ICC-ES Evaluation Report

ESR-2072

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DIVISION: 07—THERMAL AND MOISTURE PROTECTION
Section: 07210—Building Insulation

REPORT HOLDER:

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EVALUATION SUBJECT:

BAYSEAL™ CC AND BAYSEAL™ PP SPRAY-APPLIED POLYURETHANE FOAM INSULATIONS

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2006 *International Building Code*® (IBC)
- 2006 *International Residential Code*® (IRC)
- 2006 *International Energy Conservation Code*® (IECC)
- Other Codes (see Section 8)

Properties evaluated:

- Surface-burning characteristics
- Physical properties
- Thermal resistance
- Attic and crawl space installation
- Air permeability
- Vapor permeance

2.0 USES

Bayseal™ CC and Bayseal™ PP spray foam insulations are used as thermal insulating materials in Type V-B construction under the IBC and dwellings under the IRC. The insulations are for use in wall cavities, floor assemblies or ceiling assemblies, or attics and crawl spaces when installed in accordance with Section 4.0.

3.0 DESCRIPTION

3.1 Bayseal™ CC and Bayseal™ PP Foam Plastic Insulation:

Bayseal™ CC and Bayseal™ PP spray foam insulations are medium-density polyurethane foam plastics intended to be installed as a component of floor/ceiling and wall assemblies. The materials are two-component, closed cell, one-to-one-by-volume spray foam with a nominal in-place density of 1.9 pcf (30 kg/m^3). The insulation is produced in the field by combining a polymeric isocyanate (A component) with a polymeric resin blend (B component). The insulation liquid components are supplied in nominally 55-gallon (208 L) drums and must be stored at temperatures between 65°F (18°C) and 85°F (29°C).

3.2 Surface-burning Characteristics:

The insulation at a maximum thickness of 4 inches (102 mm) and a nominal density of 1.9 pcf (30 kg/m^3) 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. Greater thicknesses are recognized as described in Sections 4.3 and 4.4.

3.3 Thermal Resistance (*R*-values):

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

3.4 Vapor Retarder:

The foam plastic has a vapor permeance of less than 1 perm (5.7×10^{-11} kg/Pa-s-m^2) when applied at a minimum thickness of 1 inch (25.4 mm) and qualifies as a vapor retarder.

3.5 Air Permeability:

Bayseal™ CC and Bayseal™ PP spray foam insulations are air-impermeable in accordance with Section R806.4 of the IRC based on testing in accordance with ASTM E 283.

3.6 Bayseal™ IC Intumescent Coating:

Bayseal™ IC intumescent coating is a one-component, water-based polymer coating. Bayseal™ IC intumescent 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 a factory-sealed container at temperatures of 50°F (10°C) or above.

3.7 Flame Seal® TB Intumescent Coating:

Flame Seal® TB, manufactured by Flame Seal Products Inc., is a two-component, four-to-one-by-volume, liquid-applied, water-based polymer intumescent coating. The coating is supplied in 5-gallon (19 L) pails and 55-gallon (208 L) drums and has a shelf life of six months when stored in a factory-sealed container at temperatures between 40°F and 90°F (4°C and 32°C).

4.0 INSTALLATION

4.1 General:

Bayseal™ CC and Bayseal™ PP spray foam insulations must be installed in accordance with the manufacturer's published installation instructions and this report. A copy of

the manufacturer's published installation instructions must be available at all times on the jobsite during installation.

4.2 Application:

The insulation is spray-applied on the jobsite using a volumetric positive displacement pump as identified in the Bayer MaterialScience application instructions. The insulation is used only in areas where maximum service temperature is equal to or less than 180°F (82°C). The foam plastic must not be used in electrical outlet or junction boxes or in contact with water. The foam plastic must not be sprayed onto a substrate that is wet, or covered with frost or ice, loose scales, rust, oil, or grease.

The insulation may be applied at a maximum thickness of 3 inches (76 mm) per pass up to the maximum total thickness as specified in Sections 3.2, 4.3 and 4.4. Additional passes may be applied after ten minutes or more of curing time**.**

4.3 Thermal Barrier:

4.3.1 Application with a Prescriptive Thermal Barrier: Bayseal™ CC and Bayseal™ PP spray foam insulation 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, and installed in accordance with, IBC Section 2603.4 or IRC Section R314.4, as applicable. Thicknesses of up to 8 inches (203 mm) for wall cavities and 12 inches (305 mm) for ceiling cavities are recognized, based on room corner fire testing in accordance with NFPA 286.

4.3.2 Application without a Prescriptive Thermal Barrier: The prescribed 15-minute thermal barrier may be omitted when installation is in accordance with this section. The Bayseal™ closed cell insulation and Flame Seal® TB system may be used in lieu of the prescribed 15-minute thermal barrier. The foam plastic insulation thickness must not exceed 6 inches (152 mm) in walls and ceilings, and the insulation must be covered with 18 dry mils (0.46 mm) of Flame Seal® TB intumescent coating applied at a minimum rate of 1.6 gallons (6 L) per 100 square feet (9.3 m^2). The substrate must be dry, clean and free of dirt and loose debris or other substances that could interfere with the adhesion of the coating. Flame Seal® TB may be applied by airless sprayer at ambient temperatures between 50°F and 115°F (10°C and 46°C) and relative humidity of less than 70 percent.

4.4 Attics and Crawl Spaces:

4.4.1 Application with a Prescriptive Ignition Barrier: When Bayseal™ CC and/or Bayseal™ PP insulation is 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 R314.5.3 and R314.5.4, 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 the foam plastic insulation is not exposed. The insulation as described in this section may be installed in unvented attics in accordance with IRC Section R806.4.

4.4.2 Application without a Prescriptive Ignition Barrier:

4.4.2.1 General: Where Bayseal™ CC and/or Bayseal™ PP insulation is installed without a prescriptive ignition barrier as described in Section 4.4.2.2 or 4.4.2.3, in attics and crawl spaces, the following conditions apply:

- Entry to the attic or crawl space is only to service utilities and heat-producing appliances are not 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.
- Under-floor (crawl space) ventilation is provided in accordance with IBC Section 1203.3 or IRC Section R408.1, as applicable.
- Ventilation of the attic or crawl space is provided in accordance with applicable codes, except when air-impermeable insulation is permitted in unvented attics in accordance with Section R806.4 of the IRC.
- Combustion air must be provided in accordance with Section 701.4.2 of the 2006 *International Mechanical Code*® (IMC).

4.4.2.2 Use with Bayseal™ IC intumescent Coating: Bayseal™ CC or Bayseal™ PP insulation may be spray-applied to the underside of roof sheathing and/or rafters, and the underside of wood floors and/or floor joists in crawl spaces as described in this section. The thickness of the foam plastic applied to the underside of the wood floor or roof sheathing must not exceed 7 inches (178 mm). The thickness of the spray foam insulation applied to vertical wall surfaces in attics and crawl spaces must not exceed 3.5 inches (89 mm). All foam plastic surfaces must be covered with 10 dry mils (0.25 mm) of Bayseal™ IC intumescent coating applied at a rate of 1.15 gallons (4.35 L) per 100 square feet (9.3 m^2). Bayseal™ IC intumescent coating may be applied by brush, roller or airless sprayer at ambient temperatures between 50 F and 115 F (10 C and 46 C) and relative humidity of less than 75 percent. 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. Bayseal™ CC and Bayseal™ PP insulation, as described in this section, may be installed in unvented attics in accordance with IRC Section R806.4.

4.4.2.3 Use with Flame Seal® TB intumescent Coating: Bayseal™ CC or Bayseal™ PP insulation may be spray-applied to the underside of roof sheathing and/or rafters, and the underside of wood floors and/or floor joists in crawl spaces as described in this section. The foam plastic insulation thickness must not exceed 4 inches (102 mm) in walls and 7 inches (178 mm) in ceilings, and must be covered with 7 dry mils (0.18 mm) of Flame Seal® TB intumescent coating applied at a rate of 0.64 gallon (2.4 L) per 100 square feet (9.3 m^2). The substrate must be dry, clean and free of dirt and loose debris or other substances that could interfere with the adhesion of the coating. Flame Seal® TB may be applied by airless sprayer at ambient temperatures between 50°F and 115°F (10°C and 46°C) and relative humidity of less than 70 percent.

4.4.3 Attic Floors:

4.4.3.1 Use on Attic Floors with Bayseal™ IC Intumescent Coating: Bayseal™ CC and Bayseal™ PP insulation may be installed at a maximum thickness of 7 inches (178 mm) between and over the joists in attic floors. All foam plastic surfaces must be covered with 10 dry mils (0.25 mm) of Bayseal™ IC intumescent coating applied at a rate of 1.15 gallons (4.35 L) per 100 square feet (9.3 m^2). Bayseal™ IC intumescent coating may be applied by brush, roller or airless sprayer at ambient temperatures between 50°F and 115°F (10°C and 46°C) and relative humidity of less than 75 percent. 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 insulation must be separated from the interior of the building (beneath the attic) by an approved thermal barrier. The ignition barrier in accordance with IBC Section 2603.4 and IRC Section R314.5.3 may be omitted.

4.4.3.2 Use on Attic Floors with Flame Seal® TB Intumescent Coating: Bayseal™ CC and Bayseal™ PP insulation may be installed at a maximum thickness of 7 inches (178 mm) between and over the joists in attic floors. All foam plastic surfaces must be covered with Flame Seal® TB applied at a rate of 0.64 gallon (2.4 L) per 100 feet square (9.3 m^2) for a wet film thickness of 10 mils (0.25 mm). The substrate must be dry, clean, and free of dirt and loose debris or other substances that could interfere with the adhesion of the coating. Flame Seal® TB may be applied by airless sprayer at ambient temperatures between 50°F and 115°F (10°C and 46°C) and relative humidity of less than 70 percent. The insulation must be separated from the interior of the building (beneath the attic) by an approved thermal barrier. The ignition barrier in accordance with IBC Section 2603.4 and IRC Section R314.5.3 may be omitted.

5.0 CONDITIONS OF USE

The Bayseal™ CC and Bayseal™ PP spray-applied foam plastic 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 products 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 manufacturers' published installation instructions and this report.

5.2 The insulation must be separated from the interior of the building by an approved 15-minute thermal barrier, except when installation is as described in Sections 4.3.2 and 4.4.

5.3 The insulation must not exceed the thicknesses noted in Sections 3.2, 4.3 and 4.4 of this report.

5.4 The insulation must be protected from prolonged exposure to weather during and after application.

5.5 The insulation must be applied by contractors approved by Bayer MaterialScience, LLC.

5.6 Use of the insulation in areas where the probability of termite infestation is "very heavy" must be in accordance with IRC Section R320.5 or IBC Section 2603.8, as applicable.

5.7 The insulation has been evaluated only for use in Type V-B construction under the IBC and nonfire-resistance-rated assemblies in dwellings under the IRC.

5.8 Jobsite certification and labeling of the insulation must comply with IRC Sections N1101.4 and N1101.4.1 and IECC Sections 102.1.1 and 102.1.11, as applicable.

5.9 Bayseal™ CC and Bayseal™ PP spray-applied foam insulations are produced by Bayer MaterialScience, LLC, in Phoenix, Arizona, and Spring, Texas, 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 May 2008.

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

6.3 Reports of crawl-space fire tests along with engineering fire risk evaluation.

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

7.0 IDENTIFICATION

Components for Bayseal™ CC and Bayseal™ PP spray-applied foam plastic insulations are identified with the manufacturer's name (Bayer MaterialScience, LLC), address and telephone number; the product name (Bayseal™ CC or Bayseal™ PP); use instructions; the density; the flame-spread and smoke-development indices; the evaluation report number (ESR-2072); and the name of the inspection agency (Underwriters Laboratories Inc.)

Each pail of Bayseal™ IC intumescent coating is labeled with the manufacturer's name (Bayer MaterialScience, LLC) and address; the product name (Bayseal™ IC); and use instructions.

Each pail of Flame Seal® TB intumescent coating is labeled with the manufacturer's name (Flame Seal Products Inc.) and address; the product name (Flame Seal® TB); and use instructions.

8.0 OTHER CODES

8.1 Evaluation Scope:

The products recognized in this report have also been evaluated in accordance with the following codes:

- BOCA® *National Building Code*/1999 (BNBC)
- 1999 *Standard Building Code*© (SBC)
- 1997 *Uniform Building Code*™ (UBC)

8.2 Uses:

See Section 2.0.

8.3 Description:

See Section 3.0.

8.4 Installation:

8.4.1 General: See Section 4.1.

8.4.2 Application: See Section 4.2.

8.4.3 Thermal Barrier: See Section 4.3.1.

8.4.4 Application without a Prescriptive Ignition Barrier: See Section 4.4.2, except that combustion air must be provided in accordance with Section 703 of the SBC, Sections 701 and 703.1 of the UBC, and Chapter 10 of the BNBC, as applicable.

8.5 Conditions of Use:

The insulation described in this report complies with, or is a suitable alternative to what is specified in, those codes listed in Section 8.1 of this report, subject to the conditions noted in Sections 5.1 through 5.9, except revise Section 5.6 to read as follows:

In jurisdictions adopting the SBC, use of the insulation system in areas where the probability of termite infestation is "very heavy" must be in accordance with SBC Section 2304.1.4.

8.6 Evidence Submitted:

See Section 6.0.

8.7 Identification:

See Section 7.0.

TABLE 1—THERMAL RESISTANCE (*R*-VALUES)

THICKNESS (inches)	*R*-VALUE (°F.ft^2.h/Btu)
ASTM C 518 TESTED VALUES	
1	6.9
3.5	22
CALCULATED *R*-VALUES[1]	
2	14
3	21
4	28
5	34
5.5	38
6	41
7	48
7.5	52
8	55
9	62
10	69
11	76
12	83

For **SI:** 1 inch = 25.5 mm; 1°F.ft^2.h/Btu = 0.176 110°K.m^2/W.

[1]Calculated *R*-values are based on tested K values at a 3.5-inch thickness.