ICC-ES Evaluation Report

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

REPORT HOLDER:

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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:

- 2009 *International Building Code*® (IBC)
- 2009 *International Residential Code*® (IRC)
- 2009 *International Energy Conservation Code*® (IECC)
- 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
- 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 4.6 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. The insulation may be used in fire-resistance-rated wall assemblies when construction is in accordance with Section 4.5.

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 (32 kg/m^3). 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 E 84 at a maximum thickness of 4 inches (102 mm).

Thicknesses of up to 8 inches (203 mm) for wall cavities and 12 inches (305 mm) for ceiling cavities are recognized, based on testing in accordance with NFPA 286, when covered with a minimum $^1/_2$-inch-thick (12.7 mm) gypsum board or an equivalent thermal barrier complying with, and installed in accordance with, the applicable code.

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 [5.7 x 10^{-11} kg /(m^{2}sPa)], in accordance with ASTM E 96, 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 (38.1 mm)
COMFORT FOAM® (158)	=	3 inches (76 mm)
COMFORT FOAM® (178)	=	1.5 inches (38.1 mm)
WALLTITE® (US and US-N)	=	1.5 inches (38.1 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 E 283.

***Revised August 2011**

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 E 84.

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 0.5-inch (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 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 3.25 inches (83 mm) or less as permitted by IRC Section R316.5.11. Thicknesses of up to 8 inches (203 mm) for wall cavities and 12 inches (305 mm) for ceiling cavities are recognized, based on testing in accordance with NFPA 286.

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:

a. Flame Seal TB intumescent coating is applied to all foam surfaces at a minimum application of 25 wet mils (1.6 gallons per 100 ft^2).

b. 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. 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:

a. Entry to the attic or crawl space is to service 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. 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 Section R806.4 of IRC. 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 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 $9^1/_4$ 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 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:

4.5.1 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.

4.5.2 Wall Finish: Base layer of $^5/_8$-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 $1^7/_8$-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 $2^3/_8$-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.

4.5.3 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).

4.6 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 $3\text{-}^5/_8$ 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/ft^2 (22.3 MJ/m^2) 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 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 or 4.6, as applicable.

5.4 The spray-applied insulations must be protected from the weather during and after 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 4.5.

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 4.6.

5.10 The polyurethane foam plastic insulation components are produced in Houston, Texas, Minneapolis, Minnesota under a quality control program with inspections by Underwriters Laboratories Inc. (AA-668).

6.0 EVIDENCE SUBMITTED

6.1 Data in accordance with the ICC-ES Acceptance Criteria for Spray-applied Foam Plastic Insulation (AC377), dated June 2011, including reports of tests in accordance with Appendix X of AC377.

6.2 Data in accordance with ASTM E 119.

6.3 Reports of water vapor transmission tests in accordance with ASTM E 96.

6.4 Reports of air leakage testing in accordance with ASTM E 283.

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.

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. The containers also bear the name of the inspection agency (Underwriters Laboratories Inc.).

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 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)

SPRAYTITE® (158, 81205); COMFORT FOAM® 158	
THICKNESS (INCHES)	***R*-VALUE (˚F.ft^2.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.ft^2.h/Btu = 0.176 110 ˚K.m^2/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 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	$9^1/_4$	$11\text{-}^1/_4$	No coating required	NA	Appendix X
WALLTITE® US-N WALLTITE® US COMFORT FOAM® 178 SPRAYTITE® 178 and 81206	$9^1/_4$	$11\text{-}^1/_4$	18 wet mils ALDOCOAT 800	1.12 gal / 100 ft^2	Appendix X
WALLTITE® US-N WALLTITE® US COMFORT FOAM® 178 SPRAYTITE® 178 and 81206	$9^1/_4$	$11\text{-}^1/_4$	12 wet mils of NoBurn Plus	0.75 gal / 100 ft^2	Appendix X
WALLTITE® US-N WALLTITE® US COMFORT FOAM® 178 SPRAYTITE® 178 and 81206	$11^1/_4$	$11\text{-}^1/_4$	14 wet mils of SPRAYCOAT™ 1920	0.88 gal / 100 ft^2	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 ft^2	UL1715
WALLTITE® US-N WALLTITE® US COMFORT FOAM® 178 SPRAYTITE® 178 and 81206	8	12	20 wet mils of DC315	1.25 gal / 100 ft^2	Appendix X

For **SI:** 1 inch = 25.4 mm; 1 mil = 0.0254 mm; 1 gallon = 3.38 L; 1 ft^2 = 0.93 m^2; 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 wool (e.g. Thermafiber) 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 wool insulation (faced or unfaced)
Exterior sheathing— Use either 1, or 2	1—None 2—Minimum $^1/_2$-inch Type X thick exterior type 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/m^3.

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-inch on center with lateral bracing every 4 feet vertically
Floorline firestopping	4 pcf mineral wool (e.g. Thermafiber) 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 or 1 and 3	1—Maximum $3^5/_8$ inch thickness of SPRAYTITE 81206 or WALLTITE (US & US-N) applied using exterior gysum 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 type 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/m^3.