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ICC-ES Evaluation Report
ESR-3102

Reissued August 2023
Revised February 2024
This report is subject to renewal August 2024.

DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION
Section: 07 21 00—Thermal Insulation

REPORT HOLDER:

BASF CORPORATION

EVALUATION SUBJECT:

ENERTITE® G AND ENERTITE® X OPEN-CELL SPRAY POLYURETHANE FOAM INSULATIONS

1.0 EVALUATION SCOPE

1.1 Compliance with the following codes:

- 2021, 2018, 2015, 2012 and 2009 *International Building Code*® (IBC)
- 2021, 2018, 2015, 2012 and 2009 *International Residential Code*® (IRC)
- 2021, 2018, 2015, 2012 and 2009 *International Energy Conservation Code*® (IECC)
- Other Codes (see Section 8.0)

Properties evaluated:

- Surface-burning characteristics
- Physical properties
- Thermal resistance (*R*-values)
- Attic and crawl space installation
- Exterior walls of Types I through IV construction
- Air permeability

1.2 Evaluation to the following green standard:

2008 ICC 700 *National Green Building Standard*™ (ICC 700-2008)

2.0 USES

2.1 ENERTITE® G:

ENERTITE® G is a spray-applied foam plastic insulation used as a nonstructural thermal insulating material in buildings of Type V construction under the IBC and dwellings under the IRC. The insulation may also be used on exterior walls of buildings of Types I, II, III and IV construction when installed in accordance with Section 4.5. Under the IRC and 2021, 2018, and 2015 IBC, the insulation may be used as air-impermeable insulation when installed in accordance with Section 3.4. The insulation is for use in wall cavities and floor/ceiling assemblies, and in attic and crawl space installations as described in Section 4.4.

2.2 ENERTITE® X:

Enertite® X is a spray-applied foam plastic insulation used as a nonstructural thermal insulating material in buildings of Type V construction under the IBC and dwellings under the IRC. The insulation may also be used on exterior walls of buildings of Types I, II, III and IV construction when installed in accordance with Section 4.5 Under the IRC and 2021, 2018 and 2015 IBC, the insulation may be used as air-impermeable insulation when installed in accordance with Section 3.4. The insulation is for use in wall cavities and floor/ceiling assemblies, and in attic and crawl space installations as described in Section 4.4.

The attributes of the insulation have been verified as conforming to the provisions of ICC 700-2008 Section 703.2.1.1.1I as an air impermeable insulation. Note that decisions on compliance for those areas rest with the user of this report. The user is advised of the project-specific provisions that may be contingent upon meeting specific conditions, and the verification of those conditions is outside the scope of this report. These codes or standards often provide supplemental information as guidance.

3.0 DESCRIPTION

3.1 General:

ENERTITE® G and ENERTITE® X are two-component, low-density, open-cell, water-blown polyurethane foam plastic insulation systems. The installed nominal density of ENERTITE® G and ENERTITE® X is 0.6 pcf (9.6 kg/m^3). The two components of the insulation are polymeric isocyanate (A-component) and a resin (B-component). When stored in unopened containers at a temperature between 50°F and 80°F (10°C and 26.7°C), the isocyanate (A-component) has a shelf life of twelve months and and the resin (B-component) has a shelf life of six months.

3.2 Surface-Burning Characteristics:

3.2.1 ENERTITE® G: When tested in accordance with ASTM E84 (UL 723), at a maximum thickness of 4.2 inches (107 mm) and a nominal density of 0.6 pcf, ENERTITE® G has a flame-spread index of 25 or less and a smoke-developed index of 450 or less. There is no thickness limitation on the insulation when installed behind a code-prescribed thermal barrier.

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3.2.2 ENERTITE® X: When tested in accordance with ASTM E84 (UL 723), at a maximum thickness of 4.0 inches (91 mm) and a nominal density of 0.6 pcf (15.7 kg/m^3), ENERTITE® X has a flame-spread index of 25 or less and a smoke-developed index of 450 or less. There is no thickness limitation on the insulation when installed behind a code-prescribed thermal barrier.

3.3 Thermal Resistance:

ENERTITE® G and ENERTITE® X have thermal resistance (*R*-values) at a mean temperature of 75°F (24°C) as shown in Table 1.

3.4 Air Permeability:

3.4.1 ENERTITE® G: ENERTITE® G spray-applied polyurethane foam insulation, at a minimum thickness of 3.5 inches (89 mm), is considered air-impermeable insulation in accordance with 2021, 2018, 2015 and 2012 IRC Section R806.5 (2009 IRC Section R806.4) and 2021 and 2018 IBC Section 1202.3 (2015 IBC Section 1203.3), based on testing in accordance with ASTM E283 and ASTM E2178.

3.4.2 ENERTITE® X: ENERTITE® X spray-applied polyurethane foam insulation is considered air-impermeable insulation in accordance with 2021, 2018, 2015, and 2012 IRC Section R806.5 (2009 IRC Section R806.4) and 2021 and 2018 IBC Section 1202.3 (2015 IBC Section 1203.3), at a thickness of 3.0 inches (76 mm) based on testing in accordance with ASTM E283 and at 3.5 inches (89 mm) based on testing in accordance with ASTM E2178.

3.5 Intumescent Coatings:

3.5.1 No-Burn® Plus XD: No Burn® Plus XD intumescent coating is a latex-based coating manufactured by No-Burn, Inc., and is supplied in 1-gallon (4 L) and 5-gallon (19 L) pails and 55-gallon (208 L) drums. The coating material has a shelf life of 36 months when stored in factory-sealed containers at temperatures between 40°F (4.4°C) and 90°F (32.2°C).

3.5.2 DC 315 Coating: DC 315 Coating (ESR-3702), manufactured by International Fireproof Technology Inc., is a single-component, water-based, liquid-applied intumescent coating. The coating is supplied in 5-gallon (19 L) pails and 55-gallon (208 L) drums and has a shelf life of one year when stored in factory-sealed containers at temperatures between 50°F (10°C) and 80°F (27°C).

3.5.3 ICP CONSTRUCTION FIRESHELL® (IB-4) Coating: ICP FIRESHELL® (IB-4) intumescent coating is a proprietary, water-based, one-part, nonflammable coating manufactured by ICP. The coating is supplied in 5-gallon (19 L) pails and 55-gallon (208 L) drums and has a shelf life of 12 months when stored in factory-sealed containers at temperatures between 45°F (7.2°C) and 75°F (24°C).

3.5.4 ICP CONSTRUCTION FIRESHELL® F10E: ICP Construction FIRESHELL® F10E (ESR-3997) intumescent coating is a proprietary, water-based, one-part, nonflammable coating manufactured by ICP Construction. The coating is supplied in 5-gallon (19 L) pails and 55-gallon (208 L) drums and has a shelf life of 12 months when stored in factory-sealed containers at temperatures between 45°F (7.2°C) and 95°F (35°C).

4.0 INSTALLATION

4.1 General:

ENERTITE® G and ENERTITE® X must be installed in accordance with the manufacturer's published installation instructions and this report. The manufacturer's installation instructions and this report must be strictly adhered to, and a copy of the instructions and this evaluation report must be available on the jobsite at all times during installation.

4.2 Application:

The insulations must be applied using spray equipment specified by BASF Corporation. The product must not be used in areas which have a maximum service temperature greater than that specified in the manufacturer's published installation instructions, nor in electrical outlet or junction boxes or in contact with rain or water. The product must be protected from the weather during and after application. The insulations can be installed in multiple passes ½½ to 6 inches (12.7 mm to 152 mm) per pass to the maximum thickness. Where multiple passes are required, the cure time between passes is minimum 5 minutes for a 2-inch (51 mm) pass.

4.3 Thermal Barrier:

4.3.1 Application with a Prescriptive Thermal Barrier: ENERTITE® G and ENERTITE® X must be separated from the interior of the building by an approved thermal barrier, such ½½-inch (12.7 mm) gypsum wallboard installed using mechanical fasteners in accordance with the applicable code, or an equivalent 15-minute thermal barrier complying with the applicable code. There is no thickness limitation on the insulation when installed behind a code-prescribed thermal barrier. When installation is within an attic or crawl space, as described in Section 4.4, a thermal barrier is not required between the foam plastic and the attic or crawl space, but is required between the foam plastic and the interior of the building.

4.3.2 Application without a Prescriptive Thermal Barrier: ENERTITE® G may be installed without the thermal barrier prescribed in the IBC Section 2603.4 and IRC Section R316.4 when the installation complies with one of the assemblies described in Table 2.

4.4 Ignition Barrier – Attics and Crawl Spaces:

4.4.1 Application with a Prescriptive Ignition Barrier: When ENERTITE® G and ENERTITE® X insulations are installed within attics or crawl spaces, where entry is made only for service of utilities, an ignition barrier must be installed in accordance with IBC Section 2603.4.1.6 or IRC Section R316.5.3 or R316.5.4, as applicable. The ignition barrier must be consistent with the requirements for the type of construction required by the applicable code and must be installed in a manner so that the foam plastic insulation is not exposed.

4.4.2 Application without a Prescriptive Ignition Barrier: ENERTITE® G and ENERTITE® X insulations may be installed in an attic or crawl space without a prescriptive ignition barrier when all of the following conditions apply:

a. Entry to the attic or crawl space is only for the service of utilities and no storage is permitted.

b. There are no interconnected attic or crawl space areas.

c. Air in the attic or crawl space is not circulated to other parts of the building.

d. Combustion air is provided in accordance with IMC (*International Mechanical Code*®) Section 701.

e. Attic ventilation is provided when required by 2021 and 2018 IBC Section 1202.2 (2009, 2012, and 2015 IBC Section 1203.2) or IRC Section R806, except air-impermeable insulation is permitted in unvented attics in accordance with 2021, 2018, 2015 and 2012 IRC Section R806.5 (2009 IRC Section R806.4) or 2021 and 2018 IBC Section 1202.3 (2015 IBC Section 1203.3). Under-floor (crawl-space) ventilation is provided when required by 2021 and 2018 IBC Section 1202.4 (2015 IBC Section 1203.4; 2012 and 2009 IBC Section 1203.3) or IRC Section R408.1, as applicable. Refer to Section 3.4 for minimum thicknesses for use as air impermeable insulation.

f. If hot work is to be performed, all necessary procedures, precautions and limitations must be observed in accordance with OSHA 1926 Subpart J Standard 1926.352 requirements for hot work (welding / cutting) performed in the vicinity of combustible materials.

g. An installation certificate with the following information must be posted at each entrance:

- Product name and installation thickness.
- Manufacturer name, address and contact information.
- Installation contractor name, address and contact information.
- Attestation that the product(s) have been installed in accordance with the manufacturer's installation instructions and the requirements of the evaluation report.
- A notice that the certificate is not to be removed or altered.
- A list of limitations for the space including the following:
  - Entry to the space is only to service utilities, and no storage is permitted.
  - FIRE SAFETY WARNING: If hot work is to be performed, all necessary procedures, precautions and limitations must be observed in accordance with OSHA 1926 Subpart J Standard 1926.352 requirements for hot work (welding / cutting) performed in the vicinity of combustible materials.

The insulations may be spray-applied to the underside of roof sheathing and/or rafters in attics, and the underside of wood floors and/or floor joists in crawl spaces, as described in this paragraph and in Table 3. The maximum thickness of the foam plastic applied to the underside of the roof sheathing and to vertical wall surfaces must not exceed the thicknesses set forth in Table 3, based on the insulation type and the intumescent coating type (if applicable) and insulation thickness used.

ENERTITE® G: The intumescent coatings used to cover the ENERTITE® G insulation are described in Section 3.5. The intumescent coating must be applied over the insulation in accordance with the coating manufacturer's instructions and at the thickness as described in Table 3. Surfaces to be coated must be dry, clean, and free of dirt, loose debris and other substances that could interfere with adhesion of the coating. The coating is applied with low-pressure airless spray equipment.

The coating must be applied with ambient and substrate temperature is at least 50°F (10°C). The insulation, at a minimum thickness of $3^1/_2$ inches (89 mm), may be installed in unvented attics as described in this section in accordance with 2021, 2018, 2015 or 2012 IRC Section R806.5 (2009 IRC Section R806.4) or 2015 IBC Section 1203.3.

ENERTITE®X: ENERTITE® X insulation may be installed in an attic or crawl space without a prescriptive ignition barrier or coating at the maximum thicknesses set forth in Table 3.

4.4.3 Use on Attic Floors:

4.4.3.1 ENERTITE® G: When used on attic floors, ENERTITE® G insulation may be installed at a maximum thickness of 16 inches (406 mm) between joists. The ignition barrier in accordance with IBC Section 2603.4.1.6, or IRC Section R316.5.3, may be omitted, when the installation is in accordance with Section 4.4.2. The ENERTITE® G insulation must be separated from the interior of the building by an approved thermal barrier.

4.4.3.2 ENERTITE® X: ENERTITE® X insulation may be installed at a maximum thickness of 8 inches (203 mm) between joists in attic floors. The ignition barrier in accordance with IBC Section 2603.4.1.6, or IRC Section R316.5.3, may be omitted, when installation is in accordance with Section 4.4.2. The ENERTITE® X insulation must be separated from the interior of the building by an approved thermal barrier.

4.5 Exterior Walls in Types I, II, III and IV Construction:

ENERTITE® G insulation, when used in exterior walls of Types I, II, III or IV construction, the assembly must comply with IBC Section 2603.5, this section and Table 4. The insulation thickness must not exceed 6 inches (152 mm). The potential heat of ENERTITE® G insulation is 656 Btu/ft^2 per inch of thickness, when tested in accordance with NFPA 259. The potential heat of ENERTITE® X is 537 Btu/ft^2.

5.0 CONDITIONS OF USE

The ENERTITE® G and ENERTITE® X spray-applied polyurethane insulations described in this report complies with, or is a suitable alternative to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 This evaluation report and the manufacturer's published installation instructions, when required by the code official, must be submitted at the time of permit application.

5.2 The insulation must be installed in accordance with the manufacturer's published installation instructions, this evaluation report and the applicable code. If there is a conflict between the installation instructions and this report, this report governs.

5.3 The insulation must be separated from the interior of the building by an approved thermal barrier, except when installed as described in Section 4.3.2 or when installation is in attics and crawl spaces as described in Section 4.4.

5.4 The insulation must not exceed the thickness and density noted in Sections 3.2, 4.3 and 4.4.

5.5 The insulation must be protected from the weather during and after application.

5.6 The insulation must be applied by professional spray polyurethane foam installers approved by BASF Corporation or by the Spray Polyurethane Foam Alliance (SPFA) for the installation of spray polyurethane foam insulation.

5.7 Use of the insulation in areas where the probability of termite infestation is "very heavy" must be in accordance with 2021, 2018, 2015 or 2009 IBC Section 2603.8 (2012 IBC Section 2603.9) or IRC Section R318.4, as applicable.

5.8 Jobsite certification and labeling of the insulation must comply with 2021 or 2018 IRC Sections N1101.10.1 and N1101.10.1.1; 2015 IRC Section N1101.10.1.1; 2012 IRC Section N1101.12.1 and N1101.12.1.1; 2009 IRC Sections N1101.4 and N1101.4.1; or 2021, 2018, 2015, or 2012 IECC Sections C303.1.1, C303.1.1.1, R303.1.1 and R303.1.1.1 (2009 IECC Section 303.1.1 and 303.1.1.1), as applicable.

5.9 When installed in accordance with Section 4.4.2 of this report, the associated installation certificate(s) containing the required information referenced in Section 4.4.2 must be installed at each entrance to the crawlspace or attic, as applicable. The certificate(s) must be red in color and constructed of durable materials, such as metal, plastic, or laminated paper.

5.10 A vapor retarder must be installed in accordance with the applicable code.

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

5.12 The insulations are manufactured in Houston, Texas, under a quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

6.1 Data in accordance with the ICC-ES Acceptance Criteria for Spray-applied Foam Plastic Insulation (AC377), June 2023.

6.2 Reports of room corner fire testing in accordance with NFPA 286 and UL 1715.

6.3 Reports of room corner fire testing in accordance with AC377 Appendix X.

6.4 Reports of air permeance testing in accordance with ASTM E283 and ASTM E2178.

6.5 Reports of critical radiant heat flux of exposed attic floor in accordance with ASTM E970.

6.6 Report of fire testing in accordance with NFPA 285, and related engineering analysis.

6.7 Report of potential heat tests in accordance with NFPA 259.

7.0 IDENTIFICATION

7.1 All packages and containers of ENERTITE® G and ENERTITE® X insulations must be labeled with the BASF Corporation, name and address; the product name; the flame spread index and the smoke-developed index; the shelf life expiration date; and the evaluation report number (ESR-3102).

International Fireproof Technology, Inc., DC 315 coating is labeled with the manufacturer's name and address; the product name; the date of manufacture, the shelf life or expiration date; the manufacturer's instructions for application, and evaluation report number (ESR-3702).

ICP Construction Fireshell F10E, coating is labeled with the manufacturer's name and address; the product name; the date of manufacture, the shelf life or expiration date; the manufacturer's instructions for application, and the evaluation report number (ESR-3997).

Intumescent coatings described in Sections 3.5.1 and 3.5.3 are identified with the manufacturer's name and address, the product trade name and use instructions.

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

BASF CORPORATION
1703 CROSSPOINT AVENUE
HOUSTON, TEXAS 77054
(713) 383-4554
www.spf.basf.com

8.0 OTHER CODES

In addition to the codes referenced in Section 1.0, the products in the report were evaluated for compliance with the requirements of the following codes:

- 2006 and 2003 *International Building Code*®
- 2006 and 2003 *International Residential Code*®
- 2006 and 2003 *International Energy Conservation Code*®

The products comply with the above-mentioned codes as described in Sections 2.0 through 7.0 of this report, with the revisions noted below:

- **Application with a Prescriptive Thermal Barrier:** See Section 4.3.1, except the approved thermal barrier must be installed in accordance with Section R314.4 of the 2006 IRC or Section R314.1.2 of the 2003 IRC, as applicable.
- **Application with a Prescriptive Ignition Barrier:** See Section 4.4.1, except an ignition barrier must be installed in accordance with Section R314.2.3 of the 2003 IRC, or Section R314.5.3 or R314.5.4 of the 2006 IRC.
- **Application without a Prescriptive ignition Barrier:** See Section 4.4.2, except that combustion air is provided in accordance with Sections 701 and 703 of the 2006 IECC.
- **Protection against Termites:** See Section 5.7, except use of the insulation in areas where the probability of termite infestation if "very heavy" must be in accordance with Section 320.4 of the 2003 IRC or Section R320.5 of the 2006 IRC.
- **Jobsite Certification and Labeling:** See Section 5.8, except jobsite certification and labeling must comply with Section 102.5.1 of the 2003 IECC, or Sections 102.1.1 and 102.1.11, as applicable, of the 2006 IECC.

TABLE 1—THERMAL RESISTANCE (*R*-VALUES[1,2])

ENERTITE® G		ENERTITE® X	
THICKNESS (inches)	***R*-VALUE (°F·ft²·h/Btu)**	**THICKNESS (inches)**	***R*-VALUE (°F·ft²·h/Btu)**
1	3.9	1	4.0
2	7.6	2	7.5
3	11	3	11
3.5	13	3.5	13
4	15	4	14
5	19	5	18
5.5	21	5.5	20
6	22	6	22
7	26	7	25
7.5	28	7.5	27
8	30	8	29
9	33	9	33
9.5	35	9.5	34
10	37	10	36
11.5	43	11.5	42
12	45	12	43
16	59	16	58

For **SI:** 1 inch = 25.4 mm, 1°F•ft²•h/Btu = 0.176 110K•m²/W.
[1]*R*-values are calculated based on tested *K* values at 1- and 4-inch thicknesses.
[2]*R*-values greater than 10 are rounded to the nearest whole number.

TABLE 2—USE OF INSULATION WITHOUT A PRESCRIPTIVE THERMAL BARRIER[1]

INSULATION TYPE	MAXIMUM THICKNESS (in) (Wall Cavities)	MAXIMUM THICKNESS (in) (Ceilings, Underside of Roof Sheathing / Rafters & Floors)	FIRE-PROTECTIVE COATING MINIMUM THICKNESS & TYPE (Applied to all Foam Surfaces)[2]	MINIMUM APPLICATION RATE OF FIRE-PROTECTIVE COATING	May be left exposed as an Interior Finish	TESTS SUBMITTED
ENERTITE® G	7 1/2	14 1/2	DC315 18 wet mils	1.12 gal / 100 ft²	Yes	NFPA 286
	9 1/2	11 1/2	Fireshell F10E 18 wet mils	1.18 gal / 100 ft²	Yes	NFPA 286

For **SI:** 1 inch = 25.4 mm; 1 mil = 0.0254 mm; 1 gallon = 3.38 L; 1 ft² = 0.093 m².
[1]See Section 4.3.2.
[2]See Sections 3.5.3 and 3.5.5.

TABLE 3—USE OF INSULATION IN ATTICS AND CRAWL SPACES WITHOUT A PRESCRIPTIVE IGNITION BARRIER[1]

INSULATION TYPE	MAXIMUM THICKNESS (in) (Wall Cavities and Attic Floors)	MAXIMUM THICKNESS (in) (Underside of Roof Sheathing/Rafters and floors)	FIRE PROTECTIVE COATING MINIMUM THICKNESS AND TYPE (Applied to all Exposed Foam Surfaces)[2]	MINIMUM APPLICATION RATEOF THE FIRE-PROTECTIVE COATING	TESTS SUBMITTED
ENERTITE® G	$11^1/_4$	16	FIRESHELL® (IB-4) 8 wet mils (4 mils dry)	0.68 gal/100 ft^2	AC377 Appendix X
	$11^1/_4$	16	No-Burn Plus XD 6 wet mils (4 dry mils)	0.37 gal / 100 ft^2	AC377 Appendix X
ENERTITE® X	8	12	No covering required	N/A	AC377, Appendix X

For **SI:** 1 inch = 25.4 mm; 1 mil = 0.0254 mm; 1 gallon = 3.38 L; 1 ft^2 = 0.093 m^2.
[1]See Section 4.4.2**.**
[2]See Sections 3.5.1, 3.5.2 and 3.5.4.

TABLE 4—USE OF ENERTITE® G IN EXTERIOR WALL CAVITIES OF BUILDINGS OF TYPES I, II, III AND IV CONSTRUCTION

WALL COMPONENT	MATERIALS
Base Wall System – Use either 1, 2 or 3	1 – Concrete wall[1] 2 – Concrete masonry wall[1] 3 – 1 layer of $^5/_8$-inch-thick (15.9 mm) Type X gypsum wallboard installed on the interior side of minimum $3^5/_8$-inch-deep (92 mm), minimum 18 gauge thick steel studs spaced a maximum of 24 inches (610 mm) on center.
Perimeter Fire Barrier System	Perimeter fire barrier system complying with 2021, 2018, 2015 or 2012 IBC Section 715.4 (2009 IBC Section 714.4) shall be installed, as applicable, to fill the void between the edge of the concrete floor slab and the interior surface of the exterior wall assembly.
Interior Insulation – Use either 1, 2, 3, 4 or 5 or combinations of 3 and 4 or 3 and 5	1 – Maximum nominal thickness of 6 inches (152 mm) of ENERTITE® G or ENERTITE® X applied to the interior surface of Base Wall System 1 or 2 (See Note 1). 2 – Maximum nominal thickness of 6 inches (152 mm) of ENERTITE® GOR ENERTITE® X applied using the back face of the exterior gypsum sheathing of Base Wall System 3 as the substrate and covering the width of the cavity and the inside of the steel wall stud framing flange. 3 – Fiberglass batt insulation[2] 4 – Mineral wool insulation[2]
Exterior sheathing	$^5/_8$-inch-thick (15.9 mm) Type X exterior-type gypsum sheathing (for Base Wall System 3)
Exterior Wall Covering[3]	1 – Any non-combustible exterior wall covering material using any standard installation technique 2 – Any non-combustible exterior wall covering system with a combustible WRB that has successfully been tested in accordance with NFPA 285 Details of the exterior wall covering must be provided to the code official by the report holder, designer or specifier, with an engineering analysis demonstrating that (1) the exterior wall covering conforms to ASTM E136 and (2) the addition of the wall covering and/or water-resistive barrier to the assembly described in this section does not negatively affect conformance of the assembly with the requirements of IBC Section 2603.5.

[1] Fireblocking per Section 718 of the IBC and thermal barrier material requirements must be met for Base Wall Systems 1 and 2, as required by specific wall construction details when combustible concealed space is created on interior side of exterior wall assembly.
[2] Insulation must comply with the applicable requirements of 2021, 2018, 2015 or 2012 IBC Section 720.2 (2009 IBC Section 719.2).
[3] Under the 2021 IBC, the non-combustible exterior wall covering with or without a combustible water-resistive barrier must be tested in accordance with the 2019 edition of NFPA 285.

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Section: 07 21 00—Thermal Insulation

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1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that The ENERTITE® G and ENERTITE® X insulations, described in ICC-ES evaluation report ESR-3102, have also been evaluated for the codes noted below.

Applicable Code Editions:

- 2022 *California Building Code* (CBC)

For evaluation of applicable chapters adopted by the California Office of Statewide Health Planning and Development (OSHPD) AKA: California Department of Healthcare Access and Information (HCAI) and the Division of State Architect (DSA), See Sections 2.1.1 and 2.1.2 below.

- 2022 *California Residential Code* (CRC)
- 2022 *California Energy Code* (CEC)

2.0 CONCLUSIONS

2.1 CBC and CRC:

The ENERTITE® G and ENERTITE® X insulations described in Sections 2.0 through 7.0 of the evaluation report ESR-3102 comply with the CBC and CRC, provided the design and installation are in accordance with the 2021 *International Building Code*® (IBC) and *International Residential Code*® (IRC) provisions noted in the evaluation report.

2.1.1 OSHPD:

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

2.1.2 DSA:

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

2.2 CEC:

The ENERTITE® G and ENERTITE® X insulations, described in Sections 2.0 through 7.0 of the evaluation report ESR-3102, comply with the CEC, provided the design and installation are in accordance with the 2021 *International Building Code*® (IBC) provisions noted in the evaluation report.

2.2.1 Conditions of Use:

In accordance with Section 110.8 of the 2022 *California Energy Code*, verification of certification by the Department of Consumer Affairs, Bureau of Household Goods and Services, must be provided to the code official, demonstrating that the insulation conductive thermal performance is approved pursuant to the California Code of Regulations, Title 24, Part 12, Chapters 12-13, Article 3, “Standards for Insulating Material.” Certification can be verified with the DCA Bureau of Household Goods and Services using the following link to the bureau’s Directory of Certified Insulation Materials: https://bhgs.dca.ca.gov/consumers/ti_directory.pdf.

This supplement expires concurrently with the evaluation report, reissued August 2023, and revised February 2024.

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ICC-ES Evaluation Report

ESR-3102 FBC Supplement

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Applicable code editions:

- 2023 *Florida Building Code—Building*
- 2023 *Florida Building Code—Residential*

2.0 CONCLUSIONS

The ENERTITE® G and ENERTITE® X spray-applied polyurethane foam insulations described in Sections 2.0 through 7.0 of the evaluation report comply with the 2023 *Florida Building Code—Building* and the 2023 *Florida Building Code—Residential*, as applicable. The design requirements shall be determined in accordance with the *Florida Building Code—Building* or the *Florida Building Code—Residential*, as applicable. The installation requirements noted in ICC-ES evaluation report ESR-3102 for the 2021 *International Building Code®* (IBC) meet the requirements of the *Florida Building Code—Building* or the *Florida Building Code—Residential*, as applicable, with the following condition:

Installation must meet the requirements of Sections 1403.8 and 2603.8 of the *Florida Building Code—Building* and Sections R318.7 and R318.8 of the *Florida Building Code—Residential,* as applicable.

Use of ENERTITE® G and ENERTITE® X spray-applied polyurethane foam insulations have also been found to be in compliance with the High-Velocity Hurricane Zone provisions of the *Florida Building Code—Building* and the *Florida Building Code—Residential.*

For products falling under Florida Rule 61G20-3, verification that the report holder's quality assurance program is audited by a quality assurance entity approved by the Florida Building Commission for the type of inspections being conducted is the responsibility of an approved validation entity (or the code official when the report holder does not possess an approval by the Commission).

This supplement expires concurrently with the evaluation report, reissued August 2023 and revised February 2024.

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DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION
Section: 07 21 00—Thermal Insulation

REPORT HOLDER:

BASF CORPORATION

EVALUATION SUBJECT:

ENERTITE® G AND ENERTITE® X OPEN-CELL SPRAY POLYURETHANE FOAM INSULATIONS

1.0 EVALUATION SCOPE

Conformance to the following requirements:

Seal and Insulate with ENERGY STAR® Program—*Definitions and Testing Requirements for Residential Insulation, Version 1.0*

Properties evaluated:

- Thermal resistance
- Surface-burning characteristics

2.0 PURPOSE OF THIS SUPPLEMENT

This supplement is issued to certify that the ENERTITE® spray-applied foam plastic insulation products described in Sections 2.0 through 7.0 of the evaluation report (ESR-3102) have been reviewed for compliance with the applicable codes noted in Section 1.0 of the evaluation report and with the requirements set forth in the Seal and Insulate with ENERGY STAR® Program—*Definitions and Testing Requirements for Residential Insulation, Version 1.0*. The insulation products covered by this supplement are defined as "Spray or Pour Foam Insulation."

The requirements for testing laboratory qualifications and product sampling, as well as the specific material and test standards and editions used in this evaluation, are as set forth in the applicable documentation noted in Section 6.0 of the evaluation report.

3.0 DEFINITIONS

The following definitions are from the Definitions and Testing Requirements for Residential Insulation, Version 1.0, and are applicable to the subject of this report.

3.1 General Definitions:

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

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

3.2 Insulation Product Definition:

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

3.3 Insulation Performance Definitions:

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

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

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

3.4 Thermal Resistance:

The ENERTITE® spray-applied foam plastic insulations have thermal resistance *R*-values as noted in Table 1 of ESR-3102, based upon testing.

3.5 Installation

3.5.1 General: The installation of the ENERTITE® spray-applied foam plastic insulations must be in accordance with the requirements set forth in Sections 4.0 and 5.0 (as applicable) of ESR-3102. The insulation is manufactured on-site by spray polyurethane foam applicators meeting the qualification requirements stated in Section 5.6 of ESR-3102. The insulation should not be installed in direct contact with chimneys, flues or heat-producing appliances. See Figure 7 for recommended clearances.

3.5.2 Personal Protective Equipment (PPE): The following personal protective equipment (PPE) requirements are reprinted from the website of the American Chemistry Council (ACC) and deal with Spray Polyurethane Foam Health and Safety (http://www.spraypolyurethane.org/PPE):

"PPE for SPF High Pressure Interior Application:

When spraying an SPF two-component high pressure spray polyurethane foam system indoors, sprayers and helpers should wear:

- A NIOSH-approved full face or hood-type supplied air respirator (SAR) (as outlined in your company's Respiratory Protection Program)
- MDI-resistant chemical gloves (e.g., nitrile), or fabric gloves coated in nitrile, neoprene, butyl, or PVC
- Chemically resistant long-sleeve coveralls or chemically resistant full body suit with hood
- MDI-resistant fitted boots/booties"

"Protective Clothing:

The use of appropriate protective clothing is necessary whenever there is possibility of direct contact with SPF chemicals. The appropriate protective clothing varies depending upon the potential for exposure. Applicators and helpers typically wear disposable coveralls to keep spray and mist from contacting skin and clothing. To protect skin, wear PPE in such a manner as to protect all skin (in other words, there should be no exposed skin showing). When not wearing a hood respirator, select a coverall with an attached hood or spray head cover. For tasks where there is a potential for splash, consider a suit coated with an impermeable coating such as PVC and MDI-resistant fitted boots/booties."

"Gloves:

Gloves made of nitrile, neoprene, butyl or PVC generally provide adequate protection against A-side materials. (See Guidance for the Selection of Protective Clothing for MDI Users, Center for the Polyurethane Industry (CPI) Guidance Document AX178). A-side protection is generally considered adequate to provide B-side protection; however, consult the manufacturer's SDS for specific information about B-side protection."

"Eye and Face Protection:

Appropriate eye protection helps prevent eye contact from splashes of liquid SPF chemicals, accidental sprays of reacting foam, aerosols and vapors that are likely to be present during spraying, and airborne particulate associated with sanding and grinding operations. The type of eye protection needed depends on the nature of the activity."

Persons handling liquid SPF chemicals in open containers can protect their eyes by wearing safety goggles or safety goggles in combination with face shields. The use of contact lenses is discouraged.

During application of SPF, eye protection may be provided by virtue of wearing a full-face or hood respirator. OSHA requires that an eyewash* or safety shower be provided in the work area where the eyes or body may be exposed to "injurious corrosive materials." Consult the SDS for all materials to be used on the job in advance to help you understand whether such materials will be present, and if so, how to comply with applicable OSHA requirements.

"Respiratory Protection:

Engineering controls, such as local exhaust ventilation, can be used to control SPF chemical exposures. Administrative controls, such as work schedules and work practices, are used concurrently to minimize exposure. Respirators are needed when air concentrations continue to exceed occupational exposure limits when engineering and administrative controls are implemented. These limits have been set for a number of SPF chemicals and some common chemicals encountered during SPF application.

Air-purifying respirators (APR) and powered air-purifying respirators (PAPR) are generally appropriate for exterior applications and may be used when spraying polyurethane foam in exterior applications. Supplied air respirators (SAR) are typically used in interior applications. Refer to the NIOSH Respirator Decision Logic (2004) for more information regarding respirator selection."

Ventilation of the work area is required and should be in accordance with *Ventilation Considerations or Spray Polyurethane Foam: Guidance on Ventilation During Installation of Interior Applications of High-Pressure Spray Polyurethane Foam* as published by the Spray Foam Coalition (SFC) of the Center for the Polyurethanes Industry (CPI). The following statement regarding ventilation of the work area is reprinted from the guidance document:

"Work zone mechanical ventilation during and after SPF installation is designed to prevent workers and others in the area from being exposed to SPF chemicals above recommended or permissible levels. Potential health effects from exposure above recommended levels can range from no effects to slight irritation of the eyes, skin or respiratory system to the development of chronic lung or pulmonary disease depending on the individual person and level and duration of overexposure."

3.5.3 Occupancy Time after Installation: The re-entry or re-occupancy time shall be in accordance with the manufacturer's installation instructions, which are reprinted on pages 4 and 5 of this certification.

3.5.4 Figures: Figures 1 through 6 represent general installations of the ENERTITE® spray-applied foam plastic insulations in vented and unvented crawl spaces, the interior of below-grade foundation walls, the exterior of above-grade walls, and in vented and unvented attics. Figure 7 depicts minimum clearances to heat-producing objects. These figures are for illustration purposes only and are not to be construed or used as construction documents.

This supplement expires concurrently with the evaluation report, reissued August 2023 and revised February 2024.

The Chemical Company

BASF Re-Occupancy Times for Interior Building Spray Applications

Jim Andersen, Marketing Applications Specialist SR 021514

Introduction

The application of spray foam insulation is done through special high pressure spray application equipment, Low pressure application units or single component foams. This document will discuss two part foams field process using high pressure application equipment. When the combination of liquid part A compound and liquid B compound is done to produce either closed cell or open cell spray foam insulation there are potential health hazards during the application. OSHA and other government agencies have established protection requirements for all workers that can be exposed to the chemicals during the spray application. Only trained and properly protected workers are allowed in the spray application areas during the spraying and for a period after the spraying has stopped.

Requirements

The spray area should be posted with keep out WARNING signs before and after spraying. Workers only that are trained and have the necessary personal protection equipment are allowed inside the spray area. All others must be kept out as well as pets. Ventilation of the spray area is to be done incorporating the guidance documents: "Ventilation Guidance for Spray Polyurethane Foam Application," published by the U.S. Environmental Protection Agency (EPA), online at www.epa.gov/dfe/pubs/projects/spf/ventilation-guidance.html and "Good Practices – Engineering Controls and Ventilation," published by the American Chemistry Council's Center for the Polyurethanes Industry, available online at: www.spraypolyurethane.org/GoodPractices#EngineeringControls

The following general requirements must also be followed, Code of Federal Regulations Title 29 CFR §1926.20 Safety and Health Regulations for Construction: General Safety and Health Provisions available online at www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10606

The applicators and building owners should visit www.spraypolyurethane.org and also www.spf.basf.com for up to date information about spray polyurethane foam construction applications before starting projects.

Industry Established Re Occupancy Times

The Spray Foam Industry and government agencies have worked together to establish general guidelines for re occupancy. These can be found at www.spraypolyurethane.org. The general statement of 24 hours for re occupancy times for interior building applications is the general rule BASF suggests for two part high pressure spray.

"Evaluation reports for many types of building products, including SPF insulation, often include the suggested reoccupancy time, which is variable: for an interior application using two-component high-pressure SPF, some manufacturers recommend 24 hours before reoccupancy, and for an interior two-component, low-pressure SPF kit application, some manufacturers recommend a one hour reoccupancy time. Consult the product manufacturer to determine the recommended reoccupancy time for the particular job and SPF in use.

Note: "Exterior applications where the spray application is done to a roof top application or exterior walls and where there is wide open air spaces; the risk control is done by closing off all air intake areas to a building interior,(windows, doors, warning signs and HVAC intake vents). Roof or exterior applications will generally have plenty of ventilation with natural wind as well as massive volumes of space to dissipate the concentration of materials. Therefore the controls used for interior applications are not generally required, such as added ventilation. The elastomeric roof coatings vary in risks and must be assessed and the risks evaluated on a job by job and material specific basis by the spray foam applicator company.

BASF Re Occupancy Research

BASF, Air Products and Honeywell have conducted proprietary studies for indoor air quality measurements on spray foam applications to retrofit attics. Robert, William, James Andersen, Richard Wood, and Mary Bogdan. "Ventilation and Re-Occupancy of a Residential Home Sprayed with High Pressure Polyurethane Foam." Presented at the CPI Technical Conference, September 2012

This study of three houses where the attic was sealed and ventilated during the spray application has resulted in no chemicals detected within the house at levels greater than those currently assigned levels by government agencies and private chemical manufactures' Material Safety Data Sheets (MSDS) or Safety Data Sheets (SDS).

This particular application process indicates 2 hours after spraying has stopped and ventilation continued that re-occupancy can occur within the homes. The spray foam was done above the sheetrock in non inhabited attic spaces.

BASF continues field monitoring testing as well as supports continued research being done by the American Chemistry Council/Center for the Polyurethane Industries of which we are an active member.

Summary

This information has been provided for use by our spray foam applicators and distributors use. It may also be used to inform end customers who have contracted to have spray foam produced by spray foam applicators to their buildings. It is offered in good faith and believed to present the risks and best industry practices to manage them. Since each field application is different the responsibility rests with spray foam applicators to assess the job risks and control them per the OSHA and others requirements. Technical Questions can be directed to BASF Technical Services 800-706-0712.

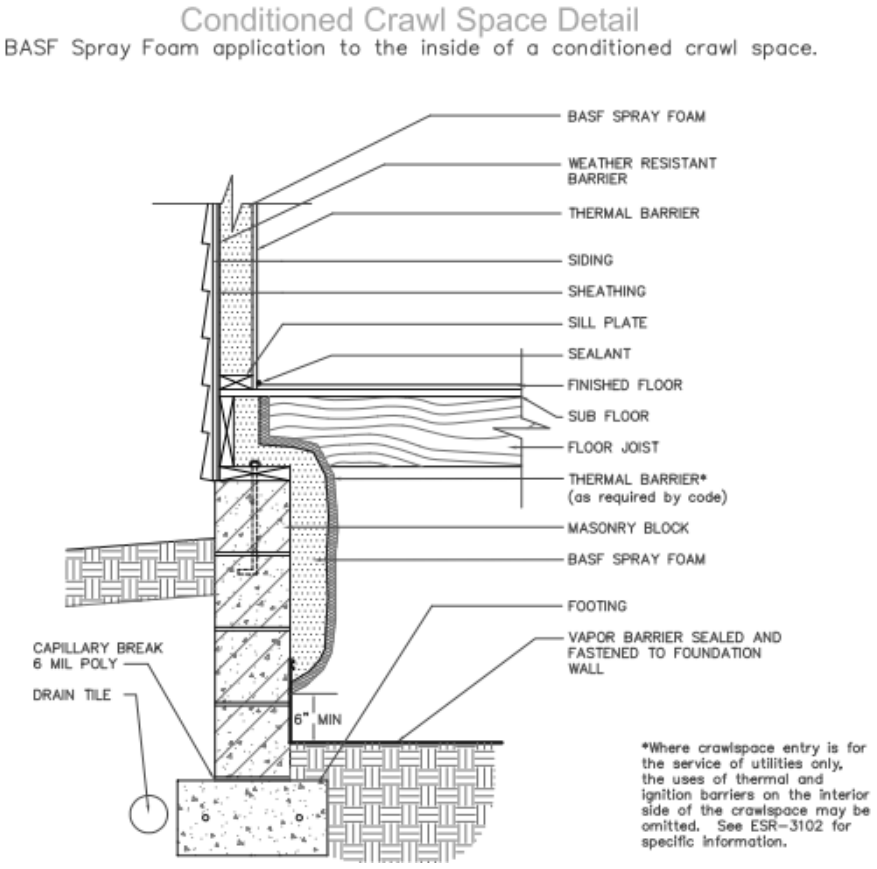


FIGURE 1

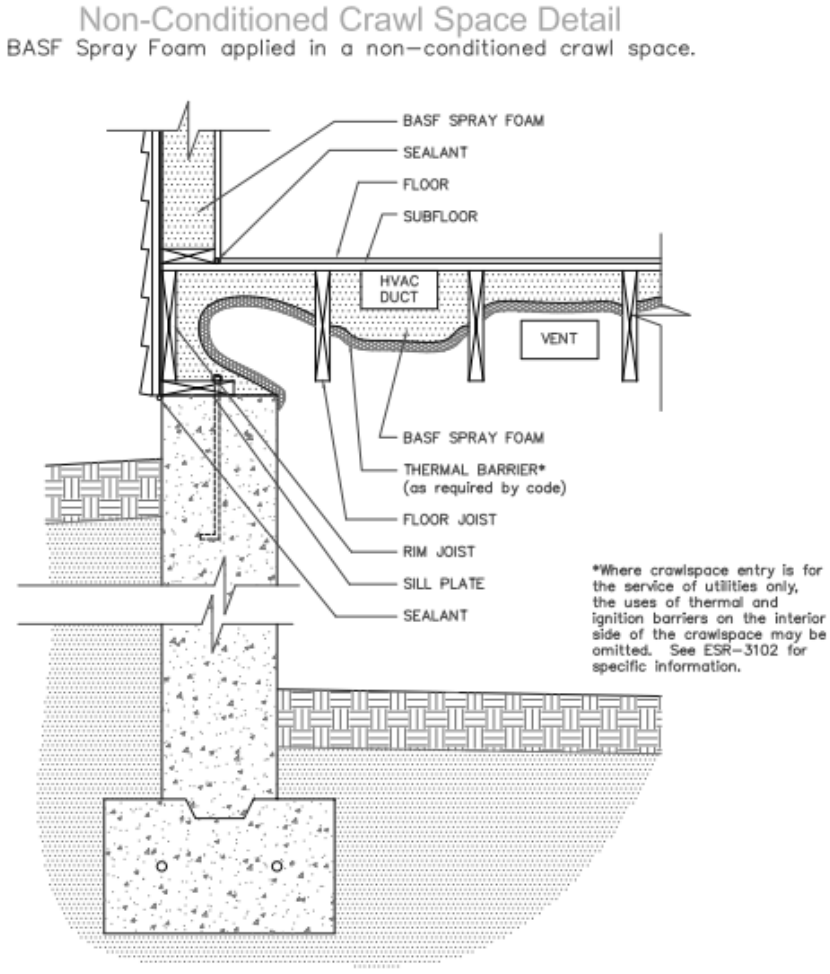

Non-Conditioned Crawl Space Detail
BASF Spray Foam applied in a non–conditioned crawl space.
BASF SPRAY FOAM
SEALANT
FLOOR
SUBFLOOR
HVAC DUCT
VENT
BASF SPRAY FOAM
THERMAL BARRIER* (as required by code)
FLOOR JOIST
RIM JOIST
SILL PLATE
SEALANT
*Where crawlspace entry is for the service of utilities only, the uses of thermal and ignition barriers on the interior side of the crawlspace may be omitted. See ESR–3102 for specific information.

FIGURE 2

Finished Basement Detail

BASF Spray Foam applied in the band/rim joist area and walls of a finished basement

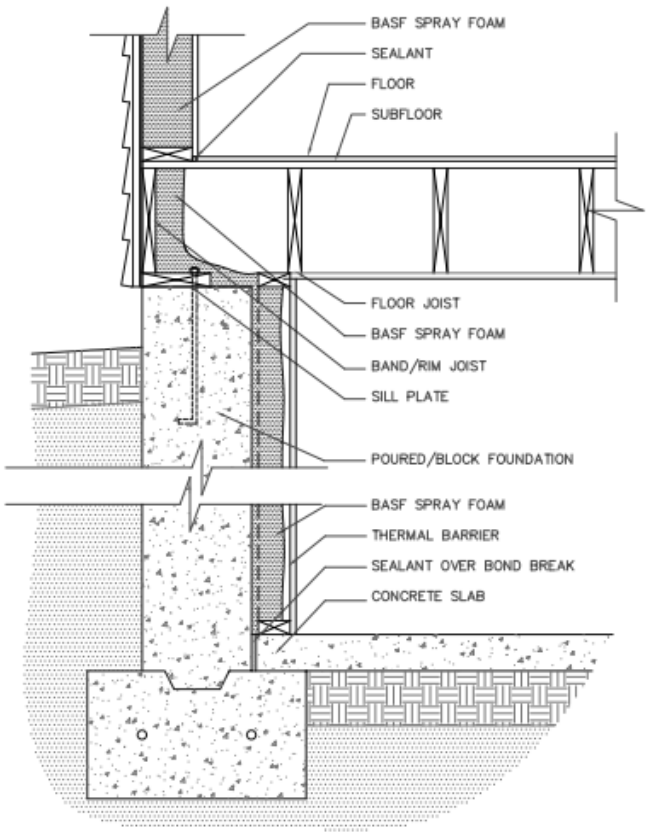
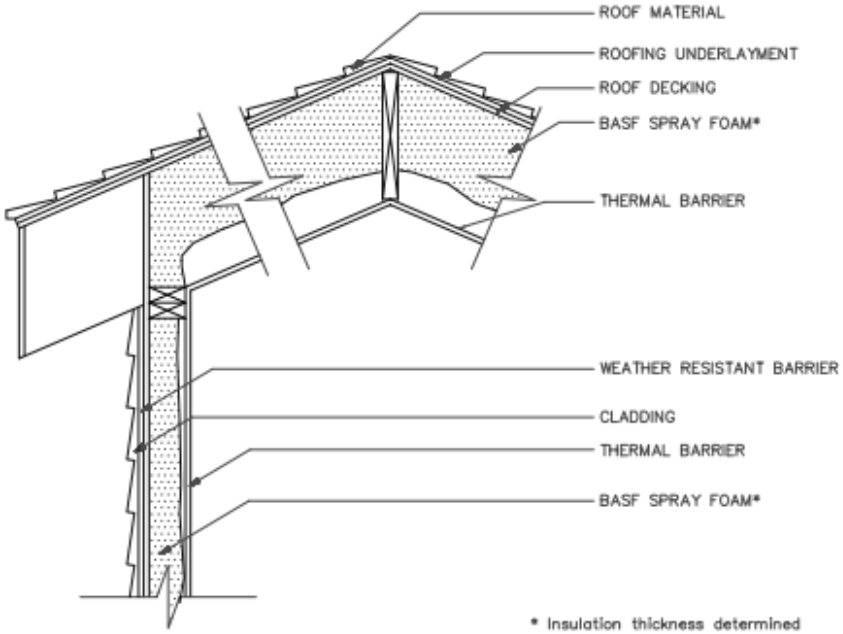


FIGURE 3

Cathedral Ceiling Detail

A cathedral ceiling insulated with BASF Spray Foam.



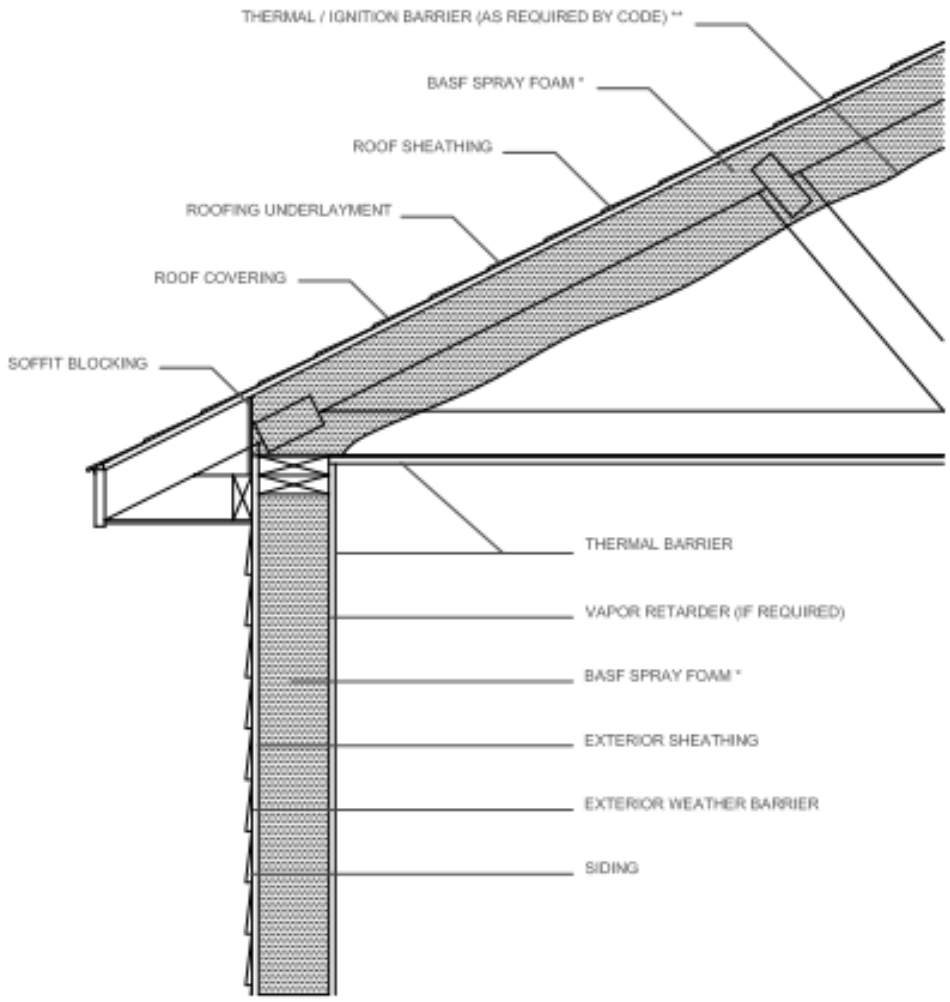
* Insulation thickness determined by IECC requirements and climate zone.

** Unvented roof assemblies shall comply with the requirements found in the IRC section R806.4

FIGURE 4

Unvented Attic Detail

An unvented attic insulated with BASF Spray Foam



*BASF Spray Foam can be used alone, or in combination with other insulation materials. For optimum results, the thickness shall be determine by the insulation requirements of the energy code, and/or the climate zone based upon IRC Section 806.4.

** Consult ESR-3102 for specific information pertaining to alternatives to prescriptive code requirements.

FIGURE 5

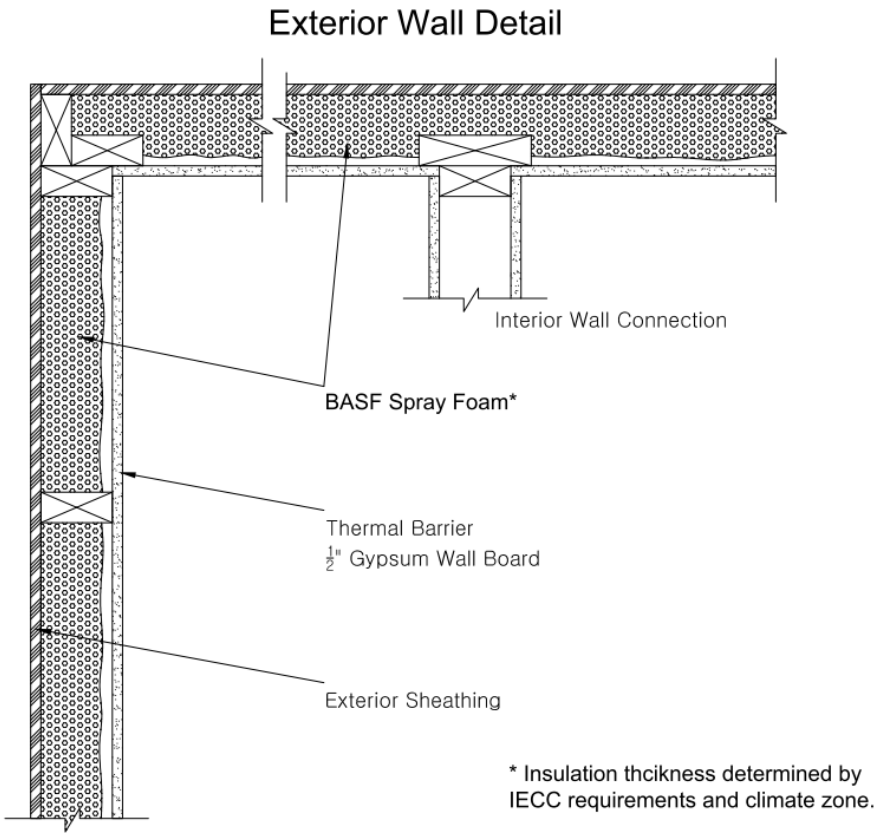


FIGURE 6

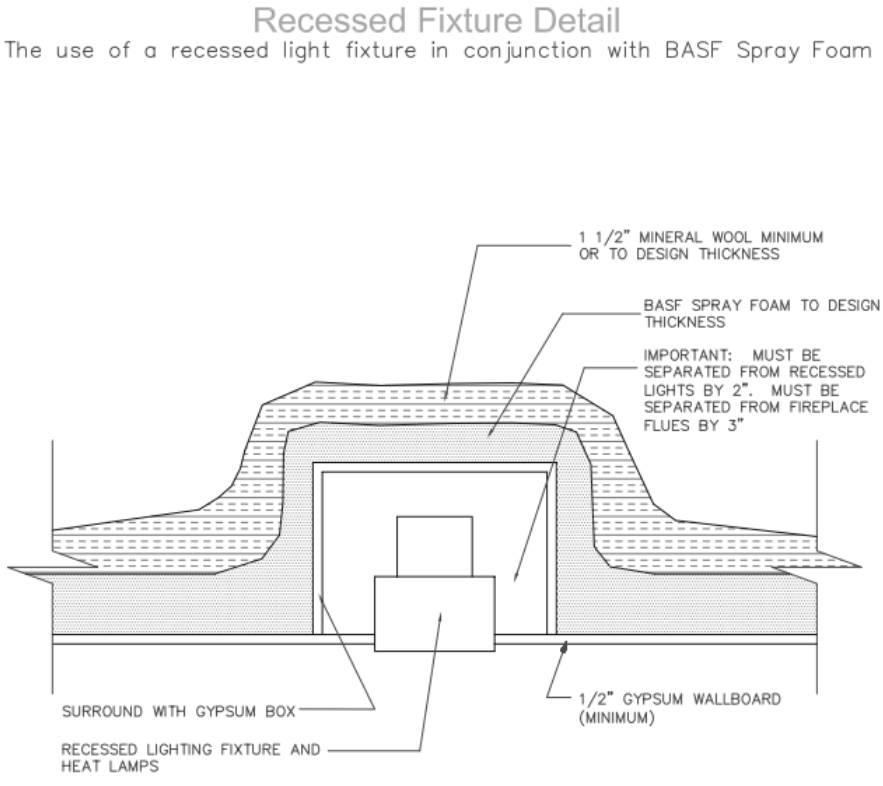


FIGURE 7