

# ICC-ES Evaluation Report

**ESR-3159**

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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:**
**JM CORBOND MCS™ SPRAY-APPLIED POLYURETHANE  
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:**

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

**2.0 USES**

JM Corbond MCS™ spray-applied polyurethane foam insulation is used as nonstructural thermal insulating material in Types I, II, III, IV and V construction under the IBC and in dwellings under the IRC. The insulation is for use in wall cavities, floor/ceiling assemblies, or attics and crawl spaces when installed in accordance with Section 4.4. Under the IRC, the insulation may be used as air-impermeable insulation under IRC Section R806.4, when installed in accordance with Section 3.5. The insulation may be used in exterior walls of Types I, II, III, and IV construction when used as described in Section 4.5.

**3.0 DESCRIPTION**
**3.1 General:**

JM Corbond MCS™ insulation is two-component, spray-applied, rigid, medium-density, polyurethane foam plastic

having a nominal in-place density of 2.0 pcf (32 kg/m<sup>3</sup>). The insulation is produced in the field by combining a polymeric isocyanate (A component) with a polymeric resin (B component). The liquid components are supplied in 55-gallon (208 L) drums and 250-gallon (946 L) totes and have a shelf life of six months when stored in factory-sealed containers at temperatures between 60°F (15.5°C) and 70°F (21°C).

**3.2 Surface-burning Characteristics:**

The insulation, at a maximum thickness of 4.3 inches (109 mm) and a nominal density of 2.0 pcf (32 kg/m<sup>3</sup>), have 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. Thicknesses of up to 9<sup>1</sup>/<sub>4</sub> inches (235 mm) for wall cavities and 11<sup>1</sup>/<sub>4</sub> inches (286 mm) for ceiling cavities are recognized, based on testing in accordance with NFPA 286, when the insulation is covered with a minimum <sup>1</sup>/<sub>2</sub>-inch-thick (12.7 mm) gypsum board or an equivalent thermal barrier complying with, and installed in accordance with, the applicable code.

**3.3 Thermal Resistance, R-values:**

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

**3.4 Vapor Permeance:**

The insulation has a vapor permeance of less than 1 perm [ $5.7 \times 10^{-12}$  kg/(Pa-s-m<sup>2</sup>)] when tested in accordance with the ASTM E 96 desiccant method (Procedure A), when applied at a minimum thickness of 1<sup>1</sup>/<sub>2</sub> inches (38 mm). The insulation qualifies as a Class II vapor retarder under the IRC.

**3.5 Air Permeability:**

The insulation, at a minimum thickness of 1<sup>1</sup>/<sub>2</sub> inches (38 mm), is considered air-impermeable insulation in accordance with Section R806.4 of the IRC, based on testing in accordance with ASTM E 283.

**3.6 JM IB Intumescent Coating:**

JM IB intumescent coating, manufactured by Johns Manville Corporation, is a one-component, water-based, liquid intumescent coating supplied in 5-gallon (19 L) pails. The coating materials have a shelf life of 12 months when stored in factory-sealed containers at temperatures above 50°F (10°C).

**3.7 DC 315 Intumescent Coating:**

DC 315 intumescent coating, manufactured by International Fire Proof Technology, Inc., is a water-based coating supplied in 5-gallon (19L) pails and 55-gallon (208L) drums. The coating material has a shelf life of 24 months when stored in factory-sealed containers at temperatures between 41°F (5°C) and 95°F (35°C).

## 4.0 INSTALLATION

### 4.1 General:

JM Corbond MCS™ spray-applied polyurethane foam insulation must be installed in accordance with the manufacturer's published installation instructions, the applicable code 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 Johns Manville application manual. The insulation must be applied when the substrate temperatures are between 45°F (7°C) and 90°F (32°C). The foam plastic must not be used in electrical outlet or junction boxes or in contact with water, rain or soil. 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 must be protected from the weather during and after application. Where the insulation is used as an air-impermeable insulation, such as in unvented attic assemblies under IRC Section R806.4, the insulation must be installed at a minimum thickness of 1½ inches (38 mm). The insulation must be applied in passes not exceeding 2 inches (51 mm) per pass and must be allowed to fully expand and cure for a minimum of 20 minutes prior to the application of the next additional pass. For additional details on curing times, see the Johns Manville published installation instructions.

### 4.3 Thermal Barrier:

#### 4.3.1 Application with a Prescriptive Thermal Barrier:

JM Corbond MCS™ spray-applied polyurethane foam insulation must be separated from the interior of the building by an approved thermal barrier of ½-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, except where insulation is in an attic or crawl space as described in Section 4.4. Thicknesses of up to 9¼ inches (235 mm) for wall cavities and 11¼ inches (286 mm) for floor/ceiling cavities are recognized, based on room corner fire testing in accordance with NFPA 286, when the insulation is covered with a minimum ½-inch-thick (12.7 mm) gypsum wallboard or an equivalent 15-minute thermal barrier complying with, and installed in accordance with, the applicable code.

#### 4.3.2 Application without a Prescriptive Thermal Barrier:

The prescriptive 15-minute thermal barrier or ignition barrier may be omitted when installation is in accordance with this section (Section 4.3.2). The insulation and intumescent coating may be spray-applied to the interior facing of walls, the underside of the roof sheathing or roof rafter, and in crawl spaces, and may be left exposed as an interior finish without a prescribed 15-minute thermal barrier or ignition barrier. The thickness of the foam plastic applied to the underside of roof sheathing must not exceed 9¼ inches (235 mm). The thickness of the spray foam insulation applied to vertical wall surfaces must not exceed 7¼ inches (184 mm). The foam plastic must be covered on all surfaces with DC 315 intumescent coating at a minimum wet film thickness of 22 wet mils (0.56 mm) [14 dry mils (0.36 mm)], at a rate of 1 gallon (3.38L) per 73 square feet (6.8 m<sup>2</sup>). The 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.

### 4.4 Attics and Crawl Spaces:

#### 4.4.1 Application with a Prescriptive Ignition Barrier:

When the spray-applied 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 Section R316.5.3 or 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:

When JM Corbond MCS™ spray-applied polyurethane foam insulation is installed without an ignition barrier in attics and crawl spaces, as described in Sections 4.4.2.1 and 4.4.2.2, 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 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 is provided in accordance with IMC (*International Mechanical Code*<sup>®</sup>) Section 701.

#### 4.4.2.1 Application with JM IB Intumescent Coating:

In attics, JM Corbond MCS™ foam insulation may be spray-applied to the underside of the roof sheathing and/or rafters; and in crawl spaces, the insulation may be spray-applied to the underside of wood floors as described in this section. The thickness of the foam plastic applied to the underside of the top of the space must not exceed 10 inches (254 mm) and the vertical surfaces must not exceed 8 inches (203 mm). The foam plastic surfaces must be covered with a minimum thickness of 5 dry mils (0.13 mm) [10 wet mils] of the JM IB intumescent coating described in Section 3.6. The intumescent coating must be spray-applied over the insulation in accordance with the Johns Manville instructions and this report at a rate of 0.6 gallon (2 L) per 100 square feet (9.3 m<sup>2</sup>) to obtain the recommended minimum dry film thickness noted in this section.

**4.4.2.2 Use on Attic Floors:** JM Corbond MCS™ spray-applied foam insulation may be installed at a maximum thickness of 8 inches (203 mm) between and over the joists in attic floors. All exposed foam plastic surfaces must be covered with a minimum nominal thickness of 5 dry mils (0.13 mm) [10 wet mils] of JM IB intumescent coating applied as described in Section 4.4.2.1, at a rate of 0.6 gallon (2 L) per 100 square feet (9.3 m<sup>2</sup>).

### 4.5 Exterior Walls of Type I, II, III and IV Construction:

**4.5.1 General:** When used on exterior walls of Type I, II, III and IV construction, the wall assembly must comply with Section 2603.5 of the IBC and this section (Section 4.5), and the insulation must be installed at a maximum thickness of 3 inches (76 mm). The potential heat of the JM Corbond MCS™ insulation is 1992 Btu/ft<sup>2</sup> (22.7 MJ/m<sup>2</sup>) per inch of thickness when tested in accordance with NFPA 259.

**4.5.2 Interior Face:** One layer of  $\frac{5}{8}$ -inch-thick (15.9 mm), Type X gypsum wallboard complying with ASTM C 36 or ASTM C 1396 is installed with the long dimension perpendicular to  $3\frac{5}{8}$ -inch deep (92 mm), No. 25 gage, C-shaped steel studs spaced a maximum of 24 inches (610 mm) on center. The wallboard must be attached with No. 6,  $1\frac{1}{4}$ -inch-long (31.8 mm), self tapping screws located 8 inches (203 mm) on center along the perimeter and in the field of the wallboard. Gypsum wallboard joints must be taped and treated with joint compound in accordance with ASTM C 840 or GA-216. Fastener heads must be treated with joint compound in accordance with ASTM C 840 or GA-216.

**4.5.3 Exterior Face:** One layer of  $\frac{1}{2}$ -inch-thick (12.7 mm), Georgia Pacific Gypsum Corporation DensGlass® Gold Fireguard Type X exterior sheathing, is installed using No. 6,  $1\frac{1}{4}$ -inch-long (32 mm) bugle head screws. The screws are spaced 8 inches (203 mm) on center around the perimeter and in the field. JM Corbond MCS™ spray-applied polyurethane foam plastic insulation is spray-applied to the exterior side of the DensGlass® Gold Fireguard Type X exterior sheathing to a maximum depth of 3 inches (76 mm).

**4.5.4 Exterior Wall Covering:** Exterior veneer must be 4-inch-thick (102 mm) standard clay brick with a minimum 1-inch (25.4 mm) air gap between the brick and the foam plastic insulation. The exterior veneer is attached with Hohmann & Barnard X-Seal™ anchors, with VB Vee Byna ties, using 5-inch-long, zinc-coated, hex head self drilling screws spaced 16 inches (406 mm) on center and secured to the steel studs.

## 5.0 CONDITIONS OF USE

The JM Corbond MCS™ 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** The products must be installed in accordance with the manufacturer's published installation instructions, this evaluation report and the applicable code. If there are any conflicts between the manufacturer's published installation instructions and this report, this report governs.
- 5.2** The insulation must be separated from the interior of the building by an approved 15-minute thermal barrier in accordance with IBC Section 2603.4 or IRC section R316.4, except when installation is as described in Sections 4.3.2 and 4.4.2. A thermal barrier must be installed between the insulation and the interior space above (crawl space) or below (attic).
- 5.3** The insulation must not exceed the thicknesses noted in Sections 3.2, 4.3, 4.4 and 4.5.
- 5.4** The insulation must be protected from exposure to weather during and after application.
- 5.5** 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.
- 5.6** When use is on exterior walls of buildings of Types I, II, III and IV, construction must be as described in Section 4.5.
- 5.7** The insulation must be applied by installers certified by Johns Manville Corporation or by the Spray Polyurethane Foam Alliance (SPFA) for the spray polyurethane foam insulation.
- 5.8** Use of insulation 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.

- 5.9** The insulation components are produced in Belgrade, Montana, 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 2011; including reports of tests in accordance with AC377 Appendix X.
- 6.2** Reports of air permeance testing in accordance with ASTM E 283.
- 6.3** Reports of vapor permeance testing in accordance with ASTM E 96.
- 6.4** Reports of room corner fire testing in accordance with NFPA 286.
- 6.5** Reports of potential heat testing in accordance with NFPA 259.
- 6.6** Reports of fire propagation characteristics testing in accordance with NFPA 285.

## 7.0 IDENTIFICATION

Components for JM Corbond MCS™ spray-applied foam plastic insulation are identified with the manufacturer's name (Johns Manville) and address, the product name, the name of the inspection agency (Intertek Testing Services NA, Inc.), mixing instructions, the flame-spread and smoke-developed indices, the expiration date, and the evaluation report number (ESR-3159).

Intumescent coatings are identified with the company name and address, the product name and use instructions.

## 8.0 OTHER CODES

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

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

- **Application with a Prescriptive Thermal Barrier:** See Section 4.3.1, except the installation must be in accordance with Section R314.4 of the 2006 IRC.
- **Application with a Prescriptive Ignition Barrier:** See Section 4.4.1, except installation must be in accordance with Sections R314.4.3 and R314.5.4 of the 2006 IRC.
- **Application without a Prescriptive Ignition Barrier:** See Section 4.4.2, except attics must be vented in accordance with Section 1203.2 of the 2006 IBC or Section R806 of the 2006 IRC; and crawl space ventilation must be in accordance with Section 1203.3 of the 2006 IBC or Section R408 of the 2006 IRC, as applicable.
- **Jobsite Certification and Labeling:** See Section 5.5, except jobsite certification and labeling must comply with Sections 303.1.1. and 303.1.2, as applicable, of the 2006 IECC.
- **Protection Against Termites:** See Section 5.8, 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.

TABLE 1—THERMAL RESISTANCE (R-VALUES)<sup>1,2</sup>

THICKNESS (inches)	R-VALUE (°F.ft <sup>2</sup> .h/Btu)
1.0	6.3
1.5	9.4
2.0	13
3.5	22
4.0	25
5.5	35
7.25	46
9.25	59
9.5	60
10.0	63
11.25	71

For **SI**: 1 inch =25.4 mm; 1°F.ft<sup>2</sup>.h/Btu = 0.176 °K.m<sup>2</sup>/W.

<sup>1</sup>R-values are calculated based on test values at a 1-inch and 4-inch thicknesses.

<sup>2</sup>R-values greater than 10 are rounded to the nearest whole number.