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JM NO MIX OPEN CELL (NMOC)

CSI Section:
07 21 00 Thermal Insulation

1.0 RECOGNITION

Johns Manville's JM No Mix Open Cell (NMOC) spray polyurethane foam plastic insulation recognized in this report has been evaluated for use as spray foam insulation complying with IBC Section 2603, IRC Section R316, IECC Sections C303, C402, R303, and R402. The surface burning, physical properties, and thermal resistance of JM NMOC comply with the intent of the provisions of the following codes and regulations:

- 2024, 2021, 2018, and 2015 International Building Code® (IBC)
- 2024, 2021, 2018, and 2015 International Residential Code® (IRC)
- 2024, 2021, 2018, and 2015 International Energy Conservation Code® (IECC)

2.0 LIMITATIONS

Use of JM NMOC recognized in this report is subject to the following limitations:

2.1 The insulation shall be installed in accordance with the manufacturer's published installation instructions, and also this evaluation report and the applicable codes, and if there are any conflicts between the manufacturer's published installation instructions and this report, the more restrictive governs.

2.2 The insulation shall be separated from the interior of the building by a code approved thermal barrier.

2.3 During installation, the insulation and the surfaces to which it is applied shall be protected from exposure to weather.

2.4 The contractors that will be installing the insulation shall be approved by Johns Manville or by the Spray Polyurethane Foam Alliance.

2.5 Use of the insulation in areas of "very heavy" termite infestation shall be in accordance with the IBC Section 2603.8, 2024 IRC Section 305.4, or 2021, 2018, or 2015 IRC Section 318.4, as applicable.

2.6 Labeling and jobsite certification of the insulation and coatings shall comply with IBC Section 2603.2, IRC Sections N1101.10 and N1101.10.1.1, and IECC Sections C303.1.1 and C303.1.2, as applicable.

2.7 Foam plastic used in plenums as interior finish or interior trim shall comply with Section 2603.7 of the IBC.

3.0 PRODUCT USE

3.1 General: When installed in accordance with Section 3.3 of this report, JM NMOC spray foam insulation can be used in wall cavities, floor assemblies or ceiling assemblies, and in attic and crawl spaces as nonstructural thermal insulation material. The spray-applied foam plastic insulation is used in Type V construction under the IBC and in dwellings under the IRC.

3.2 Design: JM NMOC spray foam insulation shall comply with requirements in IECC Sections C402.1 and R402.

3.2.1 Thermal Resistance (R-Values): JM NMOC spray foam insulation has a thermal resistance (R-Value) at a mean temperature of 75°F (24°C) as shown in Table 1 of this report.

TABLE 1
Thermal Resistance (R-Value) [1, 2]
(°F·ft²·h/BTU)

Thickness (inch)	R-Value
	JM NMOC
1	3.9
2	7.7
3	11
3.5	13
4	15
5	19
5.5	21
6	23
7	27
7.25	28
8	30
9	34
9.25	35
10	38
11	42
12	46
14	53
16	61

For **SI:** 1 inch = 25.4 mm, 1°F·ft²·h/Btu = 0.176 110 K·m²/W.
[1] *R*-Values are calculated based on tested *K* values at 1-inch and 3.5-inch thicknesses.
[2] *R*-Values greater than 10 are rounded to the nearest whole number.

3.2.2 Surface Burning Characteristics: At a maximum thickness of 4 inches (102 mm) and a nominal density of 0.5 pcf (16 kg/m^3), JM NMOC spray foam insulation 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.

3.2.3 Vapor Permeance: JM NMOC, when tested in accordance with the ASTM E96 desiccant method (Procedure A), has a permeance of less than 10 perms (574 x 10^9 g/Pa·s·m), at a minimum thickness of 3½ inches (76 mm) and qualifies as a Class III vapor retarder in accordance with IBC Section 202 and IRC Section R202.

3.2.4 Air Permeability: JM NMOC spray foam insulation is classified as an air-impermeable insulation when tested in accordance with ASTM E283 at a minimum thickness of $3^1/_2$ inches (89 mm) in accordance with 2024, 2021, and 2018 IBC Section 1202.3; 2015 IBC Section 1203.3; and IRC Section R806.5.

3.3 Installation

3.3.1 Installation General: The manufacturer's published installation instructions for JM NMOC spray foam insulation and this report shall be available and strictly adhered to at all times on the jobsite during installation.

The spray foam insulation shall be spray-applied on the jobsite using a volumetric positive displacement pump in accordance with the manufacturer's published installation instructions. JM NMOC shall be sprayed in multiple passes having a maximum thickness of 6 inches (152 mm) maximum per pass up to the maximum insulation thickness specified in this report.

The maximum in-service temperature for all areas shall not exceed 180°F (82°C). The spray-applied foam plastic insulation shall not be used in electrical outlets or junction boxes or in continuous contact with rain or water. The spray-applied foam plastic insulation shall be sprayed onto a substrate that is protected and clean from any debris or weather-related conditions during application.

3.3.2 Thermal Barrier

3.3.2.1 Installation with a Prescriptive Thermal Barrier: JM NMOC spray foam insulation shall be separated from the interior by an approved thermal barrier of minimum ½-inch-thick (12.7 mm) gypsum wallboard or an equivalent thermal barrier. When installed in accordance with this section, the spray foam may be any thickness when installed behind a prescriptive thermal barrier. The barrier shall comply with and be installed in accordance with IBC Section 2603.4 or IRC Section R316.4, as applicable.

3.3.2.2 Alternative Thermal Barrier Assemblies: JM NMOC spray foam insulation may be installed without a prescriptive thermal barrier as defined in Section 3.3.2.1 of this report when installed with a fire-protective coating as described in Table 3 of this report.

3.3.3 Installation for Attics and Crawl Spaces

3.3.3.1 General: When used in an attic or crawl space where entry is made only for service of utilities, JM NMOC spray foam insulation shall be installed in accordance with this section. The insulation shall be separated from the interior of the building by an approved thermal barrier as described in Sections 3.3.2 of this report.

3.3.3.2 Installation with a Prescriptive Ignition Barrier: Where entry is made only for the service of utilities, JM NMOC spray foam insulation may be installed within attics or crawl spaces with an ignition barrier in accordance with IBC Section 2603.4.1.6, 2024 IRC Sections 303.5.3 or 303.5.4, or 2021, 2018, or 2015 IRC Sections R316.5.3 or R316.5.4, as applicable. The ignition barrier shall be installed in a manner such that the foam plastic insulation is not exposed and is consistent with the requirements of the type of construction required by the applicable code.

3.3.3.3 Installation in Attics and Crawl Spaces Using an Alternative Ignition Barrier Assembly: JM NMOC spray-applied polyurethane foam plastic insulation may be installed in attics and crawl spaces without a prescriptive ignition barrier or fire-protective coating provided:

a. Entry is only to service utilities and no storage is permitted.
b. Attic or crawl space areas cannot be interconnected.
c. Air from the attic or crawl space cannot be circulated to other parts of the building.
d. Attic ventilation is provided as required by 2024, 2021, and 2018 IBC Section 1202.2, and 2015 IBC Section 1203.2, or IRC Section R806 except where air-impermeable insulation is permitted in unvented attics and shall comply with the following code sections as applicable:

   For Unvented Attics:
   - 2024, 2021, and 2018 IBC Section 1202.3
   - 2015 IBC Section 1203.3
   - IRC Section R806.5

   Ventilated crawl spaces shall be provided with ventilation as required by the following code sections as applicable:
   - 2024, 2021, and 2018 IBC Section 1202.4
   - 2015 IBC Section 1203.4
   - IRC Section R408.1

e. JM NMOC spray-applied polyurethane foam plastic insulations may be applied at a nominal density of 0.5 pcf (8.0 kg/m^3) to the underside of roof sheathing or roof rafters and vertical surfaces of attics and in crawl spaces without a prescriptive ignition barrier when meeting the requirements of Table 2 of this report.

f. Combustion air is provided in accordance with the UMC Chapter 7, NFPA 31, or IMC Section 701.

3.3.3.4 Unvented Attics

3.3.3.4.1 General: JM NMOC spray foam insulation may be installed in unvented attic assemblies and unvented enclosed rafter assemblies in accordance with Section 1202.3 of the 2024, 2021, or 2018 IBC, Section 1203.3 of the 2015 IBC, or Section R806.5 of the IRC, as applicable. The attic shall be protected as required in Sections 3.3.3.2, 3.3.3.3, or 3.3.3.4 as applicable.

3.3.3.4.2 Installation without Prescriptive Ignition Barrier or Coating: JM NMOC spray foam insulation, when installed in unvented attics at a maximum thickness of 14 inches (356 mm) on wall cavities and 14 inches (356 mm) on ceiling joists and a minimum thickness of 3½ inches on walls and ceilings (89 mm), is not required to be installed with a prescriptive ignition barrier or alternative ignition barrier assembly as required in Section 3.3.3 of this report when meeting the following limitations:

- The insulation shall be separated from the interior of the building by an approved thermal barrier as described in Section 3.3.2 of this report.
- Entry to the attic is for the service of utilities only and no storage is permitted.
- There are no interconnected attic areas.
- Air from the attic is not circulated to other parts of the building.
- Combustion air is provided in accordance with IMC Section 701.
- When welding, cutting, or heating are performed in the vicinity of combustible materials, all necessary requirements for fire prevention procedures, precautions, and limitations shall be in accordance with OSHA 1926 Subpart J Standard 1926.352.
- A downward opening hatch shall be required. The hatch shall always remain closed except for when servicing of utilities is required. The hatch shall be able to be opened freely without disengaging a latching or locking mechanism.

Information shall be provided to the local building official to show that the maximum uniform pressure required to open the downward opening attic hatch shall be less than or equal to 10 psf.

3.3.4 Installation Certificate: When meeting installation as required in Sections 3.3.3.3 or 3.3.3.4.2 of this report, an installation certificate shall be posted at each entrance to the attic or crawlspace, as applicable. The certificate shall be made of durable materials and red in color. The installation certificate shall include the following information:

- JM NMOC spray foam insulation product name and installation thickness.
- Johns Manville's name, address, and contact information, as applicable.
- If a coating is used as shown in Section 3.3.3 and Table 2 of this report, the coating product name, installation rate, wet and dry film thickness shall be shown as applicable.
- Installation contractor name, address, and contact information.
- Attestation that the spray foam has been installed in accordance with the manufacturer's installation instructions and the requirements of this report.
- A notice that the certificate shall not be removed or altered.
- A notice that entry to the space is only to service utilities, and no storage is permitted.
    - When meeting the requirements of Section 3.3.3.4.2 of this report, notification that the hatch shall always remain closed, except for when servicing of utilities is required. No lock or latches that would prevent the hatch from opening freely may be added to the hatch.
    - **FIRE SAFETY WARNING:** If hot work (welding/cutting) is required to be performed, all necessary procedures, precautions, and limitations shall be observed in accordance with OSHA 1926 Subpart J Standard 1926.352-Fire Prevention, in the vicinity of combustible materials.
    - When meeting the requirements of Section 3.3.3.4.2 of this report, a notification that the space has been designed and constructed / installed as an unvented attic assembly; introduction of any penetrations to the exterior or alterations to the insulation shall be designed by a registered design professional. The design of the change shall be submitted to the local building official for approval, as required by the local jurisdiction.

3.4 One-hour, Fire-resistance-rated, Limited Load-bearing Wall Assembly: JM NMOC spray foam insulation may be used as part of a limited load-bearing, 1-hour, fire-resistance-rated wall assembly when installed in accordance with Table 4 of this report. The assembly is recognized as meeting ASTM E119 and UL 263 fire-resistance ratings from both the interior and exterior.

3.5 Two-hour, Fire-resistance-rated, Limited Load-bearing Wall Assembly: JM NMOC spray foam insulation may be used as part of a limited load-bearing, 1-hour, fire-resistance-rated wall assembly when installed in accordance with Table 5 of this report. The assembly is recognized as meeting ASTM E119 and UL 263 fire-resistance ratings from both the interior and exterior.

3.6 Use in Exterior Walls of Types I, II, III, and IV Construction (IBC)

3.6.1 General: When JM NMOC spray foam insulation is used in exterior walls of Types I, II, III, or IV construction of

any height, the insulation shall comply with IBC Section 2603.5 and Section 3.4. Walls required to be fire-resistance-rated construction are beyond the scope of this report and shall comply with IBC Section 2603.5.1.

3.6.2 Complying Exterior Wall Assemblies: Wall assemblies that comply with Section 2603.5 of the IBC and this report that may be used in exterior walls of buildings of Type I, II, III, or IV construction of any height are described in Table 6 of this report.

4.0 PRODUCT DESCRIPTION

JM NMOC is a spray-applied, polyurethane open cell foam plastic and complies as a low-density insulation in accordance with Section 3.1.1 and Table 1 of AC377. The insulation is a two-component spray foam plastic with a nominal in-place density of 0.5 pcf (8.0 kg/m^3).

The spray-applied insulation is mixed in the field by combining a polymeric isocyanate (A component) and a resin blend (B component). The liquid components shall be stored in 55-gallon (208 L) drums at temperatures between 50°F and 90°F (10°C and 32°C). When Component A and Component B are stored in factory-sealed containers at the recommended temperatures, the maximum shelf life is six months.

5.0 IDENTIFICATION

JM NMOC is identified by the Johns Manville name and trademark, product name, and evaluation report number (ER-971). The IAPMO Uniform Evaluation Service Mark of Conformity may also be used as shown below:

IAPMO UES ER-971

6.0 SUBSTANTIATING DATA

6.1 Manufacturer's descriptive literature and installation instructions.

6.2 Data in accordance with the Acceptance Criteria for Spray-applied Foam Plastic Insulation, ICC-ES AC377, dated June 2023, including Appendix U and Appendix X.

6.3 Data in accordance with 2019 ICC 1100 Standard for Spray-applied Polyurethane Foam Plastic Insulation.

6.4 Report of testing for water vapor transmission with ASTM E96, desiccant method.

6.5 Reports of air permeance testing in accordance with ASTM E283.

6.6 Reports of testing in accordance with NFPA 286.

6.7 Report of testing in accordance with NFPA 285.

6.8 Test reports are from laboratories in compliance with ISO/IEC 17025.

7.0 STATEMENT OF RECOGNITION

This evaluation report describes the results of research completed by IAPMO Uniform Evaluation Service on Johns Manville's JM NMOC to assess conformance to the codes shown in Section 1.0 of this report and serves as documentation of the product certification. Products are manufactured under a quality control program with periodic inspection under the supervision of IAPMO UES.

For additional information about this evaluation report please visit www.uniform-es.org or email us at info@uniform-es.org

TABLE 2
ALTERNATIVE IGNITION BARRIER ASSEMBLIES[1]

FIRE-PROTECTIVE COATING/COVERING			MAXIMUM SPF THICKNESS (inch)	
TYPE	MINIMUM THICKNESS (mils)	THEORETICAL APPLICATION RATE	WALLS AND VERTICAL SURFACES	CEILING AND OVERHEAD SURFACES
DC315[2]	6 WFT (4 DFT)	0.38 gal/100 ft^2	10	16
Plus ThB[3]	6 WFT (4 DFT)	0.38 gal/100 ft^2	10	16

For SI: 1 inch = 25.4 mm, 1 mil = 0.0254 mm, 1 gallon = 3.785 L, 1 ft^2 = 0.0929 m^2

[1] Fire-protective coatings and coverings shall be applied over all exposed SPF surfaces in accordance with the coating/covering manufacturer's instructions and this report.
[2] International Fireproof Technology Inc., recognized in IAPMO UES ER-499
[3] No-Burn, Inc., recognized in IAPMO UES ER-305.

TABLE 3
ALTERNATIVE THERMAL BARRIER ASSEMBLIES[1]

FIRE-PROTECTIVE COATING/COVERING			MAXIMUM SPF THICKNESS (inch)	
TYPE	MINIMUM THICKNESS (mils)	THEORETICAL APPLICATION RATE	WALLS AND VERTICAL SURFACES	CEILING AND OVERHEAD SURFACES
DC315[2]	14 WFT (9 DFT)	0.87 gal/100 ft^2	10	14
Spray Seal ThB[3]	16 WFT (10 DFT)	1.0 gal/100 ft^2	10	14

For SI: 1 inch = 25.4 mm, 1 mil = 0.0254 mm, 1 gallon = 3.785 L, 1 ft^2 = 0.0929 m^2

[1] Fire-protective coatings and coverings shall be applied over all exposed SPF surfaces in accordance with the coating/covering manufacturer's instructions and this report.
[2] International Fireproof Technology Inc., recognized in IAPMO UES ER-499
[3] No-Burn, Inc., recognized in IAPMO UES ER-305.

TABLE 4 – ONE-HOUR FIRE-RESISTANCE-RATED WALL ASSEMBLY

2x4 wood studs 16 inches on center with $^5/_8$-inch Type X gypsum wallboard with JM NMOC insulation applied in the stud cavity

Framing: The framing shall be a minimum of No. 2 Southern Yellow Pine (SYP) 2x4 spaced 16 inches on center with 2x4 wood studs spaced 12 inches from the end of the wall assembly. The studs shall be fastened to the top plate and bottom plate of similar grade and species using 3-inch-long by 0.131-inch diameter smooth shank framing nails. A second top plate shall be fastened to the interior top plate using 3-inch-long by 0.131-inch diameter smooth shank framing nails space at 24 inches on center along the 2x4.

Staggered blocking shall be installed at mid-height of the wall assembly consisting of No. 2 2x4 SYP within each stud cavity. The blocking shall be staggered ¾ inch on center from the wall assembly centerline and fastened to the studs using 3-inch long by 0.131-inch diameter smooth shank framing nails.

Maximum wall height shall be 120 inches with a maximum unbraced length of 57$^3/_4$ inches.

Wallboard: $^5/_8$-inch-thick (15.9 mm) Type X gypsum wallboard shall be installed with the long side parallel to the studs on the interior and exterior faces of the framing. The wall board shall be installed using #6 1$^5/_8$-inch-long Type W bugle head drywall screws at 8 inches (203 mm) on center at the panel edges and 12 inches (305 mm) on center in the field. The seams and fasteners shall be brought to a GA-214 Level 2 finish.

Insulation in Stud Cavity: The JM NMOC insulation shall be applied to the stud cavity at a maximum nominal thickness of 3½-inches (89 mm).

Axial (ASD) Loading shall be the lesser of:
1. 1,420 pounds per stud for 2x4 construction.
2. For 2x4 construction, a maximum of 75 percent of the load calculated in accordance with Sections 3.6 and 3.7 of the ANSI/AWC NDS (NDS).

TABLE 5 – TWO-HOUR FIRE-RESISTANCE-RATED WALL ASSEMBLY

2x6 wood studs 16 inches on center with 2 layers of 5/8-inch Type X gypsum wallboard on each side with JM NMOC insulation applied in the stud cavity
Framing: The framing shall be a minimum of No. 2 Southern Yellow Pine (SYP) 2x6 spaced 16 inches on center with 2x6 wood studs spaced 12 inches from the end of the wall assembly. The studs shall be fastened to the top plate and bottom plate of similar grade and species using 3-inch-long by 0.131-inch diameter smooth shank framing nails. A second top plate shall be fastened to the interior top plate using 3-inch-long by 0.131-inch diameter smooth shank framing nails space at 24 inches on center along the 2x6. Staggered blocking shall be installed at mid-height of the wall assembly consisting of No. 2 2x4 SYP within each stud cavity. The blocking shall be staggered ¾ inch on center from the wall assembly centerline and fastened to the studs using 3-inch long by 0.131-inch diameter smooth shank framing nails. The maximum wall height shall be 120 inches with full lateral bracing from the sheathing. **Wallboard:** 2 layers of ⅝-inch-thick (15.9 mm) Type X gypsum wallboard shall be installed with the long side parallel to the studs on the interior and exterior faces of the framing. The base layer wall board shall be installed using #6 1 5/8-inch-long Type W bugle head drywall screws at 8 inches (203 mm) on center at the panel edges and 12 inches (305 mm) on center in the field. The face layer of gypsum wallboard shall be attached to the studs through the base layer using #8 – 2 1/2-inch-long Type W, bugle head drywall screws. The fasteners shall be spaced 8 inches on-center around the perimeter and 12 inches on-center in the field of the panel. Face layer fasteners shall be offset 4 inches from the base layer fasteners to avoid contact. The seams and fasteners shall be brought to a GA-214 Level 2 finish. **Insulation in Stud Cavity:** The stud cavity insulation shall be applied at a maximum nominal thickness of 5½ inches (140 mm).
Axial (ASD) Loading shall be the lesser of: **1.** 4,661 pounds per stud for 2x6 construction. **2.** For 2x6 construction, a maximum of 70 percent of the load calculated in accordance with Sections 3.6 and 3.7 of the ANSI/AWC NDS (NDS).

TABLE 6 –NFPA 285 COMPLYING EXTERIOR WALL ASSEMBLY WITH JM NMOC INSULATION APPLIED IN WALL STUD CAVITY

Wall Component	**Material Description**
Framing	The wall assembly shall be framed using a minimum of 25-gauge (22 mil thick), 6-inch-deep steel studs, spaced 24 inches on center. The studs shall be secured to a minimum 25-gauge C channel top and bottom tracks using #8 – ½ inch wafer head, self-drilling framing screws.
Fire-Stopping in Stud Cavity at Floor Lines	4-inch 4 pcf mineral wool (friction fit at each stud cavity)
Cavity Insulation	The JM NMOC insulation shall be applied to the stud cavity at a maximum nominal thickness of 5½ inches (140 mm) with a maximum airgap of ½-inch.
Exterior Sheathing	⅝-inch-thick (15.9 mm) Type X gypsum wallboard shall be installed with the short side parallel to the studs on the interior and exterior faces of the framing. The wall board shall be installed using #6 1 1/4-inch-long Type S bugle head drywall screws at 8 inches (203 mm) on center around the perimeter of the gypsum wallboard panels and 12 inches (305 mm) on center in the field. The seams and fasteners shall be brought to a GA-214 Level 2 finish.
Interior Sheathing	⅝-inch-thick (15.9 mm) Type X gypsum wallboard shall be installed with the short side parallel to the studs on the interior and exterior faces of the framing. The wall board shall be installed using #6 1 1/4-inch-long Type S bugle head drywall screws at 8 inches (203 mm) on center around the perimeter of the gypsum wallboard panels and 12 inches (305 mm) on center in the field. The seams and fasteners shall be brought to a GA-214 Level 2 finish.
Window/Door Perimeters	Framed as required for base wall. Use 31-gauge galvanized steel for flashing area outside of base wall. The window flashing shall be bent and cut to a 2-inch leg installed over the interior gypsum wallboard and 7 1/4-inch-long leg secured directly to the steel C-channel of the window opening framing using 2 #8-½-inch long, self-drilling, pan head screws spaced every 6 inches on-center.

For **SI:** 1 inch = 25.4 mm