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

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REPORT SUBJECT:
ProSeal HFO and ProSeal HFO CW Spray-applied Polyurethane 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)

ProSeal HFO and ProSeal HFO CW insulations have been evaluated for the following properties:

- Surface-burning characteristics
- Physical properties
- Thermal resistance
- Air permeability
- Water vapor permeability
- Alternatives to Thermal Barriers
- Alternatives to Ignition Barriers
- Fire-resistance-rated construction
- Exterior walls of Types I through 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 showed in brackets where they differ.

2.0 USES

ProSeal HFO and ProSeal HFO CW spray-applied polyurethane foam insulations are used as nonstructural thermal insulating material on or in interior and exterior walls, floors, ceilings and roofs. Use in fire-resistance rated construction is described in Section 4.5. The insulations may be used in all types of construction; when used in exterior walls of buildings of Types I, II, III, or IV construction, the assembly must be as described in Section 4.6. Under the IRC, the insulations may be used as air-impermeable insulation when installed in accordance with Section 3.1.3.

3.0 DESCRIPTION

3.1 Materials:

3.1.1 ProSeal HFO and ProSeal HFO CW: ProSeal HFO and ProSeal HFO CW insulations are semi-rigid, closed cell, polyurethane foam plastic. The insulations are two-component spray foam plastic with nominal in-place density of 2 pcf. The insulations are produced in the field by combining a polymeric isocyanate (A component) with a resin (B component). The insulation liquid components are supplied in 55-gallon drums and/or 250-gallon totes, and must be stored at temperatures between 50°F and 100°F. The resin (B component) must be protected from freezing temperatures and has a shelf life of 3 months.

3.1.2 FIRE-LOK/DC315 Intumescent Coating: FIRE-LOK/DC315 intumescent coating is a water-based coating manufactured by IFTI, Paint to Protect, and is supplied in 5-gallon pails and 55-gallon drums. The coating material has a shelf life of 24 months when stored in factory-sealed containers at temperatures between 41°F and 95°F. DC315 complies with ICC-ES AC456 as recognized in Intertek CCRR-1076.



3.2 Performance Characteristics:

3.2.1 Surface-burning Characteristics: ProSeal HFO and ProSeal HFO CW insulations, at a maximum thickness of 4 inches and a nominal density of 2 pcf, have a flame-spread index of 25 or less and a smoke-developed index of 450 or less, when tested in accordance with ASTM E84. Based on large scale tests in accordance with NFPA 286, the insulations can be installed at greater thicknesses as described in Sections 4.3 and 4.4. When the insulations are separated from the interior living space of the building with minimum 1/2 inch thick gypsum board, the maximum thickness is not limited.

3.2.2 Thermal Resistance, R-values: ProSeal HFO and ProSeal HFO CW insulations have thermal resistance (R-value) at a mean temperature of 75°F as shown in Table 2.

3.2.3 Air Permeability: ProSeal HFO and ProSeal HFO CW insulations, at a minimum thickness of 1 inch, have tested values of 0.008 (Infiltration) and 0.009 (Exfiltration). Therefore, they are considered air-impermeable insulations in accordance with 2015 IBC Section 1203.3 [not applicable under the 2012 and 2009 IBC] or IRC Sections R202 and R806.5 [2009 - R806.4], based on testing in accordance with ASTM E283.

3.2.4 Water Vapor Permeability: ProSeal HFO and ProSeal HFO CW have vapor permeance of 1.4 perms at a thickness of 1 inch. Therefore the insulations, with a minimum thickness of 1 inch, may be used where a Class III vapor retarder is required by the applicable Code. To achieve a vapor permeance of less than 1.0 perm, and a Class II rating, the insulations must be applied at a thickness of 1.5 inch.

4.0 INSTALLATION

4.1 General:

ProSeal HFO and ProSeal HFO CW insulations must be installed in accordance with the manufacturer's published installation instructions, the applicable Code, and this Research Report. A copy of the manufacturer's instructions must be available on the jobsite during installation.

4.2 Application:

ProSeal HFO and ProSeal HFO CW insulations are spray-applied on the jobsite using a volumetric positive displacement pump as identified in the manufacturer's application instructions. The insulations must be applied when the ambient temperature is greater than 14°F. The insulations must not be used in areas that have a maximum in-service temperature greater than 180°F. The foam plastic must not be used in electrical outlet or junction boxes or in contact with water, rain, or soil. The foam plastic must not be sprayed onto a substrate that is wet, or covered with frost or ice, loose scales, rust, oil, or grease. The insulations must be protected from the weather during and after application. The insulations may be applied to a maximum thickness of 5-1/2 inches per pass. A minimum of 20 minutes must be allowed between applications of material. Where the insulations are used as air-impermeable insulation, such as in unvented attic assemblies under IBC Section 1203.3 or IRC Section R806.5 [2009 - R806.4], the insulations must be installed at a minimum thickness of 1 inch.

4.3 Thermal Barrier:

4.3.1 Application with a Prescriptive Thermal Barrier: ProSeal HFO and ProSeal HFO CW insulations must be separated from the interior living space of the building by an approved thermal barrier of 1/2 inch thick gypsum board or an equivalent 15 minute thermal barrier complying with, and installed in accordance with, IBC Section 2603.4 or IRC Section R316.4, as applicable. Exceptions are provided in Sections 4.3.2 and 4.4.

When the insulations are separated from the interior living space of the building with minimum 1/2 inch thick gypsum board, the maximum thickness is not limited.

4.3.2 Application without a Prescriptive Thermal Barrier: ProSeal HFO and ProSeal HFO CW insulations may be installed without the 15-minute thermal barrier prescribed in IBC Section IBC Section 2603.4 and IRC Section R316.4, when installed as described in this section. The thickness of the foam plastic insulations must not exceed 8 inches on walls and 12 inches on horizontal surfaces. The foam plastic must be covered on all surfaces with one coat of DC315 coating at an application rate of 1.1 gallon





per 100 sq. ft. [18 mils nominal wet film thickness, 12 mils dry film thickness]. 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 with low-pressure airless spray equipment.

4.4 Attics and Crawl Spaces:

ProSeal HFO and ProSeal HFO CW insulations may be applied in attics and crawl spaces as described in either 4.4.1 or 4.4.2. When the insulations are installed in an attic or crawlspace in accordance with this section, a thermal barrier is not required between the insulation and the attic or crawlspace, but is required between the insulation and the interior living space.

4.4.1 Application with a Prescriptive Ignition Barrier: When the insulations are installed within attics and crawl spaces where entry is made only for service of utilities, the ignition barrier must be installed in accordance with IBC Section 2603.4.1.6, or IRC Section R316.5.3 or R316.5.4, as applicable. The ignition barrier must be consistent with the requirements for the type of construction required by the applicable Code, and must be installed in a manner so the foam plastic insulation is not exposed. The insulations as described in this section may be installed in unvented attics in accordance with 2015 IBC Section 1203.3 or IRC Section R806.5 [2009 - R806.4] at a minimum thickness of 1 inch.

4.4.2 Application without a Prescriptive Ignition Barrier:

4.4.2.1 General: The insulations may be installed in attics and crawl spaces, without the ignition barrier prescribed in IBC Section 2603.4.1.6 and IRC Sections R316.5.3 and R316.5.4, subject to the following conditions:

- Entry to the attic or crawl space is only to service utilities, and no storage is permitted.
- There are no interconnected attic or crawl space areas.
- Air in the attic or crawl space is not circulated to other parts of the building.

- Under-floor (crawl space) ventilation is provided when required by IBC Section 1203.4 [1203.3] or IRC Section R408.1, as applicable.
- Attic ventilation is provided when required by IBC Section 1203.2 or IRC Section R806, except when air-impermeable insulation is permitted in unvented attics in accordance with 2015 IBC Section 1203.3 [not applicable under the 2012 and 2009 IBC] or IRC Section R806.5 [2009 - R806.4].
- Combustion air is provided in accordance with IMC (International Mechanical Code) Section 701 [Sections 701 and 703].

The insulations may be installed in unvented attics as described in this section in accordance with IBC Section 1203.3 or IRC Section R806.5 [R806.4], when applied at a minimum thickness of 1 inch.

4.4.2.2 Application of Insulation without an Intumescent Coating: In attics and crawlspaces, the insulations may be applied to the underside of roof sheathing and rafters in attics and to the underside of wood floors and floor joists in crawl spaces, and to walls in both attics and crawl spaces. The thickness of the foam plastic must not exceed 8 inches on walls and 12 inches on the underside of roofs and wood floors. The insulations may be installed without the prescriptive ignition barrier required by IBC Section 2603.4.1.6 or IRC Sections R316.5.3 and R316.5.4, or a protective coating.

4.4.2.3 Use on Attic Floors: The insulations may be installed exposed (no coating) at a maximum thickness of 8 inches between and over the joists in attic floors. The insulations must be separated from the interior of the building by 1/2 inch gypsum or an approved thermal barrier. The insulations may be installed without the prescriptive ignition barrier required by IBC Section 2603.4.1.6 or IRC Section R316.5.3 and R316.5.4 or a protective coating.

4.5 Fire Resistance Ratings:

Assemblies containing ProSeal HFO and ProSeal HFO CW have been tested for fire resistance. Refer to details in [Design Listings ILI/FI 60-01, ILI/FI 60-02, and ILI/FI 120-01](#).





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

The insulations may be used in exterior walls of Types I, II, III, or IV construction complying with IBC Section 2603.5 when the assembly is as described in Design Listings [ILI/FI 30-01](#) and [ILI/FI 30-02](#). The potential heat of the insulations is 1885 Btu/ft² (21.4 MJ/m²) per inch of thickness.

5.0 CONDITIONS OF USE

The ProSeal HFO and ProSeal HFO CW spray-applied foam plastic insulations described in this Research Report comply with, or are 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 insulations must be separated from the interior living space of the building by a thermal barrier as described in Section 4.3.

5.3 The insulations must not exceed the thicknesses noted in Sections 4.3, and 4.4 as applicable.

5.4 The insulations must be applied by contractors approved by Icynene-Lapolla.

5.5 The insulations must be installed with a vapor retarder when required by the applicable Code.

5.6 Use of the insulations 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 [2012 - 2603.9] [2009 - 2603.8], as applicable.

5.7 Jobsite certification and labeling of the insulations must comply with IRC Section N1101.10 [2012 – N1101.12] [2009 – N1101.4] and IECC Section C303.1 or R303.1 [2009 – 303.1] as applicable.

5.8 The insulations are produced in Houston, Texas, under a quality control program with inspections by Intertek Testing Services NA, Inc. (AA-647).

6.0 SUPPORTING EVIDENCE

6.1 Reports of tests in accordance with ASTM C518, ASTM E84, ASTM E96, ASTM E119, ASTM E283, NFPA 259, NFPA 285, and NFPA 286.

6.2 Data in accordance with the ICC-ES Acceptance Criteria for Spray-applied Foam Plastic Insulation (AC 377), dated April 2016, including reports of tests in accordance with Appendix X.

6.3 Research Reports for evaluation of data in accordance with ICC-ES Acceptance Criteria for Fire-protective Coatings Applied to Spray-applied Foam Plastic Insulation Installed without a Code-prescribed Thermal Barrier (AC456), dated October 2015.

6.4 Intertek Listing Report "Icynene-Lapolla ProSeal HFO and ProSeal HFO CW Spray Foam Wall Insulation".

7.0 IDENTIFICATION

The A and B components of the insulation described in this Research Report are identified with the manufacturer's name (Icynene-Lapolla.), address and telephone number; the product name (ProSeal HFO and ProSeal HFO CW); use instructions; the flame spread and smoke-development indices; the lot number; the Intertek Mark, and the Code Compliance Research Report number (CCRR-1108).

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 Testing.

9.3 Reference to <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 ¹ | IRC SECTION ¹ | IECC SECTION ¹ |
|----------------------------------|--------------------------|---|--|
| Physical properties | Not required | Not required | Not required |
| Surface-burning characteristics | 2603.3 | R316.3 | Not applicable |
| Thermal barrier/ignition barrier | 2603.4 | R316.4 | Not applicable |
| Air permeability | 1203.3 [1301] | R806.5 [2009 - R806.4] | C402.4 R402.4 |
| Thermal resistance | 1301 | N1101.10 N1102 [N1101.1, N1101.12] | C303.1.1 C303.1.4 R303.1.1 R30301.4 [303.1.1 and 303.1.2] |

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

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TABLE 2 – THERMAL RESISTANCE (R Values)^{1,2,3}

| THICKNESS (inches) | R-VALUE (°F.ft ² .h/Btu) |
|--------------------|-------------------------------------|
| 1 | 6.2 |
| 2 | 13 |
| 3 | 20 |
| 3.5 | 24 |
| 4 | 27 |
| 5 | 34 |
| 5.5 | 38 |
| 6 | 41 |
| 7 | 48 |
| 8 | 55 |
| 9 | 62 |
| 10 | 68 |
| 11 | 75 |
| 11.5 | 79 |
| 12 | 82 |

¹ R-values are calculated based on tested K-values at 1 inch and 4 inch thicknesses.

² R-values greater than 10 are rounded to the nearest whole number.

³ To determine R values for thickness not listed:

- a. Between 1 inch and 4 inch can be determined through linear interpolation or
- b. Greater than 4 inches can be calculated based on R= 6.84/inch