

ICC-ES Evaluation Report

ESR-3005

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This report is subject to re-examination in one year.

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

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EVALUATION SUBJECT:
ICYNENE MD-R-200™ SPRAY-APPLIED FOAM PLASTIC INSULATION
1.0 EVALUATION SCOPE
Compliance with the following codes:

- 2009 *International Building Code*® (2009 IBC)
- 2009 *International Residential Code*® (2009 IRC)
- 2009 *International Energy Conservation Code*® (2009 IECC)
- Other Codes (see Section 8.0)

Properties evaluated:

- Surface burning characteristics
- Physical properties
- Thermal performance (*R*-values)
- Attic and crawl space installation
- Air permeability

2.0 USES

Icynene MD-R-200™ is used to provide thermal insulation in buildings and to seal areas such as plumbing and wiring penetrations against air infiltration, in Type III and Type V construction (IBC) and dwellings under the IRC.

3.0 DESCRIPTION
3.1 General:

Icynene MD-R-200™ is a medium-density, open-cell, polyurethane foam plastic insulation and air barrier system that is 100 percent water-blown with an installed nominal density of 2.0 pcf (16 kg/m³). Icynene LD-C-50 is a two-component, spray-applied product. The two components of the insulation are Base Seal MDI™, a polyisocyanate, and

Icynene MD-R-200™, a resin. The polyisocyanate must be stored at a temperature between 60°F and 90°F (15.6°C and 32.2°C), and has a shelf life of 12 months. The resin must be stored at a temperature between 60°F and 90°F (15.6°C and 32.2°C), and has a shelf life of three months.

3.2 Surface Burning Characteristics:

The foam plastic insulation is limited to a maximum thickness of 2 inches (51 mm) in walls and ceilings, based on testing in accordance with ASTM E 84. At a thickness of 2 inches (51 mm) and a nominal density of 2.0 pcf (32.1 kg/m³), Icynene MD-R-200 has a flame spread index of 25 or less and a smoke-developed index of 450 or less. Thicknesses up to 8 inches (203 mm) in wall cavities and 9 inches (229 mm) in ceiling cavities are recognized based on testing in accordance with NFPA 286.

3.3 Thermal Resistance:

Icynene MD-R-200 has thermal resistance (*R*-values) at a mean temperature of 75°F (24°C) as shown in Table 1.

3.4 Air Permeability:

Based on testing in accordance with ASTM E 283, Icynene MD-R-200, at a minimum thickness of 2 inches (51 mm), is considered air-impermeable.

3.5 SafeCoat Firebreak Intumescent Coating:

SafeCoat Firebreak intumescent coating, manufactured by Quantum Chemical, is a single-component, latex coating supplied in 1-gallon (3.8 L), 5-gallon (18.9 L), 55-gallon (208 L) and 275-gallon (1041 L) containers, and has a shelf life of 24 months when stored in factory-sealed containers at temperatures above 50°F (10°C).

4.0 DESIGN AND INSTALLATION
4.1 General:

The manufacturer's published installation instructions and this report must be strictly adhered to, and copies must be available on the jobsite at all times during installation.

4.2 Application:

Icynene MD-R-200 must be applied using spray equipment specified by Icynene, Inc. Icynene MD-R-200 must not be used in areas that have a maximum service temperature greater than 180°F (82°C). The foam plastic must not be used in electrical outlet or junction boxes or in contact with rain or water, and must be protected from the weather during and after application. Where Icynene MD-R-200 is used as an air-impermeable barrier, such as in unventilated attic spaces regulated by IRC Section R806,

the insulation must be installed at a minimum thickness of 3.5 inches (89 mm). Icynene MD-R-200 can be installed in one pass to the maximum thickness. Where multiple passes are required, the cure time between passes is negligible. Icynene MD-R-200 must only be installed by licensed dealers certified by Icynene, Inc., to install Icynene MD-R-200.

4.3 Thermal Barrier:

Icynene MD-R-200 must be separated from the interior of the building by an approved thermal barrier, such as $\frac{1}{2}$ -inch (12.7 mm) gypsum wallboard installed using mechanical fasteners in accordance with the applicable code, or an equivalent 15-minute thermal barrier complying with the applicable code. When installation is within an attic or crawl space as described in Section 4.4, a thermal barrier is not required between the foam plastic and the attic or crawl space, but is required between the foam and the interior of the building. The maximum thickness permitted for wall cavities is 8 inches (203 mm), and in ceiling cavities it is 9 inches (229 mm).

4.4 Attics and Crawl Spaces:

4.4.1 Application with a Prescriptive Ignition Barrier:

When Icynene MD-R-200 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 and 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. Icynene MD-R-200 may be installed in unvented attics in accordance with IRC Section R806.4.

4.4.2 Application without a Prescriptive Ignition Barrier:

Where Icynene MD-R-200 is installed in an attic or crawl space without a prescriptive ignition barrier, in accordance with Sections 4.4.2.1 and 4.4.2.2, the following conditions apply:

1. Entry to the attic or crawl space is only for the service of utilities and no storage is permitted.
2. There are no interconnected attic or basement areas.
3. Air in the attic or crawl space is not circulated to other parts of the building.
4. Combustion air is provided in accordance with IMC Section 701.
5. Attic ventilation is provided when required by IBC Section 1203.2 or IRC Section R806, or as required, except when air-impermeable insulation is permitted in unvented attics in accordance with Section R806.4 of IRC. Under-floor (crawl space) ventilation is provided when required by IBC Section 1203.3 or IRC Section R408.1, as applicable.

4.4.2.1 Assembly No. 1: Icynene MD-R-200 insulation may be spray-applied to the underside of the 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 and roof sheathing must not exceed $11\frac{1}{4}$ inches (286 mm). The spray foam insulation applied to vertical wall surfaces in attics and crawl spaces must not exceed $5\frac{1}{2}$ inches (140 mm). The foam plastic must be covered with SafeCoat Firebreak intumescent coating described in Section 3.5. The intumescent coating must be applied over the insulation in accordance with the coating manufacturer's instructions and this report.

Surfaces to be coated must be dry, clean, and free of dirt, loose debris and other substances that could interfere with adhesion of the coating. The coating is applied in one coat with low-pressure airless spray equipment at a rate of 1 gallon per 100 square feet (0.39 L/m²) to obtain a minimum wet film thickness of 16 mils (0.41 mm) per coat. The coating must be applied when ambient and substrate temperature is at least 50°F (10°C) and no more than 95°F (35°C). All surfaces (including glass) must be protected against damage from the coating. Icynene MD-R-200 insulation may be installed in unvented attics as described in this section in accordance with IRC Section R806.4.

4.4.2.2 Assembly No. 2: Icynene MD-R-200 insulation may be spray-applied to the underside of the roof sheathing and/or rafters as described in this section. The thickness of the foam plastic applied to the underside of the roof sheathing must not exceed $11\frac{1}{4}$ inches (286 mm). The spray foam insulation applied to vertical wall surfaces in the attic must not exceed $5\frac{1}{2}$ inches (140 mm). The foam plastic installed on the walls must be covered with 16 wet mils (0.41 mm) of SafeCoat Firebreak intumescent coating described in Sections 3.5 and 4.4.2.1. The intumescent coating must be applied over the insulation in accordance with the coating manufacturer's instructions and this report. Surfaces to be coated must be dry, clean, and free of dirt, loose debris and other substances that could interfere with adhesion of the coating.

4.4.3 Use on Attic Floors: Icynene MD-R-200 insulation may be installed at a maximum thickness of $5\frac{1}{2}$ inches (140 mm) between joists in attic floors. The insulation must be covered with SafeCoat Firebreak intumescent coating applied as described in Section 4.4.2.1 or a prescriptive ignition barrier described in Section 4.4.1. The Icynene MD-R-200 insulation must be separated from the interior of the building by an approved thermal barrier.

5.0 CONDITIONS OF USE

The Icynene MD-R-200 spray-applied foam plastic 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 This evaluation report and the manufacturer's published installation instructions, when required by the code official, must be submitted at the time of permit application.
- 5.2 The insulation must be installed in accordance with the manufacturer's published installation instructions, this evaluation report and the applicable code. If there is a conflict between the installation instructions and this report, this report governs.
- 5.3 The insulation must be separated from the interior of the building by an approved 15-minute thermal barrier, except when installation is in attics and crawl spaces as described in Section 4.4.
- 5.4 The insulation must not exceed the thickness and density noted in Sections 3.2, 4.3 and 4.4.
- 5.5 The insulation must be protected from the weather during and after application.
- 5.6 The insulation must be applied by installers certified by Icynene, Inc.
- 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 A vapor retarder must be installed in accordance with the applicable code.
- 5.10 The insulation is manufactured in Mississauga, Ontario, Canada, 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 (Section 4.4.2.1) and Section A1.2.2 of AC377 (Section 4.4.2.2).
- 6.2 Test report on air leakage rate in accordance with ASTM E 283.

7.0 IDENTIFICATION

All packages and containers of Base Seal MDI and Icynene MD-R-200 must be labeled with the Icynene, Inc., name and address; the product name; the flame spread index and the smoke-developed index; the shelf life expiration date; the label of the inspection agency (Intertek Testing Services); and the evaluation report number (ESR-3005).

SafeCoat Firebreak intumescent coating is identified with the manufacturer's name (Quantum) and address, the product trade name and use instructions.

8.0 OTHER CODES

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

- 2006 *International Building Code*® (2006 IBC)
- 2006 *International Residential Code*® (2006 IRC)
- 2006 *International Energy Conservation Code*® (2006 IECC)

Recognition under these codes is as noted in Sections 2.0 through 7.0 of this report, except for the following:

- **Application with a Prescriptive Ignition Barrier:** When Icynene MD-R-200 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 2006 IBC Section 2603.4.1.6 and 2006 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 that the foam plastic insulation is not exposed.
- **Application without a Prescriptive Ignition Barrier:** See Section 4.4.2, except attics and crawl spaces must be vented in accordance with the applicable code.

TABLE 1—THERMAL RESISTANCE (R-VALUES)

THICKNESS (inches)	R-VALUE (°F·ft ² ·h/Btu)
ASTM C 518 Tested Values	
1	5.2
3.5	18.2
Calculated R-Values¹	
2	10.4
5.5	28.6
7.5	39.0
8	41.6
9	46.8
9.5	49.4
11	57.2
11.25	58.5

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

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