

ICC-ES Evaluation Report

ESR-2003

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

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EVALUATION SUBJECT:

**SWD QUIK-SHIELD® | 106, SWD QUIK-SHIELD® | 111
AND SWD QUIK-SHIELD® | 112 SPRAY-APPLIED
POLYURETHANE FOAM INSULATION AND SWD QUIK-
SHIELD® | 450 POLYURETHANE FOAM INSULATION**

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:

- Surface-burning characteristics
- Physical properties
- Thermal resistance (*R*-values)
- Air permeability

2.0 USES
**2.1 SWD Quik-Shield® | 106, SWD Quik-Shield® | 111
and SWD Quik-Shield® | 112:**

The SWD Quik-Shield® | 106, SWD Quik-Shield® | 111 and SWD Quik-Shield® | 112 insulations are used as nonstructural thermal insulating material in Type III and V construction (IBC) and dwellings under the IRC. The insulations are used in wall cavities and floor and ceiling assemblies, and in attic and crawl space applications when installed in accordance with Section 4.0.

2.2 SWD Quik-Shield® | 450:

The SWD Quik-Shield® | 450 is used as a nonstructural thermal insulating material in Type III and V construction (IBC) and dwellings under the IRC. The insulation is used to fill hollow cores of concrete masonry block walls.

3.0 DESCRIPTION
3.1 SWD Quik-Shield® | 106:

3.1.1 General: SWD Quik-Shield® | 106 is a two component, open-cell, foam plastic insulation. The insulation is produced in the field by combining Component A with resin Component B, resulting in insulation with a nominal density of 0.5 pcf (8 kg/m³). The insulation components have a shelf life of six months when stored at temperatures between 50°F (10°C) and 80°F (27°C) before installation.

3.1.2 Surface-burning Characteristics: The insulation, at a maximum thickness of 4 inches (102 mm) and a nominal density of 0.5 pcf (8 kg/m³), has a flame spread index of 25 or less and a smoke-developed index of less than 450 when tested in accordance with ASTM E 84. Greater thicknesses are recognized in Sections 4.2.2, 4.2.3.2.1 and 4.2.3.3.

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

3.1.4 Air Permeability: The insulation, at a minimum thickness of 3.5 inches (89 mm), is considered air-impermeable insulation in accordance with Section R806.4 of the IRC based on testing in accordance with ASTM E 283.

3.2 SWD Quik-Shield® | 111:

3.2.1 General: SWD Quik-Shield® | 111 is a two-component foam plastic insulation. The insulation is produced in the field by combining Component A with resin Component B, resulting in insulation with a nominal density of 2.0 pcf (32 kg/m³). The insulation components have a shelf life of six months when stored at temperatures between 50°F (10°C) and 80°F (27°C) before installation.

3.2.2 Surface-burning Characteristics: The insulation, at a maximum thickness of 4 inches (102 mm) and a nominal density of 2.0 pcf (32 kg/m³), has a flame spread index of 25 or less and a smoke-developed index of less than 450 when tested in accordance with ASTM E 84.

3.2.3 Thermal Resistance (*R*-value): The insulation has thermal resistance (*R*-value), at a mean temperature of 75°F (24°C), as shown in Table 2.

3.2.4 Vapor Retarder: The insulation, at a minimum thickness of 1.40 inches (35.6 mm), is a Class II vapor retarder in accordance with IBC Section 1405.3, IRC Section R601.3 and IECC Section 402.2.9, based on testing in accordance with ASTM E 96.

3.2.5 Air Permeability: The insulation, at a minimum thickness of 3.5 inches (89 mm), is considered air-impermeable insulation in accordance with Section R806.4 of the IRC based on testing in accordance with ASTM E 283.

3.3 SWD Quik-Shield® | 112:

3.3.1 General: SWD Quik-Shield® | 112 is a two-component foam plastic insulation. The insulation is produced in the field by combining Component A with resin Component B, resulting in insulation with a nominal density of 2.0 pcf (32 kg/m³). The insulation components have a shelf life of six months when stored at temperatures between 50°F (10°C) and 80°F (27°C) before installation.

3.3.2 Surface-burning Characteristics: The insulation, at a maximum thickness of 4 inches (102 mm) and a nominal density of 2.0 pcf (32 kg/m³), has a flame spread index of 25 or less and a smoke-developed index of less than 450 when tested in accordance with ASTM E 84. Greater thicknesses are recognized in Sections 4.2.2, 4.2.3.2.2 and 4.2.3.3.

3.3.3 Thermal Resistance (R-value): The insulation has thermal resistance (R-value), at a mean temperature of 75°F (24°C), as shown in Table 4.

3.3.4 Air Permeability: The insulation, at a minimum thickness of 3.5 inches (89 mm), is considered air-impermeable insulation in accordance with Section R806.4 of the IRC based on testing in accordance with ASTM E 283.

3.4 SWD Quik-Shield® | 450:

SWD Quik-Shield® | 450 is a two-component, one-to-one by volume, foam plastic insulation with a nominal density of 2.0 pcf (32 kg/m³). The insulation is produced in the field by combining Component A with resin Component B. The insulation components have a shelf life of six months when stored at temperatures between 50°F (10°C) and 80°F (27°C) before installation.

3.4.1 Surface-burning Characteristics: The insulation, at a maximum thickness of 4 inches (102 mm) and a nominal density of 2.0 pcf (32 kg/m³), has a flame spread index of less than 25 and a smoke-developed index of less than 450 when tested in accordance with ASTM E 84. Thicknesses up to 12 inches (305 mm) are recognized when used to fill hollow cores of concrete masonry block walls based on an engineering evaluation of NFPA 286.

3.4.2 Thermal Resistance (R-value): The insulation has thermal resistance (R-value), at a mean temperature of 75°F (24°C), as shown in Table 3.

3.5 SWD Quik-Shield® | 1500 IC:

This is an intumescent coating supplied by SWD Urethane. The coating has a shelf life of six months when stored in a factory-sealed container at temperatures between 50°F (10°C) and 80°F (26.7°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 insulation must be stored at temperatures between 50°F (10°C) and 80°F (27°C) and 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, water, or soil. The substrate must be free of moisture, frost or ice,

loose scales, rust, oil, and grease. The insulation must be protected from the weather during and after application. The manufacturer's published installation instructions must be available on the jobsite at all times during installation.

4.2 SWD Quik-Shield® | 106, SWD Quik-Shield® | 111 and SWD Quik-Shield® | 112:

4.2.1 Application: The insulation is spray-applied on the jobsite using spray equipment specified in SWD Urethane's published installation instructions. Quik-Shield® | 106 can be installed in one or more passes in thicknesses up to 5.5 inches (140 mm) per pass to achieve the maximum thicknesses specified in this report. Quik-Shield® | 111 and Quik-Shield® | 112 can be installed in one or more passes in thicknesses up to 3 inches (76 mm) per pass to achieve the maximum thicknesses specified in this report. Each insulation pass must be allowed to fully expand prior to application of additional passes. Where used as an air-impermeable insulation, such as in unvented attic spaces in accordance with IRC Section R806.4, the insulation must be installed at a minimum thickness of 3.5 inches (89 mm).

4.2.2 Thermal Barrier: For thicknesses up to 4 inches (102 mm), the insulations 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 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 4.2.3.

For SWD Quik-Shield® | 106 and SWD Quik-Shield® | 112 at thicknesses greater than 4 inches (102 mm) but no more than 11.25 inches (286 mm), wall and ceiling cavities must be covered with minimum 5/8-inch-thick (15.9 mm) gypsum wallboard or an equivalent thermal barrier complying with the applicable code based on room corner testing in accordance with NFPA 286.

4.2.3 Attics and Crawl Spaces:

4.2.3.1 Application with a Prescriptive Ignition Barrier: Where SWD Quik-Shield® | 106, SWD Quik-Shield® | 111 and SWD Quik-Shield® | 112 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. The insulations, as specified in this section, may be installed in unvented conditioned attics in accordance with IRC Section R806.4.

4.2.3.2 Application without a Prescriptive Ignition Barrier: Where SWD Quik-Shield® | 106 and SWD Quik-Shield® | 112 are installed without a prescriptive ignition barrier in attics and crawl spaces in accordance with Sections 4.2.3.2.1 and 4.2.3.2.2, 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 is not circulated to other parts of the building.
- Attic ventilation is provided when required by IBC Section 1203.2 or IRC Section R806, as applicable, except when insulation is permitted in unvented attics in accordance with IRC Section R806.4.

- Under-floor (crawl space) ventilation is provided in accordance with IBC Section 1203.3 or IRC Section R408.1, as applicable.
- Combustion air is provided in accordance with IMC International Mechanical Code® Section 701.

4.2.3.2.1 Assembly No. 1: SWD Quik-Shield® | 106 spray foam insulation may be applied to the underside of roof sheathing, roof rafters and walls; and in crawl spaces, the insulation may be spray-applied to the underside of wood floors and walls, as described in this section.

The thickness of the foam plastic applied to vertical surfaces must not exceed 7¹/₂ inches (190.5 mm), and the thickness applied to the underside of the wood floor or roof sheathing must not exceed 11¹/₂ inches (292.1 mm). The foam plastic must be covered with SWD Quik-Shield 1500 IC coating, applied in accordance with the SWD Urethane instructions, at a minimum application rate to provide a minimum 18-mil (0.46 mm) wet film coating.

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 coating is applied with a roller, brush or spray equipment and must be applied when ambient and substrate temperatures will be above 50°F (10°C) for at least two hours after application.

The ignition barrier required by IBC Section 2603.4.1.6 and IRC Sections R316.5.3 and R316.5.4 may be omitted.

4.2.3.2.2 Assembly No. 2: SWD Quik-Shield® | 112 spray foam insulation may be applied to the underside of roof sheathing, roof rafters and walls; and in crawl spaces, the insulation may be spray-applied to the underside of wood floors and walls, as described in this section.

The thickness of the foam plastic applied to vertical surfaces must not exceed 5¹/₂ inches (139.7 mm), and the thickness applied to the underside of the wood floor or roof sheathing must not exceed 9¹/₂ inches (241.3 mm). The foam plastic is not required to be coated. The ignition barrier required by IBC Section 2603.4.1.6 and IRC Sections R316.5.3 and R316.5.4 may be omitted.

4.2.3.3 Use on Attic Floors: SWD Quik-Shield® | 106 insulation may be installed at a maximum thickness of 7¹/₂ inches (190.5 mm) between joists in attic floors; a minimum 18-mil (0.46 mm) wet film thickness of SWD Quik-Shield 1500 IC coating must be applied over the foam plastic. SWD Quik-Shield® | 112 insulation may be installed at a maximum thickness of 5¹/₂ inches (139.7 mm) between joists in attic floors and is not required to be coated. The insulations must be separated from the interior of the building by an approved thermal barrier. The ignition barrier required by IBC Section 2603.4.1.6 or IRC Section R316.5.3 or R316.5.4 may be omitted.

4.3 SWD Quik-Shield® | 450:

The insulation is applied at the jobsite by using a volumetric positive displacement pump as recommended in the manufacturer's published installation instructions. The insulation is injected into the cavities of code-complying concrete masonry block walls from the bottom up in horizontal thicknesses up to 12 inches (305 mm). Joints between concrete masonry blocks must be mortared or the insulations 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 IBC Section 2603.4 or IRC Section R316.4, as applicable.

5.0 CONDITIONS OF USE:

The SWD Urethane Quik-Shield® 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 foam plastic insulations must be installed in accordance with the manufacturer's published installation instructions, this report and the applicable code. If there is a conflict between the manufacturer's published installation instructions and this report, this report governs.
- 5.2** The insulations must be separated from the interior of the building by an approved 15-minute thermal barrier, as described in Sections 4.2.2, 4.2.3.3 and 4.3, of this report.
- 5.3** The insulations must not exceed the thicknesses noted in Sections 3.2.1, 3.2.2, 3.3.2, 3.4.1, 4.2.2, 4.2.3 and 4.3, unless otherwise noted in this report.
- 5.4** The insulations must be protected from the weather during and after application.
- 5.5** The insulations must be applied by contractors certified by SWD Urethane.
- 5.6** The insulations may be used in any buildings under the IRC, within the parameters set forth in IRC Section R316. The insulations were evaluated for use in Type V-B construction under the IBC.
- 5.7** Use of the insulations in areas where the probability of termite infestation is "very heavy" 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, as applicable.
- 5.9** The polyurethane foam plastic insulation components are produced in Mesa, Arizona, under a quality control program with inspections by Intertek Testing Services NA, Inc. (AA- 690).

6.0 EVIDENCE SUBMITTED

- 6.1** Data in accordance with the ICC-ES Acceptance Criteria for Spray-applied Foam Plastic Insulation (AC377), dated June 2009, including reports of tests in accordance with Appendix X of AC377.
- 6.2** Reports of air leakage tests in accordance with ASTM E 283.
- 6.3** Engineering evaluation for use of SWD Quik-Shield® | 450 installed in hollow cores of masonry block walls.
- 6.4** Reports of tests in accordance with NFPA 286.
- 6.5** Reports of tests in accordance with ASTM E 96.

7.0 IDENTIFICATION

Components of SWD Urethane insulation products are identified with the manufacturer's name (SWD Urethane), address and telephone number; the product trade name (SWD Quik-Shield® | 106, SWD Quik-Shield® | 111, SWD Quik-Shield® | 112 or SWD Quik-Shield® | 450); Product Type (A or B component); mixing instructions; the density; the flame-spread and smoke-developed indices; the shelf life and date of manufacture; the evaluation report number (ESR-2003); and the name of the inspection agency (Intertek Testing Services NA, Inc.).

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)

TABLE 1—THERMAL RESISTANCE (R-VALUES) FOR SWD Quik-Shield® | 106

THICKNESS (inches)	R-VALUE (°F.ft ² .h/Btu)
1	4.0
1.5	5.7
2	7.5
2.5	9.2
3	10.9
3.5	12.9
4	14.4
5	18.0
5.5	19.8
6	21.6
7.5	27.0
8	28.8
9.5	34.2
10	36.0
11.25	40.6

For **SI**: 1 inch = 25.4 mm; 1°F.ft².h/Btu = 0.176 110°K.m²/W.

¹R-values are calculated based on test values at a 1- and 4-inch thickness.

TABLE 2—THERMAL RESISTANCE (R-VALUES) FOR SWD Quik-Shield® | 111

THICKNESS (inches)	R-VALUE (°F.ft ² .h/Btu)
1	7.0
1.5	9.1
2	11.2
2.5	13.4
3	15.5
3.5	17.6
4	19.7
5	24.8
5.5	27.4
6	29.9
7.5	37.6
8	40.2
9.5	47.9
10	50.4
11.25	56.8

For **SI**: 1 inch = 25.4 mm; 1°F.ft².h/Btu = 0.176 110°K.m²/W.

¹R-values are calculated based on test values at a 1- and 4-inch thickness.

The products comply with the above-mentioned codes as described in Sections 2.0 through 7.0 of this report, with the following revisions:

- **Application with a Prescriptive Ignition Barrier:** See Section 4.2.3.1, except attics must be vented in accordance with Section 1203.2 of the 2003 IBC or Section R806 of the 2003 IRC, and crawl space ventilation must be in accordance with IBC Section 1203.3 or Section R408 of the 2003 IRC, as applicable.
- **Application without a Prescriptive Ignition Barrier:** See Section 4.2.3.2, except attics must be vented in accordance with Section 1203.2 of the 2003 IBC or Section R806 of the 2003 IRC, and crawl space ventilation must be in accordance with IBC Section 1203.3 or Section R408 of the 2003 IRC, as applicable.

TABLE 3—THERMAL RESISTANCE (R-VALUES) FOR SWD Quik-Shield® | 450

THICKNESS (inches)	R-VALUE (°F.ft ² .h/Btu)
1	5.1
4	20.0
6	30.0
12	60.0

For **SI**: 1 inch = 25.4 mm; 1°F.ft².h/Btu = 0.176 110°K.m²/W.

¹R-values are calculated based on test values at a 1- and 4-inch thickness.

TABLE 4—THERMAL RESISTANCE (R-VALUES) FOR SWD Quik-Shield® | 112

THICKNESS (inches)	R-VALUE (°F.ft ² .h/Btu)
1	6.0
1.5	9.4
2	12.8
2.5	16.2
3.0	19.6
3.5	23.0
4	26.4
5	33.0
5.5	36.2
6	39.5
7.5	49.4
8	52.7
9.5	62.6
10	65.9
11.25	74.1

For **SI**: 1 inch = 25.4 mm; 1°F.ft².h/Btu = 0.176 110°K.m²/W.

¹R-values are calculated based on test values at a 1- and 4-inch thickness.