



Report Number: 0139  
Issued: 02/2009  
Expires: 02/2012  
Revised: 03/04/2011

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

**REPORT HOLDER**  
**URETHANE SOY SYSTEMS COMPANY**  
**100 CASPIAN AVE.**  
**VOLGA, S.D. 57071**  
**(605) 627-6105**  
[www.SOYOL.com](http://www.SOYOL.com)

**EVALUATION SUBJECT**  
**SOYTHERM® 50 SPRAY FOAM INSULATION**

## 1.0 EVALUATION SCOPE

### 1.1 Compliance with the following codes

- 2009 *International Building Code*® (IBC)
- 2009 *International Residential Code*® (IRC)
- 2009 *International Energy Conservation Code*® (IECC)

### 1.2 Evaluated in accordance with

- ICC-ES AC 377 Dated November 2010

### 1.3 Property Evaluated

- Surface burning characteristics
- Physical Properties
- Thermal Performance (R-value)
- Air Infiltration
- Attic and crawl space installation

## 2.0 USES

SoyTherm® 50 Spray Foam Insulation is installed as a nonstructural component of floor/ceiling and wall assemblies of Type V-B construction (IBC) and residential structures constructed in accordance with the IRC.

## 3.0 DESCRIPTION

### 3.1 Product Information

**3.1.1** SoyTherm® 50 is a two component, spray applied, low-density, open-cell, polyurethane foam plastic insulation system. This system is fully water blown having a nominal density of 0.5 pcf (8 kg/m<sup>3</sup>). It is

produced by combining the isocyanate (part A) and a polymeric resin (part B) through an approved proportioner, on site, by factory trained and authorized applicators.

### 3.2 Surface Burning Characteristics

**3.2.1** The SoyTherm® 50, at a thickness of 4.5 inches (127 mm) and a density of 0.50 lbs/ft<sup>3</sup> (8 kg/m<sup>3</sup>) has a flame-spread index of 20 and a smoke-development index of 400 when tested in accordance with ASTM E84.

### 3.3 Thermal Resistance, R-Values

**3.3.1** The SoyTherm® 50 has a thermal resistance (R-value) of 4.0 ft<sup>2</sup>-hr-°F/Btu (0.71 m<sup>2</sup>-K/W) at a 1-inch (25.4 mm) thickness and a density of 0.50 lbs/ft<sup>3</sup> (8 kg/m<sup>3</sup>). See Table 1 for R-value ratings at various thicknesses.

### 3.4 Vapor Retarder

**3.4.1** The SoyTherm® 50 is not a vapor retarder. Where a vapor retarder is required by the code a vapor retarder shall be provided.

### 3.5 Air Permeability

**3.5.1** SoyTherm® 50, when tested in accordance with ASTM E283 is air-impermeable when installed at 3.5 inch (89 mm) thickness or greater.

### 3.6 Intumescent Coatings

**3.6.1** Burn Free-451 Ignition Barrier Protective Coating is a water based latex coating provided by Urethane Soy Systems Company. Burn Free-451 is supplied in 5-gallon (19 L) pails and 55-gallon (208 L) drums. It has a shelf life of 6 months when stored in factory sealed containers at temperatures between 40 °F (4.5 °C) and 90 °F (32 °C).

## 4.0 INSTALLATION

### 4.1 General

SoyTherm® 50 shall be installed in accordance with the manufacturer's most recent installation instructions and this report. A copy of the installation instructions and



Report Number: 0139  
Issued: 02/2009  
Expires: 02/2012  
Revised: 03/04/2011

this report shall be available on the jobsite during installation.

## 4.2 Application

**4.2.1** SoyTherm® 50 Spray Foam Insulation shall be installed by spray application using a volumetric, positive displacement pump to combine A and B components in a one to one volumetric ratio, as specified in the manufacturer's installation instructions. SoyTherm® 50 Spray Foam Insulation shall not be applied to areas that are exposed to ambient temperatures in excess of 180°F (82°C). The spray foam insulation shall be applied to substrates that are clean, dry, and free from frost, ice, loose debris or contaminants that will interfere with the adhesion of the spray foam insulation. The spray foam insulation shall not be applied in electrical outlet or junction boxes, or in direct contact with soil or water.

**4.2.2** When the foam insulation is used in conjunction with wood construction, in jurisdictions that have adopted the IRC, and where termite infestation is "very heavy" as determined in accordance with IRC figure 301.2(6), the foam plastic shall be installed in accordance with IRC section R320.4.

**4.2.3** When required by sections 4.4.2, 4.5.2, or 4.6.2 the Burn Free-451 ignition barrier protective coating shall be applied by medium nap rollers, soft brushes or conventional airless spray equipment. Surface must be free of loose particles or other foreign matter that may inhibit proper adhesion and affect performance of the coating. Apply Burn Free-451 in one coat at the rate of not less than 1.0 gallon per 100 sq. ft. Minimum dry thickness shall be 7.5 mils. Do not store material at temperatures below 45 °F (7.2 °C). Do not apply Burn Free-451 when ambient air and substrate temperatures fall below 50 °F (10 °C). Burn Free-451 fully cures in 24 hours however, high humidity may require longer curing times.

## 4.3 Thermal Barrier

SoyTherm® 50 shall be installed at a maximum thickness of 4.5 inches (114.3 mm) and shall be separated from the interior occupied area of the building by an approved 15 minute thermal barrier such as 0.5-inch (12.7 mm) gypsum wallboard or an equivalent 15-minute thermal barrier complying with and installed in accordance with the applicable code.

See Sections 4.4, 4.5, or 4.6 of this report for requirements where installation is in an attic or crawl space.

## 4.4 Attics

**4.4.1 Application With a Prescriptive Ignition Barrier:** The SoyTherm® 50 Spray Foam Insulation may be installed in attics when covered with a prescriptive ignition barrier in lieu of a thermal barrier in accordance with IBC Section 2603.4.1.6 or IRC Section R314.5.3 under the following conditions:

- The SoyTherm® 50 Spray Foam Insulation shall be applied to the underside/interior of the structural roof deck and rafters at a maximum thickness of 11.5 inches (292 mm) and to walls and floors at a maximum thickness of 11 inches (279.4 mm).
- Entry to the attic is limited to service of utilities, mechanical and electrical systems.
- The SoyTherm® 50 Spray Foam Insulation shall be protected against ignition by one of the following:
  - 1.5-inch-thick (38 mm) mineral fiber insulation;
  - 0.25-inch-thick (6.4 mm) wood structural panel, particleboard or hardboard;
  - 0.375-inch (9.5 mm) gypsum wallboard,
  - corrosion-resistant steel having a base metal thickness of 0.016 inch (0.4 mm), or
  - other approved material installed in such a manner that the SoyTherm® 50 is not exposed.
  - The protective covering shall be consistent with the requirements for the type of construction.

The SoyTherm® 50 must be separated from the interior occupied area of the building by an approved thermal barrier in accordance with Section 4.3.

**4.4.2 Application Without a Prescriptive Ignition Barrier:** The SoyTherm® 50 Spray Foam Insulation may be installed exposed in attics without a thermal barrier or prescriptive ignition barrier as described in this section.



Report Number: 0139  
Issued: 02/2009  
Expires: 02/2012  
Revised: 03/04/2011

- The SoyTherm® 50 Spray Foam Insulation shall be applied to the underside/interior of the structural roof deck and rafters at a maximum thickness of 11.5 inches (292 mm) and to walls and floors at a maximum thickness of 11 inches (279.4 mm).
- The SoyTherm® 50 Spray Foam Insulation shall be covered by a protective coating of Burn Free-451 applied at a thickness of 7.5 mils dry.
- Entry to the attic is limited to the service of utilities, mechanical and electrical systems. No storage is permitted.
- Air in the attic is not circulated to other parts of the building.
- There are no interconnected attic areas.
- Attic ventilation is provided when required by IBC Section 1203.2 or IRC section R806.
- Combustion air is provided in accordance with Section 701 and Section 703 of the International Mechanical Code.

- other approved material installed in such a manner that the SoyTherm® 50 is not exposed.
- The protective covering shall be consistent with the requirements for the type of construction.

The SoyTherm® 50 must be separated from the interior occupied area of the building by an approved thermal barrier in accordance with Section 4.3.

**4.5.2 Application Without a Prescriptive Ignition Barrier:** The SoyTherm® 50 Spray Foam Insulation may be installed exposed between and over joists in attic floors without a thermal barrier or prescriptive ignition barrier as described in this section.

- The SoyTherm® 50 Spray Foam Insulation shall be applied at a maximum thickness of 11 inches (279.4 mm).
- The SoyTherm® 50 Spray Foam Insulation shall be covered by a protective coating of Burn Free-451 applied at a thickness of 7.5 mils dry.
- Entry to the attic is limited to the service of utilities, mechanical and electrical systems. No storage is permitted.
- Air in the attic is not circulated to other parts of the building.
- There are no interconnected attic areas.
- Attic ventilation is provided when required by IBC Section 1203.2 or IRC section R806.
- Combustion air is provided in accordance with Section 701 and Section 703 of the International Mechanical Code.

Installation in unvented conditioned attics is permitted as specified in IRC Section R806.4. There shall be no insulation or vapor retarder on the attic floor between the occupied area and the attic.

## 4.5 Attic Floors

**4.5.1 Application With a Prescriptive Ignition Barrier:** The SoyTherm® 50 Spray Foam Insulation may be installed between and over joists in attic floors at a maximum thickness of 11 inches (279.4 mm) without a thermal barrier in accordance with IBC Section 2603.4.1.6 or IRC Section R314.5.3, under the following conditions:

- Entry to the attic is limited to service of utilities, mechanical and electrical systems.
- The SoyTherm® 50 Spray Foam Insulation shall be protected against ignition by one of the following:
  - 1.5-inch-thick (38 mm) mineral fiber insulation;
  - 0.25-inch-thick (6.4 mm) wood structural panel, particleboard or hardboard;
  - 0.375-inch (9.5 mm) gypsum wallboard,
  - corrosion-resistant steel having a base metal thickness of 0.016 inch (0.4 mm), or

## 4.6 Crawl Spaces

**4.6.1 Application With a Prescriptive Ignition Barrier:** The SoyTherm® 50 Spray Foam Insulation may be installed in a crawl space without a thermal barrier in accordance with IBC Section 2603.4.1.6 or IRC Section R314.5.3, provided:

- SoyTherm® 50 may be applied at a maximum thickness of 4.5 inches (114 mm) on the underside of the floor and on the walls.
- Entry to the crawl space is limited to service of utilities, mechanical and electrical systems.
- The SoyTherm® 50 Spray Foam Insulation shall be protected against ignition by one of the following:



Report Number: 0139  
Issued: 02/2009  
Expires: 02/2012  
Revised: 03/04/2011

- 1.5-inch-thick (38 mm) mineral fiber insulation;
- 0.25-inch-thick (6.4 mm) wood structural panel, particleboard or hardboard;
- 0.375-inch (9.5 mm) gypsum wallboard,
- corrosion-resistant steel having a base metal thickness of 0.016 inch (0.4 mm), or
- other approved material installed in such a manner that the SoyTherm® 50 is not exposed.
- The protective covering shall be consistent with the requirements for the type of construction.

The SoyTherm® 50 must be separated from the interior occupied area of the building by an approved thermal barrier in accordance with Section 4.3.

**4.6.2 Application Without a Prescriptive Ignition Barrier:** The SoyTherm® 50 may be installed in crawl spaces without a prescriptive ignition barrier in accordance with the following:

- The maximum thickness of SoyTherm® 50 allowed is 11.5 inches (292 mm) on the underside of the floor and 11 inches (179.4 mm) on walls.
- The SoyTherm® 50 Spray Foam Insulation shall be covered by a protective coating of Burn Free-451 applied at a thickness of 7.5 mils dry.
- Entry to the crawl space is limited to the service of utilities, mechanical and electrical systems. No storage is permitted.
- Air in the crawl space is not circulated to other parts of the building.
- There are no interconnected crawl space areas.
- Under-floor (crawl space) ventilation is provided when required by IBC Section 1203.3 or IRC Section R408.1, as applicable.
- Combustion air is provided in accordance with Section 701 and Section 703 of the International Mechanical Code.

The SoyTherm® 50 must be separated from the interior occupied area of the building by an approved thermal barrier in accordance with Section 4.3.

## 5.0 CONDITIONS OF USE

**5.1** The SoyTherm® 50 Spray Foam Insulation described in this report complies with, or is a suitable alternative to what is specified in those codes listed in Section 1.0 of this report, subject to the following conditions

**5.1.1** This evaluation report and the manufacturer's published installation instructions, when required by the code official, shall be submitted at the time of permit application.

**5.1.2** The SoyTherm® 50 Spray Foam Insulation shall be installed in accordance with the manufacturer's published installation instructions, this evaluation report and the applicable code.

**5.1.3** The SoyTherm® 50 Spray Foam Insulation shall be separated from the interior occupied area of the building by an approved 15-minute thermal barrier, except when installed in attics and crawl spaces as described in Sections 4.4, 4.5 and 4.6 of this report.

**5.1.4** The SoyTherm® 50 Spray Foam Insulation shall not exceed the thickness noted in Sections 4.4, 4.5 and 4.6 of this report.

**5.1.5** The SoyTherm® 50 Spray Foam Insulation shall be protected from the weather after application.

**5.1.6** The SoyTherm® 50 Spray Foam Insulation shall be applied by contractors certified by Urethane Soy Systems.

**5.1.7** In jurisdictions that have adopted the IRC, when installed in buildings of wood construction, the insulation shall not be installed on the exterior of foundation walls or below floor slabs on ground or in contact with the ground. The insulation shall have a clearance above grade and exposed earth of 6 inches (152 mm) or greater.

**5.1.8** The SoyTherm® 50 Spray Foam Insulation is limited to use in Types V-B construction under the IBC and dwellings under the IRC except where Fire Performance Evaluation in accordance with ASTM E119 and other applicable tests allows for use in other types of building construction.



Report Number: 0139  
 Issued: 02/2009  
 Expires: 02/2012  
 Revised: 03/04/2011

**5.1.9** The SoyTherm® 50 Spray Foam Insulation is produced by Urethane Soy Systems Company under a quality control program with inspections by Intertek Testing Services NA, Ltd. (AA-689).

**5.1.10** Use of SoyTherm® 50 Spray Foam Insulation as fire blocking has not been evaluated and is outside the scope of this report.

**5.1.11** 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 102.2.1, as applicable.

## 6.0 EVIDENCE SUBMITTED

**6.1** Data in accordance with ICC-ES Acceptance Criteria for Spray-Applied Foam Plastic Insulation (AC377), dated November 2010.

**6.2** Report on fire testing in accordance with Appendix X of AC 377.

**6.3** Reports of air leakage in accordance with ASTM E283.

## 7.0 IDENTIFICATION

**7.1** Each package of components for the SoyTherm® 50 Spray Foam Insulation is identified with the manufacturer's name (Urethane Soy Systems Company), the manufacturer's address and telephone number, the product trade name (SoyTherm® 50), use instructions, the density; the flame-spread and smoke-development indices; the evaluation report number (IAPMO-0139), and the name of the inspection agency (Intertek Testing Services NA, Ltd.).



**IAPMO #0139**

Director of Evaluation Service

**TABLE 1—THERMAL PERFORMANCE  
 SOYTHERM® 50 SPRAY FOAM INSULATION**

Tested per ASTM C518 Thickness (Inch)	Thermal Resistance (R-value) (°F-ft <sup>2</sup> -h/Btu)
1	4.0
4	17.1
Calculated R-values	
3.5	14.8
5.5	23.6
7.5	32.1
9	38.5
11	47.1
13	55.7