EVALUATION REPORT Number: 824

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HANDIFOAM HVLP 1.6 HIGH YIELD SPRAY-APPLIED POLYURETHANE FOAM PLASTIC INSULATION

CSI Section:
07 21 00 Thermal Insulation

1.0 RECOGNITION

HandiFoam HVLP 1.6 High Yield recognized in this report has been evaluated for use as spray-applied polyurethane foam plastic insulation. The physical properties, thermal resistance, surface burning characteristics, vapor permeance, attic and crawl space installations, and use in Type V-B construction of HandiFoam HVLP 1.6 High Yield complies with the intent of the provisions of the following codes and regulations:

- 2021, 2018, 2015, and 2012 International Building Code® (IBC)
- 2021, 2018, 2015, and 2012 International Residential Code® (IRC)
- 2021, 2018, 2015, and 2012 International Energy Conservation Code® (IECC)
- 2020 Florida Building Code, Building, (FBC, Building) -supplement attached
- 2020 Florida Building Code, Residential (FBC, Residential)- supplement attached
- 2020 Florida Building Code, Energy Conservation (FBC, Energy Conservation)- supplement attached

2.0 LIMITATIONS

Use of HandiFoam HVLP 1.6 High Yield spray-applied polyurethane foam plastic insulation 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, this evaluation report, and the applicable code. If there are any conflicts between the manufacturer's published installation instructions and this report, the more restrictive shall govern.

2.2 In accordance with Sections 4.6.1 and 4.6.3 of this report, the insulation shall be separated from the interior of the building by a code-complying thermal barrier or ignition barrier as appropriate.

2.3 The insulation shall not exceed the nominal density and thickness for the installation conditions described in this report.

2.4 During application, the insulation shall be protected from exposure to weather.

2.5 The insulation shall be installed by professional spray polyurethane foam installers approved by ICP Building Solutions Group.

2.6 Use of the insulation in areas of "very heavy" termite infestation probability shall be in accordance with 2021, 2018, and 2015 IBC Section 2603.8 or 2012 IBC Section 2603.9, or IRC Section R318.4, as applicable.

2.7 When required by the applicable code, a vapor retarder shall be installed.

2.8 Labeling and jobsite certification of the insulation and coatings shall comply with the following code sections as applicable:

- 2021, 2018, 2015, or 2012 IBC Section 2603.2
- 2021, 2018, 2015, or 2012 IRC Section R316.2
- 2021, 2018, or 2015 IRC Section N1101.10
- 2012 IRC Section N1101.12
- 2021, 2018, 2015, or 2012 IECC Sections C303.1.1.1 or R303.1.1.1

2.9 The insulations are manufactured in Cortland, Illinois.

3.0 PRODUCT USE

HandiFoam HVLP 1.6 High Yield spray-applied polyurethane foam plastic insulation complies with IBC Section 2603, IRC Section R316, and IECC Sections C303, C402, R303, and R402. When installed in accordance with Section 4.0 of this report, the foam plastic insulation may be used in wall cavities, floor assemblies or ceiling assemblies, and/or in attics and crawl spaces as nonstructural thermal insulation material. HandiFoam HVLP 1.6 High Yield insulation is used in Type V-B construction under the IBC and in one- and two-family dwellings under the IRC.

4.0 PRODUCT DESCRIPTION

4.1 Properties: HandiFoam HVLP 1.6 High Yield is a medium density, closed cell, spray-applied polyurethane foam plastic insulation in accordance with Section 3.1.1 and Table 1 of AC377. The insulation has a nominal in-place density of 1.9 pcf (30 kg/m^3). The two-component spray foam plastic is produced in the field by combining a polymeric isocyanate (A component) and a polymeric resin (B component). The liquid components shall be stored in

The product described in this Uniform Evaluation Service (UES) Report has been evaluated as an alternative material, design or method of construction in order to satisfy and comply with the intent of the provision of the code, as noted in this report, and for at least equivalence to that prescribed in the code in quality, strength, effectiveness, fire resistance, durability and safety, as applicable, in accordance with IBC Section 104.11. This document shall only be reproduced in its entirety.

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55-gallon (208 L) drums at temperatures between 50°F and 90°F (10°C and 33°C). When Component A and Component B are stored in factory-sealed containers at the recommended temperatures, the maximum shelf life is one year.

4.2 Thermal Resistance (R-Values): HandiFoam HVLP 1.6 High Yield spray-applied polyurethane foam plastic insulation has 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-Values)[1]

Thickness (inch)	HandiFoam HVLP 1.6 High Yield R-Value (°F•ft²•H/Btu)
1	6.3
2	13
3	20
3.5	24
4	27
5	33
5.5	37
6	40
7	47
7.5	50
8	53
9	60
9.5	63
10	67
11.5	77

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 4-inch thicknesses.

4.3 Surface Burning Characteristics: At a maximum thickness of 4 inches (102 mm) and a nominal density of 1.9 pcf (30 kg/m^3), the HandiFoam HVLP 1.6 High Yield insulation yields a flame spread index of 25 or less and smoke-developed index of 450 or less when tested in accordance with ASTM E84. Greater thicknesses, depending on the end use, are recognized when installed in accordance with this report.

4.4 Vapor Permeance: When tested in accordance with ASTM E96 Desiccant method (Procedure A), HandiFoam HVLP 1.6 High Yield spray-applied foam plastic insulation has a vapor Permeance of less than 1.7 perms [9.7 x 10^{-8} g/(Pa·s·m^2)], at a minimum thickness of 2 inches (51 mm) and qualifies as Class III vapor retarder in accordance with IBC Section 202 and IRC Section R202.

4.5 Fire-Protective Coatings and Coverings: DC315 Fire Protective Coating is a water-based, fire-retardant coating, manufactured expressly for the thermal protection of polyurethane foam plastic insulation. DC315 is recognized in UES ER-499 as a fire-protective coating for foam plastic products.

4.6 Installations: HandiFoam HVLP 1.6 High Yield spray-applied polyurethane foam plastic insulation shall comply with Section C402.1 or R402.1 of the IECC, as applicable.

The manufacturer's published installation instructions for HandiFoam HVLP 1.6 High Yield insulation and this report shall be available on the jobsite during installation.

HandiFoam HVLP 1.6 High Yield insulation shall be spray-applied on the jobsite using equipment specified in the manufacturer's published installation instructions. The insulation is applied in multiple passes having a maximum thickness of 3 inches (76 mm) per pass up to the maximum insulation thickness specified in this report. The spray-applied foam plastic Insulation shall be allowed to fully expand and cure for a minimum of 15 minutes prior to application of additional passes. The maximum in-service temperature for all areas shall not exceed the maximum temperature stated in the manufacturer's published installation instructions. The insulation shall be sprayed onto a substrate that is protected and clean from any debris or weather-related conditions during and after application and shall not be used in electrical outlets or junction boxes or in contact with rain, water, or soil.

4.6.1 Application with a Thermal Barrier: HandiFoam HVLP 1.6 High Yield spray-applied polyurethane foam plastic insulation in ceiling cavities and in wall cavities shall be separated from the interior by an approved thermal barrier in accordance with IBC Section 2603.4 or IRC Section R316.4, as applicable.

4.6.2 Installation in Attics or Crawl Spaces: HandiFoam HVLP 1.6 High Yield spray-applied polyurethane foam plastic insulation may be installed in attics or crawl spaces when installed in accordance with this section.

When installed in attics or crawl spaces where entry is made only for the service of utilities, HandiFoam HVLP 1.6 High Yield insulation may be installed in accordance with Section 4.6.3. HandiFoam HVLP 1.6 High Yield insulation need not be surfaced with a thermal barrier; however, such attic and crawl space areas shall be separated from the interior of the building by a thermal barrier in accordance with Section 4.6.1 of this report.

4.6.3 Installation Using a Prescriptive Ignition Barrier: When installed within attics or crawl spaces where entry is made only for the service of utilities, HandiFoam HVLP 1.6 High Yield spray-applied polyurethane foam plastic insulation shall be covered with a prescriptive ignition barrier in accordance with IBC Section 2603.4.1.6, or IRC Sections R316.5.3 and R316.4, as applicable. Thicknesses of up to 11½ inches (292 mm) for ceiling cavities and 7½ inches (191 mm) for wall cavities are recognized based on testing in accordance with Appendix X of AC377.

Exception: The prescriptive ignition barrier may be omitted when installed in accordance with Section 4.6.3.1 of this report.

4.6.3.1 Installation Using an Alternative Ignition Barrier Assembly: HandiFoam HVLP 1.6 High Yield spray-applied

polyurethane foam plastic insulation may be installed in attics and crawl spaces using an alternative ignition barrier assembly provided:

a. Entry is only to service utilities in the attic or crawl space and no storage is permitted.
b. Attic or crawl space areas are not interconnected.
c. Air from the attic or crawl space is not circulated to other parts of the building.
d. Attic ventilation is provided as required by 2021 and 2018 IBC Section 1202.2.1, or 2015 and 2012 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:
   - 2021 and 2018 IBC Section 1202.3
   - 2015 IBC Section 1203.3
   - 2021, 2018, 2015, and 2012 IRC Section R806.5

   Crawl space ventilation is provided as required by the following code sections as applicable:
   - 2021 and 2018 IBC Section 1202.4
   - 2015 IBC Section 1203.4
   - 2012 IBC Section 1203.3
   - 2018, 2015, and 2012 IRC Section R408.1

e. The foam plastic insulation is limited to the maximum thickness and density tested.
f. In accordance with IMC (International Mechanical Code®) Section 701, combustion air is provided.
g. The installed coverage rate or thickness of coatings shall be equal to or greater than described in Section 4.6.3.2 and Table 2 of this report.

4.6.3.2 Installation for the Application of Fire- Protective Coatings: HandiFoam HVLP 1.6 High Yield spray-applied polyurethane foam plastic insulation may be spray-applied in attics to the underside of roof sheathing or roof rafters, and vertical surfaces; and may be spray-applied in crawl spaces to the underside of floors and vertical surfaces as described in this section. When applied to the underside of the top of the space, the thickness of the HandiFoam HVLP 1.6 High Yield insulation shall not exceed $11^1/_2$ inches (292 mm). When applied to vertical surfaces, the maximum thickness shall not exceed $7^1/_2$ inches (191 mm). The foam plastic insulation shall be covered with DC315 Fire Protective Coating, as described in Sections 4.5.1 of this report with a 4.0-mil (0.1 mm) wet film thickness (3.0-mil dry film thickness [0.07 mm]).

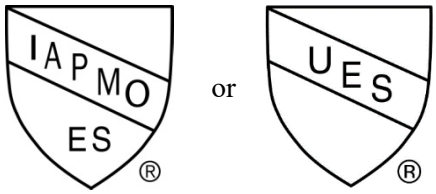
The coating shall be applied over the insulation using airless spray equipment, roller, or a brush in accordance with the coating manufacturer's published installation instructions and this report. The ambient and substrate temperatures shall be minimum 50°F (10°C), and the surface shall be dry, clean, free of dirt and loose debris, and any other substance that could interfere with adhesion of the coating.

5.0 IDENTIFICATION

The spray foam insulation is identified with the following:

a. Manufacturer's name (ICP Building Solutions Group)
b. address and telephone number,
c. the product trade name (HandiFoam HVLP 1.6 High Yield)
d. use instructions
e. density, flame-spread and smoke-development indices
f. date of manufacture or batch/run number
g. thermal resistance values
h. the evaluation report number (ER-824)
i. the name or logo of the inspection agency

Either IAPMO UES Mark of Conformity may also be used as shown below:



IAPMO UES ER-824

6.0 SUBSTANTIATING DATA

6.1 Data in accordance with the ICC-ES Acceptance Criteria for Spray-applied Foam Plastic Insulation, AC377, dated February 2020, including Appendix X.

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

6.3 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 HandiFoam HVLP 1.6 High Yield to assess its conformance to the codes and standards shown in Section 1.0 of this report and documents the product's certification. The product is manufactured at locations noted in Section 2.9 of this report under a quality control program with periodic inspections under the supervision of IAPMO UES.

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

TABLE 2
ALTERNATIVE IGNITION BARRIER ASSEMBLIES

FIRE-PROTECTIVE COATING/COVERING[1] (APPLIED TO ALL SPF SURFACES)			MAXIMUM SPF THICKNESS	
TYPE	MINIMUM THICKNESS	THEORETICAL APPLICATION RATE (COATINGS ONLY)	WALLS AND VERTICAL SURFACES	CEILING AND OVERHEAD SURFACES
DC315[2]	4 mils WFT (3 mils DFT)	0.45 gal/100 ft^2	7.5 in.	11.5 in.

For SI: 1 inch = 25.4 mm, 1 mil = 0.0254 mm, 1 gal/ft^2 = 0.08 l/m^2

[1] Fire-protective coatings and coverings shall be installed over the SPF surfaces in accordance with the coating/covering manufacturer's instructions and this report.

[2] DC315 is recognized in IAPMO UES ER-499.

FLORIDA SUPPLEMENT

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07 21 00 Thermal Insulation

1.0 RECOGNITION

HandiFoam HVLP 1.6 High Yield spray-applied foam plastic insulation, as evaluated and represented in IAPMO UES Evaluation Report ER-824 and with changes as noted in this supplement, is a satisfactory alternative for use in buildings built under the following codes (and regulations) including locations in the High-Velocity Hurricane Zone:

- 2020 Florida Building Code, Building, (FBC, Building)
- 2020 Florida Building Code, Residential (FBC, Residential)
- 2020 Florida Building Code, Energy Conservation (FBC, Energy Conservation)

2.0 LIMITATIONS

Use of HandiFoam HVLP 1.6 High Yield spray-applied foam plastic insulation recognized in this report is subject to the following limitations:

2.1 The clearance between the foam insulation installed above grade and exposed earth shall be in accordance with Sections 1403.8 and 2603.8 of the FBC, Building or Sections R318.7 and R318.8 of the FBC, Residential.

2.2 Verification shall be provided that a quality assurance agency audits the manufacturer's quality assurance program and audits the production quality of products in accordance with Section (5)(d) of Florida Rule 61G20-3.008. The quality assurance agency shall be approved by the Commission (or the building official when the report holder does not possess an approval by the Commission).

2.3 This supplement expires concurrently with ER-824