

ICC-ES Evaluation Report

ESR-2072

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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:**BAYSEAL™ CC AND BAYSEAL™ CC POLAR SPRAY-APPLIED POLYURETHANE FOAM INSULATIONS****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)

Properties evaluated:

- Surface-burning characteristics
- Physical properties
- Thermal resistance
- Attic and crawl space installation
- Air permeability
- Vapor permeance
- Exterior walls in Types I through IV construction

2.0 USES

Bayseal™ CC and Bayseal™ CC Polar spray foam insulations are used as thermal insulating materials in Type I, II, III, IV and V construction under the IBC and dwellings under the IRC. See Section 4.5 for use in Type I, II, III and IV construction. 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. Use of the insulations in fire-resistance-rated construction is outside the scope of this report.

3.0 DESCRIPTION**3.1 Bayseal™ CC and Bayseal™ CC Polar Foam Plastic Insulation:**

Bayseal™ CC and Bayseal™ CC Polar 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 insulations with a nominal in-place density of 1.9 pcf (30 kg/m³). 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 have a shelf life of six months, 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/m³) 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 (5.7x10⁻¹¹ kg/Pa-s-m²) 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™ CC Polar spray foam insulations are air-impermeable in accordance with Section R806.4 of the IRC, at a minimum thickness of 0.75-inches (19.1 mm), 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™ CC Polar 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 maximum service temperature must not exceed that specified in the manufacturer's published installation instructions. 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™ CC Polar 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 R316.4, 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 with Flame Seal® TB Intumescent Coating:

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 m²). 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.

4.3.3 Use as Interior Finish: The Bayseal™ closed cell insulation and Flame Seal® TB intumescent coating system, as described in Section 4.3.2, may be used as an interior finish in all construction types.

4.4 Attics and Crawl Spaces:

4.4.1 Application with a Prescriptive Ignition Barrier:

When Bayseal™ CC and/or Bayseal™ CC Polar 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 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 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™ CC Polar insulation is installed without a prescriptive ignition barrier as described in Section 4.4.2.2 or 4.4.3, in attics and crawl spaces, the following conditions apply:

- Entry to the attic or crawl space is only 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.
- Under-floor (crawl space) ventilation is provided when required by IBC Section 1203.3 or IRC Section R408.1, as applicable.
- 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 the IRC.
- Combustion air must be provided in accordance with Section 701 of the 2009 *International Mechanical Code*® (IMC).

4.4.2.2 Use with Bayseal™ IC Intumescent Coating:

Bayseal™ CC or Bayseal™ CC Polar 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 12 inches (305 mm). The thickness of the spray foam insulation applied to vertical wall surfaces in attics and crawl spaces must not exceed 8 inches (203 mm). All foam plastic surfaces must be covered with 4 dry mils (0.1 mm) of Bayseal™ IC intumescent coating, applied at a rate of 0.5 gallon (1.9 L) per 100 square feet (9.3 m²). 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™ CC Polar insulation, as described in this section, may be installed in unvented attics in accordance with IRC Section R806.4.

4.4.3 Attic Floors:

Use on Attic Floors with Bayseal™ IC Intumescent Coating:

Bayseal™ CC and Bayseal™ CC Polar insulation may be installed at a maximum thickness of 8 inches (203 mm) between and over the joists in attic floors. All foam plastic surfaces must be covered with 4 dry mils (0.1 mm) of Bayseal™ IC intumescent coating uniformly applied at a rate of 0.5 gallons (1.9 L) per 100 square feet (9.3 m²). 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 R316.5.3 may be omitted.

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

When used on walls of Type I, II, III and IV construction, the assembly in which the Bayseal™ CC or Bayseal™ CC Polar spray-applied polyurethane insulation is used must comply with Section 2603.5 of the IBC and must be installed at a maximum thickness of 3.25 inches (82.6 mm) in accordance with the manufacturer's published installation instructions and this report. The potential heat of the foam plastic in any portion of the walls or panels must not exceed the potential heat, expressed in Btu/ft² (MJ/m²), of the foam plastic insulation contained in the wall assembly tested in accordance with NFPA 285. The potential heat of the Bayseal™ CC or Bayseal™ CC Polar spray-applied polyurethane insulation is 1838 Btu/ft² (20.9 MJ/m²) per inch of thickness.

5.0 CONDITIONS OF USE

The Bayseal™ CC and Bayseal™ CC Polar 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 certified by Bayer MaterialScience, LLC.
- 5.6 When use is on buildings of Types I, II, III and IV construction, documentation must be submitted to the code official verifying that the insulation has been qualified as a component of an assembly tested in accordance with IBC Sections 2603.5.1, 2603.5.5 and 2603.5.7. The maximum potential heat of the foam plastic used in the assembly must be no greater than that noted in Section 4.5.
- 5.7 Use of the insulation in areas where the probability of termite infestation is "very heavy" must be in accordance with IRC Section R318.4 or IBC Section 2603.8, 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, as applicable.
- 5.9 Use of the insulations in fire-resistance-rated construction is outside the scope of this report.
- 5.10 Bayseal™ CC and Bayseal™ CC Polar 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 June 2010, including reports of tests in accordance with Appendix X.
- 6.2 Reports of room corner tests in accordance with NFPA 286 and UL 1715.
- 6.3 Reports of potential heat of foam plastics tests in accordance with NFPA 259.
- 6.4 Reports of air leakage tests in accordance with ASTM E 283.

7.0 IDENTIFICATION

Components for Bayseal™ CC and Bayseal™ CC Polar 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™ CC Polar); mixing 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

In addition to the codes referenced in Section 1.0, the products described 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)

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 attics must be vented in accordance with Section 1203.2 of the 2006 and 2003 IBC or Section R806 of the 2003 IRC, and crawl space ventilation must be in accordance with IBC Section 1203.3 of the 2006 and 2003 IBC or IRC Section R408, as applicable. Additionally, an ignition barrier must be installed in accordance with Sections R314.5.3 or R314.5.4 of the 2006 IRC or Section R314.2.3 of the 2003 IRC, as applicable.

- **Application without a Prescriptive Ignition Barrier:** See Section 4.3.2, except attics must be vented in accordance with Section 1203.2 of the 2006 and 2003 IBC or Section R806 of the 2003 IRC, and crawl space ventilation must be in accordance with IBC Section 1203.3 of the 2006 and 2003 IBC or IRC Section R408, as applicable.
- **Protection against Termites:** See Section 5.7, except use of the insulation in areas where the probability of termite infestation is “very heavy” must be in

accordance with Section R320.5 of the 2006 IRC or Section R320.4 of the 2003 IRC.

- **Jobsite Certification and Labeling:** See Section 5.9, except jobsite certification and labeling must comply with Sections 102.1.1 and 102.1.1.1, as applicable, of the 2006 IECC.

TABLE 1—THERMAL RESISTANCE (R-VALUES)¹

THICKNESS (inches)	R-VALUE (°F.ft ² .h/Btu)
1	6.9
2	14
3	21
3.5	24
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.ft².h/Btu = 0.176 110°K.m²/W.

¹R-values are calculated based on tested K values at 1 and 3.5-inch thicknesses.