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# Code Compliance Research Report CCRR-1079

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## DIVISION: 07 00 00 – THERMAL AND MOISTURE PROTECTION

### Section: 07 21 00 – Thermal Insulation

#### REPORT HOLDER:

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#### REPORT SUBJECT:

JM Corbond® oc SPF Open-Cell Spray-Applied Polyurethane Foam Insulation

### 1.0 SCOPE OF EVALUATION

This Research Report addresses compliance with the following Codes:

- 2015, 2012, and 2009 *International Building Code®* (IBC)
- 2015, 2012, and 2009 *International Residential Code®* (IRC)
- 2015, 2012, and 2009 *International Energy Conservation Code®* (IECC)

JM Corbond® oc SPF Open-Cell Spray-Applied Polyurethane Foam Insulation has been evaluated for the following properties:

- Physical properties
- Surface-burning characteristics
- Thermal resistance
- Air permeability
- Alternatives to thermal barriers
- Alternatives to ignition barriers
- Use in Types I, II, III and IV construction
- Use in Type V construction

See Table 1 for applicable Code sections related to these properties.

NOTE: This report references 2015 Code sections with [2012] and [2009] Code sections shown in brackets where they differ.

### 2.0 USES

#### 2.1 JM Corbond® oc SPF:

JM Corbond® oc SPF insulation is intended for use as a nonstructural thermal insulating material on or in interior and exterior walls, floors, and the underside of roofs, in all types of construction under the IBC and dwellings under the IRC.

When used in exterior walls of Types I, II, III, or IV construction, the construction must be as described in Section 4.5.

Under the IRC, the insulation may be used as air-impermeable insulation as described in Section 3.2.3.

The insulation may be used in attics and crawl spaces without the use of a prescriptive ignition barrier when installed as described in Section 4.4.2. The insulation may be applied without the use of a prescriptive thermal barrier when installed as described in Section 4.3.2.

Use of the insulation in fire-resistance-rated construction is outside the scope of this report.

### 3.0 DESCRIPTION

#### 3.1 Materials:

**3.1.1 Insulation:** JM Corbond® oc SPF is a two-component, open-cell, spray-applied polyurethane foam plastic insulation. The insulation is produced in the field by professional contractors combining an isocyanate component "A" with a proprietary resin component "B", resulting in a product having a nominal density of 0.5 pcf.

The "A" component has a shelf life of 12 months and the "B" component has a shelf life of 6 months, both when stored in factory-sealed containers at temperatures between 50°F and 85°F.

#### 3.1.2 Intumescent Coatings:

**3.1.2.1 TPR<sup>2</sup> FIRESHIELD® JM-IC/JM-TC Coating:** TPR<sup>2</sup> FIRESHIELD® JM-IC and JM-TC intumescent coatings are a proprietary, water-based, one-part, coating manufactured by TPR<sup>2</sup> Corporation. The coatings are supplied in 5-gallon pails and 55-gallon drums, and have a shelf life of 12 months when stored in factory-sealed containers at temperatures above 45°F.

**3.1.2.2 TPR<sup>2</sup> FIRESHELL® IB4/F10E/TB Coating:**

TPR<sup>2</sup> FIRESHELL® IB4/F10E/TB intumescent coatings are proprietary, water-based, one-part, coatings manufactured by TPR<sup>2</sup> Corporation. FIRESHELL® IB4 is identical to FIRESHELL® JM-IC, and FIRESHELL® F10E/TB is identical to FIRESHELL® JM-TC. The coatings are supplied in 5-gallon pails and 55-gallon drums, and have a shelf life of 12 months when stored in factory-sealed containers at temperatures above 45°F.

**3.1.2.3 DC315 Intumescent Coating:**

DC315 intumescent coating, manufactured by International Fireproof Technology Inc., is a single-component, water-based, liquid-applied intumescent coating. The coating is supplied in 5-gallon pails and 55-gallon drums, and has a shelf life of 12 months when stored in factory-sealed containers at temperatures between 50°F and 80°F.

**3.2 Performance Characteristics:****3.2.1 Surface Burning Characteristics:**

JM Corbond® oc SPF has a flame-spread index of 25 or less and a smoke-developed index of 450 or less, when tested in accordance with ASTM E84 at a nominal thickness of 4 in. JM Corbond® oc SPF may be installed at greater thicknesses as described in Sections 4.3 and 4.4 of this report. When the insulation is separated from the interior living space of the building with minimum 1/2 in. thick gypsum board, the maximum thickness is not limited. Under the 2015 IRC, a prescriptive thermal barrier of minimum 23/32 in. thick wood structural panel is also permitted and the thickness is not limited.

**3.2.2 Thermal Resistance:** JM Corbond® oc SPF has thermal resistance (*R*-values) at a mean temperature of 75°F as shown in Table 2.

**3.2.3 Air Permeability:** JM Corbond® oc SPF, at a minimum thickness of 3-3/4 in., is considered air-impermeable insulation in accordance with 2015 IBC Section 1203.3 [not applicable under the 2012 and 2009 IBC] or IRC Section R806.5 [2009 - R806.4], based on testing in accordance with ASTM E2178.

**4.0 INSTALLATION****4.1 General:**

The insulation must be installed in accordance with the manufacturer's published installation instructions, the applicable Code, and this Research Report. The manufacturer's published installation instructions and this Research Report must be strictly adhered to, and a

copy of the instructions must be available on the jobsite during installation.

**4.2 Application:**

The insulation is spray-applied on the jobsite using plural-component metering and processing equipment as recommended in the manufacturer's published installation instructions. The insulation must not be used in areas that have a maximum continuous service temperature greater than 180°F or in contact with heat-producing appliances. The foam plastic insulation must not be used in electrical outlet or junction boxes. The substrate must be free of moisture, frost or ice, loose scales, rust, oil, and grease or other surface contaminants. The insulation must be protected from the weather during and after application. The insulation can be installed in multiple passes, up to 12 in. per pass, to the maximum specified thickness. Multiple passes can be applied to obtain the desired thickness. Refer to the manufacturer's installation instructions for appropriate expansion and cure times between passes.

**4.3 Thermal Barrier:****4.3.1 Application with a Prescriptive Thermal Barrier:**

JM Corbond® oc SPF must be separated from the interior of the building by an approved thermal barrier, such as minimum 1/2 in. gypsum wallboard, installed using mechanical fasteners in accordance with applicable Code, or an equivalent 15-minute thermal barrier complying with IBC Section 2603.4 or IRC Section R316.4, as applicable, with exceptions as described in Sections 4.3.2 and 4.4, or when applied to a sill plate or header in dwellings under the IRC at a maximum insulation thickness of 3-1/4 in. as permitted by IRC Section R316.5.11. When the insulation is separated from the interior living space of the building with prescriptive thermal barrier, such as minimum 1/2 in. thick gypsum board or 23/32 in. thick wood structural panels, the maximum thickness is not limited.

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

JM Corbond® oc SPF may be spray-applied to the interior surface of walls, the underside of roof sheathing, and in crawl spaces without the 15-minute thermal barrier prescribed in the IBC Section 2603.4 and IRC Section R316.4, when all surfaces of the JM Corbond® oc SPF insulation are covered with FIRESHELL® JM-TC, FIRESHELL® F10E, FIRESHELL® TB, or DC315 intumescent coating as follows:

- FIRESHELL® JM-TC: Minimum application of 18 mil wet film thickness (12 mil dry film)

- FIRESHELL® F10E/TB: Minimum application of 18 mil wet film thickness (12 mil dry film)
- DC315: Minimum application of 18 mil wet film thickness (12 mil dry film)

The insulation and coating may be left exposed as an interior finish without the prescriptive thermal or ignition barrier.

The coating must be applied when ambient and substrate temperatures are above 50°F and less than 70% relative humidity, unless otherwise permitted by the coating manufacturer's installation instructions. Surfaces to be coated must be clean, dry, and free of loose dirt, loose debris, and any other substances that could interfere with the adhesion of the coating.

#### 4.4 Attics and Crawl Spaces:

**4.4.1 Application with a Prescriptive Ignition Barrier:** When JM Corbond® oc SPF 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 that the foam plastic insulation is not exposed. The insulation, as specified in this section may be installed in unvented attics and unvented enclosed rafter assemblies in accordance with 2015 IBC Section 1203.3 or IRC Section R806.5.

**4.4.2 Application without a Prescriptive Ignition Barrier:** JM Corbond® oc SPF insulation may be installed in an attic or crawl space without the prescriptive ignition barrier described in IBC Section 2603.4.1.6 and IRC Sections R316.5.3 and R316.5.4, as described in Section 4.4.2.1 or 4.4.2.2, when all of the following conditions are met and as described in Section 4.4.2.3 when conditions a. through c. and condition f. are met:

- Entry to the attic or crawl space is only for the service of 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.
- Attic ventilation is provided when required by IBC Section 1203.2 or IRC Section R806, except air-impermeable insulation is permitted in unvented attics in accordance with 2015 IBC Section 1203.3 or IRC Section R806.5 [2009 -R806.4].
- Under-floor (crawl space) ventilation is provided when required by IBC Section 1203.4 [1203.3] or IRC Section R408.1, as applicable.
- Combustion air is provided in accordance with IMC (*International Mechanical Code*®) Section 701.

**4.4.2.1 Attics and Crawl Spaces:** In attics, the insulation may be spray-applied to the underside of roof sheathing or roof rafters, and/or vertical surfaces, provided the assembly conforms to one of the assemblies described in Table 3. In crawl spaces, the insulation may be spray-applied to the underside of floors and/or vertical surfaces provided the assembly conforms to one of the assemblies described in Table 3. When an intumescent coating is used, 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 intumescent coating must be applied to all surfaces in accordance with the respective coating manufacturer's installation instructions. The coating must be applied when ambient and substrate temperatures are above of 50°F and less than 70% relative humidity, unless otherwise permitted by the intumescent coating manufacturer's installation instructions. The insulation may be installed in unvented attics as described in this section and in accordance with 2015 IBC Section 1203.3 or IRC Section R806.5 [2009 - R806.4] at a minimum thickness of 3-3/4 in.

**4.4.2.2 Use on Attic Floors:** When installed on the attic floor only, JM Corbond® oc SPF insulation is approved for exposed (without a protective covering) installation in attic floors up to a maximum thickness of 16 in. The ignition barrier described in IBC Section 2603.4.1.6 or IRC Section R316.5.3 is not required.

**4.4.2.3 Unvented Attics:** Johns Manville has conducted end-use configuration testing (per IBC Section 2603.9 [2603.10] and IRC Section R316.6), and analysis to qualify the use of JM Corbond® oc SPF insulation without a prescriptive ignition barrier or intumescent coating in unvented attics conforming with 2015 IBC Section 1203.3 or IRC Section R806.5 [2009 – R806.4]. (Note that unvented attics were not addressed in the 2012 and earlier versions of the IBC). The testing and analysis is described in Priest & Associates EEV 10409 Revision 1, dated December 20, 2016. The conclusions of that evaluation are as follows: When JM Corbond® oc SPF is applied in unvented attics conforming to IBC Section 1203.3 or IRC Section R806.5 [2009 – R806.4], the insulation may be applied to the underside of roof sheathing and/or rafters, and to vertical surfaces to a minimum thickness of 3-3/4 in. Rafters may be left without foam coverage or may be covered with foam up to the

maximum thickness allowed. Maximum thickness on the underside of roof sheathing or on vertical wall surfaces is 16 in. The insulation may be left exposed to the attic without a prescriptive ignition barrier or an intumescent coating. The attic must have attic access complying with IRC Section R807, horizontally placed in the attic floor, and opening outward toward the living space. For items penetrating the roof deck or walls, such as skylight wells or vents, all surfaces of the penetrating item exposed in the attic must be covered with a minimum of 3-3/4 in. of JM Corbond® oc SPF insulation.

#### 4.5 Exterior Walls In Types I, II, III, and IV Construction:

JM Corbond® oc SPF insulation may be installed in or on the interior side of exterior walls of buildings of Types I, II, III, and IV construction complying with IBC Section 2603.5 and as described in this section. The potential heat of JM Corbond® oc SPF is 557 Btu/ft<sup>2</sup> per in. of thickness. The tested wall assembly was extended through a third-party engineering analysis to include additional wall constructions described in Table 4.

#### 5.0 CONDITIONS OF USE

The JM Corbond® oc SPF spray-applied polyurethane foam insulation described in this Research 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** Installation must comply with this Research Report, the manufacturer's published installation instructions, and the applicable Code. In the event of a conflict between the manufacturer's 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 as described in Section 4.3.1, except as described in Sections 4.3.2 and 4.4.

**5.3** The installed thickness must not exceed that noted in Sections 3.2, 4.3, 4.4, and 4.5.

**5.4** The insulation must be protected from the weather during and after application.

**5.5** A vapor retarder must be installed in accordance with the applicable Code.

**5.6** The insulation must be applied by professional spray polyurethane foam installers approved by Johns

Manville or by the Spray Polyurethane Foam Alliance (SPFA) for the installation of spray polyurethane foam insulation.

**5.7** When JM Corbond® oc SPF insulation is installed under the conditions of Section 4.4.2.1 of this report, the following conditions apply:

**5.7.1** Since the performance of JM Corbond® oc SPF, when installed in unvented attics without a Code-prescribed ignition barrier or an intumescent coating, is based on fire performance of an unvented attic, the installation must be approved by the Code official. The installation must conform with the provisions of Section 4.4.2.3, and conditions a. through c., and condition f. of Section 4.4.2. A copy of the Priest & Associates Engineering Evaluation (referenced in Section 6.4) must be provided to the Code official upon request.

**5.7.2** Signage shall be permanently affixed in the attic and shall be visible from all points within the attic. The sign shall state *"Caution, this is an unvented attic by design. No modification may be made to this unvented condition. The attic shall not be vented. Holes into the unvented attic shall be immediately repaired and sealed. Penetrations of the ceiling or wall membrane between the unvented attic and living space, other than the horizontal access hatch, must be protected in an approved manner. This unvented attic shall not be used for storage. See Intertek Code Compliance Research Report CCR-1079 on the [Intertek Website](#)."*

**5.8** Use of the insulation in fire-resistance-rated construction in outside the scope of this report.

**5.9** Use of the insulation in areas where the probability of termite infestation is "very heavy" must be in accordance with IBC Section 2603.8 [2012 - 2603.9] [2009 - 2603.8] or IRC Section R318.4, as applicable.

**5.10** Jobsite certification and labeling of the insulation must comply with IRC Section N1101.10 [2012 - N1101.12] [2009 - N1101.4] and IECC Sections C303.1 or R303.1 [2009 - 303.1], as applicable.

**5.11** The insulation components are manufactured in Belgrade, Montana under a quality control program with inspection by Intertek Testing Services NA, Inc. (AA-647).

#### 6.0 SUPPORTING EVIDENCE

**6.1** Reports of tests in accordance with ASTM C518, ASTM D1622, ASTM D1623, ASTM D2126, ASTM D6226, ASTM E84, ASTM E2178, NFPA 259, NFPA 285, and NFPA 286.

**6.2** Data in accordance with the ICC-ES Acceptance Criteria for Spray-Applied Foam Plastic Insulation (AC377), dated April 2016, including reports of tests in accordance with Appendix X.

**6.3** Jensen Hughes letter, dated June 26, 2015 Re: Project 1AJP00150.000.

**6.4** Priest & Associates Engineering Evaluation 10409 Revision 1, dated December 20, 2016, entitled "For Inclusion of Johns Manville's JM Corbond® oc SPF Insulation in Unvented Attics without an Ignition Barrier in Intertek CCRR."

## 7.0 IDENTIFICATION

Each container of components A and B of the insulation bears a label with the Johns Manville name and address; the product name; the flame-spread and smoke-developed indices; the expiration date, the Intertek Mark; and the Research Report number (CCRR-1079). Intumescent coatings are identified with the manufacturer's name and address, the product trade name and use instructions.

## 8.0 OTHER CODES

This section does not apply.

## 9.0 CODE COMPLIANCE RESEARCH REPORT USE

**9.1** Approval of building products and/or materials can only be granted by a building official having legal authority in the specific jurisdiction where approval is sought.

**9.2** Code Compliance Research Reports shall not be used in any manner that implies an endorsement of the product by Intertek.

**9.3** Reference to the <https://bpdirectory.intertek.com> is recommended to ascertain the current version and status of this report.

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TABLE 1 – PROPERTIES EVALUATED

PROPERTY	IBC SECTION <sup>1</sup>	IRC SECTION <sup>1</sup>	IECC SECTION <sup>1</sup>
Physical properties	Not required	Not required	Not required
Surface-burning characteristics	2603.3	R316.3	Not applicable
Alternative to thermal barrier/ignition barrier	2603.4	R316.4	Not applicable
Air permeability	1203.3 [1301]	R806.5 [2009 - R806.4]	C402.4 R402.4
Exterior walls in Types I-IV construction	2603.5	Not applicable	Not applicable
Thermal resistance	1301	N1101.10 N1102 [N1101.1, N1101.12]	C303.1.1 C303.1.4 R303.1.1 R30301.4 [303.1]

<sup>1</sup> Section numbers in parentheses refer to the 2012 and 2009 Codes, if different.

TABLE 2 – THERMAL RESISTANCE<sup>1,2</sup>

THICKNESS (in.)	JM Corbond® oc SPF R-VALUE (°F·ft <sup>2</sup> ·hr/Btu)
1	3.8
2	7.4
3	11
3.5	13
4	14
5	18
5.5	20
6	22
7	25
7.25	26
8	29
9	33
9.25	33
10	36
11.25	41
12	43
16	58

<sup>1</sup> R-values are calculated based on the test K-values at 1 and 3.5 in. thicknesses.

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

TABLE 3 – USE OF INSULATION IN ATTICS AND CRAWL SPACES WITHOUT A PRESCRIPTIVE IGNITION BARRIER

INSULATION TYPE	MAXIMUM THICKNESS (in.) (Wall Cavities and Attic Floor)	MAXIMUM THICKNESS (in.) (Underside of Roof Sheathing/Rafters and Floors)	INTUMESCENT COATING, MINIMUM THICKNESS & TYPE (Applied to all Exposed Foam Surfaces)	MINIMUM APPLICATION RATE OF INTUMESCENT COATING	TEST SUBMITTED (AC377)
JM Corbond® oc SPF	7-1/2	9-1/2	FIREHELL® JM-IC 4 mil wet film thickness (3 mil dry film)	0.27 gal / 100 ft²	Appendix X
	7-1/2	9-1/2	FIREHELL® IB4 4 mil wet film thickness (3 mil dry film)	0.27 gal / 100 ft²	Appendix X
	9-1/2	11-1/2	DC315 4 mil wet film thickness (3 mil dry film)	0.25 gal / 100 ft²	Appendix X

TABLE 4 – NFPA 285 COMPLYING WALLS – JM Corbond® oc SPF IN INTERIOR WALL CAVITY

Wall Component	Materials
Base wall system – Use either 1, 2 or 3	1 - Concrete wall 2 - Concrete Masonry wall 3 - One layer of 5/8 in. thick Type X gypsum wallboard installed on the interior side of minimum 3-5/8 in. deep, minimum 20 GA thick steel studs spaced a maximum of 24 in. on center. Lateral bracing installed minimum every 4 ft. vertically or as required. Wall stud cavities shall be filled at each floor line with minimum 4 pcf mineral wool (e.g. Thermafiber) friction fit between steel wall studs
Perimeter Fire Barrier System	Perimeter fire barrier system complying with IBC Section 715.4 [714.4] shall be installed, as applicable, to fill the void between the edge of the concrete floor slab and the interior surface of the exterior wall assembly
Wall Cavity Insulation	Full wall stud cavity depth or less of JM Corbond® oc SPF applied using exterior gypsum sheathing as the substrate and covering the width of the cavity and the inside of the steel wall stud framing flange
Exterior sheathing	5/8 in. thick Type X exterior type gypsum sheathing complying with ASTM C1177
Exterior Wall Covering – Use either 1, 2, or 3 (See Note 3)	1 - Any non-combustible exterior wall covering material using any standard installation technique 2 - Any non-combustible exterior wall covering system with a combustible WRB that has successfully been tested in accordance with NFPA 285 3 - Any combustible exterior wall covering system with or without a combustible WRB that has been successfully been tested in accordance with NFPA 285
Flashing of window, door, and other exterior wall penetrations.	As an option, flash around window, door, and other exterior penetrations with limited amounts of maximum 12 in. wide flashing tape (acrylic, asphalt, or butyl-based) or liquid applied membrane material with or without fiber mesh reinforcement

**Note 1:** Fireblocking per IBC Section 718 [717] and thermal barrier material requirements must be met for Base Wall Systems 1 and 2, as required by specific wall construction details when combustible concealed space is created on interior side of exterior wall assembly.

**Note 2:** Combustible exterior wall coverings shall be installed in accordance with manufacturer's requirements.