYISOCYANURATE FOAM

Supplier Identification:
Carlisle Spray Foam Insulation

Address:
100 Enterprise Dr.
Cartersville, GA 30120

Telephone:
(770) 607-0755

24-Hr. Emergency Phone Number:
CHEMTREC (800) 424-9300
International: (703) 527-3887

Product Use: Cured polyurethane foam for construction uses

2. Hazards Identification

GHS Ratings: N/A

GHS Hazards: N/A

GHS Precautions: N/A

Signal Word: N/A

There are no GHS ratings that apply to this product at this time.

This product is classified as an article under the OSHA Hazard Communication Standard 29 CFR 1910.1200(c)
Article means a manufactured item other than a fluid or particle: (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g., minute or trace amounts of a hazardous chemical (as determined under paragraph (d) of this section), and does not pose a physical hazard or health risk to employees.

3. Composition/Data on Components:

Chemical Name	CAS number	Weight Concentration %
Cured Polyurethane/polyisocyanaurate foam	N/A	100

4. First Aid Measures:

Inhalation: Not expected to pose an inhalation hazard.

After Eye Contact: Rinse opened eye for at least 15 minutes under running water.
Remove contact lenses if present and easy to do so, and continue rinsing. If irritation persists contact physician.

After Skin Contact: Clean affected area with soap and plenty of water. Ordinary means of personal hygiene are adequate.

After Swallowing: Consult physician.
Notes to Physician: Treat symptomatically. Not expected to require any special measures.

5. Fire Fighting Measures:

Flash Point: N/A
LEL: N/A UEL: N/A
Upper and Lower Explosive Limits listed if known.
Suitable Extinguishing Agents: Water spray, CO2, Foam, Dry chemical

Information about Protection against Explosions and Fires: No unusual hazards expected.
Dangerous products of decomposition: Oxides of carbon, oxides of nitrogen, oxides of phosphorus, hydrocarbons, thick black smoke, Isocyanates, traces of HCN.
Protective equipment: Firefighters should wear pressure demand self-contained breathing apparatus and protective clothing.

6. Accidental Release Measures:

Person-related safety precautions: Avoid inhaling dusts.

Measures for environmental protection: Collect for proper disposal according to local, state, and federal regulations.

7. Handling and Storage:

Information for Safe Handling: Avoid inhaling dusts. Wash skin after contact.
Storage Requirements: Keep away from flames and sources of heat.

8. Exposure Controls and Personal Protection:

Chemical Name / CAS No.	OSHA Exposure Limits	ACGIH Exposure Limits	Other Exposure Limits
Cured Polyurethane/polyisocyanaurate foam / N/A	Not Established	Not Established	Not Established

Engineering Controls: No specific measures expected.

General protective and hygienic measures: No additional precautionary measures should be expected other than standard personal protective equipment for handling inert articles requiring moderate physical labor.

Personal Protective Equipment:

Respiratory Protection: None expected.

Hand Protection: Protective gloves standard in a normal work environment.

Eye Protection: Safety glasses.

Body Protection: Protective work clothing. Launder separately.

9. Physical and Chemical Properties:

Physical properties listed where known.

Appearance: Off white solid	**Odor:** Mild
Vapor Pressure: N/A	**Odor threshold:** N/A
Vapor Density: N/A	**pH:** N/A
Density: N/A	**Melting point:** N/A
Freezing point: N/A	**Solubility:** N/A
Boiling range: N/A	**Flash point:** N/A
Evaporation rate: N/A	**Flammability:** N/A
Explosive Limits: N/A	**Partition coefficient (n-octanol/water):** N/A
Autoignition temperature: N/A	**Decomposition temperature:** N/A

10. Stability and Reactivity:

Chemical Incompatible Materials: None known.

Hazardous Polymerization: Not expected to occur.

Dangerous products of decomposition: Oxides of carbon, oxides of nitrogen, oxides of phosphorus, hydrocarbons, thick black smoke, Isocyanates, traces of HCN.

11. Toxicological Information:

Mixture Toxicity
Individual Toxicity Values Listed if Known

Acute Toxicity:
Eyes: Possible irritation
Skin: Possible irritation
Inhalation: Possible irritation.
Ingestion: Possible irritation.

Chronic Effects: None known.

Routes of Entry: Inhalation, skin contact, eye contact
Target Organs: Skin, eyes, respiratory tract
Chemicals with Known or Possible Carcinogenic Effects: None known.

12. Ecological Information:

General Information: Based on experience, no adverse effects are to be expected if correct disposal procedures have been followed as indicated in section 13. Individual component ecotoxicity listed if known.

13. Disposal Considerations:

Recommendation: Observe local requirements. Dispose of in accordance with local/state/federal regulations.

14. Transport Information:

Not considered a dangerous good according to transport regulations unless specifically cited below:

Agency	Proper Shipping Name	UN Number	Packing Group	Hazard Class
	No data available			

15. Regulatory Information:

OSHA HAZARD COMMUNICATION STANDARD: This material is not classified as hazardous in accordance with OSHA 29 CFR 1910.1200.

SARA 311/312 Hazard Categories: None.

California Proposition 65
(Safe Drinking Water and Toxic Enforcement Act of 1986)
This product contains no substances known to the State of California to cause cancer, birth defects or other reproductive harm, at levels which would require a warning under the statute unless otherwise listed:

Warning: This product contains chemicals known to the State of California to cause cancer and/or birth defects or other reproductive harm:

- None

Massachusetts Right To Know List:

- None

New Jersey Right To Know List:

- None

Pennsylvania Right To Know List:

- None

SARA 302 Extremely Hazardous Substances:

- None

Chemicals subject to SARA 313 Reporting:

- None

Country	Regulation	All Components Listed
Canada	Canada DSL	Yes
US	Toxic Substances Control Act	Yes

16. Other Information:

Polyurethane elastomers are fully reacted polymers forming articles which are not considered hazardous under OSHA's criteria in 29 CFR 1910.1200.

This information is furnished without warranty, expressed or implied, except that it is accurate to the best knowledge of Carlisle Spray Foam Insulation. The data on these sheets relates only to the specific material designated herein. Carlisle Spray Foam Insulation assumes no legal responsibility for use or reliance upon this data. It is the user's responsibility to ensure that their activities comply with federal, state, or local laws.

Date revised: 1/9/19 Reviewer Revision 0

Date Prepared: 1/9/19

Carlisle Spray Foam Insulation Safety Data Sheet

1. Identification of Substance:

Product Name: RIGID POLYURETHANE/ POLYISOCYANURATE FOAM

Supplier Identification:
Carlisle Spray Foam Insulation

Address:
100 Enterprise Dr.
Cartersville, GA 30120

Telephone:
(770) 607-0755

24-Hr. Emergency Phone Number:
CHEMTREC (800) 424-9300
International: (703) 527-3887

Product Use: Cured polyurethane foam for construction uses

2. Hazards Identification

GHS Ratings: N/A

GHS Hazards: N/A

GHS Precautions: N/A

Signal Word: N/A

There are no GHS ratings that apply to this product at this time.

This product is classified as an article under the OSHA Hazard Communication Standard 29 CFR 1910.1200(c)
Article means a manufactured item other than a fluid or particle: (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g., minute or trace amounts of a hazardous chemical (as determined under paragraph (d) of this section), and does not pose a physical hazard or health risk to employees.

3. Composition/Data on Components:

Chemical Name	CAS number	Weight Concentration %
Cured Polyurethane/polyisocyanaurate foam	N/A	100

4. First Aid Measures:

Inhalation: Not expected to pose an inhalation hazard.

After Eye Contact: Rinse opened eye for at least 15 minutes under running water.
Remove contact lenses if present and easy to do so, and continue rinsing. If irritation persists contact physician.

After Skin Contact: Clean affected area with soap and plenty of water. Ordinary means of personal hygiene are adequate.

After Swallowing: Consult physician.
Notes to Physician: Treat symptomatically. Not expected to require any special measures.

5. Fire Fighting Measures:

Flash Point: N/A
LEL: N/A UEL: N/A
Upper and Lower Explosive Limits listed if known.
Suitable Extinguishing Agents: Water spray, CO2, Foam, Dry chemical

Information about Protection against Explosions and Fires: No unusual hazards expected.
Dangerous products of decomposition: Oxides of carbon, oxides of nitrogen, oxides of phosphorus, hydrocarbons, thick black smoke, Isocyanates, traces of HCN.
Protective equipment: Firefighters should wear pressure demand self-contained breathing apparatus and protective clothing.

6. Accidental Release Measures:

Person-related safety precautions: Avoid inhaling dusts.

Measures for environmental protection: Collect for proper disposal according to local, state, and federal regulations.

7. Handling and Storage:

Information for Safe Handling: Avoid inhaling dusts. Wash skin after contact.
Storage Requirements: Keep away from flames and sources of heat.

8. Exposure Controls and Personal Protection:

Chemical Name / CAS No.	OSHA Exposure Limits	ACGIH Exposure Limits	Other Exposure Limits
Cured Polyurethane/polyisocyanaurate foam / N/A	Not Established	Not Established	Not Established

Engineering Controls: No specific measures expected.

General protective and hygienic measures: No additional precautionary measures should be expected other than standard personal protective equipment for handling inert articles requiring moderate physical labor.

Personal Protective Equipment:

Respiratory Protection: None expected.

Hand Protection: Protective gloves standard in a normal work environment.

Eye Protection: Safety glasses.

Body Protection: Protective work clothing. Launder separately.

9. Physical and Chemical Properties:

Physical properties listed where known.

Appearance: Off white solid	**Odor:** Mild
Vapor Pressure: N/A	**Odor threshold:** N/A
Vapor Density: N/A	**pH:** N/A
Density: N/A	**Melting point:** N/A
Freezing point: N/A	**Solubility:** N/A
Boiling range: N/A	**Flash point:** N/A
Evaporation rate: N/A	**Flammability:** N/A
Explosive Limits: N/A	**Partition coefficient (n-octanol/water):** N/A
Autoignition temperature: N/A	**Decomposition temperature:** N/A

10. Stability and Reactivity:

Chemical Incompatible Materials: None known.

Hazardous Polymerization: Not expected to occur.

Dangerous products of decomposition: Oxides of carbon, oxides of nitrogen, oxides of phosphorus, hydrocarbons, thick black smoke, Isocyanates, traces of HCN.

11. Toxicological Information:

Mixture Toxicity
Individual Toxicity Values Listed if Known

Acute Toxicity:
Eyes: Possible irritation
Skin: Possible irritation
Inhalation: Possible irritation.
Ingestion: Possible irritation.

Chronic Effects: None known.

Routes of Entry: Inhalation, skin contact, eye contact
Target Organs: Skin, eyes, respiratory tract
Chemicals with Known or Possible Carcinogenic Effects: None known.

12. Ecological Information:

General Information: Based on experience, no adverse effects are to be expected if correct disposal procedures have been followed as indicated in section 13. Individual component ecotoxicity listed if known.

13. Disposal Considerations:

Recommendation: Observe local requirements. Dispose of in accordance with local/state/federal regulations.

14. Transport Information:

Not considered a dangerous good according to transport regulations unless specifically cited below:

Agency	Proper Shipping Name	UN Number	Packing Group	Hazard Class
	No data available			

15. Regulatory Information:

OSHA HAZARD COMMUNICATION STANDARD: This material is not classified as hazardous in accordance with OSHA 29 CFR 1910.1200.

SARA 311/312 Hazard Categories: None.

California Proposition 65
(Safe Drinking Water and Toxic Enforcement Act of 1986)
This product contains no substances known to the State of California to cause cancer, birth defects or other reproductive harm, at levels which would require a warning under the statute unless otherwise listed:

Warning: This product contains chemicals known to the State of California to cause cancer and/or birth defects or other reproductive harm:

- None

Massachusetts Right To Know List:

- None

New Jersey Right To Know List:

- None

Pennsylvania Right To Know List:

- None

SARA 302 Extremely Hazardous Substances:

- None

Chemicals subject to SARA 313 Reporting:

- None

Country	Regulation	All Components Listed
Canada	Canada DSL	Yes
US	Toxic Substances Control Act	Yes

16. Other Information:

Polyurethane elastomers are fully reacted polymers forming articles which are not considered hazardous under OSHA's criteria in 29 CFR 1910.1200.

This information is furnished without warranty, expressed or implied, except that it is accurate to the best knowledge of Carlisle Spray Foam Insulation. The data on these sheets relates only to the specific material designated herein. Carlisle Spray Foam Insulation assumes no legal responsibility for use or reliance upon this data. It is the user's responsibility to ensure that their activities comply with federal, state, or local laws.

Date revised: 1/9/19 Reviewer Revision 0

Date Prepared: 1/9/19

LEED CERTIFICATION GUIDE

CARLISLE SPRAY FOAM INSULATION

The Leadership in Energy and Environmental Design (LEED) certification program outlines a rating system for the design, construction, operation, and maintenance of green buildings, homes, and neighborhoods. The LEED program assists building owners and operators to incorporate environmentally responsible and sustainable features for all building types and all building phases including new construction, interior fit outs, operations and maintenance, and core and shell.

This document provides guidance regarding the contribution of SealTite Pro Spray Foam Insulation products manufactured by Carlisle Spray Foam Insulation to the overall LEED certification of a project.

ENERGY & ATMOSPHERE (EA)

EA Credit 1: Optimize energy performance (1–19 points)

Intent: To achieve increasing levels of energy performance beyond the prerequisite standard to reduce environmental and economic impacts associated with excessive energy use.

Requirements: Select 1 of the 3 compliance path options described below. Project teams documenting achievement using any of the 3 options are assumed to be in compliance with EA Prerequisite 2: Minimum Energy Performance.

Option 1. Whole building energy simulation (1–19 points)

Demonstrate a percentage improvement in the proposed building performance rating compared with the baseline building performance rating. Calculate the baseline building performance according to Appendix G of ANSI/ASHRAE/IESNA Standard 90.1-2007 (with errata but without addenda[1]) using a computer simulation model for the whole building project. Projects outside the U.S. may use a USGBC approved equivalent standard[2].

SealTite Pro Spray Foam Insulation functions as both insulation and air barrier creating a sealed building envelop with fewer air changes per hours and significantly less air infiltration. Engineers can specific more efficient HVAC systems to condition the interior air space increased occupant comfort.

The below chart shows how LEED credits are awarded. For Example: An increased efficiency of 12% above the baseline building performance will earn 1 point toward this credit for new construction, while a 48% increase over the baseline performance will earn 19 points. Specific LEED credits are determined by the individual project).

New Buildings	Existing Building Renovations	Points
12%	8%	1
14%	10%	2
16%	12%	3
18%	14%	4
20%	16%	5
22%	18%	6
24%	20%	7
26%	22%	8
28%	24%	9
30%	26%	10
32%	28%	11
34%	30%	12
36%	32%	13
38%	34%	14
40%	36%	15
42%	38%	16
44%	40%	17
46%	42%	18
48%	44%	19

SealTite™ PRO

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www.carlislesfi.com

LEED CERTIFICATION GUIDE

MATERIALS AND RESOURCES (MR)

MR Credit 4: Recycled Content (1–2 points)

Intent: To increase demand for building products that incorporate recycled content materials, thereby reducing impacts resulting from extraction and processing of virgin materials.

Requirements: Use materials with recycled content such that the sum of post-consumer recycled content plus ½ of the pre-consumer content constitutes at least 10% or 20%, based on cost, of the total value of the materials in the project. The minimum percentage materials recycled for each point threshold is as follows: 10% – 1 point, or 20% – 2 points.

MR Credit 6: Rapidly Renewable Materials (1 point)

Intent: To reduce the use and depletion of finite raw materials and long-cycle renewable materials by replacing them with rapidly renewable materials.

Requirements: Use rapidly renewable building materials and products for 2.5% of the total value of all building materials and products used in the project, based on cost. Rapidly renewable building materials and products are made from plants that are typically harvested within a 10 year or shorter cycle.

	Recycled Content		Rapidly Renewable Materials
	Pre-Consumer	Post-Consumer	
SealTite PRO Open Cell	-	-	1.5%
SealTite PRO High Yield	-	-	0.7%
SealTite PRO No Mix	-	-	1.5%
SealTite PRO No Trim 21	-	-	3.1%
SealTite PRO OCX	-	-	11.5%
SealTite PRO Closed Cell Regular	2.1%	5.3%	1.5%
SealTite PRO Closed Cell Winter	1.9%	4.8%	1.0%
SealTite PRO One Zero Regular	2.0%	5.2%	1.5%
SealTite PRO One Zero Winter	1.8%	4.7%	1.0%
SealTite PRO HFO Regular	2.4%	6.1%	-
SealTite PRO HFO Winter	2.2%	5.7%	-
SealTite One Regular	1.6%	4.2%	0.8%
SealTIte One Winter	1.6%	4.1%	0.8%

MR Credit 5: Regional Materials (1–2 points)

Intent: To increase demand for building materials and products that are extracted and manufactured within the region, thereby supporting the use of indigenous resources and reducing the environmental impacts resulting from transportation.

Requirements: Use building materials or products that have been extracted, harvested or recovered, as well as manufactured, within a specified distance of the project site for a minimum of 10% or 20%, based on cost, of the total materials value. If only a fraction of a product or material is extracted, harvested, or recovered and manufactured locally, then only that percentage (by weight) must contribute to the regional value.

SealTite Pro Spray Foam Insulation products are considered to be manufactured at the project site.

INDOOR ENVIRONMENTAL QUALITY (IEQ)

IEQ Credit 4.1: Low Emitting Materials – Adhesives and Sealants (1 point)

Intent: To reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants.

Requirements: All adhesives and sealants used on the interior of the building (i.e. inside the weatherproofing system and applied on-site) must comply with the following requirements as applicable to the project scope:

Adhesives, sealants, and sealant primer must comply with South Coast Air Quality Management District (SCAQMD) Rule #1168. Volatile organic compounds (VOC) limits listed below correspond to an effective date of July 1, 2005 and rule amendment date of January 7, 2005.

Architectural Application	VOC Limit (g/L Less Water)
Plastic Foams	50

Carlisle Spray Foam insulation products have achieved Greenguard certification for low chemical emissions

	Greenguard Certification
SealTite Pro Open Cell	Certified
SealTite Pro High Yield	Certified
SealTite Pro No Mix	Certified
SealTite Pro No Trim 21	Certified
SealTite Pro OCX	Certified
SealTite Pro Closed Cell	Gold
SealTite Pro One Zero	Gold
SealTite PRO HFO	Gold
SealTite One	Gold

IEQ Credit 7.1: Thermal Comfort Design (1 point)

Intent: To provide a comfortable thermal environment that promotes occupant productivity and well-being.

Requirements: Design heating, ventilating and air conditioning (HVAC) systems and the building envelope to meet the requirements of ASHRAE Standard 55-2004, Thermal Comfort Conditions for Human Occupancy (with errata but without addenda). Demonstrate design compliance in accordance with the Section 6.1.1 documentation.

SealTite Pro Spray Foam Insulation functions as both insulation and air barrier creating a sealed building envelop with fewer air changes per hours and significantly less air infiltration. Engineers can specific more efficient HVAC systems to condition the interior air space increased occupant comfort.

CARLISLE SPRAY FOAM INSULATION

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Environmental Product Declaration

Spray Polyurethane Foam Insulation

SEALTITE PRO, SEALTITE, PREMISEAL, AND PREMIR+ PRODUCTS

CARLISLE SPRAY FOAM INSULATION

Carlisle Spray Foam Insulation (CSFI) is a leading manufacturer of open-cell and closed-cell spray polyurethane foam (SPF) insulation products for residential and commercial applications. Previously marketed under Accella Polyurethane Systems, Covestro, and Bayer Material Science, Carlisle Spray Foam Insulation is backed by the technology resources and grounded on the corporate stability of a century-old icon in the building ecosystem, Carlisle.

Now part of Carlisle Weatherproofing Technologies, CSFI is focused on developing spray foam insulation solutions to help architects design safe, resilient, and energy-efficient buildings with low environmental impacts.

CSFI is committed to product transparency as part of our mission to help deliver a more sustainable future by supplying innovative and energy-efficient products while reducing our operational greenhouse gas emissions. For more information, visit www.carlislesfi.com.

UL CERTIFIED ENVIRONMENTAL PRODUCT DECLARATION UL.COM/EPD

ENVIRONMENTAL PRODUCT DECLARATION

CARLISLE SPRAY FOAM INSULATION

Spray Polyurethane Foam Insulation
SealTite PRO, SealTite, PremiSEAL, and PremiR+ EVO Products

CERTIFIED ENVIRONMENTAL PRODUCT DECLARATION UL.COM/EPD

According to ISO 14025, and ISO21930:2017

EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE	UL ENVIRONMENT 333 PFINGSTEN RD, NORTHBROOK, IL 60062 WWW.UL.COM WWW.SPOT.UL.COM
GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER	Program Operator Rules v 2.7 2022
MANUFACTURER NAME AND ADDRESS	Carlisle Spray Foam Insulation | 100 Enterprise Drive, Cartersville, GA 30120
DECLARATION NUMBER	4790550934.101.1
DECLARED PRODUCT & FUNCTIONAL UNIT OR DECLARED UNIT	1 m² of installed insulation material with a thickness that gives an average thermal resistance RSI=1 m2·K/W
REFERENCE PCR AND VERSION NUMBER	Part A: Product Category Rules for Building Related Products and Services (UL Environment, 2018) Part B: Building Envelope Thermal Insulation EPD Requirements (UL Environment, 2018)
DESCRIPTION OF PRODUCT APPLICATION/USE	Two-component polyurethane mixture insulation spray applied at installation site.
PRODUCT RSL DESCRIPTION (IF APPL.)	75 years
MARKETS OF APPLICABILITY	United States and Canada
DATE OF ISSUE	December 1, 2022
PERIOD OF VALIDITY	5 Years
EPD TYPE	Product Specific
RANGE OF DATASET VARIABILITY	NA
EPD SCOPE	Cradle to Grave
YEAR(S) OF REPORTED PRIMARY DATA	2020
LCA SOFTWARE & VERSION NUMBER	GaBi 10
LCI DATABASE(S) & VERSION NUMBER	GaBi 2022 (CUP 2022.2)
LCIA METHODOLOGY & VERSION NUMBER	TRACI 2.1 (2012), IPCC AR6 (2021)

The PCR review was conducted by:	UL Environment PCR Review Panel epd@ul.com
This declaration was independently verified in accordance with ISO 14025: 2006. ☐ INTERNAL ☒ EXTERNAL	Cooper McC Cooper McCollum, UL Environment
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	Sphera
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	James Mellentine, Thrive ESG

CARLISLE SPRAY FOAM INSULATION

Spray Polyurethane Foam Insulation
SealTite PRO, SealTite, PremiSEAL, and PremiR+ EVO Products

According to ISO 14025
and ISO 21930:2017

LIMITATIONS

Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc.

Accuracy of Results: EPDs regularly rely on estimations of impacts; the level of accuracy in estimation of effect differs for any particular product line and reported impact.

Comparability: EPDs from different programs may not be comparable. Full conformance with a PCR allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible". Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared.

1. Product Definition and Information

1.1. Description of Company/Organization

Carlisle Spray Foam Insulation is a leading manufacturer of spray polyurethane foam systems in North America. Previously marketed under Accella Polyurethane Systems, Covestro, and Bayer Material Science – Carlisle Spray Foam Insulation is a fully integrated, spray foam insulation solution, backed by the technology resources—and grounded on the corporate stability—of a century-old icon in the building ecosystem—Carlisle.

Now part of Carlisle Weatherproofing Technologies (CWT) Carlisle Spray Foam Insulation is the only spray foam manufacturer that provides everything needed to completely seal and protect the entire building envelop. Together with other Carlise brands such as Hunter Panels, Insulfoam, CCW, Henry, and PAC-CLAD, CSFI offers architects the most flexibility and design options to create high performance building envelope solutions from a single source ensuring material compatibility and total system performance.

1.2. Product Description

Product Identification

This EPD covers the following spray polyurethane foam insulation products manufactured by Carlisle Spray Foam Insulation and Carlisle Roof Foam and Coatings in Cartersville, GA:

- Open Cell: SealTite™ PRO Open Cell, SealTite PRO High Yield, SealTite PRO No Mix, SealTite PRO OCX, SealTite PRO No Trim 21
- Closed-cell Hydrofluorocarbon (HFC): SealTite PRO Closed Cell (HFC)
- Closed-cell Hydrofluoroolefin (HFO): SealTite PRO HFO, SealTite One
- Closed-cell Roofing (HFC): PremiSEAL 40/60/70/80
- Closed-cell Roofing (HFO): PremiR+ EVO 40/60/70

Product Specification

Spray polyurethane foam (SPF) is made on the jobsite by combining polymeric methylene-diphenyl diisocyanate (pMDI/MDI or A-side) with an equal volume of a polyol blend (B-side). Sides A and B react and expand at the point of application in the building envelope to form polyurethane foam. The formed-in-place SPF provides both thermal insulation and air sealing to the building.

Three types of SPF with varying performances and applications are assessed in this declaration. Closed-cell spray foam for roofing systems (Roofing) is used on the external surface of low slope roofs. Its higher density provides additional compressive strength needed for roofing applications. Open-cell spray foam (ocSPF) provides insulation and air sealing. Closed-cell foam provides a water-resistant insulation, air-sealing, water vapor control and delivers added structural performance to the building envelope.

SPF can be categorized based on the type of blowing agent utilized in the product. Roofing and closed cell foam use chemical blowing agents that transform into a gas during installation due to the exothermic foam reaction that occurs. These physical blowing agents are either hydrofluorocarbons (HFC) or hydrofluoroolefins (HFO).

SPF products are commonly used in residential, light commercial, commercial, institutional, and certain industrial applications. Table 1 shows the typical properties of the various SPF product types.

Table 1: Typical SPF Properties by Product Type

NAME	ROOFING	CLOSED-CELL	OPEN-CELL
Density [lb / ft^3]	3.0	2.0	0.5
Thermal resistivity [R / in]	6.3-6.7	6.9 to 7.2	3.7
Air impermeable material	✓	✓	✓
Integral vapor retarder	✓	✓	
Water resistant	✓	✓	
Cavity insulation		✓	✓
Continuous insulation	✓	✓	
Soil Gas Barrier	✓	✓	
Fungi Resistant	✓	✓	✓
Air Quality - Greenguard	✓	✓	✓
Low-slope roofing	✓		
Structural improvement	✓	✓	

Flow Diagram

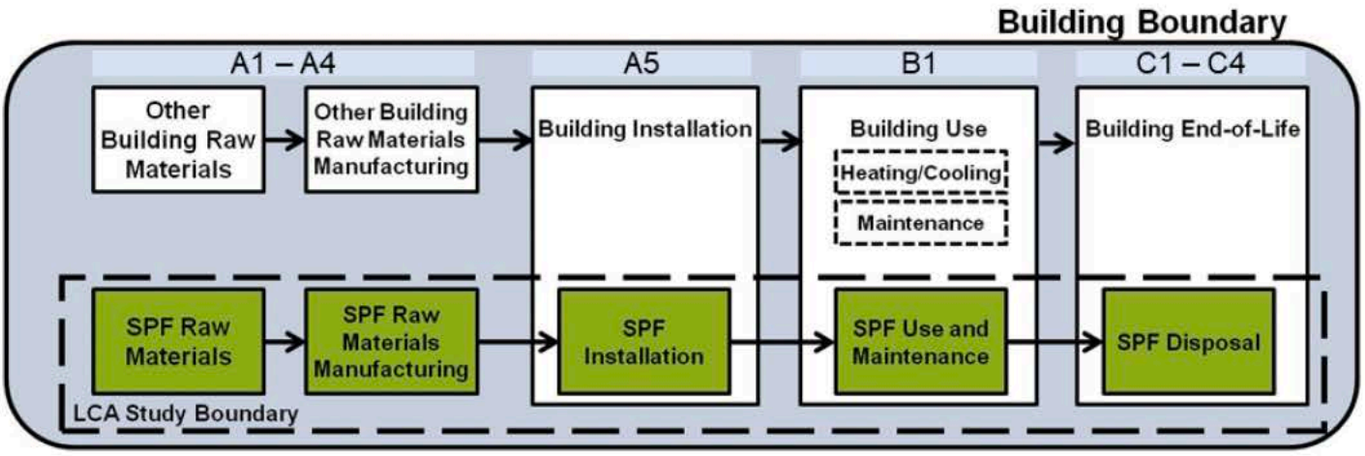

Figure 1. Flow diagram of SPF life cycle

1.3. Application

Open-cell products are applied to the interior side of the building envelope as an insulation and air-sealing material. They are used to insulate the underside of roof decks, on attic floors, above-grade walls, and between floors. Closed-cell spray foam insulation is applied to either the interior or exterior side of the building envelope and can be used in the same applications as open-cell. Due to its water resistance, it can also be used on below grade walls and under slabs. Roofing SPF is applied to the exterior surface of low-slope roofs. A variety of polymeric coatings are used over Roofing SPF to provide protection against ultraviolet light and mechanical abrasion.

1.4. Declaration of Methodological Framework

This EPD is declared under a cradle-to-grave system boundary. As such, it includes all life cycle stages including any off-gassing emissions from the blowing agent associated with use of the product. Per the product category rules (UL Environment, 2018), the assessment was conducted using a building service life of 75 years. Material and energy inputs were allocated on a mass basis. Recycled content and disposal at end-of-life follow the cut-off allocation approach. No inputs or outputs were deliberately excluded from this EPD.

1.5. Technical Requirements

All SPF products must meet numerous peformance requirments to comply with building codes. The details of these requirements are described in specific tests listed in consensus standards for material performance and code compliance. A summary of these consensus standards is provided in Table 2 below:

Table 2: Summary of Technical Standards for SPF in Construction

Standard Type	Roofing	Closed Cell	Open Cell
ASTM	ASTM C1029 Type III and IV or ASTM D7425	ASTM C1029 Type I and II	ASTM WK30150
CAN/ULC		S705.1	S712.1
ICC Building Code Compliance	ICC-ES AC-377 ICC-1100 20xx		

ASTM Standards

- C1029-15 Standard Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation
- D7425-13 Standard Specification for Spray Polyurethane Foam Used for Roofing Applications
- WK30150 (under development) Standard Specification for Spray-Applied Open Cellular Polyurethane Thermal Insulation

UL Canada Standards

- S705.1 Standard for Thermal Insulation – Spray Applied Rigid Polyurethane Foam, Medium Density
- S712.1 Standard for Thermal Insulation - Light Density, Open Cell Spray Applied Semi-Rigid Polyurethane Foam

International Code Council Standards

- ICC-ES AC-377 Acceptance Criteria for Spray-Applied Foam Plastic Insulation
- ICC-1100-20xx Standard for Spray-applied Polyurethane Foam Plastic Insulation

Table 3: Summary of Typical Material Performance Requirements for SPF in Construction

Standard Type		ROOFING	CLOSED CELL	OPEN CELL
Thermal Performance (R-value)	ASTM C518, C177 or C1363	As reported (typ R6.0-7.0/inch)	As reported (typ R6.5-7.2/inch)	As reported (typ R3.6-4.3/inch)
Surface Burning Characteristics	ASTM E84 or UL723	Flame spread index ≤ 75	Flame spread index ≤ 75 Smoke developed ≤ 450	Flame spread index ≤ 75 Smoke developed ≤ 450
Core Density	ASTM D1622	As reported (typ 2.5-4.0 pcf / 40-64 kg/m^3)	As reported (typ 1.5-2.5 pcf / 24-40 kg/m^3)	As reported (typ 0.4-1.5 pcf / 6.4-24 kg/m^3)
Closed-Cell Content	ASTM D2856 or ASTM D6226	>90%	>90%	NR
Tensile Strength	ASTM D1623	40 psi min (276 kPa)	15 psi min (103 kPa)	3 psi min (21 kPa)
Compressive Strength	ASTM D1623	40 psi min (276 kPa)	15 psi min (103 kPa)	NR
Dimensional Stability	ASTM D2126	15% max change	15% max change	15% max change
Water Vapor Permeance	ASTM E96 (dry cup)	As reported (typ 1 US perm @ 2" thk / 0.66 SI perm @ 51 mm)	As reported (typ 1 US perm @ 2" thk / 0.66 SI perm @ 51 mm)	NR
Air Permeance	ASTM D E283 or D2178	As reported (typ imperm @ 1.5" thk / 38 mm)	As reported (typ imperm @ 1.5" thk / 38 mm)	As reported (typ imperm @ 3-5" thk / 76-127 mm)
Water Absorption	ASTM D2842	<5% max	<5% max	NR

1.6. Properties of Declared Product as Delivered

The A-side and B-side chemicals required to produce SPF are delivered to the job site in separate containers. On the job site, these chemicals are mixed in equal volume proportions to create SPF.

1.7. Material Composition

The A-side of SPF is made from a blend of polymeric methylene diphenyl diisocyanate (MDI). The B-side is a mixture of polyester and or polyether polyols, flame retardants, blowing agents, catalysts, and other additives that, when mixed with A-side, creates foam that can be applied for insulation.

Since one half of the formulation by volume is MDI (A-side), the table focuses on the other multi-component half (B-side). The product composition is proprietary, so an approximate composition of chemical components is shown.

While some of the ingredients may be classified as hazardous, per the Resource Conservation and Recovery Act (RCRA), Subtitle 3, the product as installed and ultimately disposed of is not classified as a hazardous substance, as hazardous ingredients are rendered chemically inert after installation.

Table 4. Generic B-side formulations

Chemical (% Composition)		Roofing	Closed cell	Open Cell
Polyol	Polyester	35	50	
	Polyether	10	5	34
	Mannich	35	15	
	Compatibilizer			10
Fire Retardants	Various	8	15	25
Blowing Agent	Reactive (H_2O)	2	3	20
	HFO or HFC	7	7	
Catalyst	Catalyst, amine	1	3	9
	Catalyst, metal	1	1	1
Surfactant	Silicone	1	1	1

1.8. Manufacturing

The majority the A-side of SPF is manufactured by four U.S. based chemical manufacturing companies with processing facilities located in Texas and Louisiana. The B-side formulation is made by a facility in Georgia. Most of the primary chemicals used in the B-side formulation are processed in facilities in Texas, Louisiana, New Jersey, and North Carolina.

During the B-side production process, materials are blended in tanks and packaged. The B-side blending process utilizes internal scrap from a manufacturer's own operations. Additionally, the facility utilizes technology to minimize the release of gaseous material inputs, such as blowing agents, during material transfer and processing. Waste materials are typically reintegrated into the formulation without additional collection, transport, or processing.

1.9. Packaging

High-pressure SPF chemicals are packaged in 55-gallon (208 L) steel drums. Finished packaged products are loaded onto pallets, where additional shipping materials, such as strapping, cardboard, and plastic wrap, are applied. In this study, it is assumed that the empty chemical containers are properly cleaned and taken to a drum recycler.

1.10. Transportation

Final products are distributed via dry van truck, either directly to customers, or first to warehouse, prior to being sent to customers.

1.11. Product Installation

High-pressure SPF, including open-cell, closed-cell and roofing SPF, is installed by professional applicators by on-site mixing of the A-side and B-side chemicals.

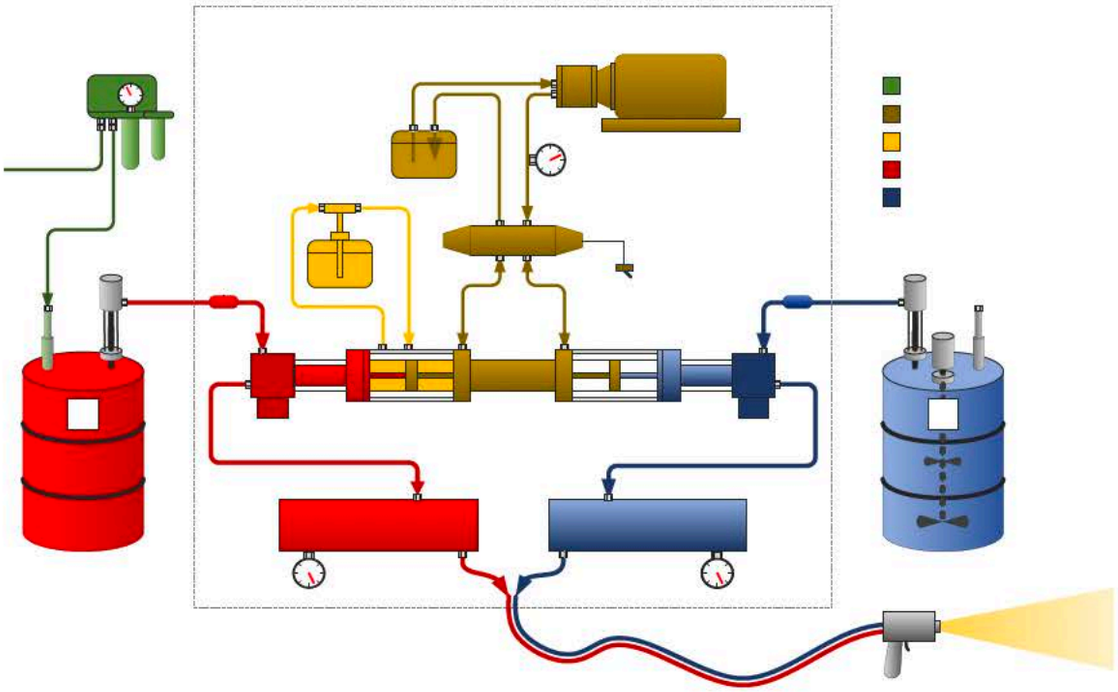

Figure 2. Schematic of a High-Pressure SPF system

Installation includes insulation of the walls, floors and ceilings of entire buildings, or application as an insulated low-slope roofing system. These chemicals are delivered to the jobsite in unpressurized containers (usually 55-gallon / 208 L drums) and heated to approximately 120-130 °F (49-54 °C) and pressurized to about 1000 psi (6,895 kPa) by specialized equipment. The chemicals are transferred by a heated hose and aerosolized by a spray gun and combined by impingement mixing at the point of application. Personal protective equipment such as goggles, protective suits, and respirator cartridges is required to protect applicators from chemical exposure during installation. Also needed are disposable materials such as masking tape and drop cloths. The schematic in Figure 2 shows the typical equipment components used to produce high-pressure SPF foam, including unpressurized A-side and B-side liquid drums with transfer pumps, which are connected to the proportioner system for heating and pressurizing the chemicals, and then through a heated hose connected to a spray gun for application.

After the foam cures and expands, any excess that may prevent installation of the interior cladding is cut off and discarded. For SPF with physical blowing agents, this study assumes 10% of the installed blowing agent is released to surrounding air during the installation phase. Discarded foam from installation also experiences blowing agent release while in landfill. Disposal of packaging materials is modeled in accordance to the assumptions outlined in Part A of the PCR (UL Environment, 2018). All ancillary installation materials are assumed to be sent to landfill.

1.12. Use

As this study only looks at the life cycle of spray foam insulation, and not the building, the use phase only contains the emissions of any chemicals off-gassed from the foam. This study assumes 24% of the original chemical blowing agent is off-gassed over a 75-year lifetime (Honeywell International).

1.13. Reference Service Life and Estimated Building Service Life

Lorem The reference service life (RSL) for SPF is the life of the building or 75 years. Additional information is provided in Table 7.

1.14. Disposal

When the building is decommissioned, it is assumed that only manual labor is involved to remove the foam. Wastes are assumed to be transported 100 miles (160 km) to the disposal site. The spray foam is assumed to be landfilled at end-of-life, as is typical for construction and demolition waste in the US. This study assumes 16% of the original physical blowing agent is emitted at this stage in the life cycle. It is further assumed the spray foam is inert in the landfill and 50% of the blowing agent remains in the product after disposal (Kjeldsen & Jensen, 2001).

2. Life Cycle Assessment Background Information

2.1. Functional or Declared Unit

The product function is providing insulation to buildings. Accordingly, the functional unit for the study is 1 m² of installed insulation material with a thickness that gives an average thermal resistance of R_{SI}=1m^2·K/W (In imperial units, R_{SI}=1 is equivalent to R = 5.68 h·ft²·°F/Btu) with a building service life of 75 years (packaging included).

2.2. System Boundary

The study uses a cradle-to-grave system boundary. As such, it includes upstream processing and production of materials and energy resources needed to produce SPF, transport of materials (all chemical inputs for production and packaging) to SPF formulation sites, formulation of SPF components, transport of the components to the installation site, installation of insulation, removal and transport of insulation to disposal site, and end-of-life-disposal. Building energy savings from the use of insulation are excluded from this analysis.

2.3. Estimates and Assumptions

The material and energy inputs and outputs were modeled according to data provided by the representative site, while the electricity grid and natural gas mix were chosen based on the location of the production facility.

Lastly, this study assumes 50% of blowing agent consumed in the production of the formulation is eventually emitted, 10% during installation, 24% during its lifetime in the building, and 16% during end-of-life. The remaining 50% remains in the product (Honeywell International) (Kjeldsen & Jensen, 2001).

2.4. Cut-off Criteria

The cut-off criteria for including or excluding materials, energy and emissions data of the study are as follows:

- **Mass** – If a flow is less than 1% of the cumulative mass of the model it may be excluded, providing its environmental relevance is not a concern.

- **Energy** – If a flow is less than 1% of the cumulative energy of the model it may be excluded, providing its environmental relevance is not a concern.
- **Environmental relevance** – If a flow meets the above criteria for exclusion yet is thought to potentially have a significant environmental impact, it was included. Material flows which leave the system (emissions) and whose environmental impact is greater than 1% of the total of an impact category that has been considered in the assessment must be covered. This judgment was made based on experience and documented as necessary.

Packaging of incoming raw materials (e.g. pallets, totes, super-sacks) are excluded as they represent less than 1% of the product mass. Capital goods and infrastructure required to produce and install SPF (e.g. batch mixers, spraying equipment) are presumed to produce millions of units over the course of their life, so impact of a single functional unit attributed to these equipment is assumed to be negligible; therefore, capital goods and infrastructure were excluded from this study. No known flows are deliberately excluded from this EPD.

2.5. Data Sources

The LCA model was created using the GaBi Software system for life cycle engineering, developed by Sphera Solutions. The GaBi 2022.2 LCI database provides the life cycle inventory data for several of the raw and process materials obtained from the background system.

2.6. Data Quality

A variety of tests and checks were performed by the LCA practitioner throughout the project to ensure high quality of the completed LCA. Checks included an extensive review of the LCA model as well as the background data used.

Temporal coverage

The data are intended to represent spray polyurethane foam production during the 2020 calendar year. As such, CSFI provided primary data for 12 consecutive months during the 2020 calendar year.

Geographical coverage

This background LCA represents CSFI's products produced in the United States. Primary data are representative of these countries. Regionally specific datasets were used to represent each manufacturing location's energy consumption. Proxy datasets were used as needed for raw material inputs to address lack of data for a specific material or for a specific geographical region. These proxy datasets were chosen for their technological representativeness of the actual materials.

Technological coverage

Data on material composition were collected directly from CSFI. Manufacturing data were provided by CSFI for the Open Cell, Closed-Cell (HFC and HFO) and Roofing (HFC and HFO) products. Waste, emissions, and energy use are calculated from reported annual production during the reference year.

2.7. Period under Review

Primary data collected represent production during the 2020 calendar year. This analysis is intended to represent production in 2020.

2.8. Allocation

The cut-off allocation approach is adopted in the case of any post-consumer and post-industrial recycled content,

which is assumed to enter the system burden-free. Only environmental impacts from the point of recovery and forward (e.g., inbound transports, grinding, processing, etc.) are considered.

3. Life Cycle Assessment Scenarios

Table 5. Transport to the building site (A4)

NAME	UNIT	ROOFING	CLOSED CELL	OPEN CELL
Fuel type		Diesel	Diesel	Diesel
Fuel economy, outbound transport (medium truck)	l/100km	44.0	44.0	44.0
Outbound distance	km	805	805	805
Capacity utilization (including empty runs, mass based	%	69	69	69
Weight of products transported (if gross density not reported)	kg	1.1-1.21	0.704-0.737	0.341

Table 6. Installation into the building (A5), per functional unit

NAME	UNIT	ROOFING	CLOSED CELL	OPEN CELL
Ancillary materials	kg	0.0184-0.0202	0.0117-0.0123	0.00571
Net freshwater consumption specified by water source and fate (amount evaporated, amount disposed to sewer)	m^3	-	-	-
Other resources	kg	-	-	-
Electricity consumption	kWh	0.0619-0.0658	0.0383-.0400	0.0187
Diesel for construction equipment	MJ	4.33-4.61	2.69-2.81	1.31
Product loss per functional unit	kg	0.1-0.11	0.064-0.067	0.031
Output materials resulting from on-site waste processing (for recycling)	kg	0.0268	0.0556-0.0576	0.0889-0.0948
Biogenic carbon contained in packaging	kg CO2	-	-	-
VOC content	$\mu g/m^3$	-	-	

Table 7. Reference Service Life

NAME	VALUE	UNIT
RSL	75	Years
Declared product properties (at the gate) and finishes, etc.	1	m^2
	1	R_{SI}

Table 8. End of life (C1-C4)

NAME	UNIT	ROOFING	CLOSED CELL	OPEN CELL
Collected as mixed construction waste	kg	1.0-1.1	0.64-0.67	0.31
Landfill	kg	1.0-1.1	0.64-0.67	0.31

4. Life Cycle Assessment Results

Table 9. Description of the system boundary modules

	PRODUCT STAGE			CONSTRUC-TION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
	Raw material supply	Transport	Manufacturing	Transport from gate to site	Assembly/Install	Use	Maintenance	Repair	Replacement	Refurbishment	Building Operational Energy Use During Product Use	Building Operational Water Use During Product Use	Deconstruction	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling Potential
Cradle-to-grave	x	x	x	x	x	x	MND	MND	MND	MND	MND	MND	x	x	x	x	MND

4.1. Life Cycle Impact Assessment Results

North American LCIA results are declared using TRACI 2.1 methodology. Note that the IPCC AR6 GWP (IPCC, 2021) results are also presented as they are more current than the TRACI 2.1 GWP results and represent accurate values for the GWP of the blowing agents. The TRACI 2.1 methodology refers to an earlier version of the IPCC report.

Table 10. Open Cell Results

TRACI v2.1	A1-A3	A4	A5	B1	C2	C4
GWP 100 [kg CO_2 eq]	1.12E+00	1.77E-02	1.27E-01	0.00E+00	3.08E-03	1.13E-02
GWP 100, IPCC AR6 [kg CO_2 eq]	1.13E+00	1.79E-02	1.28E-01	0.00E+00	3.10E-03	1.14E-02
ODP [kg CFC-11 eq]	4.32E-09	2.96E-17	1.09E-15	0.00E+00	5.15E-18	3.66E-16
AP [kg SO_2 eq]	2.01E-03	6.08E-05	1.31E-03	0.00E+00	9.61E-06	4.97E-05
EP [kg N eq]	4.80E-04	6.65E-06	1.01E-04	0.00E+00	1.09E-06	2.76E-06
POCP [kg O_3 eq]	3.60E-02	1.41E-03	4.71E-02	0.00E+00	2.22E-04	8.73E-04
ADP_{fossil} [MJ, LHV]	2.72E+00	3.50E-02	3.01E-01	0.00E+00	6.08E-03	2.20E-02

Table 11. Closed Cell, HFC Results

TRACI v2.1	A1-A3	A4	A5	B1	C2	C4
GWP 100 [kg CO_2 eq]	2.74E+00	3.81E-02	3.21E+00	6.27E+00	6.47E-03	4.16E+00
GWP 100, IPCC AR6 [kg CO_2 eq]	2.76E+00	3.83E-02	3.02E+00	5.86E+00	6.51E-03	3.89E+00
ODP [kg CFC-11 eq]	6.37E-14	6.36E-17	2.66E-15	0.00E+00	1.08E-17	7.61E-16
AP [kg SO_2 eq]	4.66E-03	1.30E-04	3.20E-03	0.00E+00	2.02E-05	1.03E-04
EP [kg N eq]	5.02E-04	1.43E-05	2.46E-04	0.00E+00	2.30E-06	5.76E-06
POCP [kg O_3 eq]	8.53E-02	3.02E-03	1.14E-01	4.58E-06	4.66E-04	1.82E-03
ADP_{fossil} [MJ, LHV]	6.96E+00	7.50E-02	7.29E-01	0.00E+00	1.27E-02	4.58E-02

Table 12. Closed Cell, HFO Results

TRACI v2.1	A1-A3	A4	A5	B1	C2	C4
GWP 100 [kg CO_2 eq]	2.67E+00	3.65E-02	3.08E-01	4.93E-03	6.21E-03	2.59E-02
GWP 100, IPCC AR6 [kg CO_2 eq]	2.69E+00	3.67E-02	3.09E-01	4.93E-03	6.25E-03	2.61E-02
ODP [kg CFC-11 eq]	7.57E-14	6.09E-17	2.55E-15	0.00E+00	1.04E-17	7.32E-16
AP [kg SO_2 eq]	4.46E-03	1.25E-04	3.07E-03	0.00E+00	1.94E-05	9.95E-05
EP [kg N eq]	5.02E-04	1.37E-05	2.35E-04	0.00E+00	2.21E-06	5.54E-06
POCP [kg O_3 eq]	8.24E-02	2.89E-03	1.10E-01	0.00E+00	4.47E-04	1.75E-03
ADP_{fossil} [MJ, LHV]	6.64E+00	7.19E-02	6.98E-01	0.00E+00	1.22E-02	4.41E-02

Table 13. Roofing, HFC Results

TRACI v2.1	A1-A3	A4	A5	B1	C2	C4
GWP 100 [kg CO_2 eq]	4.60E+00	6.25E-02	4.52E+00	8.98E+00	1.08E-02	5.97E+00
GWP 100, IPCC AR6 [kg CO_2 eq]	4.64E+00	6.29E-02	4.25E+00	8.39E+00	1.08E-02	5.58E+00
ODP [kg CFC-11 eq]	1.60E-09	1.04E-16	3.43E-15	0.00E+00	1.80E-17	1.27E-15
AP [kg SO_2 eq]	7.19E-03	2.14E-04	4.18E-03	0.00E+00	3.36E-05	1.72E-04
EP [kg N eq]	6.64E-04	2.34E-05	3.21E-04	0.00E+00	3.82E-06	9.60E-06
POCP [kg O_3 eq]	1.36E-01	4.96E-03	1.50E-01	6.56E-06	7.76E-04	3.03E-03
ADP_{fossil} [MJ, LHV]	1.17E+01	1.23E-01	9.64E-01	0.00E+00	2.12E-02	7.64E-02

Table 14. Roofing, HFO Results

TRACI v2.1	A1-A3	A4	A5	B1	C2	C4
GWP 100 [kg CO_2 eq]	4.44E+00	5.88E-02	4.07E-01	8.73E-03	1.01E-02	4.25E-02
GWP 100, IPCC AR6 [kg CO_2 eq]	4.48E+00	5.92E-02	4.09E-01	8.73E-03	1.02E-02	4.29E-02
ODP [kg CFC-11 eq]	1.46E-09	9.82E-17	3.46E-15	0.00E+00	1.68E-17	1.19E-15
AP [kg SO_2 eq]	6.94E-03	2.01E-04	4.19E-03	0.00E+00	3.15E-05	1.61E-04
EP [kg N eq]	6.47E-04	2.20E-05	3.22E-04	0.00E+00	3.58E-06	8.99E-06
POCP [kg O_3 eq]	1.31E-01	4.66E-03	1.51E-01	0.00E+00	7.27E-04	2.84E-03
ADP_{fossil} [MJ, LHV]	1.10E+01	1.16E-01	9.63E-01	0.00E+00	1.99E-02	7.15E-02

4.2. Life Cycle Inventory Results

Table 15. Resource Use, Open Cell

PARAMETER	A1-A3	A4	A5	B1	C2	C4
RPR_E [MJ, LHV]	1.82E+00	1.09E-02	1.49E-01	0.00E+00	1.89E-03	1.63E-02
RPR_M [MJ, LHV]	1.84E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
$NRPR_E$ [MJ, LHV]	2.43E+01	2.84E-01	2.16E+00	0.00E+00	4.94E-02	1.88E-01
$NRPR_M$ [MJ, LHV]	4.82E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM [kg]	4.23E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF [MJ, LHV]	-	-	-	-	-	-
NRSF [MJ, LHV]	-	-	-	-	-	-
RE [MJ, LHV]	-	-	-	-	-	-
FW [m^3]	7.29E-03	4.63E-05	2.13E-04	0.00E+00	8.04E-06	2.50E-05

Table 16. Resource Use, Closed Cell, HFC

PARAMETER	A1-A3	A4	A5	B1	C2	C4
RPR_E [MJ, LHV]	2.73E+00	2.33E-02	3.55E-01	0.00E+00	3.97E-03	3.40E-02
RPR_M [MJ, LHV]	7.85E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
$NRPR_E$ [MJ, LHV]	5.98E+01	6.10E-01	5.34E+00	0.00E+00	1.04E-01	3.92E-01
$NRPR_M$ [MJ, LHV]	1.43E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM [kg]	9.08E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF [MJ, LHV]	-	-	-	-	-	-
NRSF [MJ, LHV]	-	-	-	-	-	-
RE [MJ, LHV]	-	-	-	-	-	-
FW [m^3]	1.59E-02	9.93E-05	5.60E-04	0.00E+00	1.69E-05	5.20E-05

Table 17. Resource Use, Closed Cell, HFO

PARAMETER	A1-A3	A4	A5	B1	C2	C4
RPR_E [MJ, LHV]	3.06E+00	2.24E-02	3.40E-01	0.00E+00	3.81E-03	3.27E-02
RPR_M [MJ, LHV]	7.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
$NRPR_E$ [MJ, LHV]	5.77E+01	5.84E-01	5.12E+00	0.00E+00	9.95E-02	3.77E-01
$NRPR_M$ [MJ, LHV]	1.33E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM [kg]	8.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF [MJ, LHV]	-	-	-	-	-	-
NRSF [MJ, LHV]	-	-	-	-	-	-
RE [MJ, LHV]	-	-	-	-	-	-
FW [m^3]	1.54E-02	9.51E-05	5.37E-04	0.00E+00	1.62E-05	5.00E-05

Table 18. Resource Use, Roofing, HFC

PARAMETER	A1-A3	A4	A5	B1	C2	C4
RPR_E [MJ, LHV]	4.54E+00	3.83E-02	4.85E-01	0.00E+00	6.60E-03	5.66E-02
RPR_M [MJ, LHV]	-	-	-	-	-	-
$NRPR_E$ [MJ, LHV]	1.01E+02	1.00E+00	6.80E+00	0.00E+00	1.72E-01	6.53E-01
$NRPR_M$ [MJ, LHV]	2.25E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM [kg]	1.49E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF [MJ, LHV]	-	-	-	-	-	-
NRSF [MJ, LHV]	-	-	-	-	-	-
RE [MJ, LHV]	-	-	-	-	-	-
FW [m^3]	2.47E-02	1.63E-04	6.26E-04	0.00E+00	2.81E-05	8.67E-05

Table 19. Resource Use, Roofing, HFO

PARAMETER	A1-A3	A4	A5	B1	C2	C4
RPR_E [MJ, LHV]	5.23E+00	3.61E-02	4.80E-01	0.00E+00	6.19E-03	5.30E-02
RPR_M [MJ, LHV]	-	-	-	-	-	-
$NRPR_E$ [MJ, LHV]	9.67E+01	9.42E-01	6.88E+00	0.00E+00	1.62E-01	6.12E-01
$NRPR_M$ [MJ, LHV]	2.07E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM [kg]	1.40E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF [MJ, LHV]	-	-	-	-	-	-
NRSF [MJ, LHV]	-	-	-	-	-	-
RE [MJ, LHV]	-	-	-	-	-	-
FW [m^3]	2.39E-02	1.53E-04	6.61E-04	0.00E+00	2.63E-05	8.11E-05

Table 20. Output Flows and Waste Categories, Open Cell

PARAMETER	A1-A3	A4	A5	B1	C2	C4
HWD [kg]	2.18E-05	1.09E-12	1.36E-11	0.00E+00	1.89E-13	6.51E-12
NHWD [kg]	2.10E-02	2.45E-05	2.40E-02	0.00E+00	4.25E-06	2.72E-01
HLRW [kg]	4.76E-07	7.39E-10	2.95E-08	0.00E+00	1.28E-10	1.74E-09
ILLRW [kg]	4.02E-04	6.24E-07	2.47E-05	0.00E+00	1.08E-07	1.52E-06
CRU [kg]	-	-	-	-	-	-
MR [kg]	0.00E+00	0.00E+00	2.68E-02	0.00E+00	0.00E+00	0.00E+00
MER [kg]	-	-	-	-	-	-
EE, Steam [MJ, LHV]	-	-	-	-	-	-
EE, Electricity [MJ, LHV]	-	-	-	-	-	-

Table 21. Output Flows and Waste Categories, Closed Cell, HFC

PARAMETER	A1-A3	A4	A5	B1	C2	C4
HWD [kg]	2.67E-09	2.33E-12	3.36E-11	0.00E+00	3.97E-13	1.36E-11
NHWD [kg]	4.37E-02	5.25E-05	5.54E-02	0.00E+00	8.92E-06	5.66E-01
HLRW [kg]	9.12E-07	1.59E-09	7.14E-08	0.00E+00	2.69E-10	3.62E-09
ILLRW [kg]	8.23E-04	1.34E-06	5.98E-05	0.00E+00	2.27E-07	3.17E-06
CRU [kg]	-	-	-	-	-	-
MR [kg]	0.00E+00	0.00E+00	5.76E-02	0.00E+00	0.00E+00	0.00E+00
MER [kg]	-	-	-	-	-	-
EE, Steam [MJ, LHV]	-	-	-	-	-	-
EE, Electricity [MJ, LHV]	-	-	-	-	-	-

Table 22. Output Flows and Waste Categories, Closed Cell, HFO

PARAMETER	A1-A3	A4	A5	B1	C2	C4
HWD [kg]	2.56E-09	2.24E-12	3.22E-11	0.00E+00	3.81E-13	1.31E-11
NHWD [kg]	4.27E-02	5.03E-05	5.31E-02	0.00E+00	8.57E-06	5.44E-01
HLRW [kg]	9.64E-07	1.52E-09	6.84E-08	0.00E+00	2.59E-10	3.48E-09
ILLRW [kg]	8.99E-04	1.28E-06	5.73E-05	0.00E+00	2.18E-07	3.05E-06
CRU [kg]	-	-	-	-	-	-
MR [kg]	0.00E+00	0.00E+00	5.56E-02	0.00E+00	0.00E+00	0.00E+00
MER [kg]	-	-	-	-	-	-
EE, Steam [MJ, LHV]	-	-	-	-	-	-
EE, Electricity [MJ, LHV]	-	-	-	-	-	-

Table 23. Output Flows and Waste Categories, Roofing, HFC

PARAMETER	A1-A3	A4	A5	B1	C2	C4
HWD [kg]	8.11E-06	3.83E-12	4.24E-11	0.00E+00	6.60E-13	2.26E-11
NHWD [kg]	6.95E-02	8.63E-05	7.98E-02	0.00E+00	1.49E-05	9.44E-01
HLRW [kg]	1.69E-06	2.61E-09	9.43E-08	0.00E+00	4.49E-10	6.04E-09
ILLRW [kg]	1.50E-03	2.20E-06	7.89E-05	0.00E+00	3.79E-07	5.29E-06
CRU [kg]	-	-	-	-	-	-
MR [kg]	0.00E+00	0.00E+00	9.48E-02	0.00E+00	0.00E+00	0.00E+00
MER [kg]	-	-	-	-	-	-
EE, Steam [MJ, LHV]	-	-	-	-	-	-
EE, Electricity [MJ, LHV]	-	-	-	-	-	-

Table 24. Output Flows and Waste Categories, Roofing, HFO

PARAMETER	A1-A3	A4	A5	B1	C2	C4
HWD [kg]	7.38E-06	3.61E-12	4.30E-11	0.00E+00	6.19E-13	2.12E-11
NHWD [kg]	6.63E-02	8.11E-05	7.78E-02	0.00E+00	1.39E-05	8.84E-01
HLRW [kg]	1.82E-06	2.45E-09	9.42E-08	0.00E+00	4.20E-10	5.65E-09
ILLRW [kg]	1.70E-03	2.07E-06	7.89E-05	0.00E+00	3.55E-07	4.96E-06
CRU [kg]	-	-	-	-	-	-
MR [kg]	0.00E+00	0.00E+00	8.89E-02	0.00E+00	0.00E+00	0.00E+00
MER [kg]	-	-	-	-	-	-
EE, Steam [MJ, LHV]	-	-	-	-	-	-
EE, Electricity [MJ, LHV]	-	-	-	-	-	-

5. LCA Interpretation

For HFC containing products, installation (A5), use (B1), and disposal (C4) are the greatest contributors to the GWP category due the emissions of HFCs over the course of its lifecycle. HFO formulations and Open-cell do not have pronounced GWP impacts across the life cycle due to lower blowing agent GWP characterization factors.

In nearly all other impact categories, SPF environmental performance is driven primarily by raw materials (A1). Installation tends to be the second highest driver of impact due to the use of on-site diesel generator, which contributes significantly to Acidification, Eutrophication, and Smog Formation Potential.

The inbound transportation module (A2) has a modest contribution to overall impact. Other transportation modules representing transport to site (A4) and transport to end-of-life (C2), have negligible contribution to life cycle results.

6. Additional Environmental Information

6.1. Environment and Health During Manufacturing

Manufacturing of SPF formulations and upstream chemicals is performed in an industrial manufacturing facility. Like many manufacturing processes, hazardous chemicals and manufacturing procedures may be employed. The Carlisle Spray Foam Insulation manufacturing facility follows all local, state and federal regulations regarding safe use and disposal of all chemicals (US EPA), as well as safety requirements required of the generally manufacturing operation of equipment and processes (US and State OSHA) and safe transport of all materials (US DOT) Environment and Health During Installation

6.2. Environment and Health During Installation

Installation of SPF involves potential exposure to certain hazardous chemicals that requires risk mitigation through the use of personal protective equipment and on-site actions including ventilation and restricted access. Of greatest concern is the potential exposure to airborne and liquid isocyanates during and immediately after installation of SPF. Isocyanates are known chemical sensitizers and exposure can occur through contact with the skin, eyes and respiratory system. Ventilation of the work zone, coupled with use of proper personal protective equipment is required during and immediately after installation SPF. For more information on health and safety during and immediately after SPF installation, please visit www.spraypolyurethane.org.

6.3. Extraordinary Effects

Fire

Spray polyurethane foam, like all foam plastics and many construction materials – including wood - is a combustible material and will emit toxic gases including carbon monoxide during a fire. When used in buildings and other construction applications, foam plastics employ flame retardants to control ignition the spread of fire and development of smoke. In addition, foam plastics may need to be protected with fire-resistant coverings or coatings when used in certain construction applications, as dictated by the building codes. All foam plastics materials and assemblies should meet the fire test requirements of the applicable building codes.

Water

The closed-cell and roofing SPF products meet the FEMA Class 5 requirements[1] for flood-damage resistant insulation materials for floors and walls.

Mechanical Destruction

Should the assembly the SPF is installed in, i.e. the wall or roof, have to be replaced then the SPF will have to be replaced as well.

6.4. Delayed Emissions

This study assumes 16% of the original physical blowing agent is emitted at end of life. It is further assumed the spray foam is inert in the landfill and 50% of the blowing agent remains in the product after disposal. (Honeywell International)

6.5. Environmental Activities and Certifications

CSFI has certified or tested its insulation products to various VOC standards to measure emissions of volatile or semi-volatile compounds. These standards include:

- UL Environment GREENGUARD® Certification – The GREENGUARD® Certification Program specifies strict certification criteria for VOC's and indoor air quality. This voluntary program helps consumers identify products that have low chemical emissions for improved indoor air quality.
- California Department of Health Services – Also known as Section 01350, this small-chamber emissions test standard is detailed under: Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers (CA/DHS/EHLB/Standard Method v1.1-2010).
- Canadian ULC – Required for SPF insulation products, this standard provides a similar VOC emissions test protocol specifically for SPF: CAN/ULC S774-09 Standard Laboratory Guide for the Determination of Volatile Organic Compound Emissions from Polyurethane Foam
- Currently, an ASTM workgroup is developing a small-chamber emissions test protocol for chemical compounds specific to SPF that include MDI, blowing agents, flame retardants and catalysts.

[1] "Flood Damage-Resistant Materials Requirements", FEMA Technical Bulletin 2, 2008, Table 2.

6.6. Further Information

This EPD is based on LCAs of SPF products that use HFCs and HFOs as blowing agents. Because of the low global warming potential factor of HFOs (~1.0 g CO_2-eq./kg) the emissions of these blowing agents account for a small percentage of the global warming potential life cycle results for HFO containing foams. Despite being released at the same rate over the course of the life of the product as HFOs, HFCs have a substantially higher contribution to GWP due to their GWP characterization factor of HFC-134a and HFC-245fa (1,300 and 858 kg CO_2-eq./kg, respectively, over a 100 year time horizon (IPCC, 2021))[2].

7. References

EN 15804: Sustainability of construction works, Environmental product declarations, Core rules for the product category of construction products. (2013). European Committee for Standardization.

EPA. (2012). Tool for the Reduction and Assessment of Chemical and other Environmental Impacts (TRACI) - User's Manual. Washington, D.C.: US EPA.

Honeywell International. (n.d.). Predictive Model for Polyurethane Blowing Agent Emissions into a House. Buffalo.

IPCC. (2021). *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* doi:10.1017/9781009157896.

ISO. (2006). ISO 14025: Environmental labels and declarations - Type III environmental declarations - Principles and procedures. Geneva: International Organization for Standardization.

ISO. (2020a). ISO 14040/Amd.1:2020: Environmental management - Life cycle assessment - Principles and Framework. Geneva: International Organization for Standardization.

ISO. (2020b). ISO 14044:2006/Amd.1:2017/Amd.2:2020: Environmental management - Life cycle assessment - Requirements and Guidelines. Geneva: International Organization for Standardization.

ISO. (2017). ISO 21930: Sustainability in building construction - Environmental declaration of building products. Geneva: International Organization for Standardization.

Kjeldsen, P., & Jensen, M. (2001). Release of CFC-11 from Disposal of Polyurethane Foam Waste. *ENVIRONMENTAL SCIENCE & TECHNOLOGY*, 3055-3063.

SPFA. (2018). Environmental Product Declaration: Spray Polyurethane Foam Insulation. ASTM.

Sphera. (2022). *GaBi LCA Database Documentation.* Retrieved from Sphera Solutions, Inc.: http://www.gabi-software.com/america/support/gabi/

UL Environment. (2018). Product Category Rules (PCR) Guidance for Building-Related Products and Services Part B: Building Envelope Thermal Insulation EPD Requirements, UL 10010–1 (v2.0).

UL Environment. (2018). Product Category Rules for Building-Related Products and Services - Part A: Life Cycle Assessment Calculation Rules and Report Requirements, UL 10010 (v3.2).

UL Environment (2020). Program Operator Rules v2.5

[2] Note that the TRACI 2.1 GWP methodology uses an earlier version of the IPCC report where the characterization factors of HFC-134a and HFC-245fa are 1,430 and 1,030 kg CO_2-eq./kg, respectively.

CERTIFICATE
OF COMPLIANCE

Carlisle Spray Foam Insulation

SealTite PRO HFO

239137-420
Certificate Number

23 Aug 2021 - 16 Jan 2025
Certificate Period

Certified
Status

UL 2818 - 2022 Gold Standard for Chemical Emissions for Building Materials, Finishes and Furnishings

Product tested in accordance with UL 2821 test method to show compliance to emission limits on UL 2818. Section 7.1 and 7.2.

UL investigated representative samples of the identified Product(s) to the identified Standard(s) or other requirements in accordance with the agreements and any applicable program service terms in place between UL and the Certificate Holder (collectively "Agreement"). The Certificate Holder is authorized to use the UL Mark for the identified Product(s) manufactured at the production site(s) covered by the UL Test Report, in accordance with the terms of the Agreement. This Certificate is valid for the identified dates unless there is non-compliance with the Agreement.

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).

Hydrofluorocarbon (HFC) Compliance Statement

Over the past couple of years, twelve states have enacted legislation that prohibits the use of hydrofluorocarbon (HFC) blowing agents in spray polyurethane foam (SPF) insulation. As of Jan 1, 2022, the following states prohibit the use of HFCs in high-pressure spray polyurethane foam insulation:

California	Maryland	Rhode Island
Colorado	Massachusetts	Vermont
Delaware	New Jersey	Virginia
Maine	New York	Washington

HFC blowing agents have been the workhorse of the SPF industry for the past 20 years in closed-cell, medium-density spray foam insulation products. Despite having zero ozone depletion potential, HFCs contribute to an increase in Global Warming Potential (GWP). In response to this environmental risk, spray foam manufacturers formulated products based on hydrofluoroolefins (HFOs) – next-generation foam blowing agents with an ultra-low GWP. With the absence of a federal mandate and the availability of more environmentally responsible substitute products, individual states are now leading the transition away from products containing HFCs.

SealTite PRO HFO medium-density, closed-cell spray polyurethane foam insulation exclusively uses HFO blowing agent technology and has a GWP of 1. SealTite PRO HFO is free of any HFC chemicals and meets the environmental regulation requirements of all U.S. States.

Global warming potential (GWP) is the heat absorbed by any greenhouse gas in the atmosphere, as a multiple of the heat that would be absorbed by the same mass of carbon dioxide (CO_2). Blowing agent technology has evolved over the last few decades, greatly reducing the environmental impact. Fourth generation blowing agents based on HFO technology have reduced the GWP to be equivalent with CO_2.

BLOWING AGENT	GWP
CFC-12 (Freon 12)	10,900
HCFC-141b	725
HFC-365mfc	794
HFC-245fa	1,030
HFOs	1
CO_2	1

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SealTite PRO

PRODUCT CERTIFICATIONS

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SEALTITE™ PRO HFO SPRAY-APPLIED POLYURETHANE FOAM PLASTIC INSULATION

CSI Section:
07 21 00 Thermal Insulation

1.0 RECOGNITION

SealTite™ PRO HFO spray-applied polyurethane foam plastic insulation described in this report has been evaluated for use as thermal insulation. The physical properties, thermal resistance, surface burning characteristics, air permeability, water vapor transmission, attic and crawl space installations, and uses in Types I through V construction were evaluated for compliance with the following codes and regulations:

- 2021, 2018, 2015, 2012 International Building Code® (IBC)
- 2021, 2018, 2015, 2012 International Residential Code® (IRC)
- 2021, 2018, 2015, 2012 International Energy Conservation Code® (IECC)
- 2020 Florida Building Code, Building (FBC, Building) – Supplement attached
- 2020 Florida Building Code, Residential (FBC, Residential) – Supplement attached
- 2020 Florida Building Code, Energy Conservation (FBC, Energy Conservation) – Supplement attached

2.0 LIMITATIONS

Use of SealTite PRO HFO spray-applied polyurethane foam plastic 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 Section 4.6.1 of this report, the insulation shall be separated from the interior of the building by a code-complying thermal barrier.

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

2.4 During application, the insulation shall be protected from exposure to weather.

2.5 The insulation shall be installed by professional spray polyurethane foam installers approved by Carlisle Spray Foam Insulation or by the Spray Polyurethane Foam Alliance (SPFA).

2.6 Use of the insulation in areas of "very heavy" termite infestation probability shall be in accordance with 2021, 2018, and 2015 IBC Section 2603.8, 2012 IBC Section 2603.9, or IRC Section R318.4, as applicable.

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

2.8 Labeling and job site 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 insulation used in plenums as interior finish or interior trim shall comply with Section 2603.7 of the IBC.

2.10 Fire-resistance ratings are beyond the scope of this review. Where fire-resistance rated assemblies are required by the IBC or IRC, documentation shall be provided to the building official showing compliance.

2.11 When used in exterior walls of Type I, II, III, or IV construction, application shall be as required in Section 4.8 of this report.

2.12 The insulation recognized in this report shall be produced by Carlisle Spray Foam Insulation in Cartersville, Georgia.

3.0 PRODUCT USE

SealTite PRO HFO spray-applied polyurethane foam plastic insulation complies with IBC Sections 2603 and 1202.3, IRC Sections R316, R408.3, and R806.5, 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 or ceiling assemblies, interior or exterior sides of below-grade vertical foundations, the underside of on-grade slabs, and in attics and crawl spaces as nonstructural thermal insulation material. SealTite PRO HFO spray-applied polyurethane foam plastic insulation can be used in Types I, II, III, IV, and V construction under the IBC and in one- and two-family dwellings under the IRC.

SealTite PRO HFO spray-applied polyurethane foam plastic insulation may be used as air impermeable insulation when installed in accordance with Section 4.4 of this report.

4.0 PRODUCT DESCRIPTION

4.1 Properties: SealTite PRO HFO is a medium-density, closed-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 2.0 pcf (32 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 liquid components shall be stored in 55-gallon (208 L) drums at temperatures between 50°F and 80°F (10°C and 27°C). When Component A and Component B are stored in factory-sealed containers at the recommended temperatures, the shelf life is six months.

4.2 Thermal Resistance (R-Values): SealTite PRO HFO spray-applied polyurethane foam plastic insulation has thermal resistance (R-Value) at a mean temperature of 75°F±5°F (23.8°C ±2.8°C) as shown in Table 1 of this report. For thicknesses above 3.5 inches not listed in Table 1, a multiplier of 7.24/inch shall be used to calculate installed R value.

TABLE 1 - Thermal Resistance (R-Values)

Thickness (inch)	SealTite PRO HFO R-Value (°F•ft^2•h/Btu)
1	7.2
2	14
3	22
3.5	25
4	29
5	36
5.5	40
6	43
7	51
7.5	54
8	58
9	65
10	72
11	80
11.5	83
12	87

For **SI:** 1 inch = 25.4 mm, 1°F·ft^2·h/Btu = 0.176 110 K·m^2/W.

4.3 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 SealTite PRO HFO spray-applied polyurethane foam plastic 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. Foam insulation thicknesses are not limited when covered by a code complying thermal barrier and installed in accordance with Section 4.6.1.1 of this report.

4.4 Air Permeability: SealTite PRO HFO spray-applied polyurethane foam plastic insulation is classified as an air-impermeable insulation when tested in accordance with ASTM E2178 at a minimum thickness of 1 inch (25.4 mm), in accordance with 2021 and 2018 IBC Section 1202.3 and 2015 and 2012 IBC Section 1203.3, and IRC Section R806.5.

4.5 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 and installed in accordance with Section 4.6 of this report.

4.6 Installation: SealTite PRO HFO spray-applied polyurethane foam plastic insulation shall comply with Sections C402.1 or R402.1 of the IECC, as applicable.

The manufacturer's published installation instructions for SealTite PRO HFO spray-applied polyurethane foam plastic insulation and this report shall be available on the job site during installation. Where conflicts occur, the most restrictive governs.

SealTite PRO HFO shall be spray-applied on the job site using equipment specified in the manufacturer's published installation instructions. 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 or water.

4.6.1 Thermal Barrier

4.6.1.1 Application with a Prescriptive Thermal Barrier: SealTite PRO HFO spray-applied polyurethane foam plastic insulation, in any thickness, in ceiling cavities and in wall cavities shall be separated from the interior by a prescriptive thermal barrier. The thermal barrier shall comply with and be installed in accordance with IBC Section 2603.4 and IRC Section R316.4.

Exception: The thermal barrier is not required when the insulation is installed in attics or crawlspaces as described in Section 4.6.2 but shall be installed between the insulation and the interior of the building.

4.6.1.2 Alternative Thermal Barrier Assemblies: SealTite PRO HFO spray-applied polyurethane foam plastic insulation may be installed without a thermal barrier as defined in Section 4.6.1.1 of this report when installed with a fire-protective coating as described in Table 2 of this report based on testing in accordance with NFPA 286 or UL 1715.

4.6.2 Installation in Attics or Crawl Spaces: SealTite PRO HFO spray-applied polyurethane foam plastic insulation may be installed in attics or crawl spaces when installed in accordance with this section. The insulation may be installed in unvented attics and unvented enclosed rafter spaces for use as air-impermeable insulation as 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, SealTite PRO HFO spray-applied polyurethane foam plastic insulation may be installed in accordance with this section. SealTite PRO HFO spray-applied polyurethane foam plastic 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 a thermal barrier in accordance with Section 4.6.1 of this report.

4.6.2.1 Installation in Attics and Crawl Spaces Without an Ignition Barrier: SealTite PRO HFO spray-applied polyurethane foam plastic insulation may be installed in attics and crawl spaces without a prescriptive ignition barrier or fire-protective coating 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 2021 and 2018 IBC Section 1202.2, 2015 and 2012 IBC Section 1203.2, 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

   Unvented crawl spaces shall meet the requirements of Section 4.6.2.2 of this report.

   Ventilated crawl spaces shall be provided with ventilation 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
   - 2021, 2018, 2015, 2012 IRC Section R408.1

e. SealTite PRO HFO spray-applied polyurethane foam plastic insulation may be applied at a nominal density of 2.0 pcf to the underside of roof sheathing or roof rafters and vertical surfaces of attics and in crawl spaces without a prescriptive ignition barrier or fire-protective coating. When applied to the underside of the top of the space, the thickness of the SealTite PRO HFO spray-applied polyurethane foam plastic insulation shall not exceed $11^1/_2$ inches (292 mm), and when applied to vertical surfaces or floor, the maximum thickness shall not exceed $7^1/_2$ inches (191 mm).
f. In accordance with IMC (International Mechanical Code®) Section 701, combustion air is provided.

4.6.2.2 Installation in Unvented Crawl Spaces: SealTite PRO HFO spray-applied polyurethane foam plastic insulation may be installed in unvented crawl spaces. when using an alternative thermal barrier assembly meeting Section 4.6.1.2 of this report when complying with IRC Section R408.3.

Exception: The alternative thermal barrier assembly may be eliminated in Item 2.4 of IRC Section R408.3 when installed in accordance with Section 4.6.2.1 of this report and when the crawl space does not include an air pathway to the common area.

4.7 Water Vapor Transmission: When tested to the requirements of ASTM E96, desiccant method, at a thickness of one inch, SealTite PRO HFO has a Vapor Retarder Classification of Class II.

4.8 Use in Exterior Walls of Types I, II, III, and IV Construction (IBC)

4.8.1 General: When SealTite PRO HFO spray-applied polyurethane foam plastic 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 4.8 of this report.

4.8.2 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 Tables 3, 4, and 5 of this report.

4.9 Potential Heat of Combustion: When tested to NFPA 259, SealTite PRO HFO has a potential heat of combustion of 11,024 BTU/lb. (25,643 kJ/kg) (1,984 BTU/ft^2 per inch of thickness).

5.0 IDENTIFICATION

The spray foam insulation is identified with the following:

a. Manufacturer's name (Carlisle Spray Foam Insulation)
b. address and telephone number,
c. the product trade name (SealTite PRO HFO)
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-720)
i. the name or logo of the inspection agency

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

IAPMO UES ER-720

6.0 SUBSTANTIATING DATA

6.1 Data in accordance with the ICC-ES Acceptance Criteria for Spray-applied Foam Plastic Insulation, AC377, including Appendix X.

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

6.3 Report of fire test of interior finish material in accordance with UL 1715.

6.4 Report of testing of air permeance in accordance with ASTM E2178.

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

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.

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

6.9 Testing to the requirements of NFPA 259.

6.10 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 SealTite PRO HFO spray-applied polyurethane foam plastic insulation to assess conformance to the codes and standards shown in Section 1.0 of this report and documents the product's certification. This spray foam is produced at locations noted in Section 2.12 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 (mils)	THEORETICAL APPLICATION RATE (COATINGS ONLY)	WALLS AND VERTICAL SURFACES	CEILING AND OVERHEAD SURFACES
DC315[2]	14 WFT (9 DFT)	0.87 gal/100 ft^2	7.5	11.5
Flame Control 60-60A[3]	14 WFT (9 DFT)	0.87 gal/100 ft^2	6	12
Fireshell F10E[4]	14 WFT (9 DFT)	0.87 gal/100 ft^2	6	10
No-Burn, Inc.[5]	14 WFT (9 DFT)	0.87 gal/100 ft^2	7.25	11.25

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] Flame Control Coatings, recognized in IAPMO UES ER-596 and tested to the requirements of NFPA 286.
[4] ICP Construction, tested to the requirements of NFPA 286.
[5] No-Burn, Inc., recognized in IAPMO UES ER-305 and tested to the requirements of UL 1715.

TABLE 3 – NFPA 285 COMPLYING EXTERIOR WALL ASSEMBLIES SEALTITE PRO HFO APPLIED IN WALL STUD CAVITY

Wall Component	Material Description
Base Wall (BWS) Use either 1, 2, 3 or 4	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. 4) Fire-retardant-treated wood (FRTW) Stud Wall – 1 layer of 5/8-inch thick Type X gypsum wallboard on the interior, installed on 2x4 (min.) FRTW studs spaced a maximum of 24 inches on center.
Fire-Stopping in Stud Cavity at Floor Lines	1) 4-inch 4 pcf mineral wool (friction fit or installed with Z-Clips) 2) FRTW lumber -1.5 inches thick (minimum) (FRTW firestop shall only be used with FRTW framing)
Cavity Insulation Use Item 1, 2 or 3 when steel framing is used. Use Item 1 or 3 when FRTW framing is used.	1) None 2) Full stud cavity depth or less of **SealTite PRO HFO** 3) Any noncombustible fiberglass insulation (faced or unfaced).
Exterior Sheathing	Minimum ½-inch thick exterior gypsum sheathing.
WRB over Base Wall Use Item 1 or 2	1) None 2) Any water-resistive barrier or air vapor barrier approved to be used in an NFPA 285 compliant assembly paired with mineral wool, polyisocyanurate, EPS, or XPS insulation or no exterior insulation for claddings approved for that WRB. Approvals shall be from an evaluation report by an approved evaluation entity.
Exterior Insulation Use Item 1, 2 or 3	1) None – only where the cladding is listed to be approved with specific water-resistive barriers. (Note 1) 2) Minimum 2-inch-thick. 4 pcf mineral fiber insulation allowed for used with any water-resistive barrier on the base wall surface. (Note 1) 3) Any polyisocyanurate, EPS, or XPS insulation approved (see note) to be used in an NFPA 285 compliant assembly paired with the water-resistive barriers in Item 2 above and claddings in Item 2 below. (Note 2)
Exterior Cladding Use Item 1 or 2	1) Claddings below may only be used with noncombustible exterior insulation Item 2 above (mineral fiber). a. Any noncombustible cladding, such as brick, stone, terra cotta, fiber cement, concrete, sheet metal, etc. b. Combustible cladding. Use any cladding that has been successfully tested by the panel manufacturer (or fabricator) via the NFPA 285 test method. (Note 2) 2) Claddings below may be used with any approved (see note) combustible exterior insulation Item 3 above. Any cladding (combustible or noncombustible) approved to be used in an NFPA 285 compliant assembly paired with approved polyisocyanurate, EPS, XPS, or SPF insulation. Each insulation must be specifically approved for the exact cladding types listed in the approval. (Note 2) It is important to note the following item (Window/Door perimeter details) for specific insulation types that require unique detailing. Note: Approvals shall be by evaluation reports from approved evaluation entities.
Window/Door Perimeters	The approved design for the specific system being considered shall be used. Note: EPS and XPS required specific door/window header and jamb details to be compliant with NFPA 285. Polyisocyanurate and SPF may or may not require specific header/jamb details. Approvals from approved evaluation reports by approved evaluation entities for the header/jamb detail required for each insulation type.
(Notes to Table 3 continued on next page)	

Note 1: Examples for use with no exterior insulation or mineral wool insulation per the table above. Cladding Lists 1 and 2 below are for use with no exterior insulation. However, this will expose the substrate to moisture, in which case a water-resistive barrier shall be added to the system. For these applications, water-resistive barriers approved for use with each cladding shall be used.

(Notes to Table 3 continued)

1) Any combustible cladding that has passed NFPA 285 testing (examples below)
   a. NFPA 285 approved MCM/ACM Metal/Aluminum Composite building panels
   b. NFPA 285 approved stone/aluminum honeycomb composite
   c. NFPA 285 approved HPL High-pressure Laminate Panels.
2) Any noncombustible cladding such as (but not limited to):
   a. Brick – nominal 4-inch clay brick or veneer
   b. Stucco – $^{7}/_{8}$ -inch exterior cement plaster and lath. A secondary water-resistive barrier can be installed between the insulation and lath. The secondary WRB may not be full coverage asphalt or butyl-based self-adhering membranes.
   c. Natural Stone (granite, limestone, marble, sandstone) – 2 inches thick
   d. Architectural Cast Stone – $2^{1}/_{2}$ inches thick
   e. Terra Cotta Cladding – $1^{1}/_{4}$ inches thick
   f. $^{1}/_{4}$ -inch-thick glass-fiber-reinforced concrete panels (installed per manufacturer instructions)
   g. Concrete – 2 inches thick
   h. CMU blocks – 4 inches thick
   i. Sheet metals such as aluminum, copper, or zinc – any thickness

Note 2: Combustible WRB/Insulation/Cladding

If the base wall is covered with a combustible WRB/Insulation and various claddings (combustible or noncombustible), each insulation/WRB/cladding combination for approval shall have explicitly been tested or approved to be used with each other. Evaluation reports from approved evaluation entities may be used.

TABLE 4. NFPA 285 COMPLYING EXTERIOR WALL ASSEMBLIES WITH SEALTITE PRO HFO APPLIED TO EXTERIOR OF WALL ASSEMBLY WITH OPTIONAL SPF IN WALL STUD CAVITY

Wall Component	Material Description
Base Wall System (BWS) – Use Item 1, 2, 3 or 4	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 No. 20 gauge steel studs spaced a maximum of 24 inches on center. 4) Fire-retardant-treated wood (FRTW) stud wall – 1 layer of $^5/_8$-inch thick Type X gypsum wall board on the interior, installed on 2x4 (minimum FRTW studs spaced a maximum of 24 inches on center.
Fire-Stopping at floor lines – Use Item 1 or 2	1) 4-inch 4 pcf mineral wool (friction fit or installed with Z-clips) 2) FRT lumber -$1^1/_2$ -inch thick (min) (FRT firestop shall only be used with FRT framing)
Cavity Insulation Use Item 1, 2, 3 or 4	1) None 2) Full stud cavity or less of **SealTite PRO HFO** SealTite PRO Closed Cell, SealTite PRO One Zero, SealTite PRO Open Cell, SealTite PRO High Yield, SealTite PRO No Mix, SealTite PRO No Trim 21, or SealTite PRO OCX 3) Any noncombustible insulation per ASTM E136 4) Any fiberglass insulation (faced or unfaced)
Exterior Sheathing	Minimum ½ - inch thick exterior gypsum sheathing
Exterior Insulation Item 1 limited to cladding types 1 - 7	1) **SealTite PRO HFO** - 4-inch nominal thickness (max) of 2) **SealTite PRO** HFO - 3.5-inch nominal thickness (max)
Exterior Cladding - Items 1-7 are allowed to be used without the DC315 coating system. Use of any of Items 1-20 when exterior SPF is coated with IFTI DC315 (16 mil WFT) with Top Coat Paint (8 mils WFT Sherwin Williams Sher-Cryl or equivalent) For Items 8-20, air gap cannot exceed $2^1/_2$ inches. All claddings non-open joint. Panel claddings may use vertical or horizontal Z girt attachment. Panel claddings may be vertical or horizontal.	1) Brick – Nominal 4-inch clay or concrete brick or veneer with maximum 2-inch air gap behind the brick. Brick Ties/Anchors 24 inches on center (maximum) 2) Precast Concrete Panels – minimum $1^1/_2$-inch-thick using any standard non-open joint installation technique such as shiplap, with maximum 2-inch airgap behind the cladding. 3) Concrete Masonry Units – Minimum 2-inch-thick with maximum 2-inch air gap between exterior wall insulation and concrete masonry units. 4) Stucco – minimum $^7/_8$-inch-thick exterior cement plaster and lath. A secondary water-resistive barrier (WRB) may be installed between the exterior insulation and the lath. The secondary WRB shall not be full-coverage asphalt or butyl-based self-adhered membranes. 5) Natural Stone Veneer – minimum 2-inch-thick natural stone (granite, limestone, marble, sandstone). Any standard non-open joint installation technique may be used. 6) Cast Artificial Stone – minimum 1½-inch thick complying with ICC-ES AC 51 or ASTM C1670 using any standard non-open joint installation technique. 7) Terra Cotta Cladding – minimum 1¼-inch thick (solid or equivalent by weight) using any standard non-open joint installation technique such as shiplap. 8) Aluminum cladding – 0.030-inch minimum thickness – non-open joint. 9) Steel cladding – 0.0149-inch minimum thickness – non-open joint 10) Copper cladding – 0.0216-inch minimum thickness – non-open joint. 11) Zinc cladding – 0.040-inch minimum thickness – non-open joint. 12) Concrete – 1-inch-thick minimum thickness using any standard non-open joint installation technique. 13) One-coat Stucco – 3/8-inch minimum exterior cement plaster and lath – non-open joint 14) Thin brick adhered with noncombustible mortar to ¾-inch minimum stucco base – non-open joint. 15) CMU: Minimum 1-inch-thick concrete masonry unit. Any standard non-open joint installation technique may be used. 16) ¼-inch fiber cement cladding – non-open joint. 17) Stone veneer – minimum 1-inch thick – non-open joint. 18) Terreal Zephir Evolution Rainscreen System (or similar Terra Cotta) minimum 9/16-inch thick – non-open joint.[1] 19) SwissPearl Carat Panels (ER-551)– 0.315-inch minimum thickness – non-open joint 20) FunderMax M.Look (minimum ¼-inch) – non-open joint[1]
Window/Door Perimeters	The window opening perimeters shall be per UL Design Listings EWS0013, EWS0029, or EWS0054, as applicable were approved by the engineer and the local building official. For FRTW stud construction, openings are lined with $1^1/_2$-inch-thick FRTW lumber.

For **SI:** 1 inch = 25.4 mm

Notes:
[1]Approval of this product is beyond the scope of this review. Documentation of code compliance of this product shall be provided to the building official.

TABLE 5. NFPA 285 COMPLYING EXTERIOR WALL ASSEMBLIES WITH SEALTITE PRO HFO APPLIED DIRECTLY TO EXTERIOR INSULATION WITHOUT EXTERIOR SHEATHING

(Applicable for 2018, 2015, and 2012 IBC)

Wall Component	Material Description
Base Wall System (BWS) – Use Item 1, 2, 3 or 4	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 No. 25 gauge steel studs spaced a maximum of 24 inches on center with lateral bracing every 4 feet. 4) Fire-retardant-treated wood (FRTW) stud wall – 1 layer of $^5/_8$-inch thick Type X gypsum wall board on the interior, installed minimum 2x4 (nominal dimension) FRTW studs spaced a maximum of 24 inches on center with lateral bracing as required by the applicable code.
Fire-Stopping at floor lines – Use Item 1 or 2	1) Any approved mineral fiber-based safing insulation in each stud cavity at the floor line (safing thickness shall match stud cavity depth) 2) Solid FRT lumber in accordance with Type III Construction in the IBC (FRT firestop shall only be used with FRT framing)
Cavity Insulation	**SealTite PRO HFO** – $1^1/_2$-inch minimum up to full cavity thickness.
Exterior Sheathing	None
Exterior Insulation Use Items 1 - 3 for all cladding types Items 4 - 8 limited to Cladding Types 1 - 6.	1) Hunter Panels Xci Foil (Class A) - 3½" (max.) 2) Hunter Panels Xci-286 - 3½" (max.) 3) CCW R2+ SHEATHE - 3½" (max.) 4) Hunter Panels Xci Foil (Class A) - 4" (max.) 5) Hunter Panels Xci-286 - 4" (max.) 6) CCW R2+ SHEATHE - 4" (max.) 7) Hunter Panels Xci CG or Xci CG (Class A) – 4" (max.) 8) CCW R2+ MATTE or R2+ MATTE (Class A) - 4" (max.)
Weather Resistant Barrier Over Exterior Insulation Use any item 1 – 9 For additional engineered solutions for WRB's contact CSFI Technical Service Department	1) None 2) Hunter Xci VP-SA WRB 3) Carlisle Fire Resist 705 RS 4) Fire Resist Barithane VP 5) Fire Resist 705 VP (with 702 WB, Cav-Grip, or Low VOC Travel-Tack adhesives) 6) Fire Resist 705 FR-A (with CCW 702, 702LV, 702 WB, CAV-Grip, and Low VOC Travel Tack adhesives) 7) Fire Resist Barritech VP 8) Fire Resist Barritech NP (or NP LT) 9) Henry Air-Bloc 21 S, AB 33MR, AB 31MR, AB 17MR, AB 16MR The exterior insulation may be used with or without CavClear® Masonry Mat over the insulation with a maximum 1" air gap between the CavClear and the cladding. When CavClear is used, this may only be used with Cladding 1 – 6 or with thin brick/thin stone adhered to stucco as long as total thickness is ¾" min.
Exterior Cladding Use any Item 1 -17 Item 7 may use any tested/approved installation technique Items 8, 9, or 12 may use any standard installation technique ***Table cont'd on next page***	1) **Brick** - 4" (nom.) clay or concrete brick or veneer with maximum 2" air gap behind the brick. Brick Ties/anchors 24" (max.) O.C. 2) **Stucco** – ¾" (min.) - exterior cement plaster and lath 3) **Limestone** – 2" (min.) using any standard non-open joint installation technique such as shiplap 4) **Natural Stone** (granite, limestone, marble, sandstone) – 2" (min.) using any standard non-open joint installation technique such as grouted/mortared stone 5) **Artificial Cast Stone** - 1½" (min.) complying with ICC-ES AC 51 using any standard non-open joint installation technique such as shiplap 6) **Terracotta Cladding** - 1¼" (min.) - solid or equivalent by weight - using any standard non-open joint installation technique such as shiplap 7) **Metal Composite Material (MCM)** - any MCM that has successfully passed NFPA 285 8) **Metal building panels** - Uninsulated sheet metal building panels including steel, copper, aluminum, or zinc (zinc not permitted for use with Hunter Panels Xci-CG or CCW R2+ MATTE) 9) **Fiber-cement siding, porcelain,** or **ceramic tile** – ¼" (min.) uninsulated and mechanically attached 10) **Composite Building Panels** - Stone, porcelain, ceramic/aluminum honeycomb composite building panels that have successfully passed NFPA 285 criteria 11) **Autoclaved-aerated-concrete (AAC) panels** – any AAC panels that have successfully passed NFPA 285 criteria 12) **Terra Cotta Cladding** – ½" (min.) rain-screen terracotta with ventilated shiplap

	13) **One Coat Stucco** – ½" (min.) - any one coat stucco which meets AC11 acceptance criteria or is approved for use in Types I-IV construction or has been tested per NFPA 285 or stays in place when tested per ASTM E119 (stucco exposed to fire) for at least 30 minutes 14) **Thin brick** or **cultured stone** – ¾" (min.) in thin-set adhesive and metal lath tested to ASTM E119 (brick exposed to furnace) and remains in place for a minimum of 30 minutes or has passed an NFPA 285 test. 15) **Glen Gery Thin Tech Elite Series Masonry Veneer or TABS II Panel System -** ½" thick bricks using TABS Wall Adhesive or Brick It MCS & CI Panel Systems 16) **Stone Veneer** – 1¼" (min.) using any standard installation technique 17) **FunderMax M.Look** – ¼" (min.) using any standard installation technique
Window/Door Perimeters	The window opening perimeters shall be per UL Design Listings EWS0013, EWS0029, or EWS0054, as applicable were approved by the engineer and the local building official. For FRTW stud construction, openings are lined with 1½-inch-thick FRTW lumber.

For **SI:** 1 inch = 25.4 mm

Note 1: The following adhesives may be used to attach the polyiosyanurate (polyiso) insulation
1) LM 800 XL or BarriBond or BarriBond XL: adhesive applied discontinuously at a rate of ⅜" thick by 3" diameter dabs, 16" O.C.
2) CAV-GRIP™ or Low VOC Travel-Tack aerosol adhesive: applied per manufacturers' instructions

Note 2: The following may be used as a gap-filler between insulation panels:
1) ICP HandiFoam Fireblock
2) TVM Fireblock
3) DuPont Great Stuff PRO Gaps & Cracks Insulating Foam

Note 3: These detailing materials may be used over the polyiso insulation and can be used alone or with any approved WRB for the assembly
1) Board Joint Treatments:
   a. BarriBond or Barribond XL: 2" x 40 mil ribbon
   b. 4" DCH Reinforcing Fabric embedded in Fire-Resist VP/NP/NP LT or Fire-Resist Barrithane VP
   c. 4" Foil-GRIP 1402*
   d. 4" AlumaGRIP 701*
2) Termination Mastic for Flashing/Membrane: 1" x 40 mil ribbon or tooled ⅜" bead of SURE-SEAL Lap Sealant, LM 800 XL, BarriBond, or BarriBond XL
3) Detail Flashing: 3" on each side at Openings, Terminations, Penetrations, Transitions, and Angle Changes
   a. Fire Resist 705 FR-A/XLT*
   b. SURE-SEAL P/S Elastoform* or SURE-SEAL P/S Cover Strip*
   c. LiquiFiber or DCH Reinforcing Fabric embedded in Barritech VP/NP/NP LT
   d. 40 mil application of BarriBond, BarriBond XL, or Barrithane VP
   *Prepare the surface as recommended by Carlisle using CCW-702, CCW-702 LV, CCW-702 WB, CCW-715, Low VOC Travel-Tack, CAV-GRIP, HP 250 Primer, or Low VOC EPDM Primer per the instructions on Product Data Sheets

Note 4: In the NFPA 285 test, flashings for fenestration, including through-wall flashing (TWF), are not considered part of the WRB (Ref: 2015 IBC Sec. 1403.5 and 2018 IBC Sec. 1402.5). Therefore, suitable combustible or non-combustible flashings are permitted for wall assemblies as required in Building Code (Ref: 2015 IBC Sec. 1405.4 and 2018 IBC Sec. 1404.4).

Through Wall Flashing (TWF) is permitted for use in wall assemblies clad with masonry or stone at the base of wall, head of wall, relieving angle, window head, windowsill, and at other interruptions in the exterior cavity. TWF shall be applied at a maximum of 8" onto the back-up wall and terminate at daylight or onto a drip edge. The following TWF products may be used:
1) CCW-705 TWF/XLT*
2) Pre-Kleened EPDM TWF loose-laid or adhered with SURE-SEAL 90-8-30A bonding adhesive or SURE-SEAL low VOC Bonding adhesive
3) Metal TWF by others

Note 5: BRT-801 tape may be used over Fire-Resist 705 RS at membrane splices, terminations, and penetrations. Fire-Resist 705 RS and the substrate may be treated with CCW-702, CCW-702 LV, CCW-702 WB, or Low VOC Travel-Tack to promote adhesion of BRT-801.

Note 6: Approval of this product is beyond the scope of this review. Documentation of code compliance of this product shall be provided to the building official.

FLORIDA SUPPLEMENT

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SEALTITE™ PRO HFO SPRAY-APPLIED POLYURETHANE FOAM PLASTIC INSULATION

CSI Section:
07 21 00 Thermal Insulation

1.0 RECOGNITION

The SealTite PRO HFO spray-applied polyurethane foam plastic insulation as evaluated and represented in IAPMO UES Evaluation Report ER-720 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:

- 2020 Florida Building Code, Building, (FBC, Building)
- 2020 Florida Building Code, Residential (FBC, Residential)
- 2020 Florida Building Code, Energy Conservation (FBC, Energy Conservation)

2.0 LIMITATIONS

Use of SealTite PRO HFO spray-applied polyurethane 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 Sections 1403.8 and 2603.8 of the FBC, Building or Sections 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-720.

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

air barrier
abaa
association of
america





Evaluated Material Certificate

air barrier association of america
abaa
EVALUATED

This certificate acknowledges

Carlisle Spray Foam Insulation

has the following Air and Water Resistive Barrier evaluated in accordance with the ABAA Process for Approval of Air and Water-Resistive Barriers under the category of

Sprayed Polyurethane Foam (Medium Density Closed Cell)

SealTite PRO HFO

The Manufacturer agrees to uphold and abide by the principles of the Quality Assurance Program used by the Air Barrier Association of America Inc. The Manufacturer agrees to actively champion the promotion of the air barrier industry while sustaining high-quality standards.

April 26, 2023

Date

Quality Assurance Program Manager

SealTite PRO

QUALITY ASSURANCE

PERRY JOHNSON REGISTRARS, INC.

Certificate of Registration

Perry Johnson Registrars, Inc., has audited the Quality Management System of:

Accella Polyurethane Systems

100 Enterprise Drive, Cartersville, GA 30120 United States

(This is a single site scheme. See appendix for site specific activity.)

(Hereinafter called the Organization) and hereby declares that Organization is in conformance with:

ISO 9001:2015

This Registration is in respect to the following scope:

Design and Manufacture of Polyurethane Foam and Silicone Coatings

This Registration is granted subject to the system rules governing the Registration referred to above, and the Organization hereby covenants with the Assessment body duty to observe and comply with the said rules.

Terry Boboige, President

Perry Johnson Registrars, Inc. (PJR)
755 West Big Beaver Road, Suite 1340
Troy, Michigan 48084
(248) 358-3388

PERRY JOHNSON REGISTRARS, INC.

ANAB ACCREDITED ISO/IEC 17021 MANAGEMENT SYSTEMS CERTIFICATION BODY

PERRY JOHNSON REGISTRARS, INC.

UKAS MANAGEMENT SYSTEMS 0105

The use of the UKAS accreditation symbol is in respect to the activities covered by the Accreditation Certificate Number 0105.

The validity of this certificate is dependent upon ongoing surveillance.

Effective Date: March 9, 2021
Expiration Date: March 8, 2024

Certificate No.: C2021-00529

PERRY JOHNSON REGISTRARS, INC.

Appendix

100 Enterprise Drive, Cartersville, GA 30120 United States	***Customer Orders, Purchasing, Receipt, Design, Production, Inventory Raw Materials, and Inspection of Polyurethane and Silicon Coatings***
400 North Main Street, Adairsville, GA 30103 United States	***Receipt, Storage, and Ship Finished Packaged Product***

Terry Boboige, President

Perry Johnson Registrars, Inc. (PJR)
755 West Big Beaver Road, Suite 1340
Troy, Michigan 48084
(248) 358-3388

PERRY JOHNSON REGISTRARS, INC.

Certificate of Registration

Perry Johnson Registrars, Inc., has audited
the Environmental Management System of:

Accella Polyurethane Systems
100 Enterprise Drive, Cartersville, GA 30120 United States

(Hereinafter called the Organization) and hereby declares that Organization is in conformance with:

ISO 14001:2015

This Registration is in respect to the following scope:

Manufacture of Polyurethane Wall Roof Spray Foam and Liquid Applied Silicone Roof Coating

This Registration is granted subject to the system rules governing the Registration referred to above, and the Organization hereby covenants with the Assessment body duty to observe and comply with the said rules.

PERRY JOHNSON REGISTRARS, INC.

ANAB
ANSI National Accreditation Board
ACCREDITED
ISO/IEC 17021-1
MANAGEMENT SYSTEMS CERTIFICATION BODY

Terry Boboige, President

Perry Johnson Registrars, Inc. (PJR)
755 West Big Beaver Road, Suite 1340
Troy, Michigan 48084
(248) 358-3388

The validity of this certificate is dependent upon ongoing surveillance.

Effective Date:	Expiration Date:	Certificate No.:
June 1, 2023	May 31, 2026	C2023-02919

air barrier
abaa
association of
america

Member Certificate

Carlisle Spray Foam Insulation

IS A MEMBER IN GOOD STANDING WITH THE

Air Barrier Association of America Inc.

THE MEMBER AGREES TO ACTIVELY CHAMPION THE AIR BARRIER INDUSTRY WHILE SUSTAINING HIGH INDUSTRY STANDARDS, PROFESSIONALISM AND ABIDING BY THE PRINCIPLES OF ABAA.

2023

510-0414

MEMBER #

AIR BARRIER ASSOCIATION OF AMERICA INC.

Manufacturer's Defect Warranty

Carlisle Spray Foam Insulation (CSFI) warrants that our Products meet the published physical and chemical properties (Product Specifications) of the liquid products at the time they are shipped.

Physical characteristics of spray-applied polyurethane foam insulation are dependent upon various factors at the time of installation. These factors include but are not limited to, the temperature of the product at the time of application, environmental conditions such as air temperature, substrate temperature and relative humidity, and capabilities of application equipment including mixing chamber size, tip size, as well as equipment pressure and temperature settings, and the skill of the applicator(s). These factors are outside the control of CSFI. Physical characteristics of applied products are determined by the applicator.

CSFI warrants that, if applied according to our published processing parameters, the finished product will have the physical characteristics as defined in the product technical data sheets.

Terms and Conditions

1. Property Owner shall notify CSFI within 30 days from the date any defect is discovered, or of any products that do not conform to the finished physical characteristics.
2. Property Owner's sole remedy and CSFI's sole liability for claims of breach of warranty shall be CSFI's choice of either:
    a. replacement of non-conforming Products; or
    b. refund of monies paid to CSFI for the non-conforming Products
3. CSFI shall have the opportunity to inspect all Products that Property Owner claims are non-conforming. Property Owner shall hold, at no cost to CSFI, the Products pending such inspection. The conditions of any test of the Products for conformance with any specification shall be mutually agreed upon and CSFI shall be notified of, and may be represented at, all tests that may be made by or for Property Owner.
4. Property Owner assumes all risk for misuse of the Products.
5. As CSFI is not the applicator, CSFI assumes no liability for misapplication or any other error or omission of applicator.
6. THIS WARRANTY IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, ORAL OR WRITTEN, STATUTORY OR OTHERWISE, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTIBILITY AND FITNESS FOR A PARTICULAR PURPOSE WHICH ARE EXPRESSLY DISCLAIMED.

The Parties hereby agree that CSFI does not represent or warrant that the importation, use or sale of the Products is/are free from infringement of any third-party patent(s), trademark(s), or copyright(s).

Limited Lifetime Insulation Warranty

Carlisle Spray Foam Insulation (CSFI) warrants that the CSFI spray polyurethane foam insulation products, when applied in conformity to local building codes and according to CSFI's published application guidelines, by a contractor authorized by CSFI, will conform to the physical properties shown on the respective Product Technical Data Sheet in effect on the date the Products are purchased from CSFI.

This warranty is valid for the life of the building and is conditioned upon the original purchaser completing the Warranty Registration Form and returning it to CSFI within 60 days of occupancy. This warranty extends to subsequent property owners upon written notice to CSFI, and providing that the building use remains the same.

CSFI's sole responsibility under this warranty will be for the replacement of Products only. CSFI will not be liable for any labor or other costs, including, but not limited to, costs associated with the removal of insulation or the installation of replacement Products.

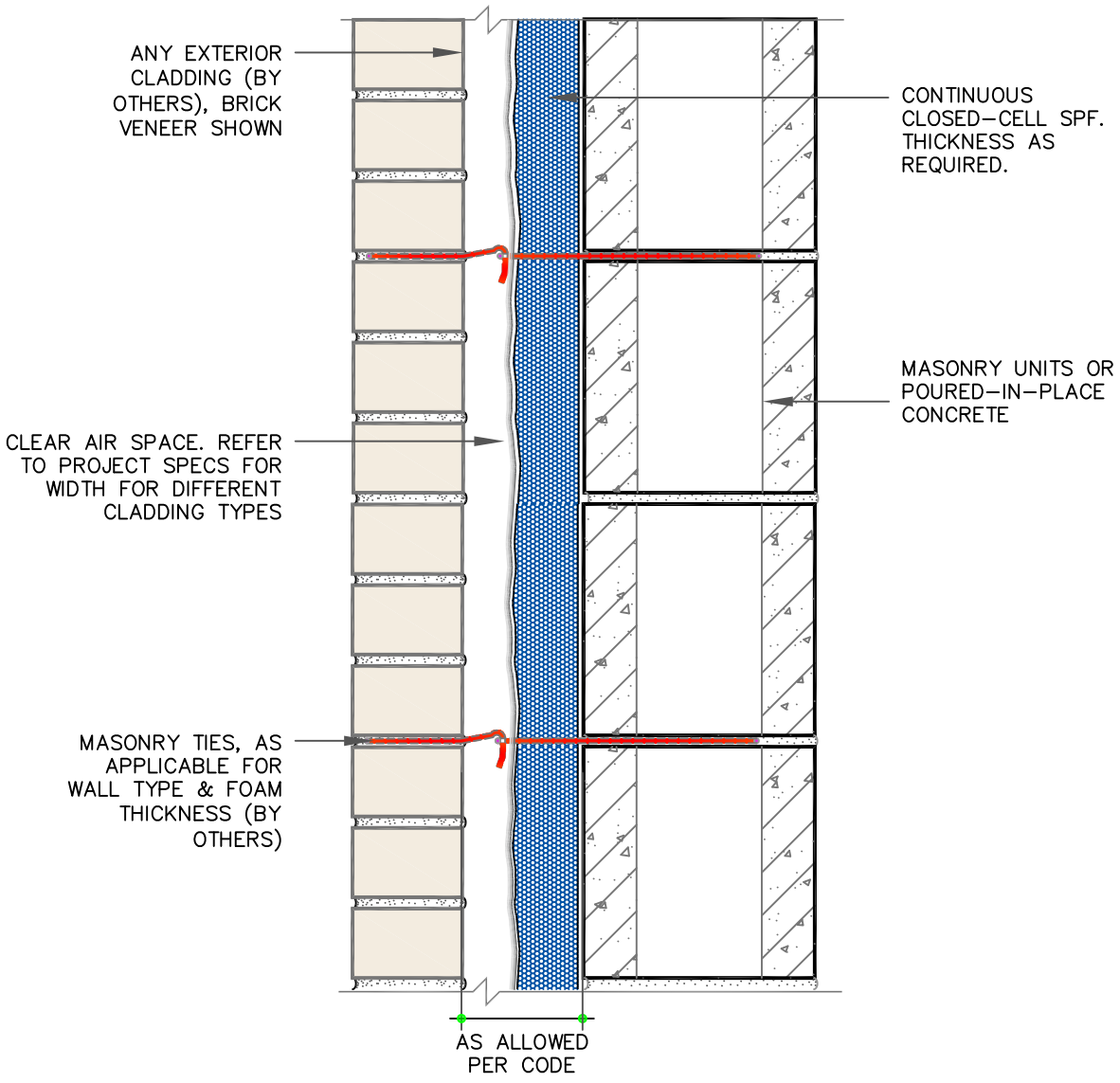
CSFI will have no liability under this warranty for defects, damages or failures caused by improper storage of Products, improper application of Products, including failure to follow CSFI published application guidelines, fire, weather, floods, acts of God, abuse, structural failures, breaks, movement, or penetrations or alterations made after installation of the Products.

To file a claim under this warranty, within 30 days after discovery of the alleged nonconformity, the property owner must submit a statement to CSFI, which describes the nonconformity. The statement must include the property address, proof of the date of occupancy, and the name and address of the contractor, who installed the Products.

THIS WARRANTY IS MADE IN LIEU OF ALL OTHER WARRANTIES, WHETHER AT LAW OR IN EQUITY, OR WHETHER ARISING UNDER STATUTE OR OTHERWISE. CSFI DISCLAIMS ALL OTHER EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMTED TO, IMPLIED WARRANTIES OF MERCHATABILITY AND FITNESS FOR A PARTICULAR PURPOSE. UNDER NO CIRCUMSTANCES WILL CSFI BE LIABLE FOR SPECIAL, INCIDENTAL, PUNITIVE, OR CONSEQUENTIAL DAMAGES.

SealTite PRO

ARCHITECTURAL DETAILS



CARLISLE SPRAY FOAM INSULATION

SPF	SPRAY POLYURETHANE FOAM
ccSPF	CLOSED CELL SPRAY POLYURETHANE FOAM
c.i.	CONTINUOUS INSULATION
LGMF	LIGHT GAUGE METAL FRAME

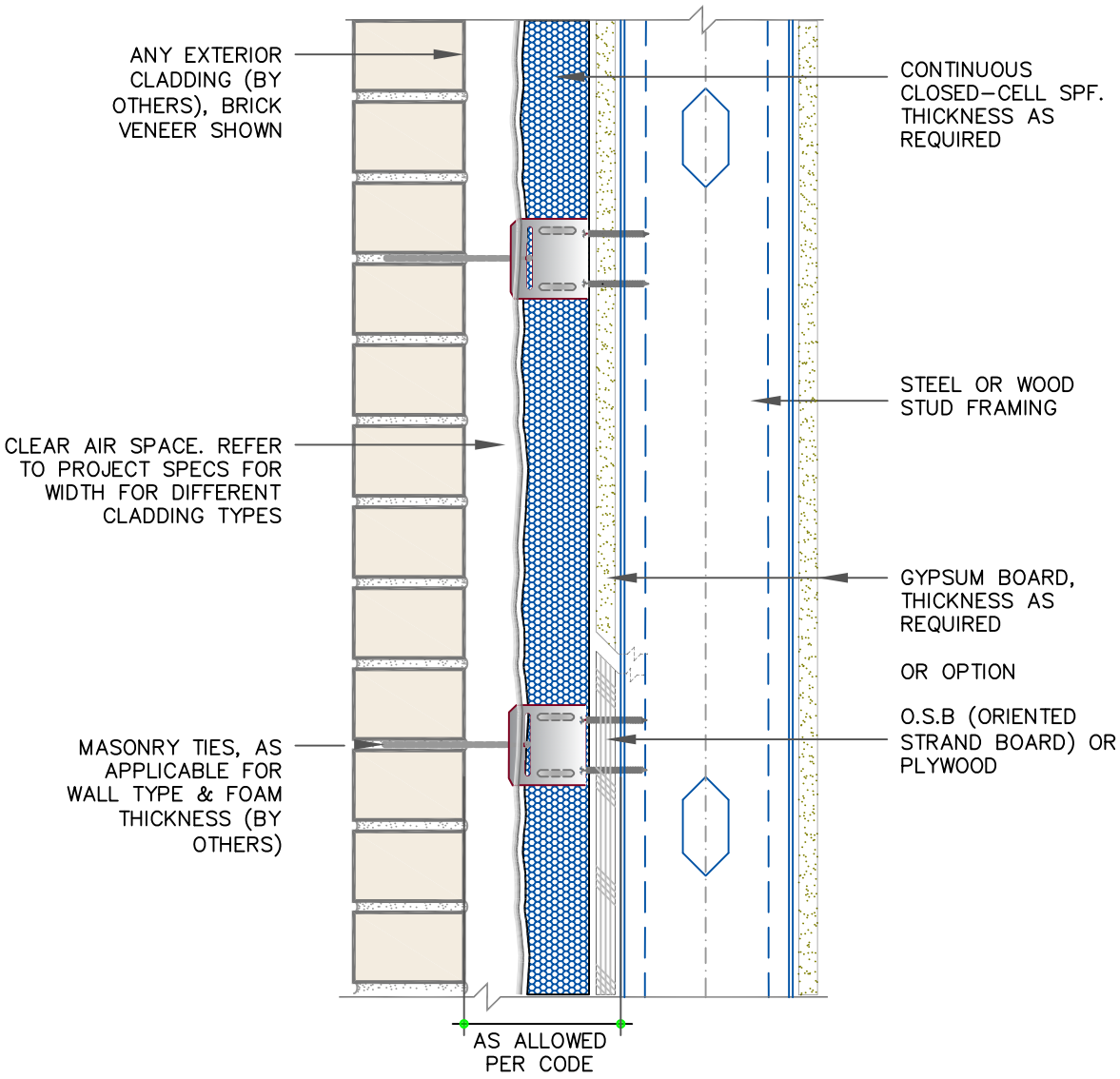
0 NOTE(S)

SPRAYED POLYURETHANE FOAM

WALL TYPE A: BACKUP CMU WALL – EXTERIOR FOAM APPLICATION

A

For additional information, refer to Specifications



CARLISLE SPRAY FOAM INSULATION

SPF	SPRAY POLYURETHANE FOAM
ccSPF	CLOSED CELL SPRAY POLYURETHANE FOAM
c.i.	CONTINUOUS INSULATION
LGMF	LIGHT GAUGE METAL FRAME

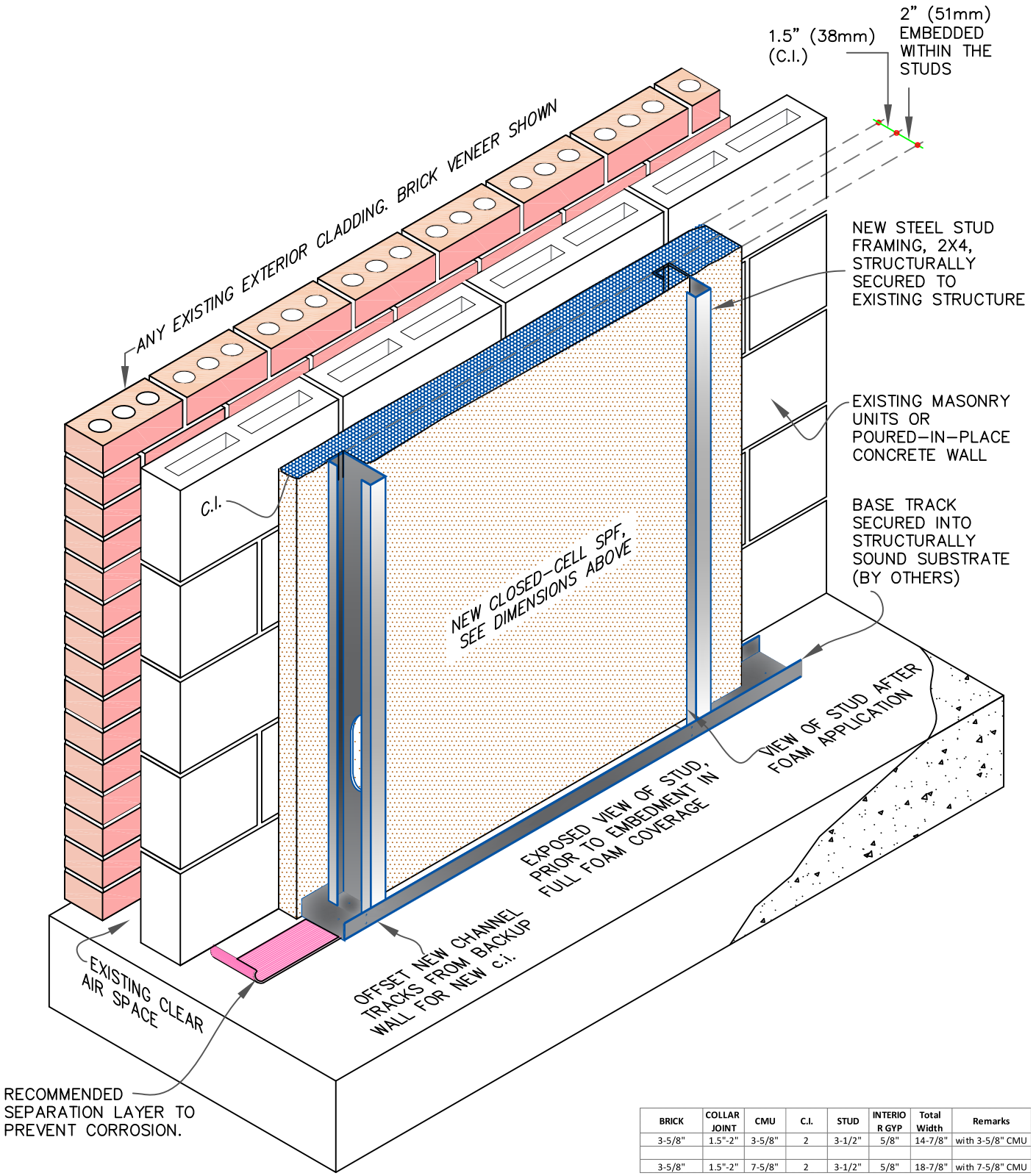
0 NOTE(S)

SPRAYED POLYURETHANE FOAM

WALL TYPE B: BACKUP STUD WALL – EXTERIOR FOAM APPLICATION

B

For additional information, refer to Specifications



BRICK	COLLAR JOINT	CMU	C.I.	STUD	INTERIOR GYP	Total Width	Remarks
3-5/8"	1.5"-2"	3-5/8"	2	3-1/2"	5/8"	14-7/8"	with 3-5/8" CMU
3-5/8"	1.5"-2"	7-5/8"	2	3-1/2"	5/8"	18-7/8"	with 7-5/8" CMU

CARLISLE SPRAY FOAM INSULATION

SPF	SPRAY POLYURETHANE FOAM
ccSPF	CLOSED CELL SPRAY POLYURETHANE FOAM
c.i.	CONTINUOUS INSULATION
LGMF	LIGHT GAUGE METAL FRAME

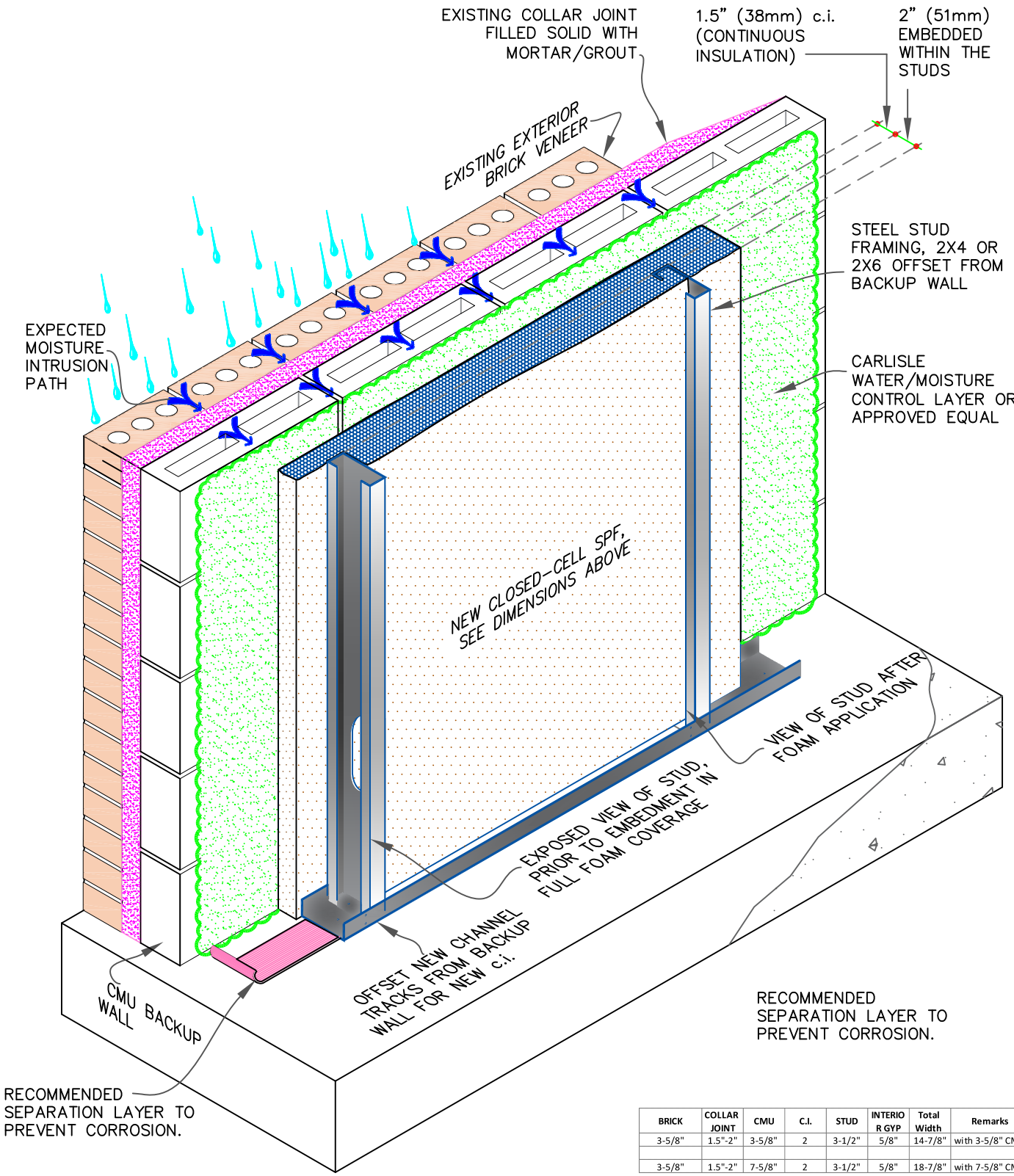
0 NOTE(S)

SPRAYED POLYURETHANE FOAM

WALL TYPE C: RETROFIT EXISTING WALL WITH CLEAR AIR CAVITY

C

For additional information, refer to Specifications



BRICK	COLLAR JOINT	CMU	C.I.	STUD	INTERIOR GYP	Total Width	Remarks
3-5/8"	1.5"-2"	3-5/8"	2	3-1/2"	5/8"	14-7/8"	with 3-5/8" CMU
3-5/8"	1.5"-2"	7-5/8"	2	3-1/2"	5/8"	18-7/8"	with 7-5/8" CMU

CARLISLE SPRAY FOAM INSULATION

SPF	SPRAY POLYURETHANE FOAM
ccSPF	CLOSED CELL SPRAY POLYURETHANE FOAM
c.i.	CONTINUOUS INSULATION
LGMF	LIGHT GAUGE METAL FRAME

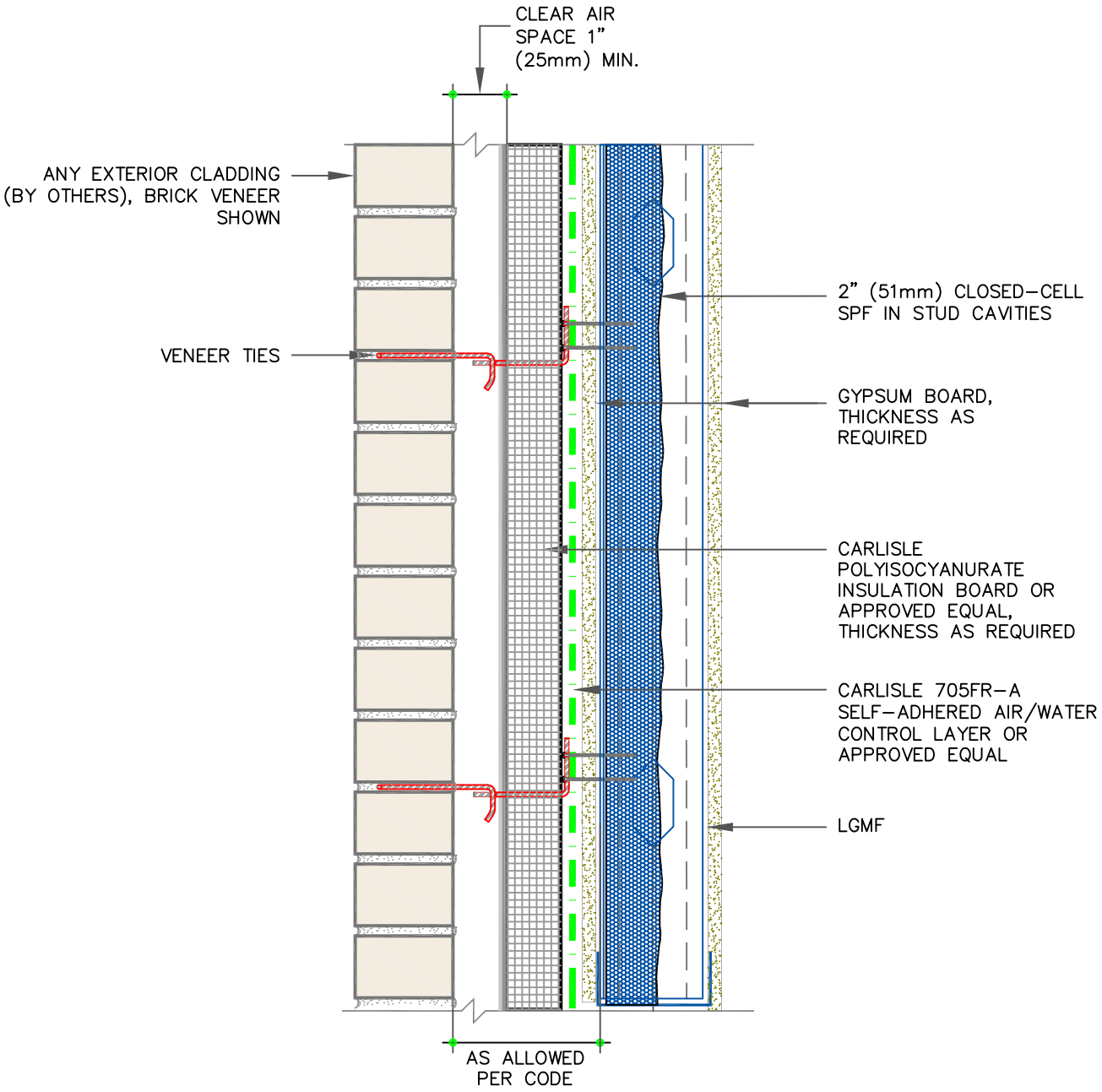
0 NOTE(S)

SPRAYED POLYURETHANE FOAM

WALL TYPE D: RETROFIT EXISTING WALL WITH FILLED COLLAR BOND

D

For additional information, refer to Specifications



CARLISLE SPRAY FOAM INSULATION

SPF	SPRAY POLYURETHANE FOAM
ccSPF	CLOSED CELL SPRAY POLYURETHANE FOAM
c.i.	CONTINUOUS INSULATION
LGMF	LIGHT GAUGE METAL FRAME

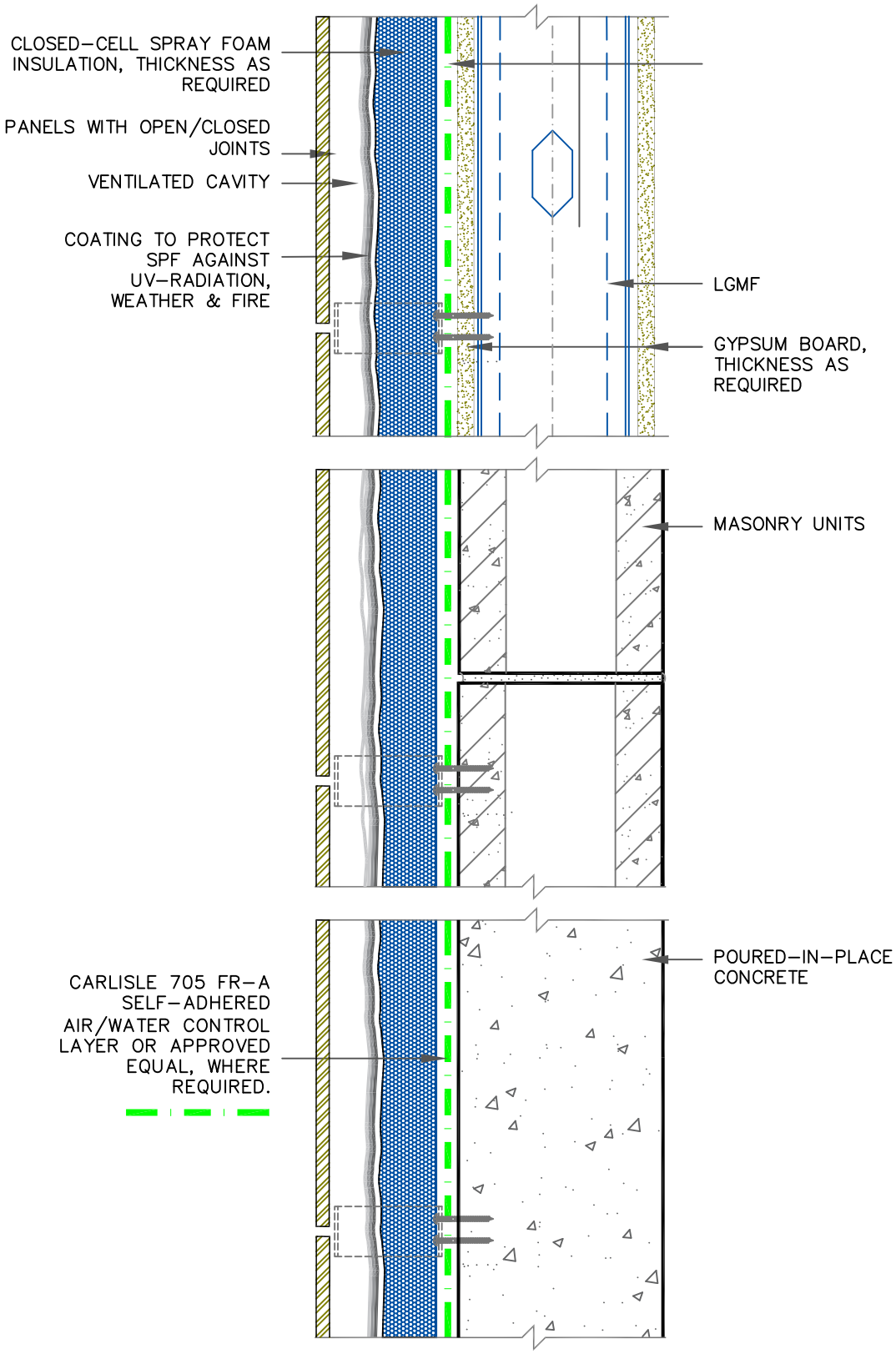
0 NOTE(S)

SPRAYED POLYURETHANE FOAM

WALL TYPE E: COMBINATION OF SPF & RIGID BOARD INSULATION

E

For additional information, refer to Specifications



CARLISLE SPRAY FOAM INSULATION

SPF	SPRAY POLYURETHANE FOAM
ccSPF	CLOSED CELL SPRAY POLYURETHANE FOAM
c.i.	CONTINUOUS INSULATION
LGMF	LIGHT GAUGE METAL FRAME

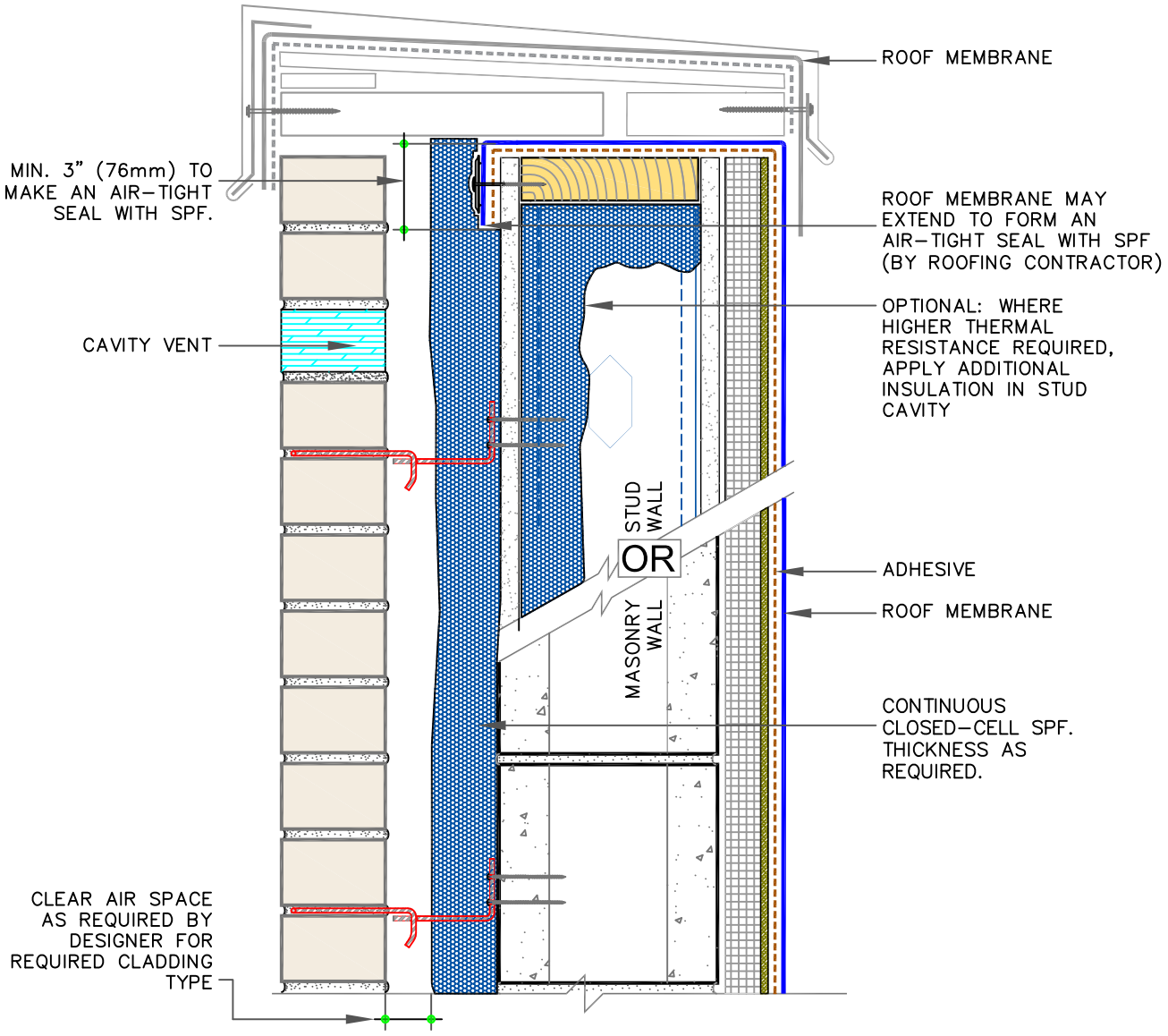
0 NOTE(S)

SPRAYED POLYURETHANE FOAM

WALL TYPE F: EXTERIOR CLADDING WITH OPEN JOINTS & FOAM COATING

For additional information, refer to Specifications

F



CARLISLE SPRAY FOAM INSULATION

SPF	SPRAY POLYURETHANE FOAM
ccSPF	CLOSED CELL SPRAY POLYURETHANE FOAM
c.i.	CONTINUOUS INSULATION
LGMF	LIGHT GAUGE METAL FRAME

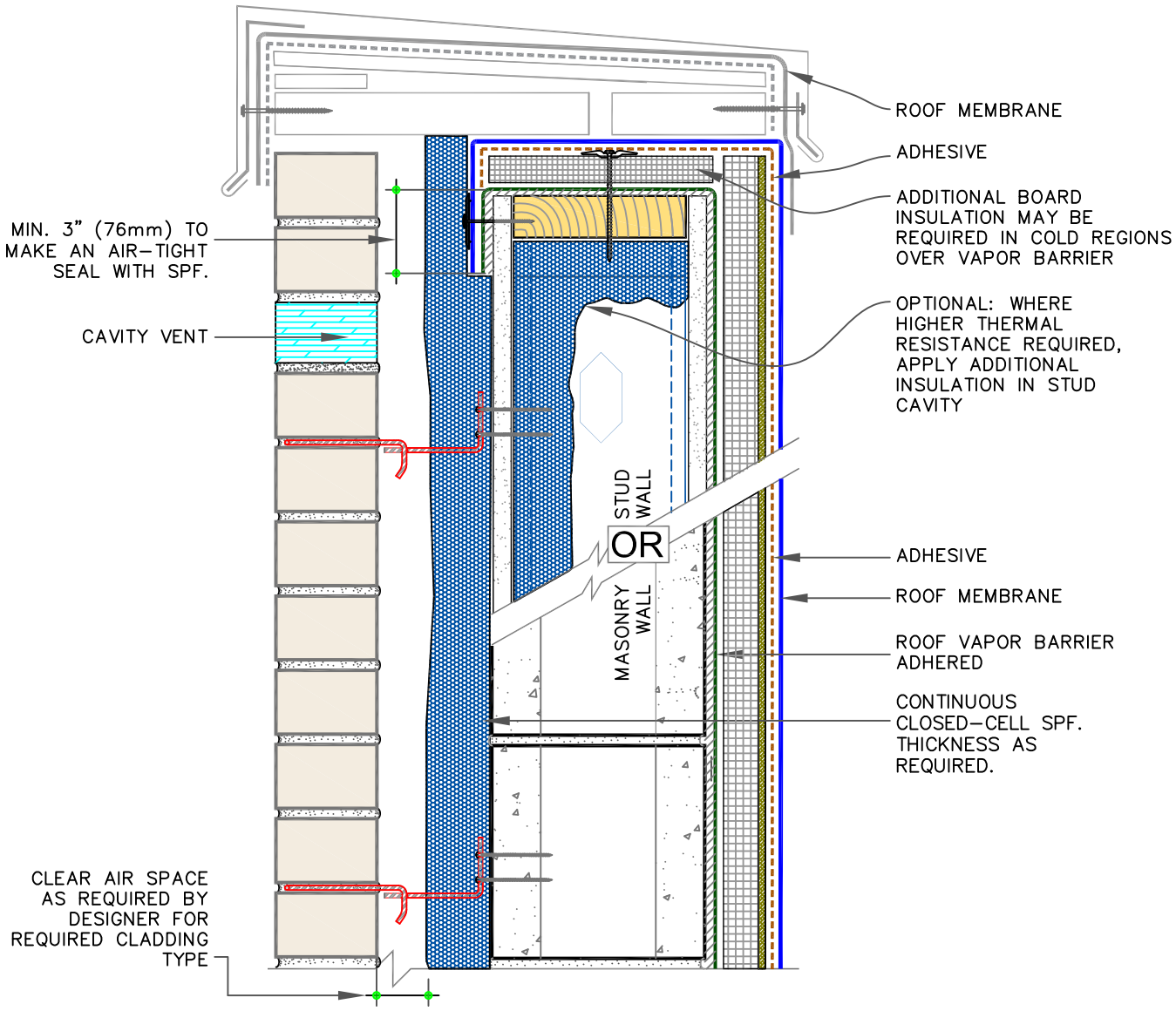
0 NOTE(S)

SPRAYED POLYURETHANE FOAM

PARAPET WITHOUT ROOF VAPOR BARRIER

1.1

For additional information, refer to Specifications



CARLISLE SPRAY FOAM INSULATION

SPF	SPRAY POLYURETHANE FOAM
ccSPF	CLOSED CELL SPRAY POLYURETHANE FOAM
c.i.	CONTINUOUS INSULATION
LGMF	LIGHT GAUGE METAL FRAME

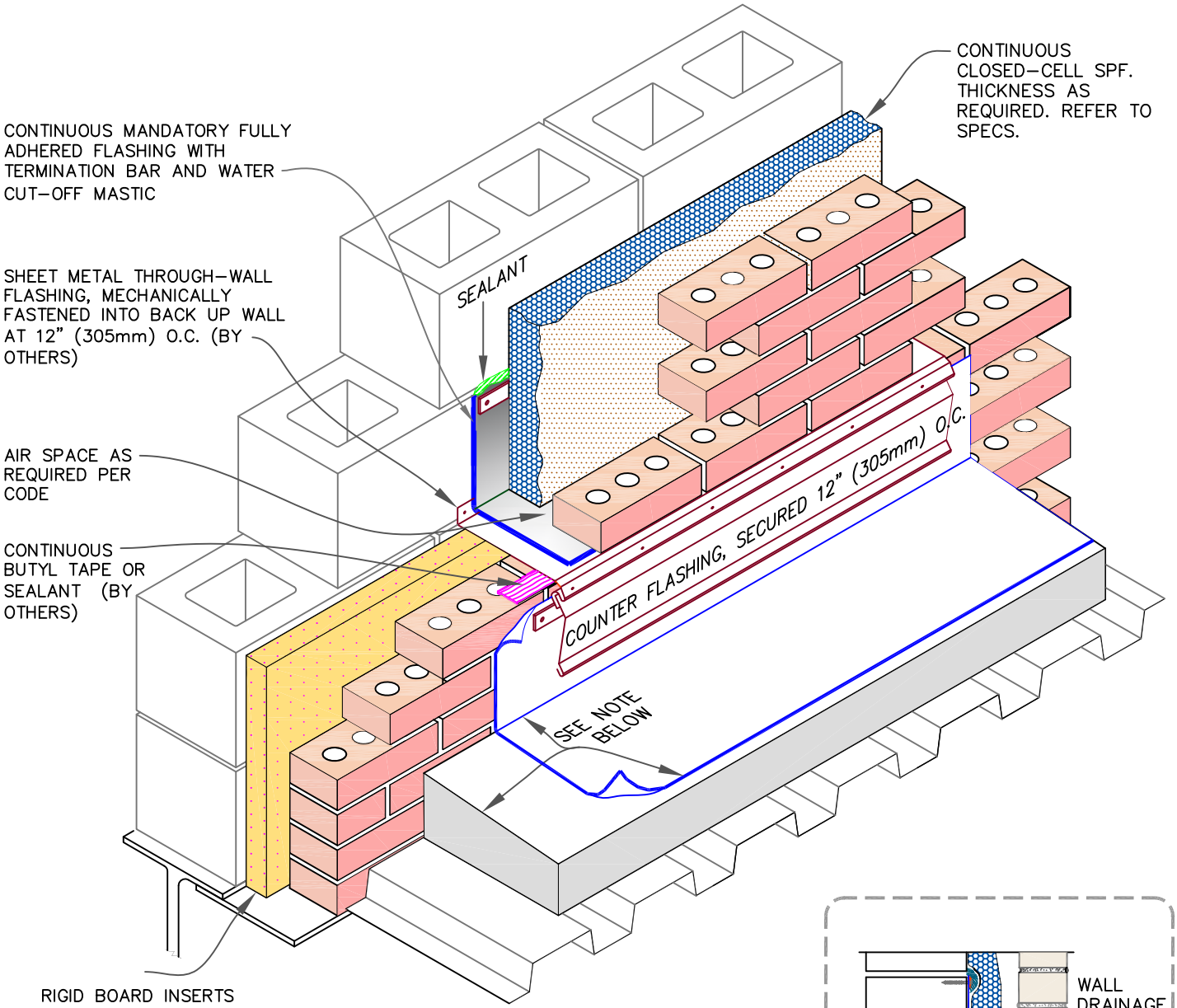
0 NOTE(S)

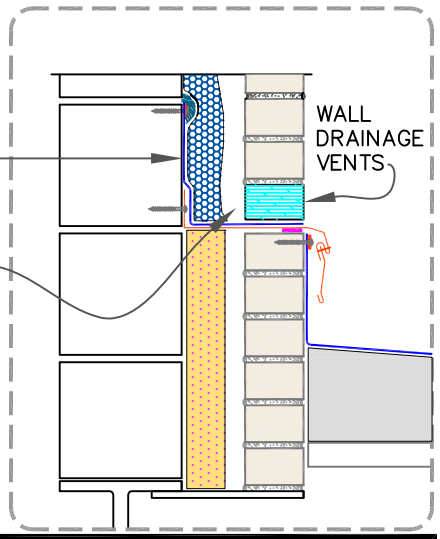
SPRAYED POLYURETHANE FOAM

PARAPET WITH ROOF VAPOR BARRIER

1.2

For additional information, refer to Specifications





NOTE:

GENERIC VIEW OF ROOF ASSEMBLY BY OTHERS OR CONTACT CARLISLE FOR ASSEMBLY TYPE & DETAILS

CARLISLE SPRAY FOAM INSULATION

SPF	SPRAY POLYURETHANE FOAM
ccSPF	CLOSED CELL SPRAY POLYURETHANE FOAM
c.i.	CONTINUOUS INSULATION
LGMF	LIGHT GAUGE METAL FRAME

0 NOTE(S)

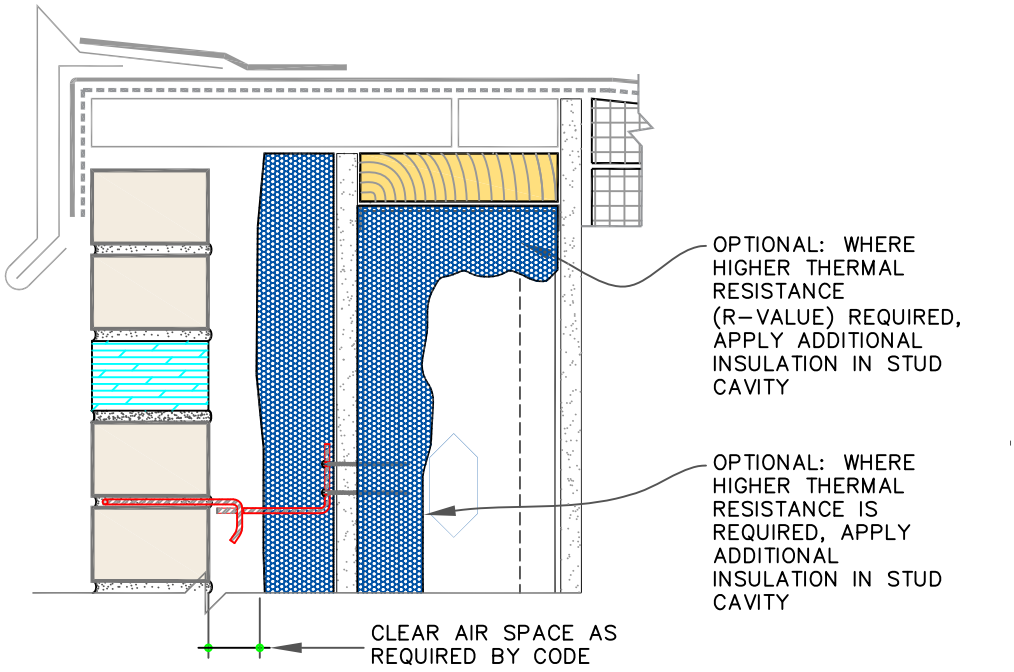
SPRAYED POLYURETHANE FOAM

RISING WALL BETWEEN LOWER ROOF AND UPPER ROOF

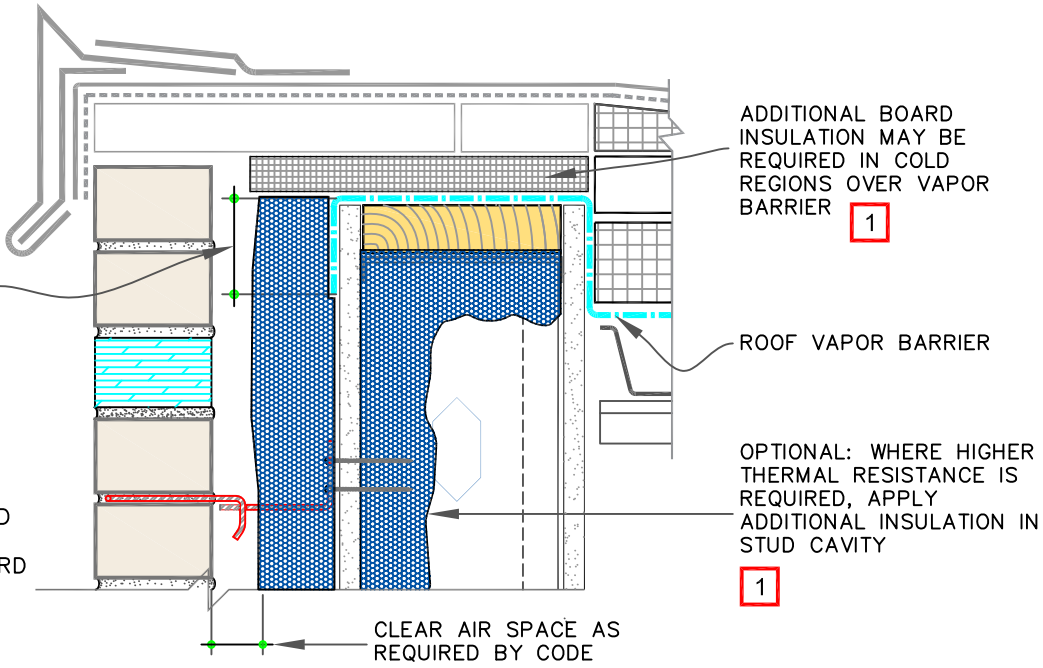
1.3

For additional information, refer to Specifications

WALL WITHOUT ROOF VAPOR BARRIER



WALL WITH ROOF VAPOR BARRIER



NOTE:

1. IF SPF IS ALSO APPLIED IN STUD CAVITY, THEN FILL THE TOP END AS SHOWN FOR c.i. AND DESIGNER MAY ELIMINATE THE BOARD INSULATION ON TOP OF WALL.

CARLISLE SPRAY FOAM INSULATION

SPF	SPRAY POLYURETHANE FOAM
ccSPF	CLOSED CELL SPRAY POLYURETHANE FOAM
c.i.	CONTINUOUS INSULATION
LGMF	LIGHT GAUGE METAL FRAME

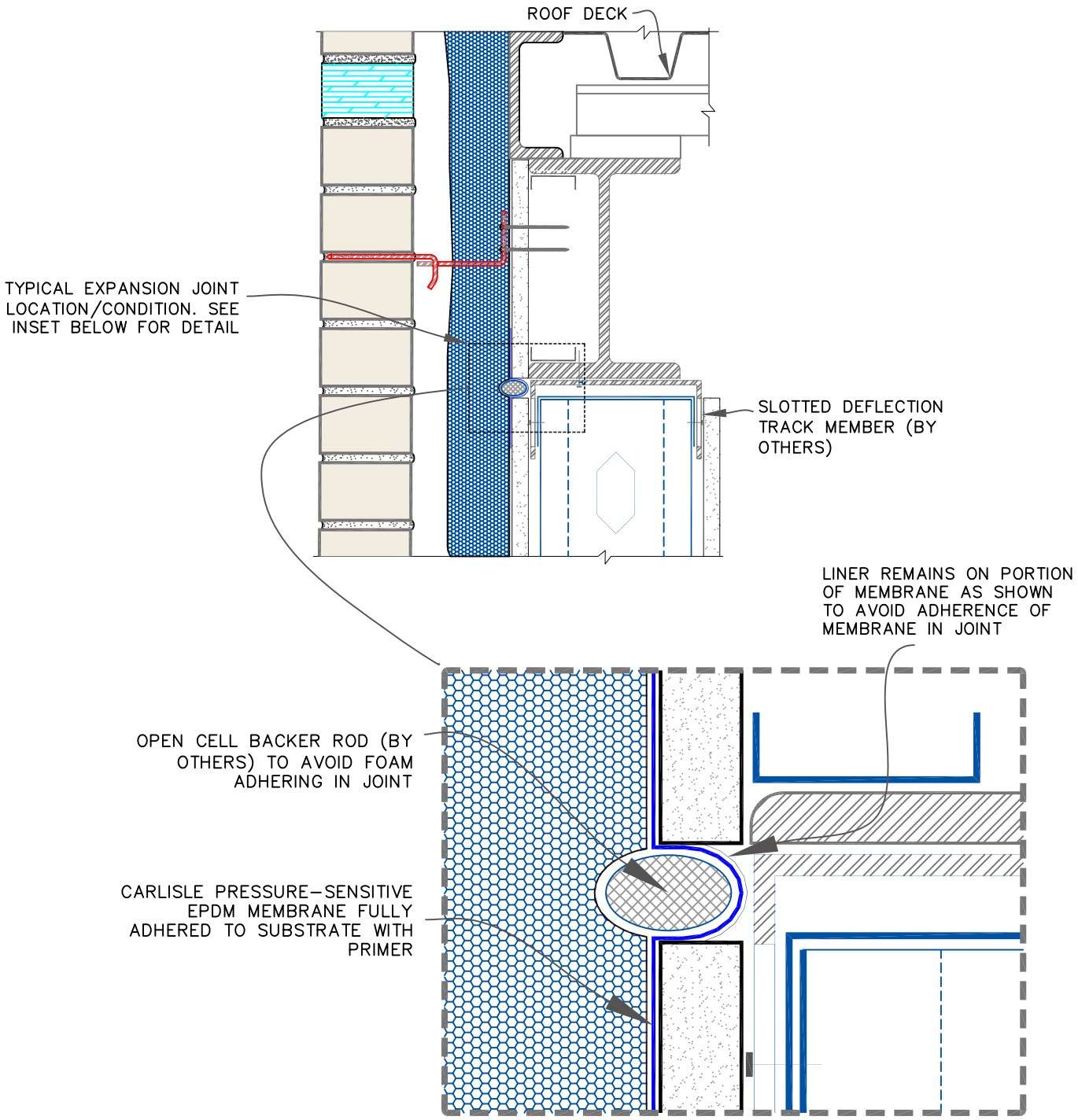
0 NOTE(S)

SPRAYED POLYURETHANE FOAM

ROOF EDGE WITH & WITHOUT ROOF VAPOR BARRIER

2.1

For additional information, refer to Specifications



CARLISLE SPRAY FOAM INSULATION

SPF	SPRAY POLYURETHANE FOAM
ccSPF	CLOSED CELL SPRAY POLYURETHANE FOAM
c.i.	CONTINUOUS INSULATION
LGMF	LIGHT GAUGE METAL FRAME

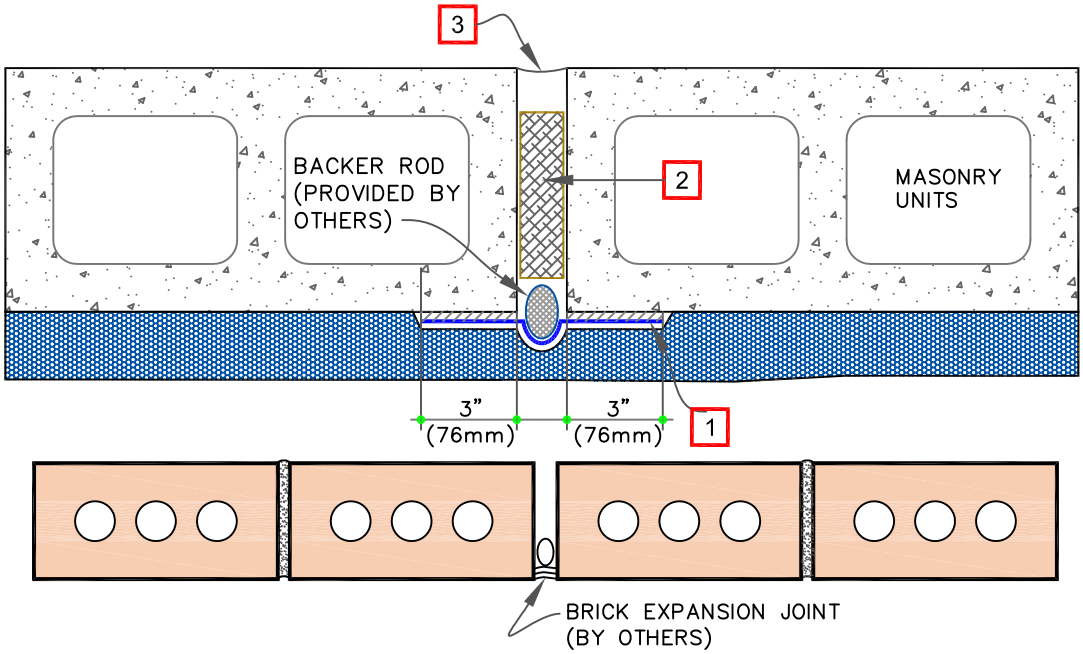
0 NOTE(S)

SPRAYED POLYURETHANE FOAM

EXPANSION JOINT AT DEFLECTION TRACK

3.1

For additional information, refer to Specifications



NOTES:

1. CARLISLE PRESSURE-SENSITIVE EPDM MEMBRANE FULLY ADHERED TO SUBSTRATE WITH PRIMER.
2. WOOD FIBER BOARD REQUIRED TO SUPPORT THE BACKER ROD (BY OTHERS).
3. INTERIOR CONTROL JOINT (BY OTHERS).

CARLISLE SPRAY FOAM INSULATION

SPF	SPRAY POLYURETHANE FOAM
ccSPF	CLOSED CELL SPRAY POLYURETHANE FOAM
c.i.	CONTINUOUS INSULATION
LGMF	LIGHT GAUGE METAL FRAME

0 NOTE(S)

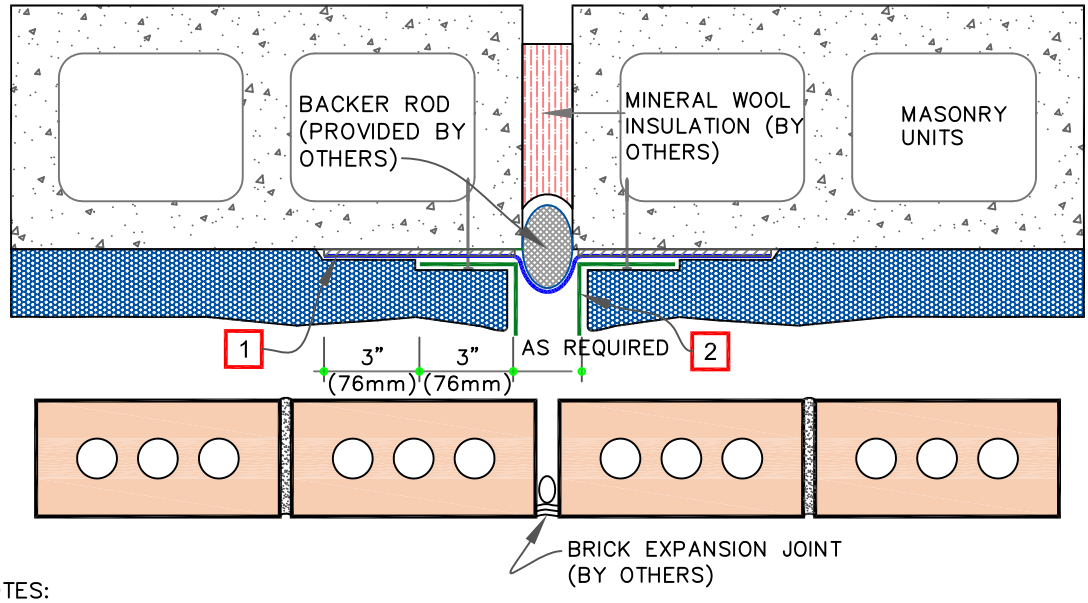
SPRAYED POLYURETHANE FOAM

MASONRY CONTROL JOINT

3.2

For additional information, refer to Specifications

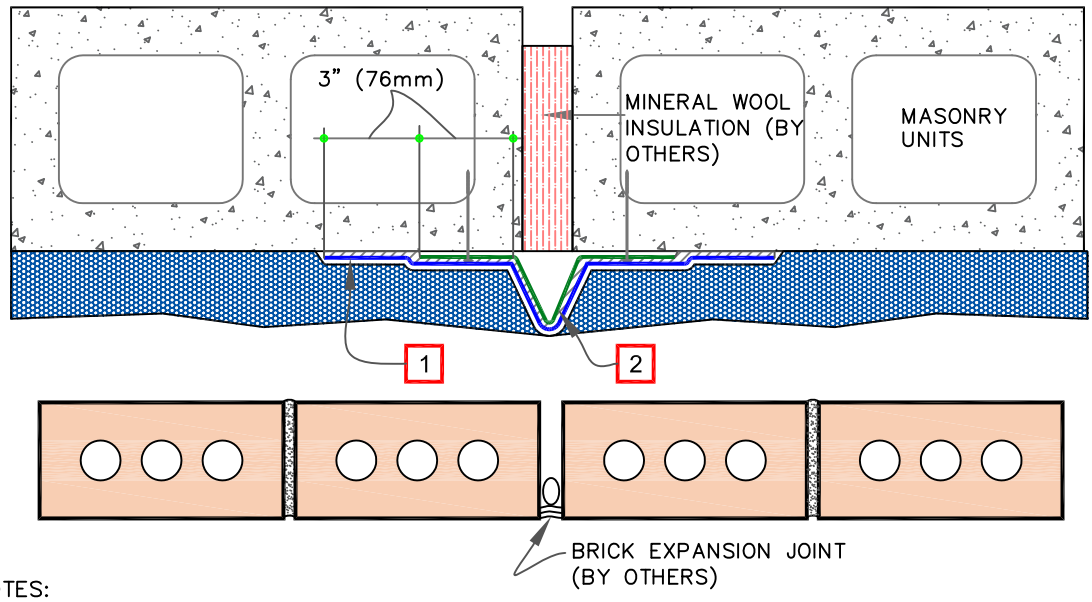
OPTION A



NOTES:

1. CARLISLE PRESSURE-SENSITIVE EPDM MEMBRANE FULLY ADHERED TO SUBSTRATE WITH PRIMER
2. PVC ANGLES MECHANICALLY SECURED INTO SUBSTRATE WALL.

OPTION B



NOTES:

1. CARLISLE PRESSURE-SENSITIVE EPDM MEMBRANE FULLY ADHERED TO SUBSTRATE WITH PRIMER.
2. 16 OZ COPPER OR 26GA STAINLESS STEEL E.J. SECURED @ 12" (305mm) O.C. ON BOTH SIDES.

CARLISLE SPRAY FOAM INSULATION

SPF	SPRAY POLYURETHANE FOAM
ccSPF	CLOSED CELL SPRAY POLYURETHANE FOAM
c.i.	CONTINUOUS INSULATION
LGMF	LIGHT GAUGE METAL FRAME

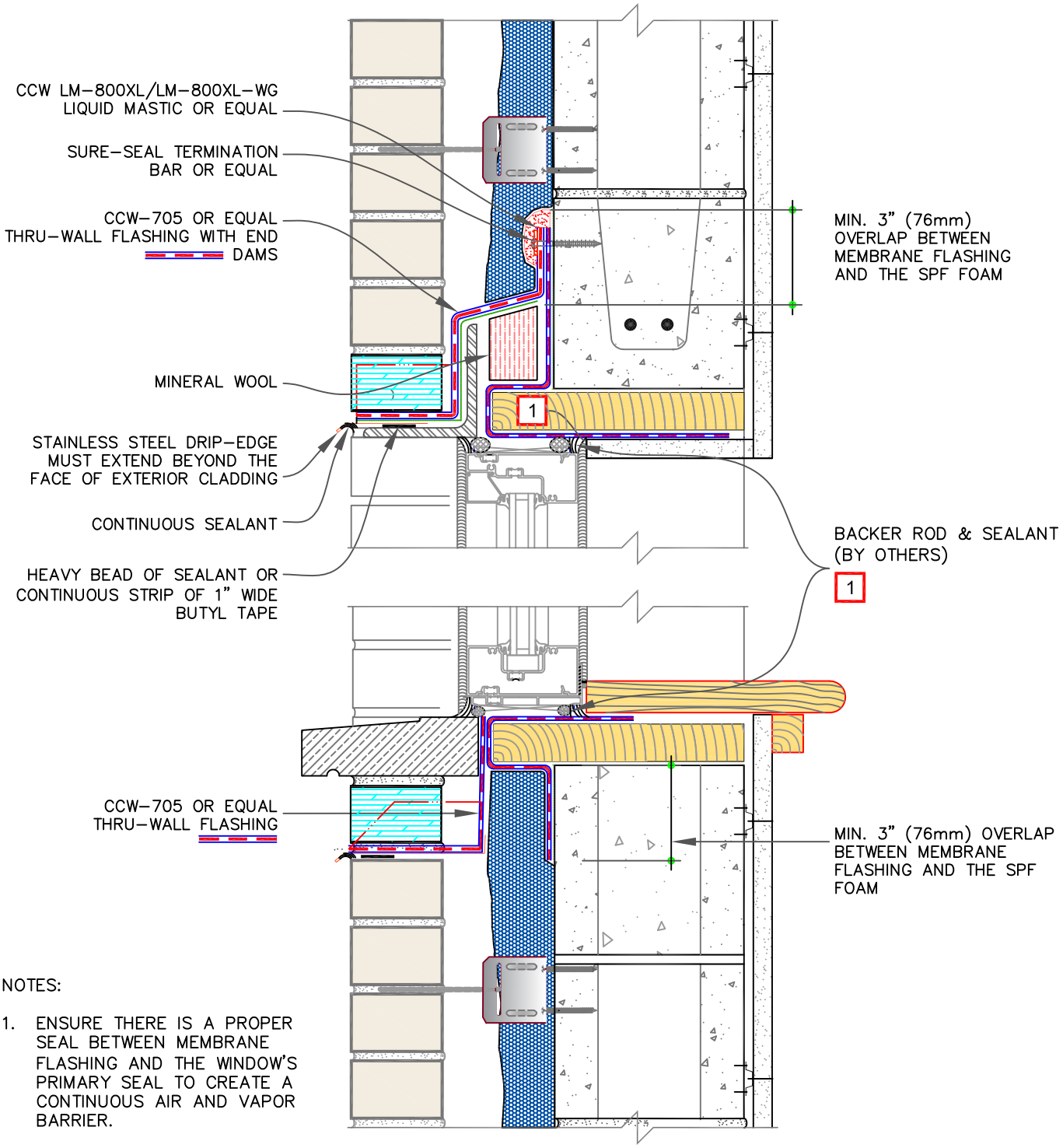
0 NOTE(S)

SPRAYED POLYURETHANE FOAM

MASONRY EXPANSION JOINT OPTIONS

3.3

For additional information, refer to Specifications



NOTES:

1. ENSURE THERE IS A PROPER SEAL BETWEEN MEMBRANE FLASHING AND THE WINDOW'S PRIMARY SEAL TO CREATE A CONTINUOUS AIR AND VAPOR BARRIER.
2. COORDINATE WITH CARLISLE FOR DIFFERENT WINDOW INSTALLATION CONDITIONS.

CARLISLE SPRAY FOAM INSULATION

SPF	SPRAY POLYURETHANE FOAM
ccSPF	CLOSED CELL SPRAY POLYURETHANE FOAM
c.i.	CONTINUOUS INSULATION
LGMF	LIGHT GAUGE METAL FRAME

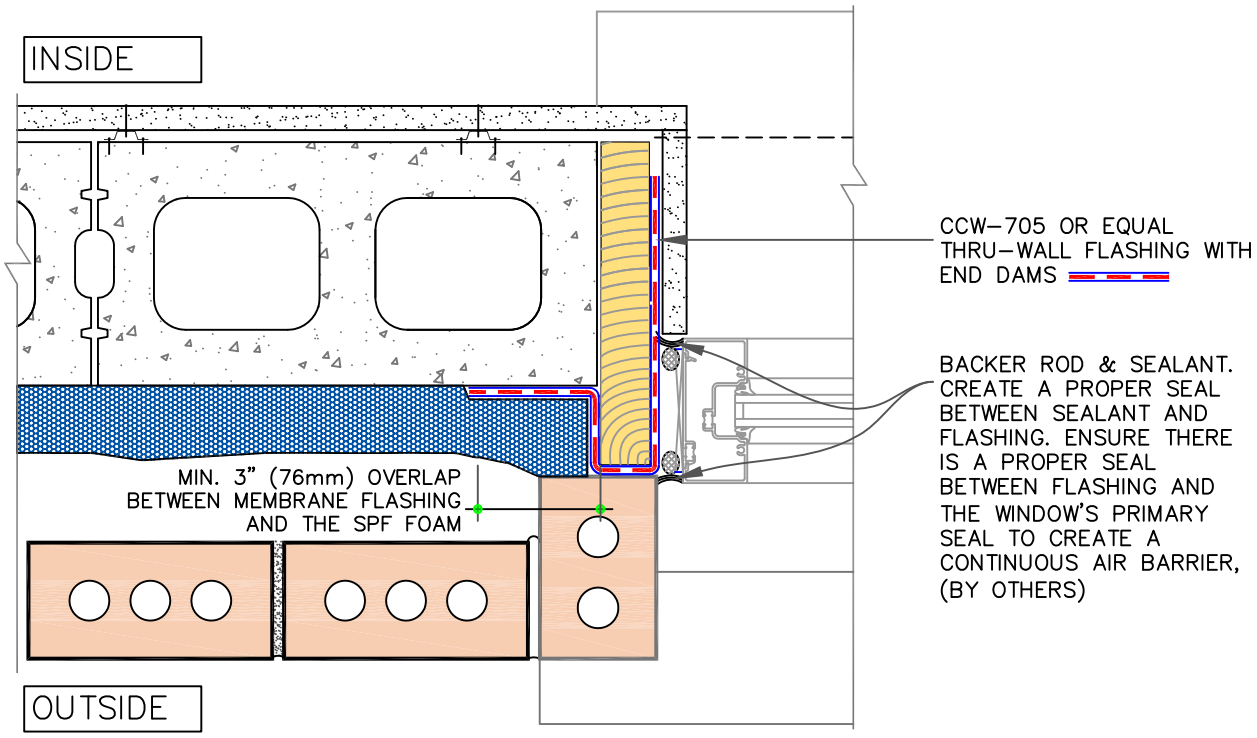
0 NOTE(S)

SPRAYED POLYURETHANE FOAM

WINDOW HEAD AND SILL WITH WOOD BLOCKING IN ROUGH OPENING

4.1

For additional information, refer to Specifications



CARLISLE SPRAY FOAM INSULATION

SPF	SPRAY POLYURETHANE FOAM
ccSPF	CLOSED CELL SPRAY POLYURETHANE FOAM
c.i.	CONTINUOUS INSULATION
LGMF	LIGHT GAUGE METAL FRAME

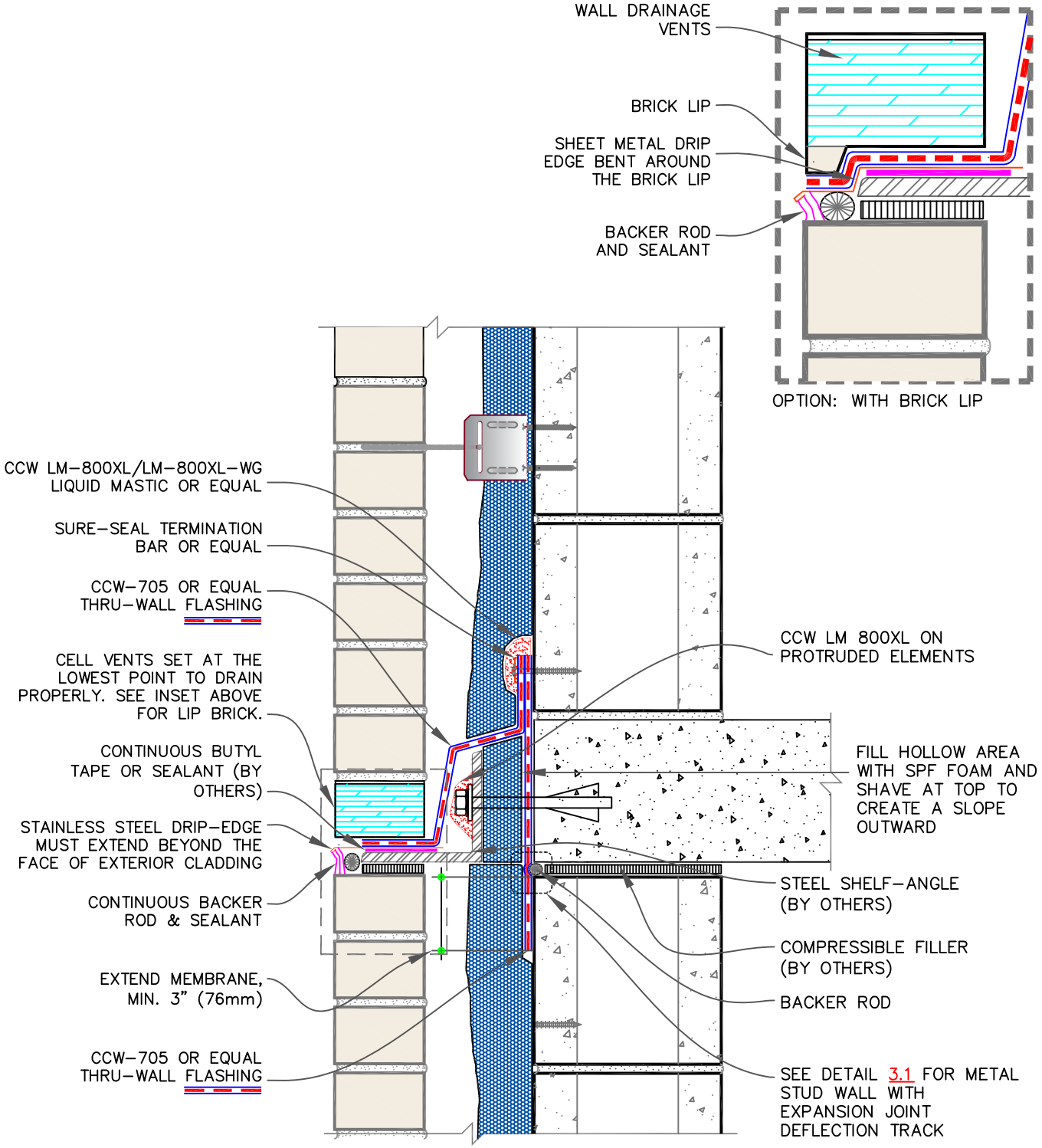
0 NOTE(S)

SPRAYED POLYURETHANE FOAM

WINDOW JAMB WITH WOOD BLOCKING IN ROUGH OPENING

4.2

For additional information, refer to Specifications



CARLISLE SPRAY FOAM INSULATION

SPF	SPRAY POLYURETHANE FOAM
ccSPF	CLOSED CELL SPRAY POLYURETHANE FOAM
c.i.	CONTINUOUS INSULATION
LGMF	LIGHT GAUGE METAL FRAME

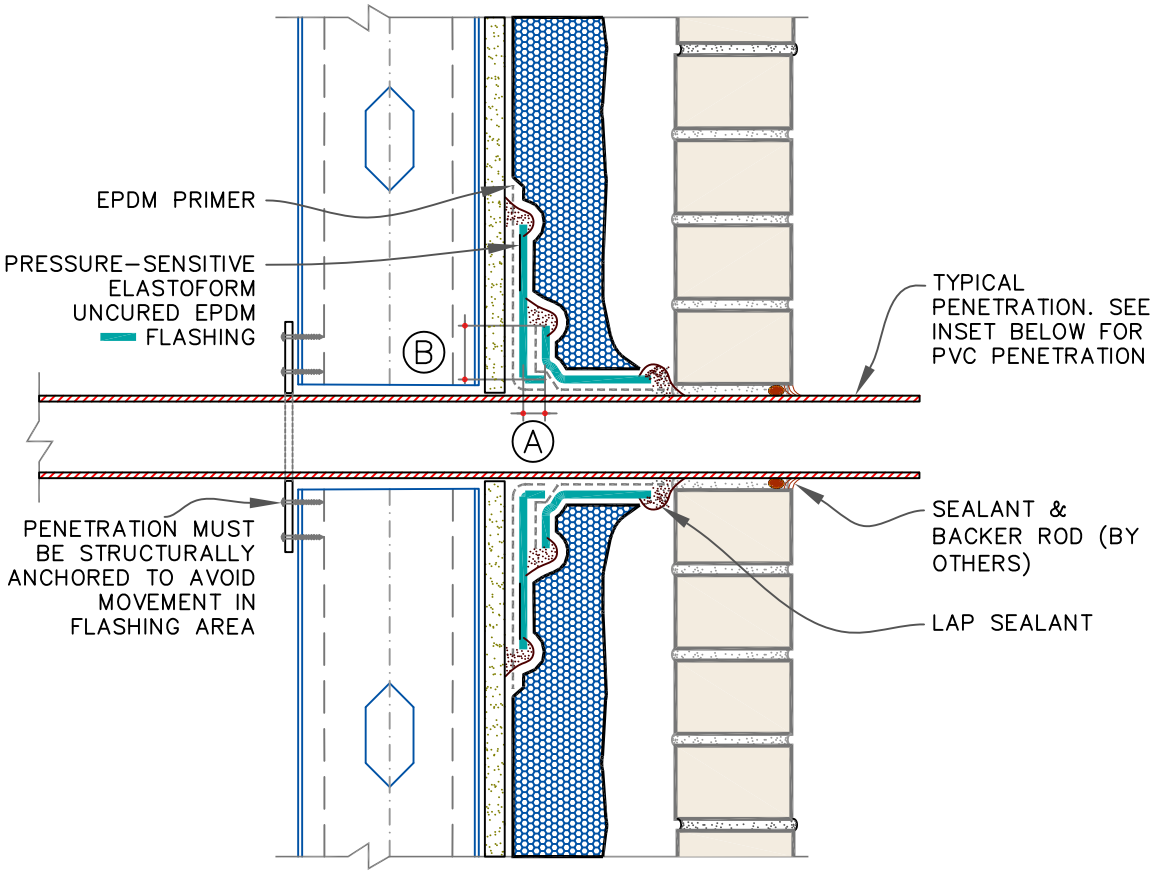
0 NOTE(S)

SPRAYED POLYURETHANE FOAM

SHELF ANGLE

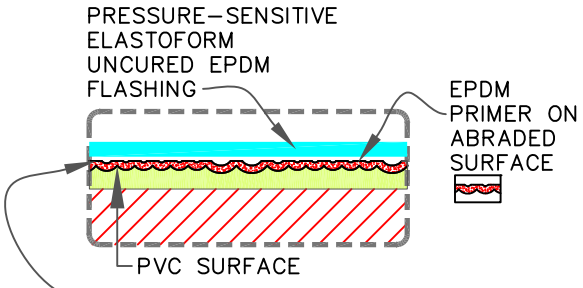
5.1

For additional information, refer to Specifications



NOTES:

1. THIS DETAIL IS APPLICABLE TO OTHER SHAPES, E.G. ROUND/SQUARE TUBES ALSO.
2. FLASHING IS APPLIED TO SMOOTH, SOUND, DRY SUBSTRATES, FREE OF OILS, RUST OR ANY CONTAMINATIONS.
3. IN COLDER TEMPERATURES, A HEAT GUN MUST BE USED WHEN FORMING PRESSURE–SENSITIVE ELASTOFORM OR UNCURED FLASHING.



NOTE:
ON PVC PIPES / PVC SUBSTRATES, ACHIEVE AN ABRADED SURFACE BY GRINDING WITH COARSE SANDPAPER OR POWERED WIRE BRUSH TO ENHANCE THE ADHESION.

MAGNIFIED PVC SURFACE

DIMENSIONS		mm	
A	1/2"	13	MIN.
B	1"	25	MIN.

CARLISLE SPRAY FOAM INSULATION

SPF	SPRAY POLYURETHANE FOAM
ccSPF	CLOSED CELL SPRAY POLYURETHANE FOAM
c.i.	CONTINUOUS INSULATION
LGMF	LIGHT GAUGE METAL FRAME

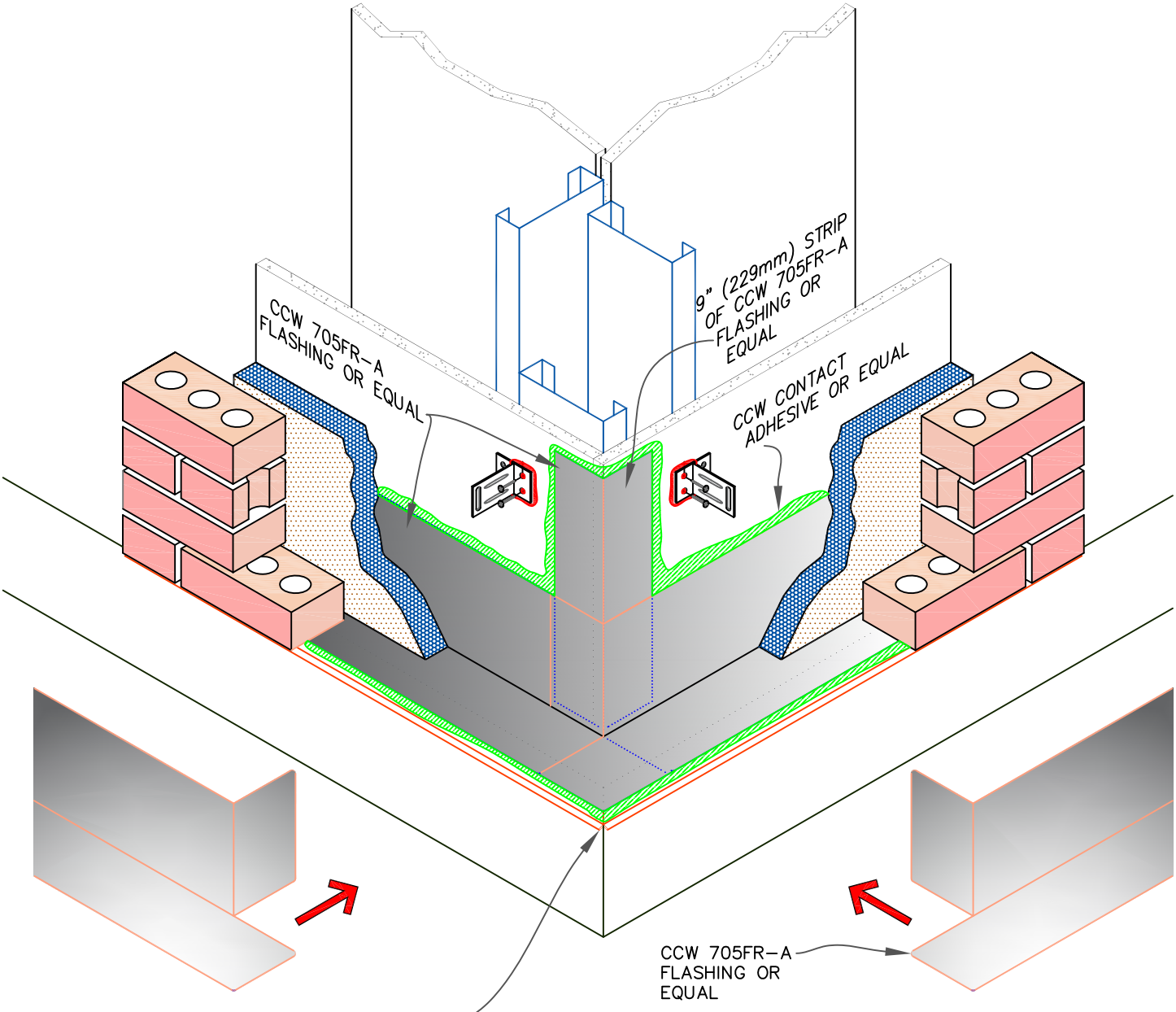
0 NOTE(S)

SPRAYED POLYURETHANE FOAM

PENETRATION DETAIL

5.2

For additional information, refer to Specifications



STAINLESS STEEL DRIP-EDGE MUST EXTEND BEYOND THE FACE OF EXTERIOR CLADDING. SET IN HEAVY BEAD OF SEALANT OR CONTINUOUS STRIP OF 1" (25mm) WIDE BUTYL TAPE.

CARLISLE SPRAY FOAM INSULATION

SPF	SPRAY POLYURETHANE FOAM
ccSPF	CLOSED CELL SPRAY POLYURETHANE FOAM
c.i.	CONTINUOUS INSULATION
LGMF	LIGHT GAUGE METAL FRAME

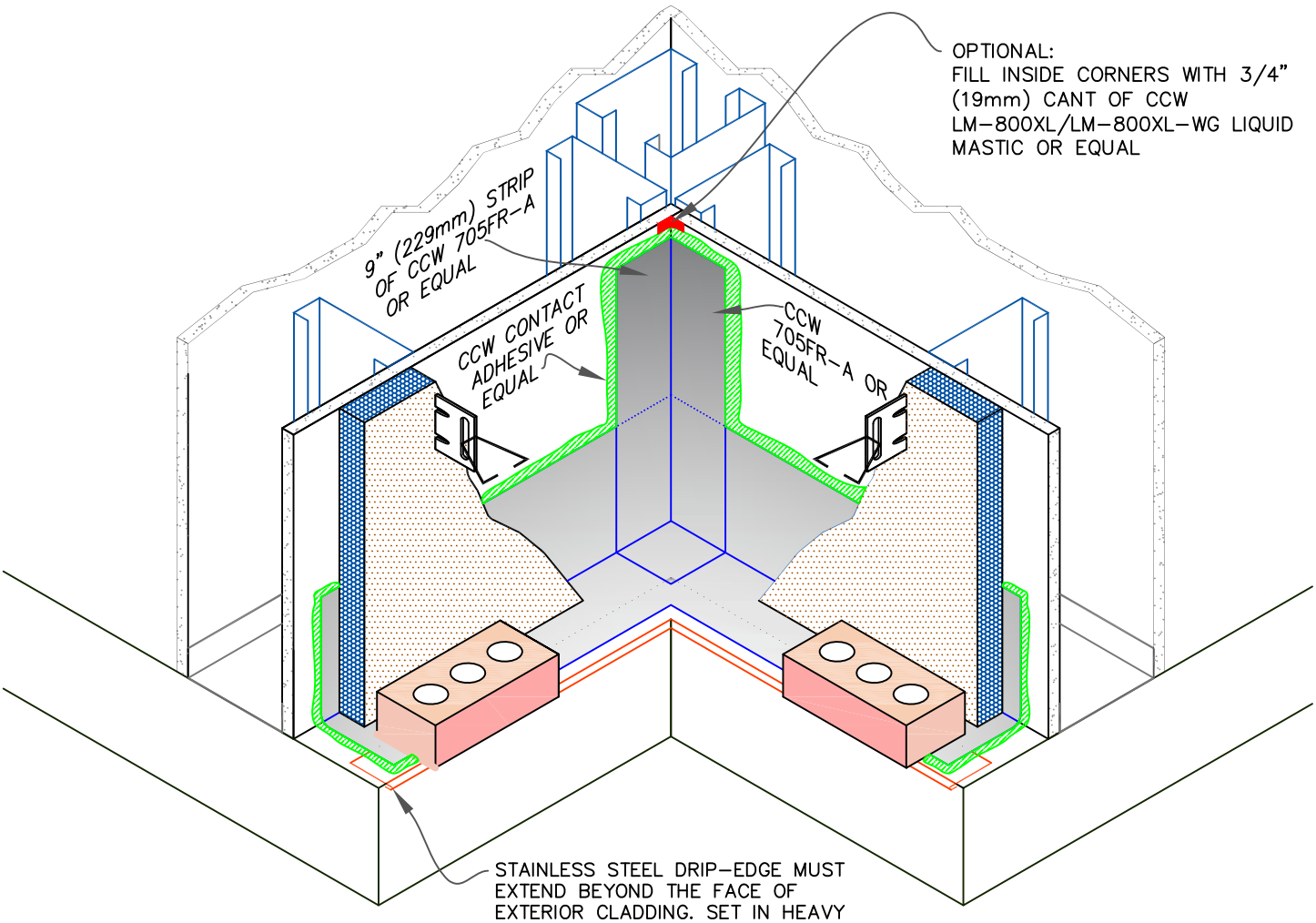
0 NOTE(S)

SPRAYED POLYURETHANE FOAM

WALL BASE FLASHING AT OUTSIDE CORNER

6.1

For additional information, refer to Specifications



CARLISLE SPRAY FOAM INSULATION

SPF	SPRAY POLYURETHANE FOAM
ccSPF	CLOSED CELL SPRAY POLYURETHANE FOAM
c.i.	CONTINUOUS INSULATION
LGMF	LIGHT GAUGE METAL FRAME

0 NOTE(S)

SPRAYED POLYURETHANE FOAM

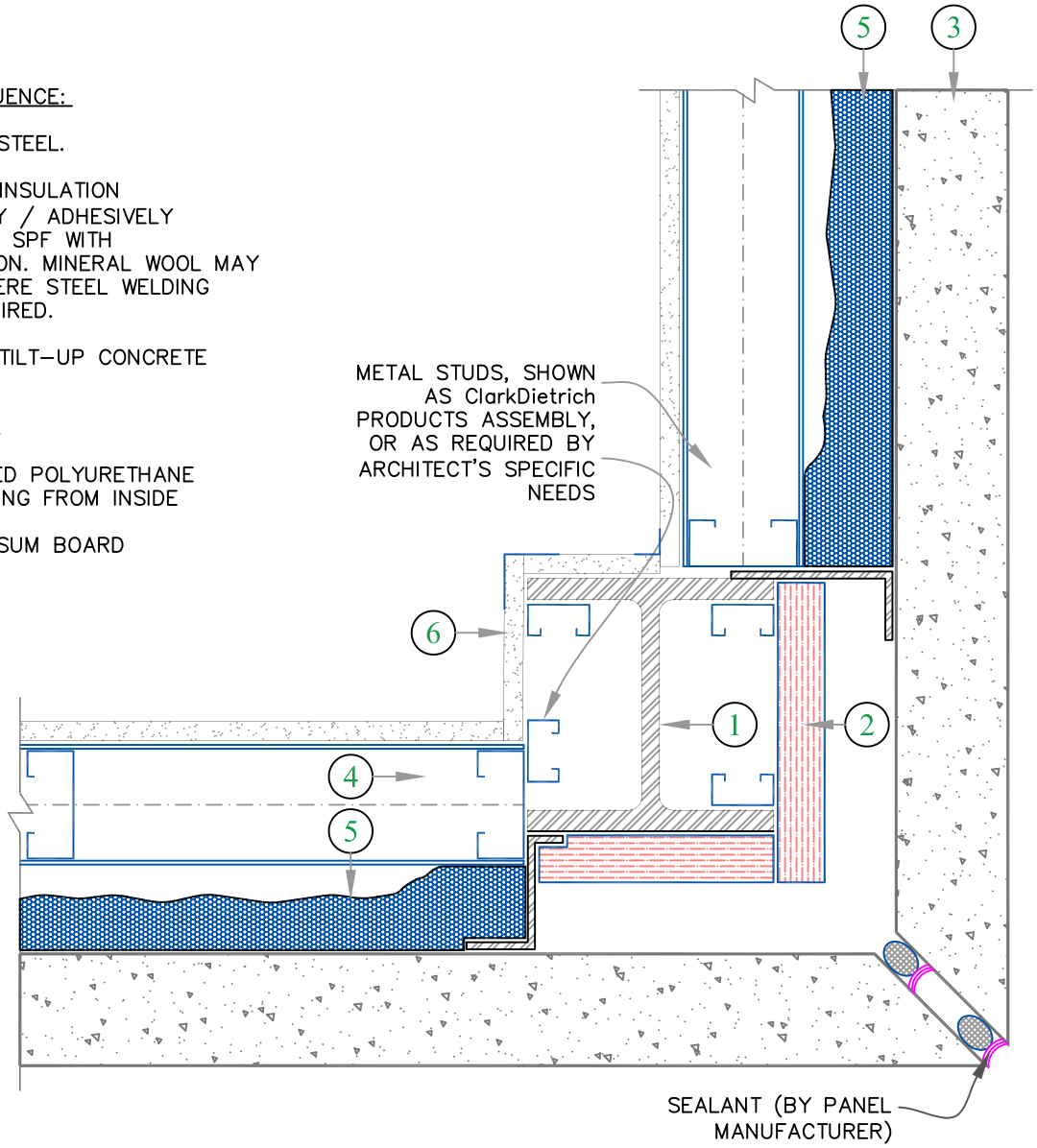
WALL BASE FLASHING AT INSIDE CORNER

6.2

For additional information, refer to Specifications

INSTALLATION SEQUENCE:

1. STRUCTURAL STEEL.
2. RIGID BOARD INSULATION MECHANICALLY / ADHESIVELY ATTACHED OR SPF WITH UV–PROTECTION. MINERAL WOOL MAY BE USED, WHERE STEEL WELDING WILL BE REQUIRED.
3. PRECAST OR TILT–UP CONCRETE PANELS.
4. METAL STUDS.
5. SPRAY APPLIED POLYURETHANE FOAM, REACHING FROM INSIDE
6. INTERIOR GYPSUM BOARD



NOTE:

SAME DETAIL APPLIES TO CONCRETE COLUMNS.

CARLISLE SPRAY FOAM INSULATION

SPF	SPRAY POLYURETHANE FOAM
ccSPF	CLOSED CELL SPRAY POLYURETHANE FOAM
c.i.	CONTINUOUS INSULATION
LGMF	LIGHT GAUGE METAL FRAME

0 NOTE(S)

SPRAYED POLYURETHANE FOAM

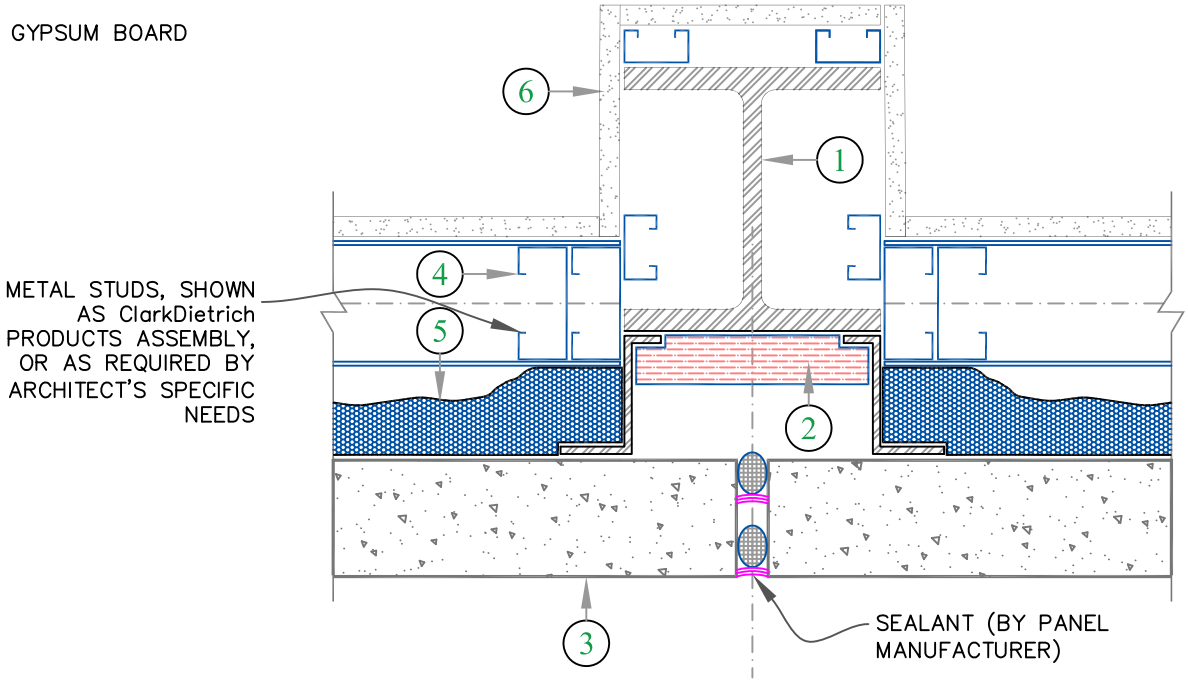
INSULATION INSTALLATION AT INACCESSIBLE AREAS: H–COLUMN AT CORNER

7.1

For additional information, refer to Specifications

INSTALLATION SEQUENCE:

1. STRUCTURAL STEEL.
2. RIGID BOARD INSULATION MECHANICALLY / ADHESIVELY ATTACHED OR SPF WITH UV–PROTECTION. MINERAL WOOL MAY BE USED, WHERE STEEL WELDING WILL BE REQUIRED.
3. PRECAST OR TILT–UP CONCRETE PANELS.
4. METAL STUDS.
5. SPRAY APPLIED POLYURETHANE FOAM, REACHING FROM INSIDE
6. INTERIOR GYPSUM BOARD



NOTE:

SAME DETAIL APPLIES TO CONCRETE COLUMNS.

CARLISLE SPRAY FOAM INSULATION

SPF	SPRAY POLYURETHANE FOAM
ccSPF	CLOSED CELL SPRAY POLYURETHANE FOAM
c.i.	CONTINUOUS INSULATION
LGMF	LIGHT GAUGE METAL FRAME

0 NOTE(S)

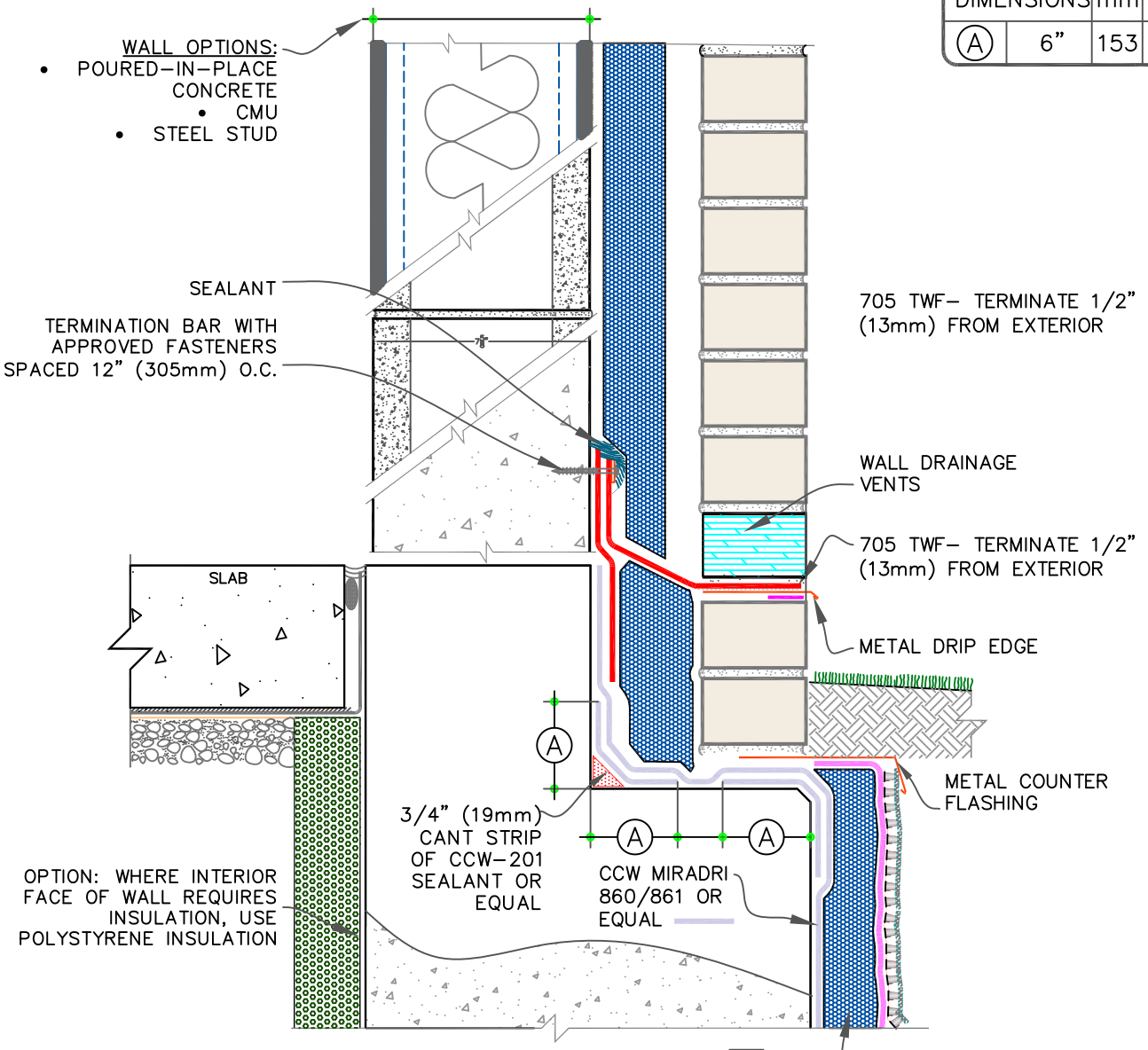
SPRAYED POLYURETHANE FOAM

INSULATION INSTALLATION AT INACCESSIBLE AREAS: H–COLUMN IN WALL

7.2

For additional information, refer to Specifications

DIMENSIONS	mm	
Ⓐ 6"	153	MIN.



CARLISLE SPRAY FOAM INSULATION

SPF	SPRAY POLYURETHANE FOAM
ccSPF	CLOSED CELL SPRAY POLYURETHANE FOAM
c.i.	CONTINUOUS INSULATION
LGMF	LIGHT GAUGE METAL FRAME

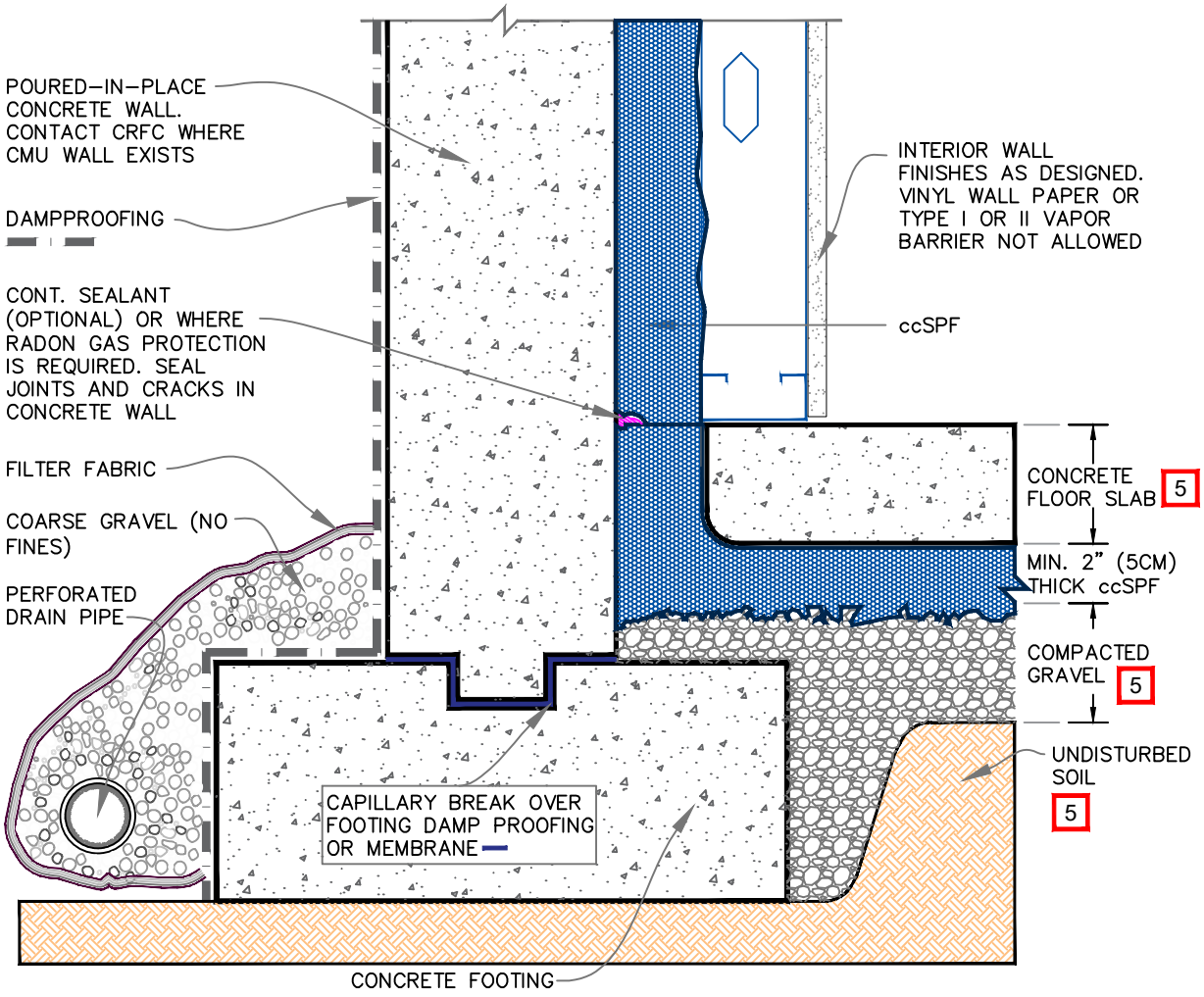
0 NOTE(S)

SPRAYED POLYURETHANE FOAM

WALL TO BELOW GRADE JUNCTION FOR NON RESIDENTIAL STRUCTURE

8.1

For additional information, refer to Specifications



NOTES:

1. VAPOR BARRIER MEMBRANE MAY NOT BE REQUIRED UNDER CONCRETE SLAB IF ccSPF IS USED & PROPLERY SEALED.
2. DO NOT LAY HORIZONTAL PIPES OR CONDUITS WITHIN ccSPF UNDER SLAB. VERTICAL PENETRATIONS ARE ALLOWED WITH PROPER SEAL AROUND PENETRATION.
3. REMOVE STANDING WATER PRIOR TO CONCRETE POURING AND SPF APPLICATION.
4. IN CLOSED BASEMENTS, ENSURE THERE IS PROPER VENTILATION.
5. DIMENSIONS, DEPTH AND PROPERTIES AS REQUIRED.

CARLISLE SPRAY FOAM INSULATION

SPF	SPRAY POLYURETHANE FOAM
ccSPF	CLOSED CELL SPRAY POLYURETHANE FOAM
c.i.	CONTINUOUS INSULATION
LGMF	LIGHT GAUGE METAL FRAME

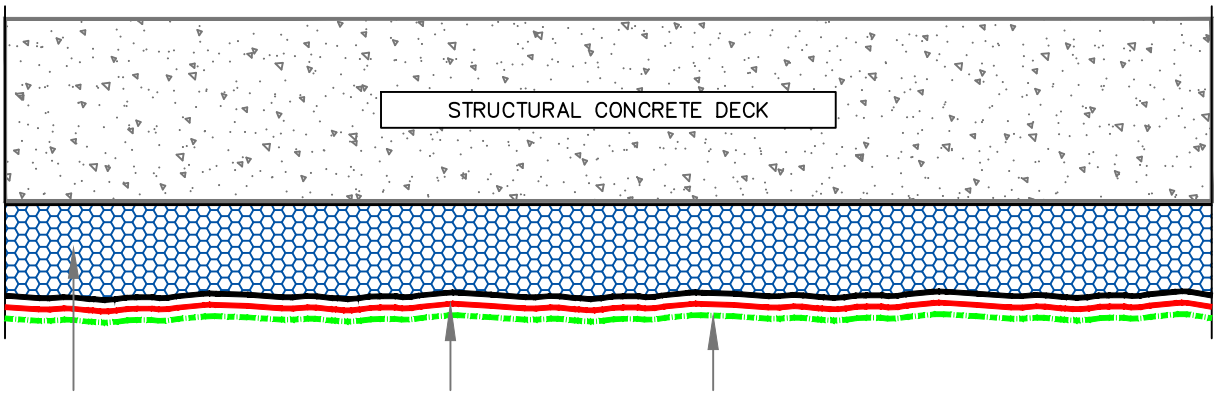
0 NOTE(S)

SPRAYED POLYURETHANE FOAM

ccSPF INSULATION UNDER BASEMENT SLAB

9.1

For additional information, refer to Specifications

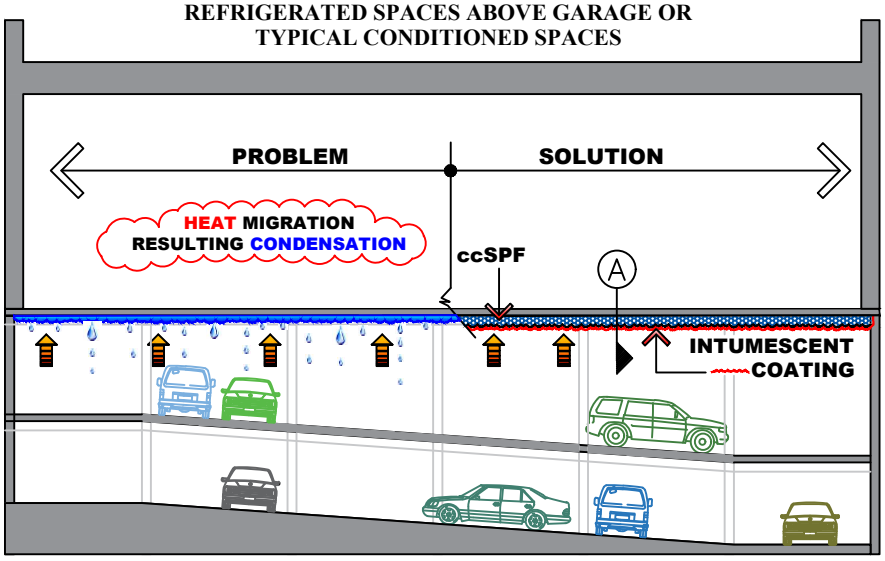


Ⓐ CEILING CROSS–SECTION

NOTES:

1. REFER TO SPRAY FOAM PRODUCT TDS (TECHNICAL DATA SHEET) OR PRODUCT EVALUATION REPORTS FOR APPROVED ALTERNATE OR NON–PRESCRIPTIVE THERMAL BARRIER (INTUMESCENT COATING).
2. REQUIRED IN HIGH HUMIDITY CONDITIONS. CONTACT INTUMESCENT COATING MANUFACTURER FOR RECOMMENDED TOP COATS.

SUGGESTED APPLICATION:
REFRIGERATED SPACES ABOVE GARAGE OR TYPICAL CONDITIONED SPACES



CARLISLE SPRAY FOAM INSULATION

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ccSPF	CLOSED CELL SPRAY POLYURETHANE FOAM
c.i.	CONTINUOUS INSULATION
LGMF	LIGHT GAUGE METAL FRAME

0 NOTE(S)

SPRAYED POLYURETHANE FOAM

CONCRETE CEILING WITH SPF INSULATION

10.1

For additional information, refer to Specifications