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

REPORT HOLDER:  
DUPONT DE NEMOURS, INC.  

EVALUATION SUBJECT:  
STYROFOAM™ SPRAY POLYURETHANE FOAM  
RS2030, RS2045, CM2030, CM2045, MX2030 AND MX2045  

1.0 EVALUATION SCOPE  
Compliance with the following codes:  
  - 2012 and 2009 International Building Code® (IBC)  
  - 2012 and 2009 International Residential Code® (IRC)  
  - 2012 and 2009 International Energy Conservation Code® (IECC)  
  - Other Codes (see Section 8.0)  

Properties evaluated:  
  - Physical properties  
  - Surface-burning characteristics  
  - Water vapor transmission  
  - Air permeability  
  - Attic and crawl space installation  
  - Fire-resistance-rated construction  
  - Thermal resistance  
  - Exterior walls in Types I through IV construction  

2.0 USES  
STYROFOAM™ Spray Polyurethane Foam RS2030, RS2045, CM2030, CM2045, MX2030 and MX2045 are used as nonstructural thermal insulating materials.  

STYROFOAM™ Spray Polyurethane Foam RS2030 and RS2045 are used in Type V construction under the IBC and dwellings under the IRC. The insulations are for use in wall cavities, sprayed onto the surface of walls, floor/ceiling assemblies, attics, crawl spaces, sill plates and/or headers when installed in accordance with Section 4.0. Under the IRC, the insulations may be used as air-impermeable insulation when installed in accordance with Section 3.5.  

STYROFOAM™ Spray Polyurethane Foam CM2030 and CM2045 may be used in fire-resistance-rated wall assemblies when construction is in accordance with Section 4.6.  

3.0 DESCRIPTION  
3.1 General:  
The insulations are two-component, closed-cell, spray-applied, semirigid, medium-density, polyurethane foam plastics having a nominal density of 2 pcf (32 kg/m^3). The insulations are produced in the field by combining a polymeric isocyanate component A with a resin-based component B. The Part A component is packaged in 55-gallon (208 L) drums, labeled as “DuPont 3019 Isocyanate.” The insulation components have a shelf life of six months when stored between 60°F (15°C) and 90°F (32°C) in unopened containers.  

3.2 Surface-burning Characteristics:  
The insulations 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 (UL 723) at a maximum thickness of 4 inches (102 mm).  

Thicknesses of up to 12 inches (305 mm) for wall and ceiling cavities are recognized based on testing in accordance with NFPA 286, when the insulation is covered with a minimum 1/2-inch-thick (12.7 mm) gypsum wallboard or an equivalent thermal barrier complying with, and installed in accordance with, the applicable code.  

3.3 Thermal Resistance, R-values:  
The insulations have thermal resistance (R-values) at a mean temperature of 75°F (24°C) as shown in Table 1.  

3.4 Vapor Retarder:  
The insulations have a vapor permeance of less than 1 perm [5.7x10^-11 kg/(Pa-s-m^2)], in accordance with ASTM E96, when applied at minimum thicknesses of 2.2 inches (56 mm), and qualify as Class II vapor retarders.
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 manufacturer’s published installation instructions must be available on the jobsite at all times during installation.

4.2 Application:
The insulation is spray-applied on the jobsite using a volumetric displacement pump combining Part A and Part B components at a one-to-one ratio, as specified in the manufacturer’s published installation instructions. The insulation is applied in passes having thicknesses of no less than 1/2 inch (12.7 mm) and no more than 2 1/2 inches (64 mm) to achieve the total thicknesses specified in this report.

The maximum service temperature must be no greater than that specified in DuPont de Nemours, Inc. installation instructions. The insulation must not be used in electrical outlet or junction boxes or in direct contact with water. The substrates to which the insulation is applied must be free of moisture (dew or frost), grease, oil, solvents and other materials that would adversely affect the adhesion of the spray polyurethane foam.

4.3 Thermal Barrier:
The spray-applied 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 attics, crawl spaces, sill plates, band joists, rim joists or headers as described in Sections 4.4 and 4.5.

4.4 Attics and Crawl Spaces:

4.4.1 Application with a Prescriptive Ignition Barrier:
When the spray-applied insulations are installed within attics or crawl spaces, where entry is made only to service 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.

4.4.2 Application without a Prescriptive Ignition Barrier:
STYROFOAM™ Spray Polyurethane Foam insulations may be installed in attics and crawl spaces as described in this section without the ignition barriers described in IBC Section 2603.4.1.6 and IRC Sections R316.5.3 and R316.5.4, subject to the following conditions:

a. Entry to the attic or crawl space is only to service utilities, and no storage is permitted.

b. There are no interconnected attic or crawl space areas.

c. Air in the attic or crawl space is not circulated to other parts of the building.

d. 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 the IRC.

e. Under-floor (crawl space) ventilation is provided when required by IBC Section 1203.3 or IRC Section R408.1, as applicable.

f. Combustion air is provided in accordance with IMC (International Mechanical Code®) Section 701.

In attics, the insulation may be spray-applied with no covering (no ignition barrier) to the underside of roof sheathing or roof rafters, and/or vertical surfaces. In crawl spaces, the insulation may be spray-applied with no covering (no ignition barrier) to the underside of floors and/or vertical surfaces. The thickness of the foam plastic, applied to the underside of the top of the space and/or vertical surfaces, must not exceed 10 inches (254 mm). The insulations may be installed in unvented attics as described in this section in accordance with 2012 IRC Section R806.5 (2009 IRC Section R806.4).

4.4.3 Use on Attic Floors:
The STYROFOAM™ Spray Polyurethane Foam insulations may be installed at a maximum thickness of 10 inches (254 mm) between and over the joists in attic floors. The insulation must be separated from the interior of the building by an approved thermal barrier. The ignition barrier required in IBC Section 2603.4.1.6 and IRC Section R316.5.3 may be omitted.

4.5 Use on Sill Plates, Band Joists and Headers:
The STYROFOAM™ Spray Polyurethane Foam insulations with a maximum thickness of 8 inches (203 mm) may be applied to sill plates and headers without a thermal barrier or ignition barrier, based on testing in accordance with NFPA 286.

4.6 One-hour Nonload-bearing Fire-resistance-rated Wall Assemblies:
The STYROFOAM™ Spray Polyurethane Foam CM2030 and CM2045 may be installed in the stud cavities of nonload-bearing one-hour fire-resistance-rated walls (see Figure 1 for all components in the assembly), provided the system is installed in accordance with the following:

4.6.1 Steel Framing:
The framing consists of channel-shaped steel studs, 3/8 inches wide (79 mm) with 1 1/2-inch (38 mm) legs, formed from minimum No.18 MSG galvanized steel spaced 16 inches on center; and channel-shaped runners, 3/4 inches wide (95 mm) with 1 1/4-inch (31 mm) legs, formed from minimum No.18 MSG galvanized steel, attached to the floor at 24 inches (610 mm) on center.

4.6.2 Wall Finish:
The interior side of the wall must be finished with one layer of 1/4-inch-thick (15.9 mm), Type X gypsum wallboard applied vertically with joints centered over studs and fastened to steel studs with 1 1/2-inch-long (31 mm), No.8, Type S, self-drilling, self-tapping steel screws spaced 8 inches (203 mm) on center along edges and 12 inches (305 mm) on center in the field of the board. All joints and screw heads must be covered with joint tape and two coats of joint compound in accordance with GA-216 or ASTM C840. The exterior of the wall must be covered with DuPont Thermax™ (ESR-1659) board, 1/2 inch to 3 inches thick (12.7 to 76 mm), attached to the studs with No.8, Type S steel screws in each corner of each piece of the board. The screws must be a minimum of 1/2 inch (12.7 mm) longer than the thickness of the board.
4.6.3 Insulation: STYROFOAM™ Spray Polyurethane Foam CM2030 or CM2045 insulations are applied in the stud cavities against the DuPont Thermax™ at a maximum thickness of 1 1/2 inches (38 mm).

4.6.4 Exterior Wall Covering: The exterior wall covering must be 4-inch-wide (102 mm) common brick, with a minimum of a 1-inch (25.4 mm) air space provided between the brick and the foam plastic insulation.

4.7 Exterior Walls of Types I, II, III, and IV Construction:

When used on exterior walls of Type I, II, III and IV construction, the STYROFOAM™ Spray Polyurethane Foam CM2030, CM2045, MX2030 and MX2045 insulations must comply with Section 2603.5 of the IBC at a maximum thickness of 1 1/2 inches (38 mm). The potential heat of the foam plastic in any portion of the wall or panels must not exceed the potential heat, expressed in Btu/ft² (MJ/m²), of the Spray Polyurethane Foam insulation contained in the wall assembly tested in accordance with NFPA 285. The potential heat of STYROFOAM™ Spray Polyurethane Foam CM2030, CM2045, MX2030 and MX2045 insulations is 2458 Btu/ft² (28 MJ/m²) per inch of thickness.

5.0 CONDITIONS OF USE

The STYROFOAM™ Spray Polyurethane Foam RS2030, RS2045, CM2030, CM2045, MX2030 and MX2045 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 insulations must be installed in accordance with the manufacturer’s published installation instructions, this evaluation report and the applicable code. The instructions within this report govern if there are any conflicts between the manufacturer’s published installation instructions and this report.

5.2 The insulations must be separated from the interior of the building by an approved 15-minute thermal barrier as described in Section 4.3, except when installation is in attics and crawl spaces as described in Section 4.4, or when application is on sill plates or headers as described in Section 4.5.

5.3 The insulations must be protected from the weather during and after application.

5.4 The insulations must be applied by installers certified by DuPont de Nemours, Inc. or by the Spray Polyurethane Foam Alliance (SPFA) for the installation of spray polyurethane foam insulation.

5.5 Use of the insulations in areas where the probability of termite infestation is “very heavy” must be in accordance with 2012 IBC Section 2603.9 (2009 IBC Section 2603.8) or IRC Section R318.4, as applicable.

5.6 Jobsite certification and labeling of the insulation must comply with 2012 IRC Sections N1101.16 (2009 IRC Sections N1101.4 and N1101.4.1) and 2012 IECC Sections C303.1.1, C303.1.2 and R401.3 (2009 IECC Sections 303.1.1 and 303.1.2), as applicable.

5.7 When use is on buildings of Type I, II, III or IV construction, documentation must be submitted to the code official verifying that the insulation has been qualified as a component of an assembly tested in accordance with IBC Sections 2603.5.1 (unless constructed in accordance with Section 4.6), 2603.5.5 and 2603.5.7. The maximum potential heat of the spray polyurethane foam plastic used in the assembly must be no greater than that noted in Section 4.7.

5.8 The insulation components (Parts A and B) are produced by DuPont de Nemours, Inc., under a quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

6.1 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 of AC377.

6.2 Reports on air leakage tests in accordance with ASTM E283.

6.3 Reports on water vapor transmission tests in accordance with ASTM E96.

6.4 Data in accordance with ASTM E119.

6.5 Reports of potential heat tests in accordance with NFPA 259.

6.6 Reports of room corner fire tests in accordance with NFPA 286.

7.0 IDENTIFICATION

7.1 Components of STYROFOAM™ Spray Polyurethane Foam insulations are identified with the manufacturer’s name (DuPont de Nemours, Inc.) and address; the product name (A Component is labeled DuPont 3019 isocyanate; B Component is labeled with one of the product names listed in this report); lot number; use and application instructions; the flame-spread and smoke-development indices; the evaluation report number (ESR-2670).

7.2 The report holder’s contact information is the following:

DUPont DE NEMOURS, INC.
1501 LARKIN CENTER DRIVE
MIDLAND, MICHIGAN 48642
(866) 583-2583
www.dupont.com/building

8.0 OTHER CODES

8.1 Evaluation Scope:

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 Residential Code® (2006 IRC)
- 2003 International Residential Code® (2003 IRC)

8.2 Uses:

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

- Application with a Prescriptive Ignition Barrier: See Section 4.4.1, except attics must be vented in accordance with Section 1203.2 of the 2006 and 2003 IBC or Section R806 of the 2006 and 2003 IRC; and crawl space ventilation must be in accordance with
Section 1203.3 of the 2006 and 2003 IBC or Section R408 of the 2006 and 2003 IRC, as applicable.

**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 and 2003 IBC or Section R806 of the 2006 and 2003 IRC; and crawl space ventilation must be in accordance with Section 1203.3 of the 2006 and 2003 IBC or Section R408 of the 2006 and 2003 IRC, as applicable.

### TABLE 1—THERMAL RESISTANCE (R-VALUES)

<table>
<thead>
<tr>
<th>THICKNESS (inches)</th>
<th>PRODUCT R-VALUES(^1,2) (°F.ft(^2).h/Btu)</th>
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<tbody>
<tr>
<td></td>
<td>2030 (RS, CM, MX)</td>
</tr>
<tr>
<td>1</td>
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<tr>
<td>1.5</td>
<td>9.0</td>
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<tr>
<td>11</td>
<td>68.0</td>
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<tr>
<td>12</td>
<td>74.0</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.5 mm; 1 °F.ft\(^2\).h/Btu = 0.176 110 °K.m\(^2\)/W.

\(^1\)R-values are calculated based on test values at 1- and 4-inch thicknesses.

\(^2\)R-values are calculated based on test values at 1- and 3.5-inch thicknesses.
Legend:
(1) Floor and ceiling runners; (2) steel studs; (3) lateral support members (not shown); (4) gypsum board; (5) DuPont CM Series spray polyurethane foam plastic; (6) DuPont Thermax™; (7) self-adhered flashing tape or sealant (optional); (8) mortar drop protection (optional); (9) wall anchor ties; (10) vapor retarder or water-resistant barrier (optional); (11) brick veneer

FIGURE 1