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ESR-2642

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Valid: 02/15 to 02/17

DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION

SECTION: 07 21 00—THERMAL INSULATION

SECTION: 07 25 00—WATER-RESISTIVE BARRIERS/WEATHER BARRIERS

REPORT HOLDER:

BASF CORPORATION

**1703 CROSSPOINT AVENUE
HOUSTON, TEXAS 77054**

EVALUATION SUBJECT:

BASF CORPORATION SPRAY-APPLIED INSULATIONS: SPRAYTITE® (158, 178, 81205 AND 81206); COMFORT FOAM® (158 AND 178) AND WALLTITE® (US AND US-N)



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**DIVISION: 07 00 00—THERMAL AND MOISTURE
PROTECTION**
Section: 07 21 00—Thermal Insulation
Section: 07 25 00—Water-Resistive Barriers/Weather Barriers
REPORT HOLDER:
BASF CORPORATION
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EVALUATION SUBJECT:
**BASF CORPORATION SPRAY-APPLIED INSULATIONS:
 SPRAYTITE® (158, 178, 81205 AND 81206); COMFORT
 FOAM® (158 AND 178) AND WALLTITE® (US AND US-N)**
1.0 EVALUATION SCOPE
Compliance with the following codes:

- 2012 and 2009 *International Building Code*® (IBC)
- 2012 and 2009 *International Residential Code*® (IRC)
- 2012 and 2009 *International Energy Conservation Code*® (IECC)
- 2013 *Abu Dhabi International Building Code* (ADIBC)[†]

[†]The ADIBC is based on the 2009 IBC. 2009 IBC code sections referenced in this report are the same sections in the ADIBC.

- Other Codes (see Section 8.0)

Properties evaluated:

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

2.0 USES

SPRAYTITE® (158, 178, 81205 and 81206), COMFORT FOAM® (158 and 178) and WALLTITE® (US and US-N) spray-applied polyurethane foam insulations are used as nonstructural thermal insulating material in Type I, II, III, IV and V construction under the IBC and dwellings under the

IRC. See Section 4.7 for use in Type I, II, III, IV and V construction. The insulation is for use in wall cavities, floor/ceiling assemblies, or attic and crawl spaces as described in Section 4.4. Under the IRC, the insulation may be used as air-impermeable insulation when installed in accordance with Section 3.5. When installed in accordance with Section 4.5, the insulation may be used as an alternative to the water-resistive barriers required in IBC Section 1404.2 and IRC Section R703.2. The insulation may be used in fire-resistance-rated wall assemblies when construction is in accordance with Section 4.6.

3.0 DESCRIPTION
3.1 General:

SPRAYTITE® (158, 178, 81025 and 81206), COMFORT FOAM® (158 and 178) and WALLTITE® (US and US-N) are two-component, closed-cell, rigid foam plastic insulations. The insulations are produced in the field by combining an isocyanate component A with a resin component B, resulting in products having a nominal density of 2.0 pcf. SPRAYTITE®, COMFORT FOAM® and WALLTITE® insulations use an A component designated as ELASTOSPRAY® 8000A. Each insulation uses a different proprietary blend for the B component. The insulation components B have a shelf life of three months and components A have a shelf life of nine months when stored in factory-sealed containers at temperatures between 50°F (10°C) and 80°F (27°C) before installation.

3.2 Surface-burning Characteristics:

The insulations have a flame-spread index of 25 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E84 (UL 723) at a maximum thickness of 4 inches (102 mm).

3.3 Thermal Resistance, R-values:

The insulations have thermal resistance (*R*-values) at a mean temperature of 75°F (24°C) as shown in Table 1.

3.4 Vapor Retarder:

The insulations have a vapor permeance of less than 1 perm [$5.72 \times 10^{-8} \text{ g}/(\text{Pa}\cdot\text{s}\cdot\text{m}^2)$], in accordance with ASTM E96 (Desiccant Method), when applied at the following minimum thicknesses, and qualify as Class II vapor retarders:

SPRAYTITE® (158, 81205)	=	3 inches (76 mm)
SPRAYTITE® (178, 81206)	=	1.5 inches (38 mm)
COMFORT FOAM® (158)	=	3 inches (76 mm)
COMFORT FOAM® (178)	=	1.5 inches (38 mm)
WALLTITE® (US and US-N)	=	1.5 inches (38 mm)

3.5 Air Permeability:

SPRAYTITE® (178 and 81206), COMFORT FOAM® 178 and WALLTITE® (US and US-N) spray-applied polyurethane foam insulations, at a minimum thickness of 1 inch (25.4 mm), are considered air-impermeable insulation in accordance with Section R806.4 of the IRC, based on testing in accordance with ASTM E283.

3.6 ALDOCOAT 800 Intumescent Coating:

ALDOCOAT 800 intumescent coating, manufactured by Aldo Products Company, is a single-component, water-based latex coating supplied in 5-gallon pails and 55-gallon (18.9 and 208 L) drums. The materials have a shelf-life of six months when stored in a factory-sealed container at temperatures of 40°F (4.5°C) and 90°F (32°C).

3.7 NoBurn® Plus Intumescent Coating:

NoBurn® Plus intumescent coating, manufactured by No-Burn, Inc., is a translucent aqueous liquid supplied in 1- and 5-gallon (3.8 and 18.8 L) pails and 55-gallon (208 L) drums. The coating has a shelf life of three years when stored in a factory-sealed container at temperatures between 40°F (4.5°C) and 90°F (32°C).

3.8 SPRAYCOAT™ 1920 Intumescent Coating:

SPRAYCOAT™ 1920 intumescent coating, supplied by BASF Corporation, is a single-component, water-based, liquid-applied, latex intumescent coating. The coating is supplied in 5-gallon (18.8 L) pails and 55-gallon (208-L) drums and has a shelf-life of six months when stored in factory-sealed containers at temperatures between 45°F (7.2°C) and 75°F (23.9°C).

3.9 Flame Seal® TB Intumescent Coating:

Flame Seal TB intumescent coating, manufactured by Specialty Products, Inc., is a two-component, four-to-one-by-volume, liquid-applied, water-based polymeric intumescent coating. The coating is supplied in 6-gallon (19-L) pails and 55-gallon (208-L) drums and has a shelf-life of six months when stored in factory-sealed containers at temperatures between 40°F (4°C) and 90°F (32°C). When applied over SPRAYTITE® (178 and 81206,) COMFORT FOAM® 178 and WALLTITE® (US and US-N) insulations, the assembly has a flame-spread index of 25 or less and a smoke-developed index of 450 or less, when tested in accordance with ASTM E84 (UL 723).

3.10 DC315 Intumescent Coating:

DC315 intumescent coating, 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 two years when stored in factory-sealed containers at temperatures between 41°F (5°C) and 95°F (35°C).

4.0 INSTALLATION

4.1 General:

The insulations must be installed in accordance with the manufacturer's published installation instructions, the applicable code and this report. The manufacturer's published installation instructions must be available on the jobsite at all times during installation.

4.2 Application:

The insulation is spray-applied at the jobsite using a volumetric positive displacement pump as recommended in the manufacturer's published installation instructions. The insulation is applied in passes having a minimum

thickness of 1/2 inch (12.7 mm) and a maximum thickness of 2 inches (51 mm) per pass, up to the total thickness specified in Sections 3.2, 4.3 and 4.4 of this report. The insulation passes must be allowed to fully expand and be cured for a minimum of 15 minutes prior to application of an additional pass. The insulation must not be used in areas that have a maximum service temperature greater than 180°F (82°C). The foam plastic insulation must not be used in electrical outlet or junction boxes or in contact with rain or water (e.g., rain, condensation, ice, snow). The substrate must be free of moisture, frost or ice, loose scales, rust, oil, and grease or other surface contaminants. The insulation must be protected from the weather during and after application.

4.3 Thermal Barrier:

4.3.1 Application with a Prescriptive Thermal Barrier:

The spray-applied insulations must be separated from the interior of the building by an approved thermal barrier of 1/2-inch-thick (12.7 mm) gypsum wallboard or an equivalent 15-minute thermal barrier complying with IBC Section 2603.4 or IRC Section R316.4, as applicable, except where installation is in accordance with Section 4.3.2, or in an attic or crawl space as described in Section 4.4, or when the installation is in sill plates and headers at a total thickness of 3 1/4 inches (83 mm) or less as permitted by IRC Section R316.5.11. There is no thickness limit when installation is behind a code-prescribed thermal barrier, except as noted in Section 4.4.3.

4.3.2 Application without a Prescriptive Thermal Barrier:

The SPRAYTITE® (178 and 81206,) COMFORT FOAM® 178 and WALLTITE® (US and US-N) insulations may be installed without the 15-minute thermal barrier prescribed in IBC Section 2603.4 and IRC Section R316.4, subject to the following conditions:

- Flame Seal TB intumescent coating is applied to all foam surfaces at a minimum application of 25 wet mils (1.6 gallons per 100 ft²).
- The maximum installed thickness is 8 inches (203 mm) on vertical walls and 12 inches (304 mm) on ceilings.

4.4 Attics and Crawl Spaces:

4.4.1 Application with a Prescriptive Ignition Barrier:

When the spray-applied 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 Sections R316.5.3 and R316.5.4, as applicable, except where the installation is in accordance with Section 4.4.2. The ignition barrier must be consistent with the requirements for the type of construction required by the applicable code, and must be installed in a manner so that the foam plastic insulation is not exposed.

4.4.2 Application without a Prescriptive Ignition Barrier:

The SPRAYTITE® (178 and 81206), COMFORT FOAM® 178 and WALLTITE® (US and US-N) insulations may be installed in attics and crawl spaces as described in this section without the ignition barriers described in IBC Section 2603.4.1.6 and IRC Sections R316.5.3 and R316.5.4, subject to the following conditions:

- Entry to the attic or crawl space is to service utilities, and no storage is permitted.
- There are no interconnected attic or crawl space areas.
- Air in the attic or crawl space is not circulated to other parts of the building.

- d. Attic ventilation is provided when required by IBC Section 1203.2 or IRC Section R806, except when air-impermeable insulation is permitted in unvented attics in accordance with 2012 IRC Section R806.5 or 2009 IRC Section R806.4. Under-floor (crawl space) ventilation is provided when required by IBC Section 1203.3 or IRC Section R408.1, as applicable.
- e. Combustion air is provided in accordance with IMC Sections 701.

In attics, the insulation may be spray-applied to the underside of roof sheathing or roof rafters, and/or vertical surfaces provided the assembly conforms to one of the assemblies described in Table 2. In crawl spaces, the insulations may be spray-applied to the underside of floors and/or vertical surfaces provided the assembly conforms to one of the assemblies described in Table 2. When an intumescent coating is used, surfaces to be coated must be dry, clean, and free of dirt, loose debris and any other substances that could interfere with adhesion of the coating. The intumescent coating must be applied to all surfaces in accordance with the respective coating manufacturer's installation instructions. The coating must be applied when ambient and substrate temperatures are above of 50°F (10°C). The insulations may be installed in unvented attics as described in this section in accordance with 2012 IRC Section R806.5 or 2009 IRC Section R806.4.

4.4.3 Use on Attic Floors: The SPRAYTITE® (178 and 81206), COMFORT FOAM® 178, and WALLTITE® (US and US-N) insulations may be installed in accordance with this section and Table 2 at a maximum thickness of 9¹/₄ inches (235 mm) between and over the joists in attic floor. The insulation must be separated from the interior of the building by an approved thermal barrier. The ignition barrier required in IBC Section 2603.4.1.6 and IRC Section R316.5.3 may be omitted.

4.5 Water-resistive Barrier:

The SPRAYTITE® (178 and 81206), COMFORT FOAM® 178, and WALLTITE® (US and US-N) insulations may be used as the water-resistive barrier prescribed in IBC Section 1404.2 and IRC Section R703.2, when installed on exterior walls as described in this section. The insulations must be spray-applied to the exterior side of the sheathing, masonry or other suitable exterior wall substrates to form a continuous layer of 1 inch (25.4 mm) minimum thickness. All construction joints and penetrations must be sealed with SPRAYTITE® (178 and 81206), COMFORT FOAM® 178, or WALLTITE® (US and US-N) insulation.

4.6 Two-hour Fire-resistance-rated Wall Assemblies (Load-bearing):

SPRAYTITE® 158, SPRAYTITE® 81205 or COMFORT FOAM® 158 may be installed on interior load-bearing two-hour fire-resistance-rated walls, provided the system is installed in accordance with the following:

4.6.1 Wood Framing: Two rows on separate plates, 3 inches (76 mm) apart, of minimum 2-by-4 wood studs (No. 2 Douglas fir) spaced a maximum of 16 inches (406 mm) on center.

4.6.2 Wall Finish: Base layer of ⁵/₈-inch-thick (15.9 mm), Type X gypsum wallboard is applied horizontally and fastened to each outer side of a double row of studs with 6d by 1⁷/₈-inch-long (48 mm) coated nails, spaced 2 feet (610 mm) on center. Face layer of ⁵/₈-inch-thick (15.9 mm), Type X gypsum board is applied horizontally and fastened to each outer side of studs over the base layer with 8d by

2³/₈-inch-long (60 mm) coated nails, spaced 8 inches (203 mm) on centers. Gypsum wallboard joints must be staggered 24 inches (610 mm) between layers and on opposite sides of the wall.

4.6.3 Insulation: SPRAYTITE® 158, SPRAYTITE® 81205 or COMFORT FOAM® 158 is applied in the stud cavities of both rows at a thickness of 3 inches (76 mm).

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

SPRAYTITE 81206 and WALLTITE (US and US-N) may be installed in or on exterior walls of buildings of Type I, II, III and IV construction complying with IBC Section 2603.5 and as described in this section. The maximum thickness of the foam plastic is 3 inches (76 mm) when installed on the exterior of the sheathing or 3⁵/₈ inches (92.1 mm) when installed in stud cavities. The potential heat of SPRAYTITE® 81206 and WALLTITE® (US and US-N) spray-applied insulations is 1961 Btu/ft² (22.3 MJ/m²) per inch of thickness. The wall assembly must be as described in Table 3 or 4.

5.0 CONDITIONS OF USE

The BASF Corporation spray-applied insulations described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1 The spray-applied insulations and the intumescent coatings must be installed in accordance with the manufacturer's published installation instructions, this evaluation report and the applicable code. The instructions within this report govern if there are any conflicts between the manufacturer's published installation instructions and this report.
- 5.2 The spray-applied insulations must be separated from the interior of the building by an approved 15-minute thermal barrier, as described in Section 4.3, except where installation is in accordance with Section 4.3.2 or where installation is in an attic or crawl space as described in Section 4.4.
- 5.3 The spray-applied insulations must not exceed the thicknesses noted in Section 3.2, 4.3, 4.4, 4.5, 4.6 or 4.7, as applicable.
- 5.4 The spray-applied insulations must be protected from the weather during application.
- 5.5 The spray-applied insulations 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.
- 5.6 Installation in fire-resistance-rated construction must be as described in Section 4.6.
- 5.7 Use of the insulation in areas where the probability of termite infestation is "very high" must be in accordance with IBC Section 2603.8 or IRC Section R318.4, as applicable.
- 5.8 Jobsite certification and labeling of the insulation must comply with IRC Sections N1101.4 and N1101.4.1 and IECC Sections 303.1.1 and 303.1.2.
- 5.9 When used in or on exterior walls of buildings of Type I, II, III and IV construction, the wall assembly must conform to those described in Section 4.7.
- 5.10 The polyurethane foam plastic insulation components are produced 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), dated November 2012 (editorially corrected April 2013), including reports of tests in accordance with Appendix X of AC377.
- 6.2 Data in accordance with ASTM E119.
- 6.3 Reports of water vapor transmission tests in accordance with ASTM E96.
- 6.4 Reports of air leakage testing in accordance with ASTM E283.
- 6.5 Reports of fire propagation characteristics tests in accordance with NFPA 285.
- 6.6 Reports of potential heat of foam plastics tests in accordance with NFPA 259.
- 6.7 Reports of room corner tests in accordance with NFPA 286 and UL 1715.
- 6.8 Data in accordance with ICC-ES Acceptance Criteria for Foam Plastic Sheathing Panels Used as Water-resistant Barriers (AC71), dated February 2003 (editorially revised November 2013).

7.0 IDENTIFICATION

Each container of components A and B of the polyurethane foam plastic insulation bears a label with the BASF Corporation, name and address, the product name, the product type (A or B component), density, the flame-spread and smoke-developed indices, the evaluation report number (ESR-2642), the shelf life and the date of manufacture.

Intumescent coatings are identified with the manufacturer's name, the product trade name and use instructions.

8.0 OTHER CODES

8.1 Evaluation Scope:

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

- 2006 *International Building Code*[®] (2006 IBC)
- 2006 *International Residential Code*[®] (2006 IRC)
- 2006 *International Energy Conservation Code*[®] (2006 IECC)
- 2003 *International Building Code*[®] (2003 IBC)
- 2003 *International Residential Code*[®] (2003 IRC)
- 2003 *International Energy Conservation Code*[®] (2003 IECC)

8.2 Uses:

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

- **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 IMC.
- **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)

SPRAYTITE® (158, 81205); COMFORT FOAM® 158	
THICKNESS (INCHES)	R-VALUE (°F.ft².h/Btu) ¹
1	6.6
2	13
3	20
3.5	24
4	27
5	34
6	41
7	48
8	54
10	68
11	75
12	82
SPRAYTITE® (178, 81206); COMFORT FOAM® 178 and WALLTITE® (US and US-N)	
1	6.7
2	13
3	20
3.5	24
4	28
5	34
6	41
7	48
8	55
10	69
11	76
12	83

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

¹R-values are calculated based on tested K values at 1-and 4-inch thicknesses.

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

TABLE 2—USE OF INSULATION IN ATTICS AND CRAWL SPACES WITHOUT A PRESCRIPTIVE IGNITION BARRIER

INSULATION TYPE	MAXIMUM THICKNESS (in) (Wall Cavities & Attic Floors)	MAXIMUM THICKNESS (in) (Underside of Roof Sheathing/Rafters & Floors)	INTUMESCENT COATING MINIMUM THICKNESS & TYPE (Applied to all Foam Surfaces)	MINIMUM APPLICATION RATE OF THE INTUMESCENT COATING	TESTS SUBMITTED (AC377)
WALLTITE® US-N WALLTITE® US COMFORT FOAM® 178 SPRAYTITE® 178 and 81206	9¼	11¼	No coating required	NA	Appendix X
WALLTITE® US-N WALLTITE® US COMFORT FOAM® 178 SPRAYTITE® 178 and 81206	9¼	11¼	18 wet mils ALDOCOAT 800	1.12 gal / 100 ft²	Appendix X
WALLTITE® US-N WALLTITE® US COMFORT FOAM® 178 SPRAYTITE® 178 and 81206	9¼	11¼	12 wet mils of NoBurn Plus	0.75 gal / 100 ft²	Appendix X
WALLTITE® US-N WALLTITE® US COMFORT FOAM® 178 SPRAYTITE® 178 and 81206	11¼	11¼	14 wet mils of SPRAYCOAT™ 1920	0.88 gal / 100 ft²	Appendix X
WALLTITE® US-N WALLTITE® US COMFORT FOAM® 178 SPRAYTITE® 178 and 81206	8	12	25 wet mils of Flame Seal TB	1.60 gal / 100 ft²	UL1715
WALLTITE® US-N WALLTITE® US COMFORT FOAM® 178 SPRAYTITE® 178 and 81206	8	12	20 wet mils of DC315	1.25 gal / 100 ft²	Appendix X

For SI: 1 inch = 25.4 mm; 1 mil = 0.0254 mm; 1 gallon = 3.38 L; 1 ft² = 0.93 m²; NA = not applicable.

TABLE 3—NFPA 285 COMPLYING WALLS—SPF ON EXTERIOR

WALL COMPONENTS	MATERIALS
Base wall system— Use either 1, 2 or 3	1—Concrete wall 2—Concrete masonry wall 3—1 layer of 5/8-inch-thick Type X gypsum wallboard on interior, installed over minimum 3 5/8-inch-depth, minimum No. 20-gage steel studs at a maximum of 24 inches on center with lateral bracing every 4 feet vertically
Floorline firestopping	4 pcf mineral-fiber insulation friction-fit in each wall stud cavity at each floor line.
Cavity insulation— Use either 1, 2, or 3	1—None 2—Fiberglass batt insulation (faced or unfaced) 3—Mineral-fiber insulation (faced or unfaced)
Exterior sheathing— Use either 1, or 2	1—None 2—Minimum 1/2-inch-thick Type X exterior gypsum sheathing
Exterior Insulation	Maximum 3-inch thickness of SPRAYTITE 81206 or WALLTITE (US & US-N)
Exterior wall covering—Use either 1, 2, 3 or 4	1—Brick —Standard type brick veneer anchors installed maximum 24 inches on center, vertically on each stud —Maximum 2-inch air gap between exterior insulation and brick —Standard nominal 4-inch-thick, clay brick 2—Stucco – Minimum 3/4 -inch-thick, exterior cement plaster and lath. A secondary water-resistive barrier can be installed between the exterior insulation and the lath. The secondary water-resistive barrier shall not be full-coverage asphalt or butyl-based self-adhered membranes. 3—Minimum 2-inch-thick Limestone, natural stone or minimum 1 1/2-inch-thick cast artificial stone. Any standard non-open-jointed installation technique such as ship-lap, etc. can be used. 4—Terracotta cladding – Use any terracotta cladding system in which the terracotta is minimum 1 1/4 inch. Any standard non-open-jointed installation technique such as ship-lap, etc. can be used.

For **SI**: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pcf = 16.01 kg/m³.

TABLE 4—NFPA 285 COMPLYING WALLS—SPF IN WALL CAVITY

WALL COMPONENTS	MATERIALS
Base wall system— Use either 1, 2 or 3	1—Concrete wall 2—Concrete masonry wall 3—1 layer of 5/8-inch-thick Type X gypsum wallboard on interior, installed over minimum 3 5/8-inch-depth minimum No. 20-gage steel stud at a maximum of 24 inches on center with lateral bracing every 4 feet vertically
Floorline firestopping	4 pcf mineral fiber insulation friction-fit in each wall stud cavity at each floor line.
Cavity Insulation— Use either 1, 2, 3 or combination of 1 and 2 or combination of 1 and 3	1—Maximum 3 5/8 inch thickness of SPRAYTITE 81206 or WALLTITE (US & US-N) applied using exterior gypsum sheathing as the substrate and covering the width of the cavity and the inside the steel stud framing flange. 2—Fiberglass batt insulation (faced or unfaced) on the exterior side of the foam plastic 3—Mineral wool insulation (faced or unfaced) on the exterior side of the foam plastic
Exterior sheathing	5/8-inch-thick Type X exterior gypsum sheathing
Exterior wall covering	Any noncombustible exterior wall covering material. Details of the exterior wall covering must be provided by the report holder, designer or specifier to the code official, with a fire engineering analysis demonstrating that the addition of the wall covering will not negatively affect conformance of the assembly with the requirements of IBC Section 2603.5.

For **SI**: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pcf = 16.01 kg/m³.

ICC-ES Evaluation Report**ESR-2642 Seal & Insulate with
ENERGY STAR® Supplement**

Issued February 2015

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DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION
Section: 07 21 00—Thermal Insulation**REPORT HOLDER:****BASF CORPORATION**
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www.spf.basf.com**EVALUATION SUBJECT:****BASF CORPORATION SPRAY-APPLIED INSULATIONS: SPRAYTITE® (158, 178, 81205 AND 81206); COMFORT FOAM® (158 AND 178); AND WALLTITE® (US AND US-N)****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 SPRAYTITE®, COMFORT FOAM® and WALLTITE® spray-applied foam plastic insulation products described in Sections 2.0 through 7.0 of the master report (ESR-2642) have been reviewed for compliance with the applicable codes noted in Section 1.0 of the master report and for 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 master 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].

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 SPRAYTITE[®], COMFORT FOAM[®] and WALLTITE[®] spray-applied foam plastic insulations have thermal resistance R-values as noted in Table 1 of ESR-2642, based upon testing.

3.5 Installation

3.5.1 General: The installation of the SPRAYTITE[®], COMFORT FOAM[®] and WALLTITE[®] 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-2642. The insulation is manufactured on-site by spray polyurethane foam applicators meeting the qualification requirements stated in Section 5.5 of ESR-2642. 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 SPRAYTITE[®], COMFORT FOAM[®] and WALLTITE[®] 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 master report reissued February 2015.



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.

Conditioned Crawl Space Detail

BASF Spray Foam application to the inside of a conditioned crawl space.

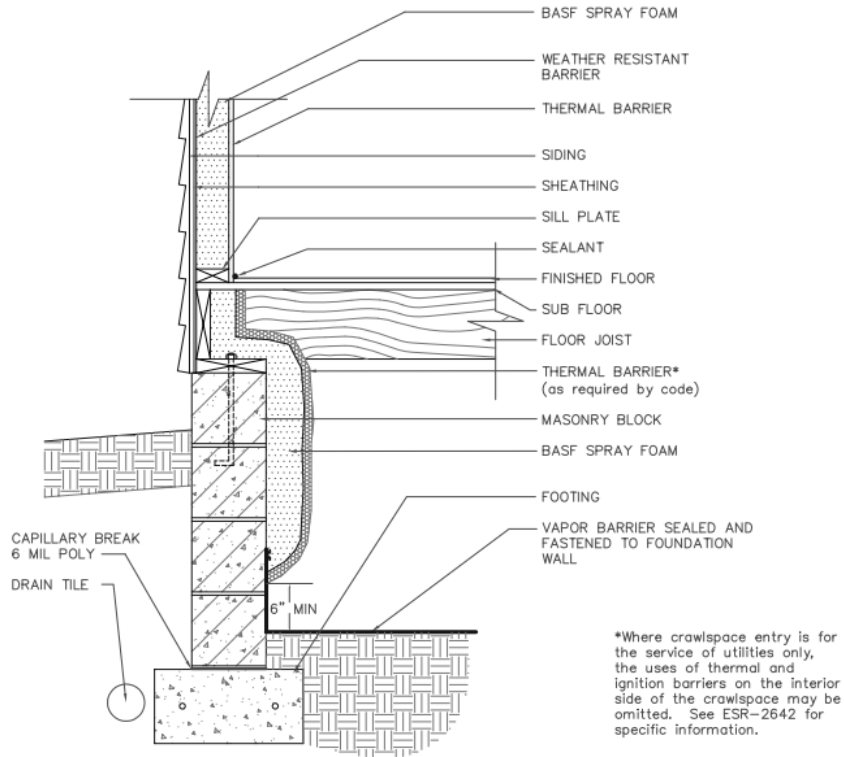


FIGURE 1

Non-Conditioned Crawl Space Detail

BASF Spray Foam applied in a non-conditioned crawl space.

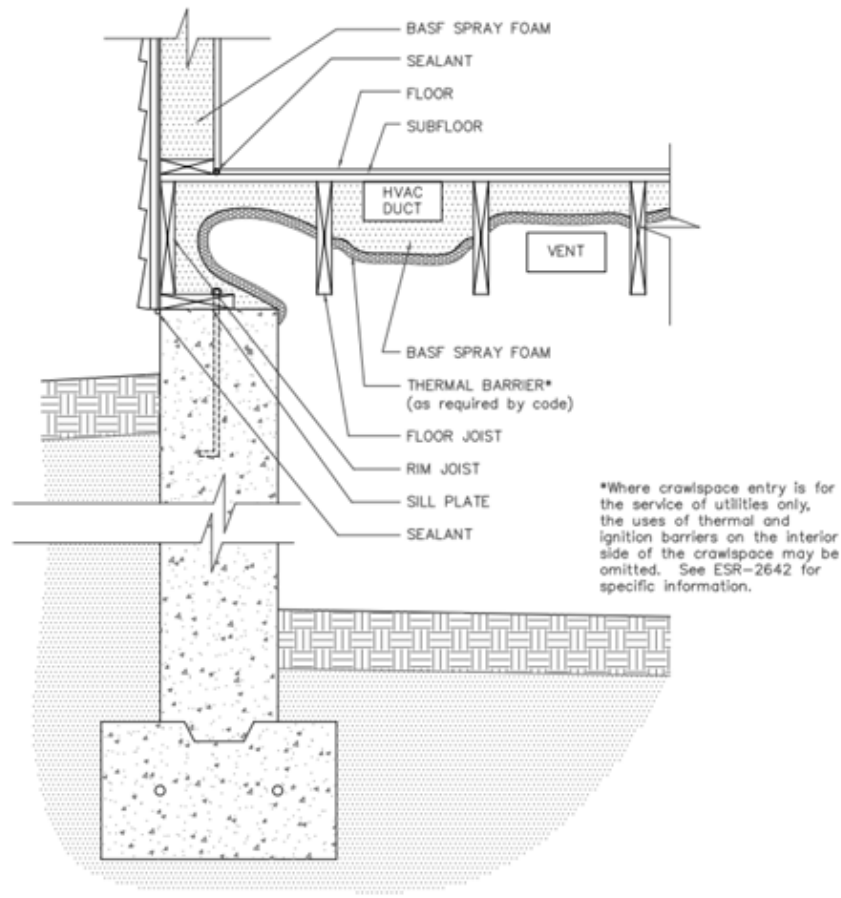


FIGURE 2

Finished Basement Detail

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

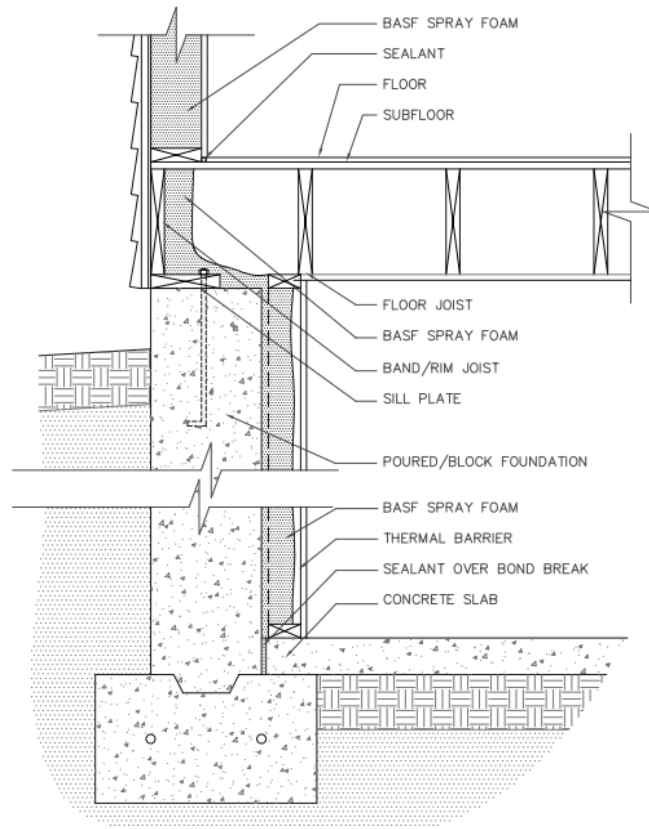
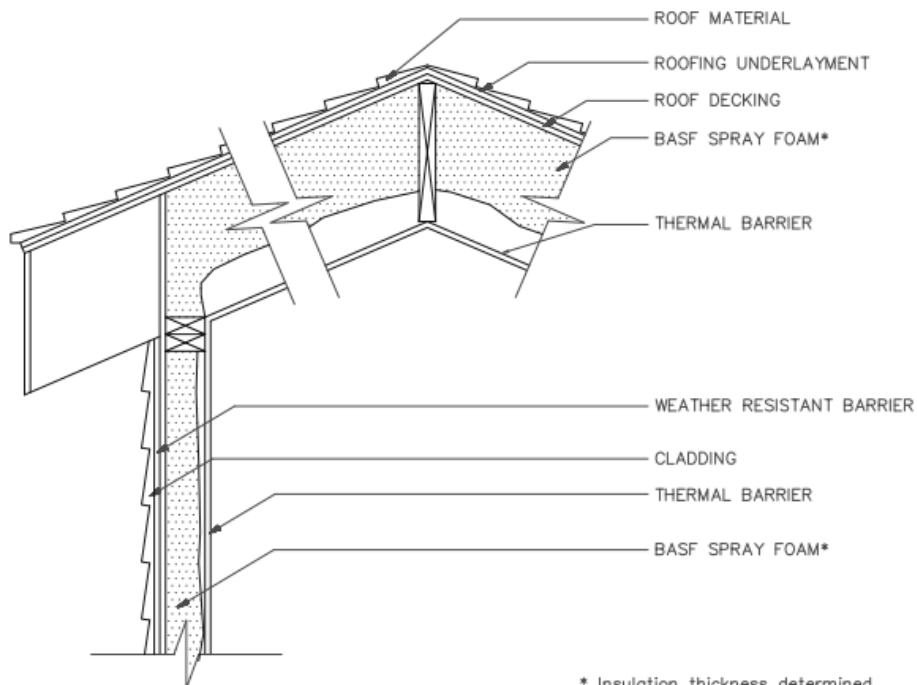


FIGURE 3

Cathedral Ceiling Detail

A cathedral ceiling insulated with BASF Spray Foam.



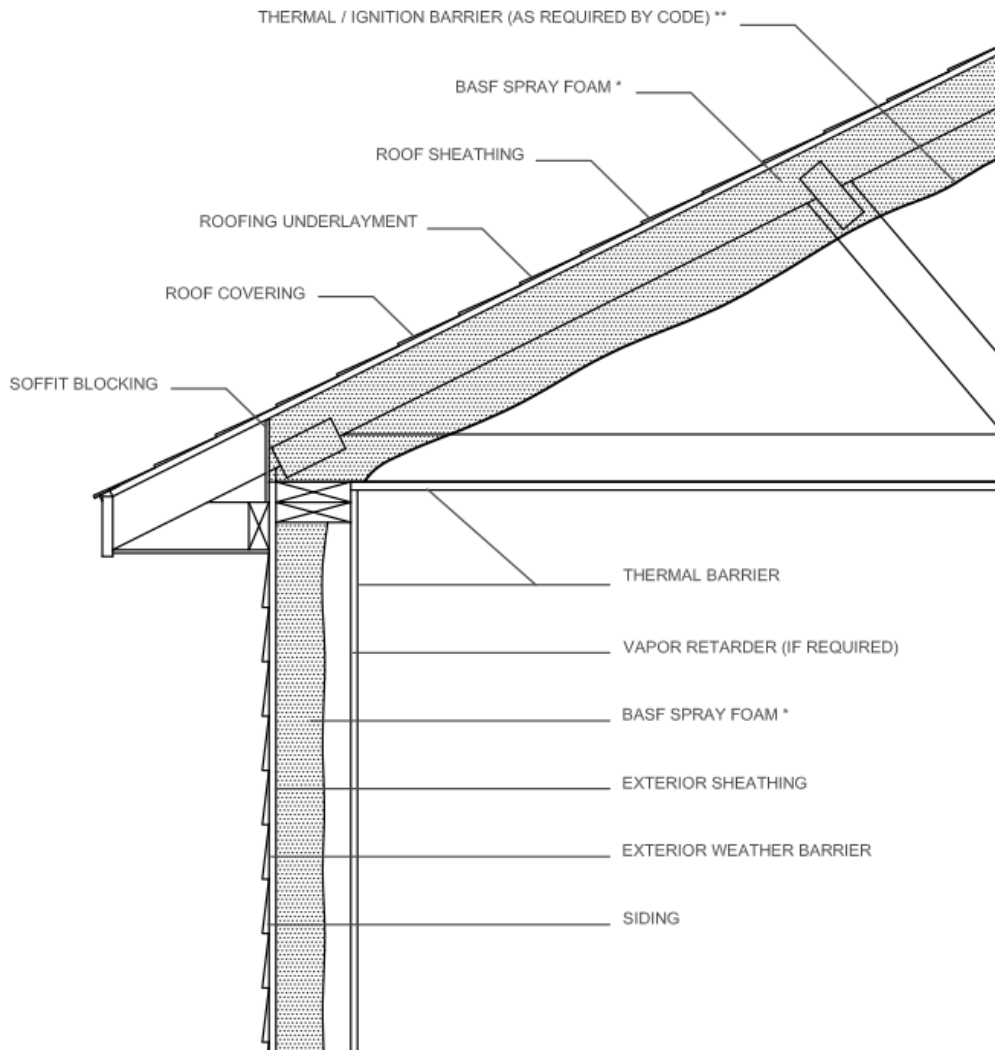
* Insulation thickness determined by IECC requirements and climate zone.

** 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-2642 for specific information pertaining to alternatives to prescriptive code requirements.

FIGURE 5

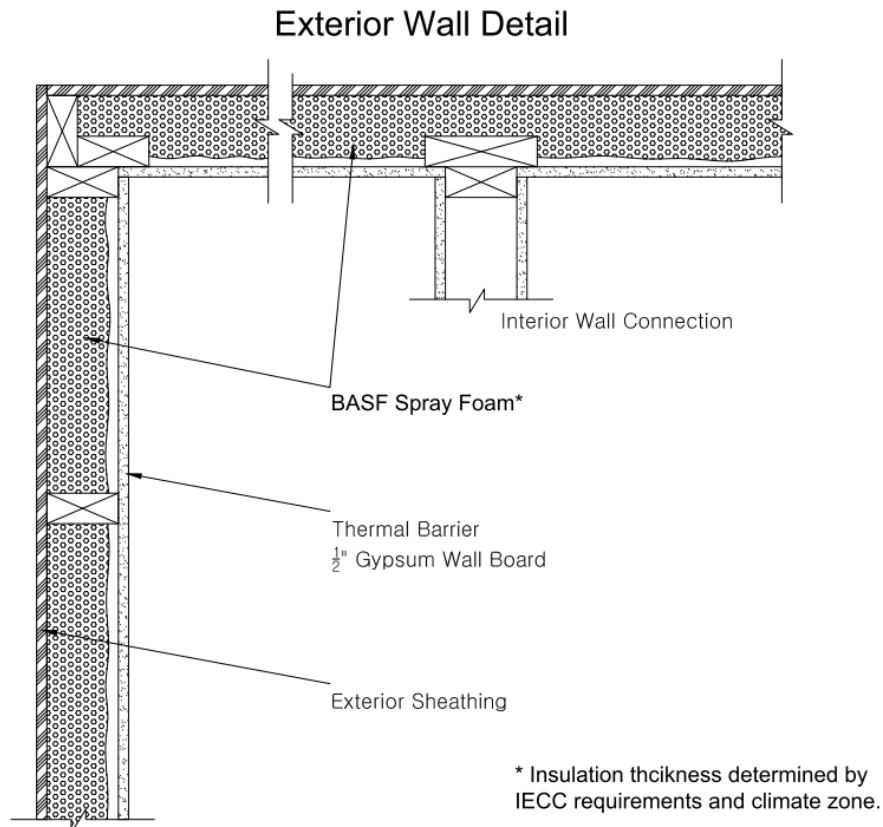


FIGURE 6

Recessed Fixture Detail

The use of a recessed light fixture in conjunction with BASF Spray Foam

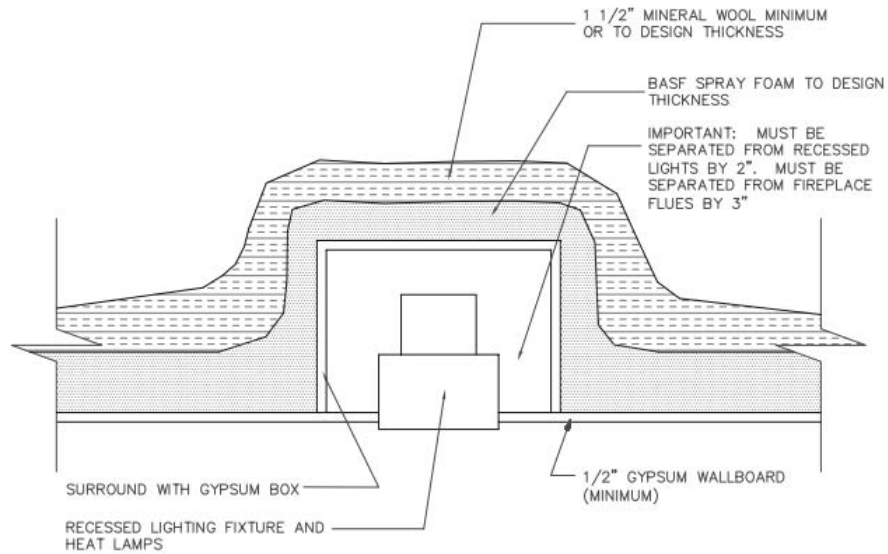


FIGURE 7