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ESR-2717

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Reissued 07/2017
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DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION
SECTION: 07 21 00—THERMAL INSULATION
DIVISION: 07 27 00—AIR BARRIERS

REPORT HOLDER:

ICP ADHESIVES & SEALANTS, INC.

2775 BARBER ROAD
NORTON, OHIO 44203

EVALUATION SUBJECT:

HANDI-FOAM E-84 CLASS 1(A) SPRAY FOAM SYSTEM

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DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION
Section: 07 21 00—Thermal Insulation
Section: 07 27 00—Air Barriers

REPORT HOLDER:

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EVALUATION SUBJECT:

HANDI-FOAM E-84 CLASS 1(A) SPRAY FOAM SYSTEM

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.

- Other Codes (see Section 8.0)

1.2 Evaluation to the following green standard:

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

Attributes verified:

- See Section 3.4

Properties evaluated:

- Physical properties
- Surface-burning characteristics
- Thermal resistance (*R*-values)
- Attic and crawl space installation
- Air Permeability

2.0 USES

The Handi-Foam E-84 Class 1(A) Spray Foam System is used as nonstructural thermal insulating material in Type V-B construction under the IBC and nonfire-resistance-rated construction under the IRC. The insulation is for use in wall cavities, floor/ceiling assemblies, attics and crawl spaces, and sill plates, band joists and headers when installed in accordance with this report. The insulation is air-impermeable insulation and may be used to seal the joints in site-fabricated metallic air ducts under IRC Section M1601.4.1 when installed as described in Section 4.4; and may be used in any type of construction as an air barrier material when installed as described in Section 4.5. Use in attics and crawl spaces is described in Section 4.7.

3.0 DESCRIPTION

3.1 General:

The Handi-Foam E-84 Class 1(A) Spray Foam System is a two-component, closed-cell, low-pressure, semi-rigid, polyurethane plastic insulation. The two components, components A and B, are delivered in separate pressurized vessels and combined in the field, using a dispensing system specified by ICP Adhesives & Sealants, Inc. Component A, a polymeric isocyanate, mixes and reacts with Component B, a polymeric resin blend, producing a foam insulation with a nominal density of 2.1 lb/ft^3 (34 kg/m^3). The spray foam system is available in nonrefillable sizes II-105, II-205, and II-605, and in refillable sizes System 8, System 17, System 27, System 60, and System 100. The components in the nonrefillable vessels have a shelf life of 12 months, and those in the refillable vessels have a shelf life of six months, when stored unopened at temperatures between 50°F (10°C) and 120°F (49°C). The A and B components for the II-105 and II-205 are packaged together. The components of the nonrefillable II-605 and the refillable System 8, System 17, System 27, System 60, and System 100 are packaged separately.

3.2 Surface-burning Characteristics:

The Handi-Foam E-84 Class 1(A) 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 at a maximum thickness of 2 inches (51 mm) and a nominal density of 2.1 pcf (34 kg/m^3).

3.3 Thermal Resistance (*R*-values):

Handi-Foam E-84 Class 1(A) Spray Foam insulation has thermal resistance (*R*-values) at a mean temperature of 75°F (24°C) as shown in Table 1.

3.4 Air Permeability:

Handi-Foam E-84 Class 1(A) Spray Foam insulation, at a minimum thickness of 1 inch (25.4 mm), is considered an air-impermeable insulation in accordance with 2015 IBC Section 1203.3 and 2015 and 2012 IRC Section R806.5 (2009 IRC Section R806.4), based on testing in accordance with ASTM E283.

The attributes of the insulation 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.

3.5 Intumescent Coating:

3.5.1 No Burn Plus XD:

No-Burn® Plus XD, manufactured by No-Burn, Inc., is a latex-based intumescent coating supplied in 5-gallon (19 L) pails. The coating material has a shelf life of 36 months when stored in factory-sealed containers at temperatures between 40°F (4.4°C) and 90°F (32°C).

3.5.2 DC 315 Coating:

DC 315 coating (ESR-3702), manufactured by International Fireproof Technology Inc. / Paint To Protect Inc., is a water-based coating supplied in 5-gallon (19 L) pails and 55-gallon (208 L) drums. The coating has a shelf life of one (1) year when stored in factory-sealed containers at temperatures between 50°F (10°C) and 80°F (27°C).

4.0 INSTALLATION

4.1 General:

The Handi-Foam E-84 Class 1(A) spray-applied insulation must be installed in accordance with the manufacturer's published installation instructions, the applicable code, and this report. The manufacturer's published installation instructions, which are provided with every system, must be available on the jobsite at all times during installation.

4.2 Application:

The insulation is applied in single or multiple passes having a minimum thickness of $^1/_2$ inch (12.7 mm) and a maximum thickness of 2 inches (51 mm) per pass, and must not exceed a total thickness of 2 inches (51 mm) in wall, floor, or ceiling cavities. Each insulation pass must be allowed to fully expand and cure for a minimum of 15 minutes prior to the application of an additional pass. The maximum service temperature must not exceed that specified in the manufacturer's installation instructions. The foam plastic insulation must not be used in electric outlet or junction boxes or in contact with rain or water. The substrate must be free of moisture, frost or ice, loose scales, rust, oil, and grease. The insulation must be protected from the weather during and after application.

4.3 Thermal Barrier:

4.3.1 Application with a Prescriptive Thermal Barrier: Handi-Foam E-84 Class 1(A) Spray Foam insulation must be separated from the interior of the building by an approved thermal barrier of $^1/_2$-inch (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 as described in Sections 4.3.2, 4.4, 4.5 and 4.6. Within an attic or crawl space, installation must be in accordance with Section 4.7.

4.3.2 Application without a Prescriptive Thermal Barrier: The prescriptive 15-minute thermal barrier may be omitted when installation is in accordance with this section. The Handi-Foam E-84 Class 1(A) Spray Foam System and DC315 intumescent coating may be used in lieu of the prescribed 15-minute thermal barrier. The foam plastic insulation thickness must not exceed 2 inches (51 mm) in walls and 2 inches (51 mm) in ceilings, and the insulation must be covered with 13 dry mils (0.33 mm) [20 wet mils (0.51 mm)], at an application rate of 1.25 gallons per 100 square feet (0.51 L/m^2). The coating must be applied over the insulation in accordance with the coating manufacturer's instructions and this report. The surface to be coated must be dry, clean and free of dirt and loose debris or other substances that could interfere with the adhesion of the coating. DC 315 intumescent coating must be applied by airless sprayer at ambient temperatures between 50°F (10°C) and 80°F (27°C) and relative humidity of less than 65 percent.

4.4 Joint Sealant on Metallic Air Ducts:

The insulation, installed at a maximum thickness of 2 inches (51 mm) and a maximum width of 6 inches (152 mm), may be used to seal the joints of nonfactory-made (nonlisted) air ducts, in accordance with Section M1601.4.1 of the IRC. See Figure 1.

4.5 Applications as Air Barrier Material:

Handi-Foam E-84 Class 1(A) Spray Foam insulation may be used in any type of construction as an air barrier material for wall/floor and roof/wall intersections in the exterior building envelope when installed a maximum of 2 inches (51 mm) thick and 6 inches (152 mm) wide, and an unlimited length. See Figures 2 and 3.

In wall/floor intersections, the foam plastic may be applied over a fire-resistant joint without affecting the fire-resistance rating, provided the foam plastic is limited to maximum dimensions of 2 inches (51 mm) by 2 inches (51 mm) (length is unlimited).

4.6 Use on Sill Plates, Band Joists and Headers:

Handi-Foam E-84 Class 1(A) Spray Foam insulation with a maximum thickness of 2 inches (51 mm) may be applied to sill plates, band joists and headers without a thermal barrier or ignition barrier, in Type V construction in accordance with IBC Section 2603.4.1.13 and IRC Section R316.5.11.

4.7 Attics and Crawl Spaces:

4.7.1 Application with a Prescriptive Ignition Barrier: When the foam plastic insulation is 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 so that the foam plastic insulation is not exposed. The attic or crawl space area must be separated from the interior, habitable space of the building by an approved 15-minute thermal barrier. The insulation may be installed in unvented attics as described in this section in accordance with 2015 IBC Section 1203.3 and 2015 and 2012 IRC Section R806.5 (2009 IRC Section R806.4).

4.7.2 Application without a Prescriptive Ignition Barrier:

4.7.2.1 General: When the Handi-Foam E-84 Class 1(A) Spray Foam System is installed without a prescriptive ignition barrier in attics and crawl spaces, in accordance with Sections 4.7.2.2 and 4.7.2.3, the following conditions apply:

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. Under-floor (crawl-space) ventilation is provided in accordance with 2015 IBC Section 1203.4 (2012 and 2009 IBC Section 1203.3) or IRC Section R408.1, as applicable.

e. Attic ventilation is provided in accordance with IBC Section 1203.2 or IRC Section R806, as applicable.

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

4.7.2.2 Application with No Burn Plus XD Intumescent Coating: In attics, Handi-Foam E-84 Class 1(A) Spray Foam may be spray-applied to the underside of the roof sheathing and/or rafters; and, in crawl spaces, to the underside of wood floors and/or floor joists as described in this section. The thickness of the Handi-Foam E-84 Class 1(A) Spray Foam applied to the underside of the top of the space must not exceed 2 inches (51 mm). The thickness of the Handi-Foam E-84 Class 1(A) Spray Foam applied to vertical wall surfaces in attics and crawl spaces must not exceed 2 inches (51 mm). The foam plastic insulation must be covered with a minimum 6.4-mil-thick dry film (10 mils of wet film) of No Burn Plus XD intumescent coating applied over the insulation in accordance with the manufacturer's installation instructions and this report. The coating is applied using an airless sprayer, brush or roller at a rate of 1 gallon per 160 square feet (0.26 L/m^2) per coat, to obtain the required minimum thickness. The coating must be applied to surfaces that are dry, clean, and free of dirt, loose debris and any other substances that could interfere with adhesion of the coating, and when ambient and substrate temperatures are within a range of 50°F (10°C) to 90°F (32°C).

4.7.2.3 Use on Attic Floors: The Handi-Foam E-84 Class 1(A) Spray Foam may be installed at a maximum thickness of 2 inches (51 mm) between joists in attic floors when the exposed surfaces of the foam plastic insulation are covered as described in Section 4.7.2.2 of this report. The intumescent coating must be applied in accordance with the manufacturer's installation instructions and this report. The insulation must be separated from the interior of the building by an approved thermal barrier.

5.0 CONDITIONS OF USE

The Handi-Foam E-84 Class 1(A) Spray Foam System described in this report complies with, or is a suitable alternative to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 The insulation must be installed in accordance with the manufacturer's published installation instructions, this report, and the applicable building code. In the event of a conflict between the installation instructions and this report, this report governs.

5.2 The foam plastic insulation must be applied by installers certified by ICP Adhesives & Sealants, Inc.

5.3 The spray-applied foam plastic must not exceed the thicknesses recognized in Sections 3.2 and 4.0.

5.4 The foam plastic insulation must be separated from the interior of the building by an approved 15-minute thermal barrier, as described in Section 4.3 except as described in Sections 4.3.2, 4.4, 4.5, 4.6 and 4.7.

5.5 The foam plastic insulation must be protected from the weather during and after application.

5.6 Handi-Foam E-84 Class 1(A) Spray Foam insulation has been evaluated only for use in Type V-B construction under the IBC and nonfire-resistance-rated construction under the IRC.

5.7 Use of the insulation in areas where the probability of termite infestation is "very heavy" must be in accordance with 2015 and 2009 IBC Section 2603.8 (2012 IBC Section 2603.9) or IRC Section R318.4, as applicable.

5.8 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, C303.1.2, R303.1.1 and R303.1.2 (2009 IECC Sections 303.1.1 and 303.1.2), as applicable.

5.9 Handi-Foam E-84 Class 1(A) Spray Foam insulation must not be used as a component of a fire-resistant joint system, but may be applied over the top of a fire-resistant joint system, as described in Section 4.5.

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

5.11 The Handi-Foam E-84 Class 1(A) Spray Foam System components are produced in Tomball, Texas and Akron, Ohio 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 May 2015, including report of test in accordance with Appendix X of AC377.

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

6.3 Report of room corner test in accordance with NFPA 286 for application without a prescriptive thermal barrier (applicable to Section 4.3.2).

6.4 Report of room corner test in accordance with NFPA 286 (applicable Section 4.6).

6.5 Engineering analysis addressing use as an air barrier material and duct joint sealant.

7.0 IDENTIFICATION

Each container of the Handi-Foam E-84 Class 1(A) Spray Foam System is identified with the ICP Adhesives & Sealants, Inc., name and address, the product name, the component type (A or B), the date of manufacture and the shelf life of the component. Additionally, the labeling includes the installed density, flame-spread and smoke-developed indices, and the evaluation report number (ESR-2717). The combined packaging of the II-105, II-205 and II-605 products is identified with the manufacturer's name and address, the product name, date of manufacture, shelf life, installed density, flame-spread and smoke-developed indices, and the evaluation report number (ESR-2717).

The No-Burn®, Inc. No-Burn® XD Plus intumescent coating described in Section 3.5.1 is identified with the manufacturer's name, the product trade name and use instructions.

The International Fireproof Technology Inc. / Paint To Protect Inc. DC 315 intumescent coating described in Section 3.5.2 is identified with the manufacturer's name, the product trade name, use instructions and ICC-ES evaluation report number ESR-3702.

8.0 OTHER CODES

In addition to the codes referenced in Section 1.0, the products described in this report were evaluated for compliance with the requirements of the following codes:

- 2006 *International Building Code*® (2006 IBC)
- 2006 *International Residential Code*® (2006 IRC)
- 2006 *International Energy Conservation Code*® (2006 IECC)

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

- **Application with a Prescriptive Thermal Barrier:**

See Section 4.3, except the approved thermal barrier must be installed in accordance with 2006 IRC Section R314.4.

- **Application with a Prescriptive Ignition Barrier:**

See Section 4.7.1, except attics must be vented in accordance with 2006 IBC Section 1203.2 or 2006 IRC Section R806, and crawl space ventilation must be in accordance with 2006 IBC Section 1203.3 or 2006 IRC Section R408, as applicable. Additionally, an ignition barrier must be installed in accordance with 2006 IRC Section R314.5.3 or Section R314.5.4, as applicable.

- **Application without a Prescriptive Ignition Barrier:**

See Section 4.7.2, except attics must be vented in accordance with 2006 IBC Section 1203.2 or 2006 IRC Section R806 and crawl space ventilation must be in accordance with 2006 IBC Section 1203.3 or 2006 IRC Section R408, as applicable.

- **Protection against Termites:**

See Section 5.7, except use of the insulation in areas where the probability of termite infestation is "very heavy" must be in accordance with 2006 IRC Section R320.5.

- **Jobsite Certification and Labeling:**

See Section 5.8, except jobsite certification and labeling must comply with Sections 102.1.1 and 102.1.11, as applicable, of the 2006 IECC.

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

THICKNESS (inches)	*R*-VALUE (°F·ft²·h/Btu)
1	6[1]
2	12[1]

For **SI:** 1 inch = 25.4 mm: 1 °F·ft²·h/Btu = 0.176 °K·m²/W.

[1]*R*-values are based on tested *k*-values at 2-inch thickness.

FIGURE 1—DUCT JOINT SEALING

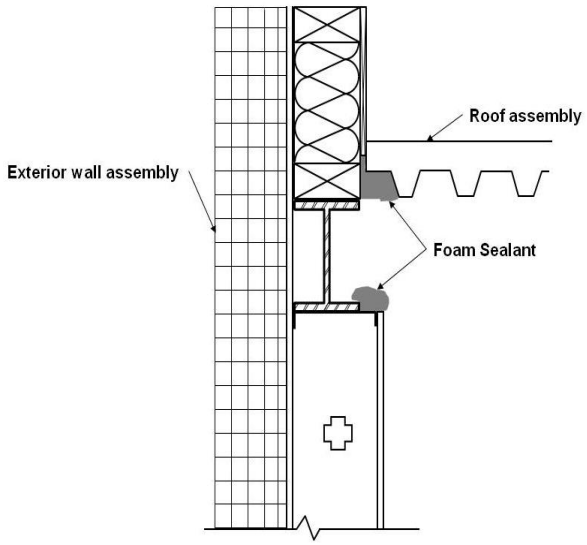

FIGURE 2—ROOF WALL JUNCTURE

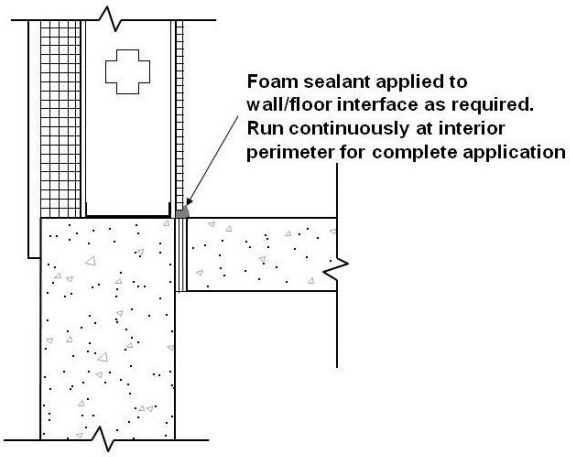

FIGURE 3—WALL FLOOR JUNCTURE