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ESR-1826

Reissued 02/2018
This report is subject to renewal 02/2019.

DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION
SECTION: 07 21 00—THERMAL INSULATION

REPORT HOLDER:

ICYNENE, INC.

6747 CAMPOBELLO ROAD
MISSISSAUGA, ONTARIO L5N 2L7
CANADA

EVALUATION SUBJECT:

ICYNENE CLASSIC, CLASSIC ULTRA, CLASSIC ULTRA SELECT AND CLASSIC PLUS

"2014 Recipient of Prestigious Western States Seismic Policy Council (WSSPC) Award in Excellence"

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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:

ICYNENE CLASSIC, CLASSIC ULTRA, CLASSIC ULTRA SELECT AND CLASSIC PLUS

1.0 EVALUATION SCOPE

1.1 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)
- 2013 *Abu Dhabi International Building Code* (ADIBC)†

†The ADIBC is based on the 2009 IBC. 2009 IBC code sections referenced in this report are the same sections in the ADIBC.

Properties evaluated:

- Surface burning characteristics
- Physical properties
- Thermal performance (*R*-values)
- Attic and crawl space installation
- Fire–resistance-rated construction
- Air permeability
- Exterior walls of Types I–IV construction

1.2 Evaluation to the following green standard:

- 2008 ICC 700 *National Green Building Standard*™ (ICC 700-2008)

Attributes verified:

- See Section 2.0

2.0 USES

Icynene Classic, Classic Ultra, Classic Ultra Select (replaces Classic Max and Classic Max Select, respectively) and Classic Plus are used to provide thermal insulation in buildings and to seal areas such as plumbing and conduit penetrations against air infiltration. The insulations are for use in wall cavities and floor assemblies; and in attic and crawl space installations as described in Section 4.4.

The Classic, Classic Ultra and Classic Ultra Select insulations are for use in Type V construction under the IBC and dwellings under the IRC; fire-resistance-rated construction when installed in accordance with Section 4.5; and in Types I through IV construction when installed in accordance with Section 4.6.

The Classic Plus insulation is for use in nonfire-resistance-rated construction under the IBC and IRC and in Types I through IV construction when installed in accordance with Section 4.6.

The attributes of the insulations have been verified as conforming to the provisions of ICC 700-2008 Section 703.2.1.1.1(c) as an air impermeable insulation. Note that decisions on compliance for those areas rest with the user of this report. The user is advised of the project-specific provisions that may be contingent upon meeting specific conditions, and the verification of those conditions is outside the scope of this report. These codes or standards often provide supplemental information as guidance.

3.0 DESCRIPTION

3.1 General:

3.1.1 Classic, Classic Ultra and Classic Ultra Select: Icynene Classic, Classic Ultra and Classic Ultra Select are low-density, open-cell, polyurethane foam plastic insulations and air barrier systems that are 100 percent water-blown with an installed nominal density of 0.5 pcf (8 kg/m^3). The insulations are two-component, spray-applied products. The two components of the insulation are polymeric isocyanate (A-Component, also known as Base Seal®) and proprietary resin (B-Component, Classic, Classic Ultra or Classic Ultra Select Resin). When stored at temperatures between 50°F (10°C) and 100°F (38°C), the components have a shelf life of six months.

3.1.2 Classic Plus: The Icynene Classic Plus foam plastic insulation is two-component, low density, open cell, spray-applied, foam plastic with a nominal density of 0.7 pcf (11 kg/m^3). The polyurethane foam is produced by combining a polymeric isocyanate (A component) and

proprietary resin, Classic Plus (B component). When stored at temperatures between 50°F (10°C) and 100°F (38°C), the components have a shelf life of twelve months.

3.2 Surface Burning Characteristics:

3.2.1 Classic, Classic Ultra and Classic Ultra Select: When tested in accordance with ASTM E84/UL 723, at a thickness of 6 inches (152 mm) and a nominal density of 0.5 pcf (8 kg/m^3), Icynene Classic, Classic Ultra and, Classic Ultra Select have a flame spread index of 25 or less and a smoke-developed index of 450 or less. There is no thickness limit when installed behind a code-prescribed 15-minute thermal barrier, except as noted in Section 4.3.1.2 and Table 2.

3.2.2 Classic Plus: When tested in accordance with ASTM E84/UL 723, at a thickness of 4 inches (152 mm) and a nominal density of 0.7 pcf (11 kg/m^3), Icynene Classic Plus has a flame spread index of 25 or less and a smoke-developed index of 450 or less. There is no thickness limit when installed behind a code-prescribed 15-minute thermal barrier, except as noted in Section 4.3.1.2 and Table 2.

3.3 Thermal Resistance:

Icynene Classic, Classic Ultra, Classic Ultra Select and Classic Plus have thermal resistance (*R*-values) at a mean temperature of 75°F (24°C) as shown in Table 1.

3.4 Air Permeability:

Icynene spray-applied foam plastic insulations are considered air-impermeable insulation in accordance with 2015 IBC Section 1203.3 and 2015 and 2012 IRC Sections R202 and R806.5 (2009 IRC Sections R202 and R806.4), at the following thicknesses:

- **Classic, Classic Ultra and Classic Ultra Select:** Minimum, 3 inches (76 mm) based on testing in accordance with ASTM E2178.
- **Classic Plus:** Minimum, 2 inches (51 mm) based on testing in accordance with ASTM E2178.

3.5 Intumescent Coatings:

3.5.1 No Burn Plus XD: No Burn Plus XD intumescent coating is a latex-based coating supplied in 1-gallon (4L) and 5-gallon (19L) pails and 55-gallon (208 L) drums. The coating material has a shelf life of 12 months when stored in factory-sealed containers at temperatures between 40°F (4.4°C) and 90°F (32.2°C).

3.5.2 DC 315 Coating: DC 315 coating (ESR-3702), manufactured by International Fireproof Technology, International Inc. / Paint To Protect Inc., is a water-based intumescent coating supplied in 5-gallon (19L) pails and 55-gallon (208L) drums. The coating material has a shelf life of 12 months when stored in factory-sealed containers at temperatures between 50ºF (10ºC) and 80ºF (27ºC).

3.5.3 Fireshell® F10E Coating: Fireshell® F10E coating, manufactured by TPR2 Corporation (ESR-3997), is a water-based intumescent coating supplied in 5-gallon (19L) pails and 55-gallon (208L) drums. The coating material has a shelf life of 12 months when stored in factory-sealed containers at temperatures between 45ºF (7.2ºC) and 95ºF (35ºC).

4.0 INSTALLATION

4.1 General:

The manufacturer's published installation instructions and this report must be strictly adhered to and a copy of these instructions and this evaluation report must be available on the jobsite at all times during installation.

4.2 Application:

4.2.1 General: Icynene Classic, Classic Ultra, Classic Ultra Select and Classic Plus foam plastic insulations must be applied on the jobsite using two-component, 1-to-1 ratio, spray equipment specified by Icynene, Inc. 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 foam plastic insulation 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 the insulation is used as air-impermeable insulation, such as in unvented attic spaces regulated by 2015 IBC Section 1203.3 or IRC Section R806, the insulation must be installed at a minimum thicknesses noted in Section 3.4. The insulation can be installed in one pass to the maximum thickness. Where multiple passes are required, the cure time between passes is negligible.

4.2.2 Classic, Classic Ultra and Classic Ultra Select: The insulation must be used in areas where the maximum service temperature is no greater than 180°F (82°C). The insulation must be applied when the temperature is at or above 14°F (-10°C) and be protected from the weather during and after application.

4.2.3 Classic Plus: The insulation may be used in areas where the maximum service temperature is no greater than 180°F (82°C). The insulation must be applied when the temperature is at or above 14°F (-10°C) and be protected from the weather during and after application.

4.3 Thermal Barrier:

4.3.1 Classic, Classic Ultra, Classic Ultra Select and Classic Plus:

4.3.1.1 Application with a Prescriptive Thermal Barrier: Icynene Classic, Classic Ultra, Classic Ultra Select and Classic Plus foam plastic insulations must be separated from the interior of the building by an approved thermal barrier, such as $^1/_2$-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 plastic insulation and the interior of the building. There is no thickness limit when installed behind a code-prescribed 15-minute thermal barrier, except as noted in Section 4.3.1.2 and Table 2.

4.3.1.2 Application without a Prescriptive Thermal Barrier or Ignition Barrier: The prescriptive 15-minute thermal barrier or ignition barrier may be omitted when installation is in accordance with the following requirements:

4.3.1.2.1 The insulation must be covered on all surfaces with a fire protective coating at the minimum thickness set forth in Table 2.

4.3.1.2.2 The maximum installed thickness of the insulation must not exceed the thicknesses set forth in Table 2.

4.3.1.2.3 The coating must be applied over the insulation in accordance with the coating manufacturer's instructions and this report.

4.4 Attics and Crawl Spaces:

4.4.1 Classic, Classic Ultra and Classic Ultra Select:

4.4.1.1 Application with a Prescriptive Ignition Barrier: When Icynene Classic, Classic Ultra and Classic Ultra Select foam plastic insulations are installed within attics 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. The Classic, Classic Ultra or Classic Ultra Select insulation may be installed in unvented attics when the foam plastic is applied at a minimum thickness of 3 inches (76 mm) in accordance with 2015 IBC Section 1203.3 or 2015 and 2012 IRC Section R806.5 (2009 IRC Section R806.4), as applicable.

4.4.1.2 Application without a Prescriptive Ignition Barrier: Where Icynene Classic, Classic Ultra and Classic Ultra Select foam plastic insulations are installed in an attic or crawl space without a prescriptive ignition barrier, in accordance with Sections 4.4.1.2.1, 4.4.1.2.2, 4.4.1.2.3 and 4.4.1.2.4, the following conditions apply:

1. Entry to the attic or crawl space is only for service of utilities and no storage is permitted.
2. There are no interconnected attic, crawl space 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, except when air-impermeable insulation is permitted in unvented attics in accordance with 2015 IBC Section 1203.3 or 2015 and 2012 IRC Section R806.5 (2009 IRC Section R806.4), as applicable.
6. Under-floor (crawl space) ventilation is provided when required by 2015 IBC Section 1203.4 (2012 and 2009 IBC Section 1203.3) or IRC Section R408.1, as applicable.

4.4.1.2.1 Attics—Classic, Classic Ultra and Classic Ultra Select: In attics, Icynene Classic, Classic Ultra and Classic Ultra Select foam plastic insulations 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 14 inches (356 mm). The thickness of the spray foam insulation applied to vertical wall surfaces must not exceed 5.5 inches (140 mm). The insulation must be covered on all surfaces with one of the coatings described in Section 3.5. 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. The coating must be applied to a thickness as follows:

- No Burn Plus XD at a minimum thickness of 6 wet mils (0.15 mm) [4 dry mils (0.1 mm) dry film thickness], applied at a rate of 0.4 gallon (1.5 L) per 100 square feet (9.2 m^2).
- DC 315 at a minimum thickness of 4 wet mils (0.1 mm) [3 dry mils], applied at a rate of 0.3 gallon (1.1 L) per 100 square feet (9.2 m^2).

The coatings must be applied when ambient and substrate temperature is at least 60°F (16°C) and no more than 95°F (35°C). All other surfaces (including glass) must be protected against damage from the coating. The insulation may be installed in unvented attics when the foam plastic is applied at a minimum thickness of 3.5 inches (89 mm) as described in this section in accordance with 2015 IBC Section 1203.3, 2015 and 2012 IRC Section R806.5 or 2009 IRC Section R806.4, as applicable.

4.4.1.2.2 Attics—Classic Ultra and Classic Ultra Select: When Classic Ultra or Classic Ultra Select is applied in unvented attics conforming to 2015 IBC Section 1203.3 and 2015 and 2012 IRC Section R806.5 or 2009 IRC Section R806.4, the insulation may be applied to the underside of roof sheathing and/or rafters to a minimum thickness of $3^1/_2$ inches (90 mm) and may be applied to vertical wall surfaces to a minimum thickness of $3^1/_2$ inches (90 mm). Maximum thickness on the underside of roof sheathing or on vertical wall surfaces is 20 inches (508 mm). 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 floor, and opening outward toward the living space. Items penetrating the roof deck or walls, such as skylight wells and vents, must be covered with a minimum of $3^1/_2$ inches (90 mm) of the Classic Ultra or Classic Ultra Select insulation.

4.4.1.2.3 Crawl Spaces: In crawl spaces, Icynene Classic, Classic Ultra or Classic Ultra Select insulations may be spray-applied to vertical walls and the underside of floors, as described in this section. The thickness of the foam plastic applied to the underside of the floors must not exceed 14 inches (356 mm). The thickness of the spray foam plastic insulation applied to vertical wall surfaces must not exceed $3^1/_2$ inches (88.9 mm). The foam plastic does not require an ignition barrier or a coating.

4.4.1.2.4 Use on Attic Floors: When used on attic floors, Icynene Classic, Classic Ultra or Classic Ultra Select foam plastic insulations may be installed at a maximum thickness of $11^1/_2$ inches (292 mm) between joists in attic floors. The insulation must be separated from the interior of the building by an approved thermal barrier. The coatings specified in Section 4.4.1.2.1 and the ignition barrier in accordance with IBC Section 2603.4.1.6 and IRC Section R316.5.3, may be omitted.

4.4.2 Classic Plus:

4.4.2.1 Application with a Prescriptive Ignition Barrier: When Icynene Classic Plus is installed up to a maximum thickness of 4 inches (102 mm) 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 Classic Plus may be installed in unvented attics when the foam plastic is applied at a minimum thickness of 2 inches (51 mm) in accordance with 2015 IBC Section 1203.3, 2015 and 2012 IRC Section R806.5 or 2009 IRC Section R806.4, as applicable.

4.4.2.2 Application without a Prescriptive Ignition Barrier: Where Icynene Classic Plus insulation is installed in accordance with Sections 4.4.3.2.1, 4.4.3.2.2, and 4.4.3.2.3, the following conditions apply:

1. Entry to the attic or crawl space is to service utilities, and no storage is permitted.
2. There are no interconnected attic or crawl space 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, except when air-impermeable insulation is permitted in unvented attics in accordance with 2015 IBC Section 1203.3 or 2015 and 2012 IRC Section R806.5 or 2009 IRC Section R806.4, as applicable.
6. Under-floor (crawl space) ventilation is provided when required by 2015 IBC Section 1203.4 (2012 and 2009 IBC Section 1203.3) or IRC Section R408.1, as applicable.

4.4.2.2.1 Attics: In attics, Icynene Classic Plus insulation may be spray-applied to the underside of the roof sheathing and/or rafters, the underside of wood floors, and vertical surfaces, as described in this section. The thickness of the foam plastic applied to the underside of the top of the space must not exceed 14 inches (356 mm). The thickness of the spray foam plastic insulation applied to vertical wall surfaces must not exceed 8 inches (203 mm). The foam plastic insulation must be covered on all exposed surfaces with DC315 intumescent coating at a minimum thickness of 4 wet mils (0.1 mm) [3 dry mils (0.08 mm)], applied at a rate of 0.25 gallon (0.95 L) per 100 square feet (9.2 m^2). The coating must be applied over the Icynene Classic Plus 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.

The coating must be applied when ambient and substrate temperature is at least 60°F (16°C) and no more than 95°F (35°C). All other surfaces (including glass) must be protected against damage from the coating.

Icynene Classic Plus insulation may be installed in unvented attics when the foam plastic is applied at a minimum thickness of 2 inches (51 mm) as described in this section, in accordance with 2015 IBC Section 1203.3, 2015 and 2012 IRC Section R806.5 or 2009 IRC Section R806.4, as applicable.

4.4.2.2.2 Crawl Spaces: In crawl spaces, Icynene Classic Plus insulation may be spray-applied to vertical walls and the underside of floors, as described in this section. The thickness of the foam plastic applied to the underside of the floors must not exceed 14 inches (356 mm). The thickness of the spray foam plastic insulation applied to vertical wall surfaces must not exceed 8 inches (203 mm). The insulation must be covered with DC-315 coating as described in Section 4.4.2.2.1.

4.4.2.2.3 Use on Attic Floors: Icynene Classic Plus insulation may be installed at a maximum thickness of 13 inches (330 mm) between joists in attic floors. The insulation must be separated from the interior of the building by an approved thermal barrier. The insulation does not require an ignition barrier or a coating.

4.5 One-hour Fire-resistance-rated Assemblies:

4.5.1 Classic, Classic Ultra and Classic Ultra Select:

4.5.1.1 Assembly 1 (Limited Load-bearing Wood Stud Wall): Minimum nominally 2-by-4 [$1^1/_2$ by $3^1/_2$ inches (38 mm by 89 mm)] southern pine (G = 0.55), No. 2 grade studs spaced 16 inches (406 mm) on center with a base layer of $^1/_2$-inch-thick (12.7 mm) wood fiber sound board installed horizontally on each face with vertical joints located over the studs, attached with 6d box nails, 2 inches (51 mm) long and spaced 24 inches (610 mm) on center along the studs, and a second layer of $^5/_8$-inch-thick (15.9 mm) Type X gypsum wallboard installed vertically on each face, attached with 8d box nails, $2^1/_2$ inches (64 mm) long and spaced 7 inches (178 mm) on center along the studs. The stud cavity contains Icynene Classic, Classic Ultra or Classic Ultra Select insulation nominally 2 inches (51 mm) thick.

Axial loads applied to the wall assembly must be limited to the least of the following:

- 1,805 pounds (8029 N) per stud.
- Design stress of 0.78 $F'c$.
- Design stress of 0.78 $F'c$ at a maximum l_e/d of 33.

4.5.1.2 Assembly 2 (Limited Load-bearing Wood Stud Wall): Minimum nominally 2-by-4 [$1^1/_2$ by $3^1/_2$ inches (38 mm by 89 mm)] southern pine (G = 0.55), No. 2 grade studs spaced 16 inches (406 mm) on center with two layers of $^1/_2$-inch-thick (12.7 mm) Type X gypsum wallboard installed vertically with joints staggered on each face, attached with 8d box nails, $2^1/_2$ inches (64 mm) long and spaced 7 inches (178 mm) on center along the studs for the face layer and 6d cement coated box nails, 2 inches (51 mm) long and spaced 24 inches (610 mm) on center along the studs. The stud cavity contains Icynene Classic, Classic Ultra or Classic Ultra Select insulation nominally 2 inches (51 mm) thick.

Axial loads applied to the wall assembly must be limited to the least of the following:

- 1,805 pounds (8029 N) per stud.
- Design stress of 0.78 $F'c$.
- Design stress of 0.78 $F'c$ at a maximum l_e/d of 33.

4.5.1.3 Assembly 3 (Floor/Ceiling): Minimum nominally 2-by-10 [$1^1/_2$ by $9^1/_4$ inches (38 mm by 235 mm)] Douglas fir, No. 2 grade wood joists spaced 24 inches (610 mm) on center, with minimum 1-by-3 [$^3/_4$ by $2^1/_2$ inches (19.1 by 64 mm)] spruce bridging at mid-span. Floor decking must be minimum $^1/_2$-inch-thick (12.7 mm) exterior grade plywood installed perpendicular to joists and fastened with 2-inch-long (51 mm) ring shank nails 6 inches (152 mm) on center at the joints and 12 inches (305 mm) on center at the intermediate joists. Plywood joints must occur over joists. Icynene Classic, Classic Ultra or Classic Ultra Select insulation must be applied to the underside of the plywood deck between the joists to a depth of 5 inches (127 mm). Two layers of minimum $^5/_8$-inch-thick (15.9 mm), Type X gypsum wallboard must be attached perpendicular to the joists on the ceiling side of the assembly. The first layer must be attached with $1^1/_4$-inch-long (32 mm), Type W drywall screws, spaced 24 inches (610 mm) on center. The second layer must be applied perpendicular to the joists, offset 24 inches (610 mm) from the base layer. The second layer must be attached with 2-inch-long (51 mm), Type S drywall screws spaced 12 inches (305 mm) on center. Additional fasteners must be installed along the butt joints of the second layer, securing the two layers together. These fasteners must be $1^1/_2$-inch-long (38 mm), Type G drywall screws placed 2 inches (51 mm) back from each end of the butt joint and spaced 12 inches (305 mm) on center. The wallboard joints on the exposed side must be treated with paper tape embedded in joint compound and

topped with an added coat of compound, and the fastener heads must be coated with joint compound in accordance with ASTM C840 or GA-216.

4.5.1.4 Assembly 4 (Non-loadbearing Steel Stud Wall): Nominally 6-inch-deep (152.4 mm), No. 18 gage, galvanized steel studs spaced 16 inches (406.4 mm) on center, are friction-fit into No. 18 gage galvanized steel floor and ceiling track with a layer of $^5/_8$-inch-thick (15.9 mm),Type X gypsum board applied to the interior side with the long edge parallel to steel studs and secured using No. 6, $1^1/_4$-inch-long (31.7 mm), self-drilling drywall screws spaced 8 inches (203 mm) on center around the perimeter and 12 inches (305 mm) on center in the field. The gypsum board joints must be treated with vinyl or casein, dry or premixed joint compound applied in two coats to cover all exposed screw heads and gypsum board butt joints, and a minimum 2-inch-wide (51 mm) paper, plastic, or fiberglass tape embedded in the first layer of compound over butt joints of the gypsum board. The stud cavity is filled with Icynene Classic, Classic Ultra or Classic Ultra Select insulation up to 6 inches (152 mm) thick. DensGlass® Exterior Sheathing, $^1/_2$ inch (12.7 mm) thick, is installed parallel to steel studs with vertical joints offset a minimum of 16 inches (406 mm) from the vertical joints of the gypsum board and the horizontal joints offset a minimum of 24 inches (610 mm) from the horizontal joints of the gypsum board. The sheathing is attached using No. 6, $1^1/_4$-inch-long (31.7 mm), self-drilling drywall screws spaced 8 inches (203 mm) on center around the perimeter and in the field. Hohmann & Barnard DW-10 brick ties, 6 inches (152 mm) long by $1^1/_2$-inches (38 mm) wide, are spaced 16 inches (406.4 mm) on center vertically on each steel stud, and secured, using two $1^5/_8$-inch-long (41.3 mm) self-drilling screws, through 4-inch (102 mm) red clay brick [$3^1/_2$ inches (88.9 mm) by $2^1/_4$ inches (57.1 mm) by $7^3/_4$ inches (197 mm)] laid in a running bond pattern with Type S mortar, leaving a nominally 1-inch (25.4 mm) air gap between the brick and the exterior sheathing.

Optional: It is permitted to add code-complying, expanded polystyrene (EPS), extruded polystyrene (XPS), foil-faced, rigid polyurethane board stock or polyurethane spray foam on the exterior of the wall (between the DensGlass® sheathed wall and the brick), while maintaining the 1-inch (25.4 mm) air space. The length of the brick ties must be increased to account for the thickness of the insulation.

4.6 Exterior Walls in Type I, II, III and IV Construction:

4.6.1 General: When used on exterior walls of Types I, II, III or IV construction, the assembly must comply with IBC Section 2603.5 and this section, and the Classic, Classic Ultra and Classic Ultra Select insulations must be installed at a maximum thickness described in Table 3. The potential heat of Icynene insulations tested in accordance with NFPA 259 is as follows:

- **Classic, Classic Ultra and Classic Ultra Select:** 494 Btu/ft^2 (5.6 MJ/m^2) per inch of thickness

4.6.2 Specific Wall Assemblies: Wall assemblies complying with Section 4.6 must be as described in Table 3.

5.0 CONDITIONS OF USE

The Icynene Classic, Classic Ultra, Classic Ultra Select and Classic Plus spray-applied polyurethane foam plastic 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 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 as noted in this report.

5.4 Since the performance of Classic Ultra and Classic Ultra Select, 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 as conforming with the provisions of Section 4.4.1.2.2 and Conditions 1 to 5 of Section 4.4.1.2.

5.5 When Classic Ultra and Classic Ultra Select insulation is installed under Section 4.4.1.2.2 of this report, a certificate must be placed in the attic stating that the foam plastic insulation has been installed in accordance with Conditions 1 to 5 of Section 4.4.1.2 and the terms of Section 4.4.1.2.2 of ESR-1826; any alterations to the attic or insulation must be consistent with those requirements.

5.6 The insulation must not exceed the thicknesses and densities noted in this report.

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

5.8 The insulation must be applied by licensed dealers and installers certified by Icynene, Inc.

5.9 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.

5.10 Jobsite certification and labeling of the insulation must comply with 2015 IRC Sections N1101.10.1 and N1101.10.1.1 (2012 IRC Sections N1101.12.1 and N1101.12.1.1 or 2009 IRC Sections N1101.4 and N1101.4.1) and 2015 and 2012 IECC Sections C303.1.1, C303.1.1.1, R303.1.1 and R303.1.1.1 (2009 IECC Sections 303.1.1 and 303.1.1.1), as applicable.

5.11 A vapor retarder must be installed in accordance with the applicable code.

5.12 Icynene Classic, Classic Ultra, Classic Ultra Select and Classic Plus foam plastic insulations are manufactured in Mississauga, Ontario, Canada, 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.

6.2 Reports of tests in accordance with AC377 Appendix X [Classic, Classic Ultra and Classic Ultra Select (Section 4.4.1.2.1) and Classic Plus (Sections 4.4.3.2.1 and 4.4.3.2.3)] and Appendix C [Classic, Classic Ultra and Classic Ultra Select (Section 4.4.1.2.3)].

6.3 Test report on air leakage rate in accordance with ASTM E2178 (Classic, Classic Ultra and Classic Ultra

Select and Classic Plus).

6.4 Reports of room corner fire testing in accordance with NFPA 286 (Classic, Classic Ultra, Classic Ultra Select and Classic Plus).

6.5 Test reports in accordance with ASTM E119 (Classic, Classic Ultra and Classic Ultra Select).

6.6 Test report in accordance with NFPA 285, and related engineering analysis (Classic, Classic Ultra and Classic Ultra Select).

6.7 Reports of tests in accordance with NFPA 259 (Classic, Classic Ultra and Classic Ultra Select).

6.8 Reports of fire tests in accordance with ASTM E970 (Classic, Classic Ultra, Classic Ultra Select and Classic Plus).

6.9 For Classic Ultra and Classic Ultra Select, an engineering evaluation, including full-scale fire testing, small-scale testing and fire modeling (Section 4.4.1.2.2).

7.0 IDENTIFICATION

All packages and containers of Classic, Classic Ultra, Classic Ultra Select and Classic Plus insulations must be labeled with the Icynene, Inc., name and address; the product name; component designation (A or B); the flame spread index and the smoke-developed index; the expiration date; the name of the inspection body (ICC-ES); and the evaluation report number (ESR-1826).

No Burn Plus XP Intumescent coating described in Section 3.5.1 is identified with the manufacturer's name and address, the product trade name and use instructions.

The International Fireproof Technology, Inc. / Paint To Protect Inc. DC 315 coating described in Section 3.5.2 is identified with the manufacturer's name and address, the product trade name, date of manufacture, shelf life or expiration date, the manufacturer's application instructions and the evaluation report number (ESR-3702).

Fireshell F10E coating is labeled with the manufacturer's name and address; the product name; the date of manufacture, the shelf life or expiration date; the manufacturer's instructions for application, and the evaluation report number (ESR-3997).

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

	***R*-VALUE (°F·ft²·h/Btu)**	
THICKNESS (inches)	**Classic, Classic Ultra and Classic Ultra Select**	**Classic Plus**
1	3.7	4.0
2	7.4	8.0
3	11	12
3.5	13	14
4	14	16
5	18	20
5.5	20	22
6	22	24
7	25	28
7.5	27	30
8	29	32
9	32	36
9.5	34	38
10	36	40
11.5	41	42
13.5	—	54
14	50	56

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- and 3.5-inch thicknesses.
[2] *R*-values greater than 10 are rounded to the nearest whole number.

TABLE 2—USE OF INSULATION WITHOUT A PRESCRIPTIVE THERMAL BARRIER[1]

INSULATION TYPE	MAXIMUM THICKNESS (in.) (Walls & Vertical Surfaces)	MAXIMUM THICKNESS (in.) (Ceilings, Underside of Roof Sheathing/Rafters & Floors)	FIRE-PROTECTIVE COATING MINIMUM THICKNESS & TYPE (Applied to all Foam Surfaces)[2]	MINIMUM THEORETICAL APPLICATION RATE OF FIRE-PROTECTIVE COATING[3]	TESTS SUBMITTED
CLASSIC, CLASSIC ULTRA AND CLASSIC ULTRA SELECT	6	14	DC315 20 mils WFT / 13 mils DFT	1.25 gal / 100 ft^2	NFPA 286
	$7^1/_2$	$11^1/_2$	Fireshell F10E 21 mils WFT / 14 mils DFT	1.31 gal / 100 ft^2	NFPA 286
CLASSIC PLUS	$6^1/_2$	$11^1/_2$	DC315 20 mils WFT / 13 mils DFT	1.25 gal / 100 ft^2	NFPA 286

For **SI:** 1 inch = 25.4 mm; 1 mil = 0.0254 mm; 1 gallon = 3.38 L; 1 ft^2 = 0.093 m^2; NA = not applicable.

[1]See Section 4.3.1.2.
[2]See Sections 3.5.2 and 3.5.3.
[3]As reported in the manufacturer's application instructions. Actual application rate, based on specific project conditions, must be in accordance with the manufacturer's application instructions.

TABLE 3—NFPA 285 COMPLYING EXTERIOR WALL ASSEMBLIES

WALL COMPONENT	MATERIALS
Base Wall System – Use either 1, 2 or 3	1 – Concrete wall. 2 – Concrete masonry wall. 3 –Minimum $3^5/_8$-inch-deep (92 mm), No. 20 gage, C-shaped steel studs, spaced a maximum of 24 inches on center with lateral bracing every 4 feet (1219 mm) as required by code. Sheathing shall be a described in Exterior Sheathing below.
Floorline Firestopping	Minimum 4 pcf mineral wool in each stud cavity at each floorline, attached with Z-clips. Thickness must match stud cavity depth.
Cavity Insulation – Use either 1, 2, 3, 4 or 5	1 – None. 2 – Partial cavity fill with a maximum air space of 2 inches (51 mm) or full cavity depth not exceeding $7^5/_8$ inches (194 mm) of Classic, Classic Plus, Classic Ultra or Classic Ultra Select (ESR-1826); MD-R-210 (ESR-3493); MD-C-200 (ESR-3199); or Proseal (ESR-3500). 3 – Any insulation qualified as noncombustible in accordance with ASTM E136. 4 – Glass fiber batt insulation[a]. 5 – Mineral fiber insulation[a]. [a.] Insulation must comply with the applicable requirements of 2015 or 2012 IBC Section 720.2 (2009 IBC Section 719.2).
Exterior Sheathing – Only for Base Wall System No.3 – Use either 1 or 2	1 – Minimum $^1/_2$-inch-thick (12.7 mm),), glass mat gypsum sheathing complying with ASTM C1177. 2 – Sheathing shall be attached with No. 6, $1^1/_4$- inch-long (32 mm)self-tapping screws located 8 inches (203 mm) on center along the perimeter and 12 inches 302 mm) on center in the field of wallboard. Joints must be taped and treated with joint compound in accordance with ASTM C840 or GA-216.
Exterior Insulation	Maximum thickness of $5^1/_2$ inches (140 mm) of Proseal Eco (MD-R-210) (ESR-3493) or Proseal (ESR-3500).
Exterior Wall Covering – Use either 1, 2, 3, 4, 5, 6 or 7	1 – Brick - standard nominally 4-inch-thick (102 mm) clay brick; brick veneer anchors – standard types installed a maximum of 24 inches OC vertically on each stud[b]. 2 – Stucco - minimum $^3/_4$-inch-thick (19.1 mm), exterior cement plaster and lath with a secondary water-resistive barrier may be installed between the exterior insulation and the lath. 3 – Natural stone (limestone, granite, marble, sandstone), minimum 2-inch-thick (51 mm)[c]. 4 – Cast artificial stone, minimum $1^1/_2$-inch-thick (38 mm), complying with AC51 and subject of a current ICC-ES evaluation report[c]. 5 – Terracotta cladding, minimum of $1^1/_4$–inch-thick (32 mm)[c]. 6 – Precast concrete panels, minimum of $1^1/_2$–inch-thick (32 mm)[c]. 7 – Concrete masonry units (CMU), minimum of $1^1/_2$–inch-thick (38 mm)[c]. [b.] The maximum air gap between exterior insulation and cladding shall be 2 inches (51 mm). [c.] Any standard non-open-jointed installation technique such as ship-lap, etc., may be used.