



Bayseal™ Wall Insulation for Residential Building Envelope Insulation Specification

PART 1 - GENERAL

1.1 DESCRIPTION

This document discusses the application of seamless sprayed in place polyurethane foam for use as a building envelope insulation system.

- A. BaySystems Bayseal for Residential Buildings is a spray-applied polyurethane foam designed to provide thermal and moisture insulation for residential buildings.
- B. The contractor will furnish all labor, materials, tools and equipment necessary for the application of Bayseal insulation products, including accessory items, subject to the general provisions of the contract.

1.2 QUALITY ASSURANCE

- A. Contractor Qualifications: The contractor should provide information concerning projects similar in nature to the one proposed, including location and person to be contacted.
- B. Qualifications of applicator: Applicator of fluid-applied spray polyurethane foam shall have a Qualified Applicator certificate issued by the SPFA or BaySystems that has been issued within the last two years.

1.3 SUBMITTALS

- A. BaySystems to provide published datasheets or letter of certification that their products comply with the materials specified. This is to include primers (if required), spray polyurethane foam, thermal barriers or ignition barriers, and detailed drawings.
- B. Approvals and credentials which show material and application compliance with local or national building codes.
- C. Safety and handling instructions for storage, handling, and application of Bayseal.



1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Materials shall be delivered in tightly sealed containers or unopened package, all clearly labeled with the Bayer Material Science name, product identification, safety information, manufacture date, and lot numbers where appropriate.
- B. Containers shall be stored at 65° to 85°F in a dry and well-ventilated area out of the weather and direct sunlight.
- C. All materials shall be stored in compliance with local safety requirements.

1.5 JOB CONDITIONS

- A. Spray polyurethane foam should be spray-applied to substrates when ambient air and surface temperatures fall within a range of 50°F to 120°F (30°F to 80°F for Bayseal PP™), and relative humidity is less than 85%.
- B. The substrates to which the insulation is applied must be clean, dry, and free of frost, ice, loose debris, or contaminants that will interfere with adhesion of the spray foam insulation. The insulation must not be applied in electrical boxes.

1.6 SAFETY REQUIREMENTS

- A. API Bulletin AX-119, "MDI-Based Polyurethane Foam Systems: Guidelines for Safe Handling and Disposal."
- B. Proper disposal of waste materials and containers must be done in compliance with federal, state and local regulatory agencies.
- C. For protection against exposure to higher levels of MDI (greater than 1ppm) or for entry into confined spaces, workers must wear either a self-contained breathing apparatus, with full face piece, operated in a pressure-demand or other positive-pressure mode, or a combination respirator, including a Type C air-supplied respirator, with full face piece, operated in a pressure-demand or other positive-pressure mode, or an auxiliary self-contained breathing apparatus, operated in a pressure-demand or other positive-pressure mode.



- D. Personal protective clothing should be worn according to OSHA standards.

PART 2 - PRODUCTS

2.1 POLYURETHANE FOAM

Bayseal™ CC **Closed Cell** Polyurethane Foam

- A. Bayseal CC is a spray-applied cellular polyurethane foam plastic insulation that is installed in stud wall assemblies, ceilings, floors, crawlspaces and vented/unvented attics. The foam plastic insulation is a two-component, closed-cell, one-to-one by volume spray foam system with a nominal density of 1.9 pcf.

BAYSEAL™ CC PHYSICAL PROPERTIES

Properties	Test Method	Value
Core Density	ASTM D-1622	1.9 – 2.2 lbs/ft ³
Compressive Strength	ASTM D-1621	15-20 psi
R-Value (aged)	ASTM C-518	6.9 at 1 inch 24 at 3.5 inches 37.8 at 5.5 inches 54.3 at 7.9 inches
Closed Cell Content	ASTM D-2856	≥ 92%
Flammability* (FSI)	ASTM E-84	≤ 25
Tensile Strength	ASTM D-1623	55 – 65 psi
Sound Transmission Coefficient	ASTM E90-85/E413	43 (STC)
Noise Reduction Coefficient:	ASTM C-43	0.2 (NRC)
Moisture Vapor Transmission (permeance):	ASTM E-96	0.80 Perms at 1" 0.23 Perms at 3.5" 0.16 Perms at 5" 0.10 Perms at 7.9"
Dimensional Stability	ASTM D-2126	(7 days at 158°F, 95% RH)
	% Change in Volume:	6%
Air Leakage Rate:	ASTM E-283	0.00 ± 0.001 (L/s)/m ²
Fungi Resistance:	ASTM G-21	Zero Rating





Bayseal™ OC **Open Cell** Polyurethane Foam

B. Bayseal™ OC is a spray-applied cellular polyurethane foam plastic insulation that is installed in stud wall assemblies, ceilings, floors, crawlspaces, and vented/unvented attics. The foam plastic insulation is a two-component, closed-cell, one-to-one by volume spray foam system with a nominal density of 0.5 pcf.

BAYSEAL™ OC PHYSICAL PROPERTIES

Properties	Test Method	Value
Apparent Density	ASTM D-1622	0.5 pcf
R-Value (aged)	ASTM C-518	3.9 at 1 inch 13 at 3.5 inches 19 at 5.5 inches
Oxygen Index	ASTM D-2863	25
Compressive Strength	ASTM D-1621	0.88 pcf
Fungus Resistance	ASTM G-21	Zero Rating
Air Leakage:	ASTM E-283	0.00 ± .01 (L/s)/m ²
Sound Transmission Coefficient:	ASTM E-90	51 (STC)
Noise Reduction Coefficient:	ASTM C-423	0.7 (NRC)
Open Cell Content	ASTM D-2846	>92%
Tensile Strength	ASTM D-1623	3.2 psi
Shear Strength	ASTM C-273	1.4 psi
Permeability:	ASTM E-96	20.587 perm-in

2.2 RELATED PRODUCTS

A. 15-Minute Rated Thermal Barriers.

1. Sprayed-in-place cementitious.
2. Sprayed-in-place fiber.
3. Minimum 1/2-inch gypsum board.
4. Flame Seal thermal barrier equivalent.

B. IGNITION BARRIER

Bayseal IC intumescent coating for attic and crawlspace applications, manufactured by Bayer MaterialScience.

C. VAPOR RETARDER.

A vapor retarder may be required in accordance with IRC Section R318 and IECC Sections 402.5 and 502.5.

PART 3 - EXECUTION

3.1 SUBSTRATE PREPARATION

The substrates to which the insulation is applied must be clean, dry, and free of frost, ice, loose debris, or contaminants that will interfere with adhesion of the spray foam insulation. The insulation must not be applied in electrical boxes.

A. WOOD

1. Plywood shall contain no more than 18% water, as measured in accordance with ASTM D-4449 and 4444-84.
2. Most untreated and unpainted wood surfaces need not be primed. The spray polyurethane foam can be applied directly to the dry wood. Priming may be required in certain instances. Contact a BaySystems representative for specific details.

B. STEEL

1. Primed: If the primed metal surface is free of loose scale, rust, weathered or chalking paint. It can be cleaned using vacuum equipment and hand or power tools to remove loose dirt. Grease, oil, or other contaminants shall be removed with proper cleaning solutions.
2. Previously Painted: Clean the painted metal surface using hand or power tools to remove loose scale and dirt. Grease, oil, and other surface contaminants shall be removed using a power wash technique.
3. Galvanized: When required, clean galvanized steel as recommended by BaySystems. Steel should be primed with Bayblock™ Prime RI at the rate of 1 gallon per 300 square feet.
4. Unpainted Steel: Clean as recommended by BaySystems in order to prepare the steel surface for the primer. Steel should be primed with Bayblock™ Prime RI at the rate of 1 gallon per 300 square feet.

C. CONCRETE AND MASONRY. Must be cured, and loose dirt and any other contaminants, such as asphaltic materials, removed. If a primer is required, prime with Bayblock Prime SG, at the rate of one gallon per 200 square feet.

D. SHEATHING BOARD. Most sheathing boards need not be primed prior to the application of sprayed-in-place polyurethane foam.

3.2 PRIMER APPLICATION

When required, the primer shall be applied to the properly prepared substrate in accordance with the BaySystems guidelines to achieve a minimum thickness of dry mils. Many primers require a curing time of 24 hours prior to application of



spray polyurethane foam or other products. Refer to the appropriate BaySystems primer datasheet for application procedures.

3.3 SPRAY POLYURETHANE FOAM APPLICATION

- A. The spray polyurethane foam components (A) and (B) shall be processed in accordance with instructions found on the appropriate BaySystems product datasheet.

- B. Applicators must recognize and anticipate climatic conditions prior to application to ensure highest quality foam and to maximize yield. Ambient air and substrate temperatures, moisture, and wind velocity are all critical determinants of foam quality. Variations in ambient air and substrate temperature will influence the chemical reaction of the two components, directly affecting the expansion rate, amount of rise, yield, adhesion, and the resultant physical properties of the foam insulation. To obtain optimum results, Bayseal foam should be spray-applied to substrates when ambient air and surface temperatures fall within a range of 50°F to 120°F. All substrates to be sprayed must be dry at the time of application. Moisture in the form of rain, fog, frost, dew, or high humidity (>85% R.H.) will react chemically with the mixed components, adversely affecting the polyurethane foam formation, dimensional stability and physical properties of the finished product. Wind velocities in excess of 12 miles per hour may result in excessive loss of exotherm and interfere with the mixing efficiency of the spray gun affecting foam surface texture, cure, physical properties and will cause overspray. Precautions must be taken to prevent damage to adjacent areas from fugitive overspray.

- C. **Bayseal Spray Foam Application with a Prescriptive Ignition Barrier.** When Bayseal spray foam systems 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 and IRC Section 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 that the foam plastic insulation is not exposed. Bayseal spray foam insulation, as described in these sections, may be installed in unvented attics in accordance with IRC Section R806.4.

- D. **Application with Intumescent Coating.** In **attics**, Bayseal insulation may be spray-applied to the underside of roof sheathing and roof rafters. In **crawlspaces**, Bayseal spray foam insulation may be spray-applied to the underside of floors as described in this section. The thickness of Bayseal OC open-cell foam applied to the underside of the top space must not exceed 10 inches (254 mm). The thickness of Bayseal CC closed-cell foam must not exceed 7 inches (178 mm).



When applied to **vertical** surfaces, the thickness of Bayseal OC open-cell foam must not exceed 6 inches (152 mm) and the thickness of Bayseal CC closed-cell foam must not exceed 3.5 inches (89 mm). The foam plastic must be covered with a minimum nominal 10 mils (0.25 mm) dry mil thickness of Bayseal™ IC intumescent coating. The Bayseal IC intumescent coating must be applied over the Bayseal foam insulation in accordance with the manufacturer's instructions. Surfaces to be coated must be dry, clean, and free of dirt, loose debris, and any other substances that could interfere with the adhesion of the coating. The Bayseal IC coating is applied with a medium size nap roller, soft brush, or conventional airless spray equipment at a rate of 1 gallon (3.8 liters) per 100 square feet (9.2 m²) until the required minimum thickness of 10 mils (0.25 mm) dry film thickness is reached. The coating must be applied when ambient and substrate temperatures are above 50°F (10°C) and requires a 24-hour curing time after application. Bayseal foam insulation, as described in this section, may be installed in unvented conditioned attics in accordance with IRC Section R806.4.

- E. **Application with Minimum ½” Gypsum Board.** In **attics**, Bayseal insulation may be spray-applied to the underside of roof sheathing and roof rafters. In crawlspaces, Bayseal spray foam insulation may be spray-applied to the underside of floors as described in this section. The thickness of Bayseal OC open-cell foam applied to the underside of the top space must not exceed 16 inches (406 mm) and the thickness of Bayseal CC closed-cell foam must not exceed 8 inches (203 mm). When applied to vertical surfaces, the thickness of Bayseal OC open-cell foam must not exceed 12 inches (305 mm) and the thickness of Bayseal CC closed-cell foam must not exceed 12 inches (305 mm).
- F. **Use on Attic Floors:** Bayseal OC insulation may be installed to a maximum thickness of 10 inches (254 mm) between joists in attic floors. The Bayseal OC insulation must be separated from the area beneath the attic by an approved thermal barrier. The ignition barrier in accordance with IBC Section 2603.4.1.6 and IRC Section R314.5.3 may be omitted.
- G. **One-hour Fire-Resistance-Rated Wall Assemblies (Limited Load-Bearing):**
Interior Face: One layer of 5/8-inch-thick (15.9 mm) Type X gypsum wallboard must be applied parallel to the interior face of 2-by-6 wood studs space a maximum of 16 inches (406 mm) on center. The gypsum boards must be attached using Type S, 1 5/8-inch (41 mm) long screws spaced 8 inches (203 mm) on center. The interior cavity is filled with 3 inches of Bayseal OC spray-applied foam insulation. Another layer of 5/8-inch-thick (15.9 mm) Type X gypsum wallboard must be applied in the same manner as above, so both sides are covered by gypsum wallboard.



Axial Load Design: Axial loads applied to the wall assembly must be limited to the least of the following:

- 2,756 pounds (122 642 N) per stud.
- A maximum of 51 percent of the load calculated in accordance with Sections 3.6 and 3.7 of the ANSI/AF&PA NDS.

H. **Exothermic Caution:** The polyurethane foam shall be sprayed in minimum 1/2 inch thick passes (lifts). The overall thickness applied in one pass should be limited to a maximum of 10 inches for Bayseal OC open cell foam and 3 inches for Bayseal CC closed cell foam to avoid fire hazards resulting from excessive heat generation. If a second pass is needed, applicators should wait 10 to 15 minutes between passes to allow reaction heat to dissipate. If more passes are needed, the applicator should wait 30 minutes between passes to allow reaction heat to dissipate. The exothermic reaction can cause temporary substrate thermal rises in excess of 150°F, which may result in substrate thermal expansion. If the substrate then contracts when the reaction heat dissipates, substrate deformation can occur. The full thickness of spray polyurethane foam to be applied within any given area should be completed in one day.

3.4 VAPOR RETARDER APPLICATION

- A. When required, a vapor retarder shall be applied to the substrate to be insulated or to the finished spray polyurethane foam insulation. The predominant direction of the vapor drive determines the location of the vapor retarder relative to the spray polyurethane foam. A minimum of one inch of Bayseal CC closed-cell foam constitutes a vapor retarder – where permitted by code.
- B. Apply thermal barriers and vapor retarder (if required) according to ICC recommendations.

3.5 THERMAL BARRIER APPLICATION

IRC and IBC codes require that SPF be separated from the interior of a building by a thermal barrier, which is applied over the SPF to slow thermal rise during a fire, and delay its involvement in a fire. A building code definition of an approved thermal barrier is one that is equal in fire resistance to 1/2 inch gypsum board. Thermal barriers limit the temperature rise of the underlying SPF to not more than 121°C (250°F) after 15 minutes of fire exposure in compliance with ASTM-E119 (Test Methods for Fire Tests of Building Construction Materials). Thermal barriers meeting this criterion are termed a “15 minute thermal barrier” or classified as having an “index of 15”. BaySystems recommends that an approved thermal barrier separate Bayseal spray polyurethane foam from the building interior unless waived by a local building code official. There are exceptions to the thermal barrier requirement: (1) Code authorities may approve coverings based on fire tests specific to the SPF application. For example,



covering systems that successfully pass large scale tests may be approved by code authorities in lieu of a thermal barrier; (2) SPF protected by 1" thick masonry does not need a thermal barrier. Certain materials that offer protection from ignition, called "ignition barriers," may not be considered as thermal barrier alternatives unless they comply with ASTM E-119. Just because a material is advertised as a "thermal barrier" or "ignition barrier" does not mean that it has been tested in conjunction with SPF and approved by a code agency or a local code official. Applicators should request test data and code body approvals or other written indications of acceptability under the code to be sure that the product selected offers code-compliant protection.

PART 4 – CLEAN UP

- 4.1. At the end of each work day, remove rubbish, empty containers, rags, and other discarded items from the site. After completing work, clean glass and spattered surfaces.

END OF SECTION