Prescriptive Requirements for Installation of Vinyl Siding over Foam Plastic Insulating Sheathing (FPIS)

Foam Sheathing Committee (FSC) Members

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DIVISION: 07 00 00 – THERMAL AND MOISTURE PROTECTION
Section: 07 21 00 – Thermal Insulation
Section: 07 46 00 – Siding
Section: 07 46 33 – Plastic Siding

1. Code Compliance Process Evaluated:
   1.1. Prescriptive requirements for installation of vinyl siding over foam plastic insulation sheathing (FPIS) from the manufacturers listed in Section 4.1 in thicknesses up to and including 4”, when used as insulating material in exterior wall assemblies.

   1.2. For the most recent version of this report, visit driengineering.org. For more detailed state professional engineering and code compliance legal requirements and references, visit driengineering.org/statelaw. DrJ is fully compliant with all state professional engineering and code compliance laws.

   1.3. This code compliance report can be used to obtain product approval in any country that is an IAF MLA Signatory (all countries found here) and covered by an IAF MLA Evaluation per the Purpose of the MLA (as an example, see letter to ANSI from the Standards Council of Canada). Manufacturers can go to jurisdictions in the U.S., Canada and other IAF MLA Signatory Countries and have their products readily approved by authorities having jurisdiction.

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The Foam Sheathing Committee (FSC) of the American Chemistry Council sponsors research and tools to support the reliable, efficient, and economic design and installation of foam sheathing. This report is developed by DrJ from a grant provided by FSC. Learn more about foam sheathing at www.continuousinsulation.org. DrJ is a professional engineering company, an approved source as defined in Chapter 2, an independent as defined in Chapter 17 of the IBC and an ANSI accredited 17065 certification body.

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2. Applicable Codes and Standards:

2.1. International Building Code (IBC)

2.2. International Residential Code (IRC)

2.3. ANSI/SBCA FS100 – Standard Requirements for Wind Pressure Resistance of Foam Plastic Insulating Sheathing Used in Exterior Wall Covering Assemblies

2.4. ASCE 7 – Minimum Design Loads for Buildings and Other Structures

2.5. ASTM C578 Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation

2.6. ASTM C1289 Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board

2.7. ASTM D3679 Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Siding

NOTE

With a couple exceptions, details in this research report only illustrate solid wood structural framing members. However, the same principles apply for typical shapes used for cold-formed steel light-frame construction. The general concepts may also be used with CMU or Concrete construction with slight modification.

3. Evaluation Scope:

3.1. This research report addresses code compliance of the products listed in Section 4.1 with respect to their use with Vinyl Siding in exterior wall assemblies.

3.2. This research report is limited to exterior applications where the FPIS product is used as an exterior wall sheathing that is required to resist transverse wind loading only.

3.3. Any code compliance issues not specifically addressed in this section are outside the scope of this evaluation.

3.4. For guidance on specific matters of code compliance, refer to the locally applicable building code, manufacturer's installation instructions for specified materials, and the research reports listed in Section 7 that address specific code compliance topics for appropriate application of FPIS materials.

4. Product Description and Materials:

4.1. This research report applies to the following manufacturers and products:


4.1.3. GAF EnergyGuard™


4.1.5. Johns Manville – “AP™ Foil”

Unless otherwise noted, all references in this research report are from the 2018 version of the codes and the standards referenced therein, including, but not limited to, ASCE 7, SDPWS and WFCM. This product also complies with the 2000-2015 versions of the IBC and IRC and the standards referenced therein. As required by law, where this research report is not approved, the building official shall respond in writing, stating the reasons this research report was not approved.

4.2. FPIS products listed in Section 4.1 and used in accordance with this research report shall comply with the following material standards:

4.2.1. Expanded polystyrene (EPS) manufactured in compliance with ASTM C578
4.2.2. Extruded polystyrene (XPS) manufactured in compliance with ASTM C578
4.2.3. Polyisocyanurate (Polyiso) manufactured in compliance with ASTM C1289

4.3. FPIS products are produced under proprietary manufacturing processes and are formed into rigid insulation panels.

4.4. EPS and XPS Foam Plastic Sheathing complying with ASTM C578 are used with:

4.4.1. No facings
4.4.2. Facings on one side
4.4.3. Facings on both sides

4.5. Polyiso Foam Plastic Sheathing complying with ASTM C1289 must have facings on both sides.

4.6. FPIS products are typically available in the following sizes:

4.6.1. Thicknesses range from ½” to 6”.
4.6.2. The standard product width is 48”.
4.6.3. Standard lengths include 96”, 108” and 120”.

4.7. Consult manufacturer for availability of product with non-standard width or length.

4.8. Consult FPIS manufacturer and manufacturers of other wall components for material property data regarding vapor permeability, WRB qualification, air barrier qualification, fire performance properties, and other matters required to ensure an overall code-compliant wall assembly. See Section 7 for additional information.

Photo 1: Examples of Polyiso, XPS & EPS Foam Plastic Insulating Sheathing

5. Applications:

5.1. General Requirements:

5.1.1. Minimum installation requirements for Foam Plastic Sheathing products listed in Section 4.1 when applied to light-frame wall framing members

5.1.1.1. Light-frame wood framing members supporting FPIS products shall have a nominal thickness of not less than 2” (1.5” actual).
5.1.1.2. Light-frame steel framing members shall have a flange width of not less than 1-1/2” (including bend radius at web and lip).
5.1.1.3. Framing members shall be spaced a maximum of 24 in. o.c.

5.1.1.3.1. FPIS products shall be attached to the wall framing in accordance with the manufacturer’s installation instructions.
5.1.1.3.2. All sheathing edges shall be supported by wall framing or blocking. Blocking at horizontal sheathing joints located between the top and bottom plates of a wall shall not be required when it is determined to be unnecessary through approved analysis.

5.2. Vinyl Siding over Foam Plastic Sheathing (FPIS) Installation Requirements in the IRC

5.2.1. General vinyl siding fastener requirements are listed in IRC Table R703.3(1) and IRC Table R703.3(2) which include fasteners for vinyl siding over foam plastic sheathing into studs:

5.2.1.1. For wood studs: 0.12” nail (shank) with a 0.313 in. diameter head and references IRC Section R703.11.2.

5.2.1.2. For CFS studs: No. 8 screws with a head diameter equal to or greater than 0.313 in. (IRC Table R703.3(2) footnote b)

5.2.2. Where FPIS is applied directly over an approved backing material capable of independently resisting the design wind pressure, vinyl siding shall be installed in accordance with the manufacturer’s installation instructions (IRC Section R703.11.2, Exception)

5.2.2.1. Where vinyl siding and FPIS are applied over structural panels and siding is fastened into studs (IRC Section R703.11.1)

5.2.2.2. Where vinyl siding and FPIS are applied over structural panels and siding is fastened into sheathing (IRC Section R703.3.2 & Table R703.3.2)

5.2.3. Where Vinyl siding manufacturer provides approved design wind pressure rating for installation over foam plastic sheathing, vinyl siding shall be installed in accordance with the manufacturer's installation instructions (IRC Section R703.11.2.3).

5.2.4. Where FPIS does not qualify as an approved backing material capable of independently resisting the design wind pressure (IRC Section R703.11.2), one of the following must be met:

5.2.4.1. For 2018 IRC: The siding shall have a design wind pressure resistance in accordance with Table R703.11.2.

5.2.4.2. Where ultimate design wind speed does not exceed 115$^3$ miles per hour and Exposure Category is B and where gypsum wall board or equivalent is installed on the side of the wall opposite the FPIS the following requirements must be met (IRC Section R703.11.2.1):

5.2.4.2.1. Siding fastener penetration into wood framing shall be 1-1/4 in. using minimum 0.120 in. nail shanks with a minimum 0.313 in. diameter head, 16 in. o.c.

5.2.4.2.2. Minimum FPIS shall be as follows:

5.2.4.2.2.1. ½ inch thick extruded poly styrene per ASTM C 578

5.2.4.2.2.2. ½ inch thick polyisocyanurate per ASTM C1289

5.2.4.2.2.3. 1 inch thick expanded polystyrene per ASTM C 578

5.2.4.3. Where basic wind speed exceeds 115$^3$ miles per hour or Exposure Category is C or D or all conditions described at Section 5.2.4.1 are not met (IRC Section R703.11.2.2):

5.2.4.3.1. The adjusted design pressure rating for the assembly shall meet or exceed the loads listed in IRC Table R301.2(2), see Table 1 of this report, adjusted for height and exposure using IRC Table R301.2(3) Table 2.

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$^3$ 2012 IRC 90 mph basic wind speed.
5.2.4.3.2. The design wind pressure rating of the vinyl siding for installation over solid sheathing provided by the manufacturer shall be adjusted as follows:

5.2.4.3.2.1. For wall assemblies with FPIS on the exterior side and gypsum wall board or equivalent on the interior side, the vinyl siding’s design wind pressure rating shall be multiplied by 0.39.

5.2.4.3.2.2. For wall assemblies with FPIS on the exterior side and no gypsum wall board or equivalent on the interior side, the vinyl siding’s design wind pressure rating shall be multiplied by 0.27.

5.2.5. Prescriptive cladding attachment (direct and over furring) over FPIS by cladding weight would include vinyl siding in the 3 psf cladding weight category.
5.2.5.1. To Wood Framing see Table 3 and Table 4 (IRC R703.15 and Tables R703.15.1 and R703.15.2)

Table 3: IRC Table R703.15.1 Direct Attachment to Wood Framing

<table>
<thead>
<tr>
<th>Wood Framing (minimum 1½-in. penetration)</th>
<th>CLADDING FASTENER THROUGH FOAM SHEATHING</th>
<th>CLADDING FASTENER TYPE AND MINIMUM SIZE</th>
<th>CLADDING FASTENER VERTICAL SPACING (inches)</th>
<th>MAXIMUM THICKNESS OF FOAM SHEATHING (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.113&quot; diameter nail</td>
<td>6</td>
<td>2.00</td>
<td>1.45</td>
<td>0.75</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>2.00</td>
<td>1.00</td>
<td>0.55</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>2.00</td>
<td>0.55</td>
<td>DR</td>
</tr>
<tr>
<td>0.120&quot; diameter nail</td>
<td>6</td>
<td>3.00</td>
<td>1.70</td>
<td>0.90</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>3.00</td>
<td>1.20</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>3.00</td>
<td>0.70</td>
<td>DR</td>
</tr>
<tr>
<td>0.131&quot; diameter nail</td>
<td>6</td>
<td>4.00</td>
<td>2.15</td>
<td>1.20</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>4.00</td>
<td>1.55</td>
<td>0.80</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>4.00</td>
<td>0.90</td>
<td>DR</td>
</tr>
<tr>
<td>0.162&quot; diameter nail</td>
<td>6</td>
<td>4.00</td>
<td>3.55</td>
<td>2.05</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>4.00</td>
<td>2.55</td>
<td>1.45</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>4.00</td>
<td>1.60</td>
<td>0.85</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

DR = Design Required.

Table 4: IRC Table R703.15.2 Furring Attachment to Wood Framing

<table>
<thead>
<tr>
<th>Furring Material</th>
<th>Framing Member</th>
<th>Fastener Type and Minimum Size</th>
<th>Minimum Penetration into Wall Framing (Inches)</th>
<th>Fastener Spacing in Furring (Inches)</th>
<th>Maximum Thickness of Foam Sheathing (Inches)</th>
</tr>
</thead>
</table>

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

DR = Design Required.

Table 5: IRC Table R703.15.2 Furring Attachment to Wood Framing

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

DR = Design Required.

Table 6: IRC Table R703.15.2 Furring Attachment to Wood Framing

For SI: 1 inch = 25.4 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 6.895 kPa.

DR = Design Required.
5.2.5.2. To CFS see Table 5 and Table 6 ([IRC R703.16 and Tables R703.16.1 and R703.16.2])

**Table 5: IRC Table R703.16.1 Direct Attachment to CFS**

<table>
<thead>
<tr>
<th>Cladding Fastener Through Foam Sheathing Into:</th>
<th>Cladding Fastener Type and Minimum Size</th>
<th>Cladding Fastener Vertical Spacing (inches)</th>
<th>Maximum Thickness of Foam Sheathing (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel framing (minimum penetration of steel thickness + 3 threads)</td>
<td>No. 8 screw into 33-mil steel or thicker</td>
<td>6</td>
<td>3.00</td>
</tr>
<tr>
<td></td>
<td>No. 10 screw into 33-mil steel</td>
<td>8</td>
<td>3.00</td>
</tr>
<tr>
<td></td>
<td>No. 10 screw into 43-mil steel or thicker</td>
<td>12</td>
<td>3.00</td>
</tr>
</tbody>
</table>

Table 5: IRC Table R703.16.1 Direct Attachment to CFS

<table>
<thead>
<tr>
<th>Furriing Material</th>
<th>Framing Member</th>
<th>Fastener Type and Minimum Size</th>
<th>Minimum Penetration into Wall Framing (inches)</th>
<th>Maximum Thickness of Foam Sheathing (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 8 screw</td>
<td>Steel thickness + 3 threads</td>
<td>12</td>
<td>3.00</td>
<td>1.80</td>
</tr>
<tr>
<td>No. 10 screw</td>
<td>Steel thickness + 3 threads</td>
<td>16</td>
<td>3.00</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>Steel thickness + 3 threads</td>
<td>24</td>
<td>2.85</td>
<td>DR</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 mil = 0.0254 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 0.895 kPa.

DR = Design Required.

o.c. = On Center.

a. Steel framing shall be minimum 33 ksi steel for 33 mil and 43 mil steels, and 50 ksi steel for 44 mil steel or thicker.

b. Screws shall comply with the requirements of ASTM C1513.

c. Foam sheathing shall have a minimum compressive strength of 15 psi in accordance with ASTM C578 or ASTM C1289.

**Table 6: IRC Table R703.16.2 Furring Attachment to CFS**

<table>
<thead>
<tr>
<th>Furriing Material</th>
<th>Framing Member</th>
<th>Fastener Type and Minimum Size</th>
<th>Minimum Penetration into Wall Framing (inches)</th>
<th>Maximum Thickness of Foam Sheathing (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 8 screw</td>
<td>Steel thickness + 3 threads</td>
<td>12</td>
<td>4.00</td>
<td>2.25</td>
</tr>
<tr>
<td></td>
<td>Steel thickness + 3 threads</td>
<td>16</td>
<td>3.85</td>
<td>1.45</td>
</tr>
<tr>
<td></td>
<td>Steel thickness + 3 threads</td>
<td>24</td>
<td>3.40</td>
<td>DR</td>
</tr>
<tr>
<td>No. 10 Screw</td>
<td>Steel thickness + 3 threads</td>
<td>12</td>
<td>3.00</td>
<td>1.80</td>
</tr>
<tr>
<td></td>
<td>Steel thickness + 3 threads</td>
<td>16</td>
<td>4.00</td>
<td>2.80</td>
</tr>
<tr>
<td></td>
<td>Steel thickness + 3 threads</td>
<td>24</td>
<td>4.00</td>
<td>2.25</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 mil = 0.0254 mm, 1 pound per square foot = 0.0479 kPa, 1 pound per square inch = 0.895 kPa.

DR = Design Required.

o.c. = On Center.

a. Wood framing shall be Spruce-pine-fir or any softwood species with a specific gravity of 0.42 or greater. Steel framing shall be minimum 33 ksi steel. Steel studs shall be minimum 33 ksi steel for 33 mil and 43 mil thickness, and 50 ksi steel for 44 mil steel or thicker.

b. Screws shall comply with the requirements of ASTM C1513.

c. Where the required cladding fastener penetration into wood material exceeds 1/2 inch and is not more than 1 1/2 inches, a minimum 2-inch nominal wood framing or an approved design shall be used.

d. Foam sheathing shall have a minimum compressive strength of 15 psi in accordance with ASTM C578 or ASTM C1289.

e. Furring shall be spaced not more than 24 inches (610 mm) on center, in a vertical or horizontal orientation. In a vertical orientation, furring shall be located over wall studs and attached with the required fastener spacing. In a horizontal orientation, the indicated 8-inch and 12-inch fastener spacing in furring shall be achieved by use of two fasteners into studs at 16 inches and 24 inches on center, respectively.

5 2015 IRC Tables R703.16.1 and R703.16.2 differ slightly
5.2.5.3. To Masonry or Concrete (*IRC Section R703.17*) by design or per approved installation instructions provided by the cladding manufacturer.

5.3. Vinyl Siding over Foam Plastic Sheathing (FPIS) Installation Requirements in the *IBC*

5.3.1. *IBC Section 1405.14* vinyl siding with no foam sheathing.

5.3.2. The *IBC* includes requirements for prescriptive cladding attachment (direct and over furring) over FPIS by cladding weight which would include vinyl siding in the 3 psf cladding weight category.

5.3.2.1. Cladding direct or furring attachment over FPIS by cladding weight (*Section 2603.12*) for CFS and includes minimum fastening requirements for direct attachment (2603.12.1 & Table 2603.12.1) or for attachment to furring (2603.12.2 and Table 2603.12.2), see Table 7 and Table 8.6

<table>
<thead>
<tr>
<th>Cladding Fastener Through Foam Sheathing Into:</th>
<th>Cladding Fastener Type and Minimum Size</th>
<th>Maximum Thickness of Foam Sheathing a (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cold-formed steel framing (minimum penetration of steel thickness plus 3 threads)</td>
<td>#8 screw into 33 mil steel or thicker</td>
<td>16&quot; o.c. fastener horizontal spacing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>24&quot; o.c. fastener horizontal spacing</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>3 psf</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>3.00</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>3.00</td>
</tr>
<tr>
<td>#10 screw into 33 mil steel</td>
<td>6</td>
<td>4.00</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>4.00</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>4.00</td>
</tr>
<tr>
<td>#10 screw into 43 mil steel or thicker</td>
<td>6</td>
<td>4.00</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>4.00</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>4.00</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 pound per square foot (psf) = 0.0479 kPa, 1 pound per square inch = 0.00689 MPa.

DR = design required, o.c. = on center.

a. Cold-formed steel framing shall be minimum 33 ksi steel for 33 mil and 43 mil steel and 50 ksi steel for 54 mil steel or thicker.

b. Screws shall comply with the requirements of AISI S240.

c. Foam sheathing shall have a minimum compressive strength of 15 pounds per square inch in accordance with ASTM C576 or ASTM C1289.

6 2015 IBC Tables 2603.12.1 and 2603.12.2 differ slightly

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Table 7: *IBC* Table 2603.12.1 Direct Attachment to CFS
5.3.2.2. Cladding direct attachment over FPIS by cladding weight (Section 2603.11) for Concrete/Masonry by design or per cladding manufacturer’s approved installation instructions.

5.3.2.3. Note that the 2015 IBC does not include cladding direct or furring attachment over FPIS by cladding weight for wood framing, this has been accepted for inclusion in the 2018 IBC. However, engineered design would be permitted.

6. Installation Examples:

6.1. Steps to determine vinyl siding over FPIS design parameters:

6.1.1. **Step 1**: Determine if structure is within the limits of the IRC for wind design:

6.1.1.1. If wind design is not required per Figure R301.2(4)B (R301.2.1.1), Go to **Step 2**

6.1.1.2. If wind design is required per Figure R301.2(4)B or local jurisdiction, the structure is out of scope of the IRC prescriptive wind provisions. Design is required. (R301.2.1.1)

6.1.2. **Step 2**: Determine basic wind speed from local jurisdiction or Figure R301.2(4)A, Exposure Category (R301.2.1.4), and Mean Roof Height of structure (R202)

6.1.3. **Step 3**: Determine Component and Cladding Loads (Table R301.2(2)).

6.1.3.1. Zone 5 with Effective Wind area = 10 square feet will always control (Table 1).

6.1.3.2. Negative value will always control.

6.1.3.3. Adjust design value, if necessary (Table R301.2(3)), for mean roof height and exposure (Table 2).

6.1.4. **Step 4**: Determine vinyl siding product’s design wind pressure rating for fastener and stud spacing from manufacturer’s literature or other approved source.
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6.1.5. **Step 5:** Determine FPIS product’s design wind pressure rating per stud spacing from manufacturer’s literature, or other approved source.

6.2. **Steps to determine vinyl siding over FPIS code requirements:**

6.2.1. If the FPIS product’s *approved* design wind pressure rating exceeds the design wind pressure value determined above, the FPIS product can serve as the vinyl siding backing.

6.2.2. If the vinyl siding product’s *approved* design wind pressure rating when installed over FPIS exceeds the design wind pressure value determined above, the vinyl siding product requires no special backing requirement.

6.2.3. If the vinyl siding *approved* design wind pressure rating when installed over FPIS and FPIS product’s *approved* design wind pressure rating does not exceed the design wind pressure value determined above, the following steps are required:

6.2.3.1. If the design wind speed = 115 miles per hour or less and Exposure Category is B *(R703.11.2.1)*

6.2.3.1.1. Gypsum wall board or equivalent on wall interior is required.

6.2.3.1.2. Fastener specifications and penetration into framing must meet

6.2.3.1.3. Minimum FPIS product thicknesses must be met

6.2.3.2. If the design wind speed = greater than 115 miles per hour or Exposure Category is C or D or all the requirements for R703.11.2.1 cannot be met *(R703.11.2)*

6.2.3.2.1. The vinyl siding *approved* design wind pressure rating over solid sheathing must be adjusted as follows:

6.2.3.2.1.1. Where there is gypsum wall board or equivalent on the interior, multiply vinyl siding *approved* design wind pressure rating over solid sheathing value by 0.39.

6.2.3.2.1.2. Where there is no gypsum wall board or equivalent on the interior, multiply vinyl siding *approved* design wind pressure rating over solid sheathing value by 0.27.
The following two tables are used as references in the examples that follow. Consult the FPIS manufacturer’s information for allowable design wind pressure resistance applicable to their specific product.

<table>
<thead>
<tr>
<th>FPIS Material</th>
<th>FPIS Thickness (in.)</th>
<th>Wall with Interior Finish</th>
<th>Walls without Interior Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPS (Type II, ASTM C578)</td>
<td>⅜</td>
<td>21.8</td>
<td>NP</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>38.8</td>
<td>19.4</td>
</tr>
<tr>
<td></td>
<td>≥1⅛</td>
<td>89.0</td>
<td>39.5</td>
</tr>
<tr>
<td>Polyiso (Type 1, ASTM C1289)</td>
<td>½</td>
<td>33.3</td>
<td>NP</td>
</tr>
<tr>
<td></td>
<td>¾</td>
<td>56.4</td>
<td>25.1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>67.5</td>
<td>30.0</td>
</tr>
<tr>
<td></td>
<td>≥1⅛</td>
<td>77.4</td>
<td>34.4</td>
</tr>
<tr>
<td>XPS (Type X, ASTM C578)</td>
<td>¼ ⁴</td>
<td>28.3 ⁴</td>
<td>NP</td>
</tr>
<tr>
<td></td>
<td>¾</td>
<td>21.4</td>
<td>NP</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>38.0</td>
<td>29.0</td>
</tr>
<tr>
<td></td>
<td>≥1⅛</td>
<td>78.2</td>
<td>34.7</td>
</tr>
</tbody>
</table>

For SI: 1 inch = 25.4 mm, 1 pound per square foot (psf) = 0.0479 kPa.

**Table Notes:**
1. Linear interpolation shall not be permitted.
2. Tabulated resistance values apply to positive and negative wind pressure design loads as applicable.
3. NP = not permitted (allowable design wind pressure less than 17.4 psf)
4. Facers are permissible for EPS and XPS products manufactured in accordance with ASTM C578. For ⅜ XPS, the values in Table 5 are based on use of polymeric film facers although facers are not required for FPIS products that meet the requirements of Section 5 without the use of facers. The values for all other thicknesses of XPS and all EPS thicknesses shown in Table 5 are based on the absence of any facer, although facers may be used for FPIS products provided the requirements of Section 5 are satisfied with the use of facers. Polyiso products are required to have facers in accordance with ASTM C1289.
5. Interior finish material shall be minimum ½”-thick gypsum wall board complying with ASTM C1396 and installed in accordance with the locally applicable building code.
6. Manufacturer specific wind pressure resistance as published in approved code evaluation reports, if any shall supersede the values given here.

<table>
<thead>
<tr>
<th>Siding</th>
<th>Max. Stud Spacing (in.)</th>
<th>Fastener</th>
<th>Approved Design Wind Pressure (psf)</th>
<th>Siding adjustment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Over solid sheathing</td>
<td></td>
</tr>
<tr>
<td>Product A</td>
<td>16</td>
<td>Nail to stud</td>
<td>26</td>
<td>10.14</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>Staple to stud</td>
<td>23</td>
<td>8.97</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>Nail to stud</td>
<td>54</td>
<td>21.06</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>Nail to stud</td>
<td>32</td>
<td>12.48</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>Staple to stud</td>
<td>38</td>
<td>14.82</td>
</tr>
<tr>
<td>Product B</td>
<td>16</td>
<td>Nail to stud</td>
<td>86</td>
<td>33.54</td>
</tr>
<tr>
<td></td>
<td>24</td>
<td>Nail to stud</td>
<td>50</td>
<td>19.50</td>
</tr>
<tr>
<td></td>
<td>16</td>
<td>Staple to stud</td>
<td>56</td>
<td>21.84</td>
</tr>
</tbody>
</table>

**Table 9: FPIS Allowable Wind Pressure Table**

**Table 10: Sample Vinyl Siding Approved Design Wind Pressures**
6.3. Example 1:

6.3.1. Design wind pressure for 115 MPH Exposure C, 15 ft Mean Roof Height

6.3.1.1. Zone 5 (Effective wind area 10 ft²) = -19.0 (Table 1) adjusted for height and exposure per Table R301.2(3) by 1.21 = -23.0 (Table 2)

6.3.1.2. Stud spacing is 16 in. o.c. (gyp on interior)

6.3.1.3. Sheathing is 1 in. FPIS

6.3.1.3.1. All FPIS products, 1 inch or thicker, in qualify as approved backing material with 16 in. o.c. stud spacing (gyp on interior) per R703.11.2.2

6.3.1.4. Vinyl Sidings from Table 10 that would qualify:

6.3.1.4.1. Product C only. Siding must be nailed to stud. $33.54 > 23.0$

6.4. Example 2:

6.4.1. Design wind pressure for 115 MPH Exposure B, less than or equal to 30 ft Mean Roof Height

6.4.1.1. Zone 5 (Effective wind area 10 ft²) = -19.0 (Table 1)

6.4.1.2. Stud spacing is 24 in. o.c. (gyp on interior)

6.4.1.3. Sheathing is 1 in. EPS

6.4.1.3.1. R703.11.2.1 allows the use of 1 inch thick EPS as long as siding fastener requirements are met.

6.4.1.3.2. Table 9 allowable design wind pressure for 1 inch EPS with 24 in. o.c. studs (gyp interior) = 19.4.

6.4.1.4. Vinyl Sidings from Table 10 that would qualify:

6.5. All without any adjustment with the 1” EPS as an approved vinyl siding backer (Table 9)

6.6. Example 3:

6.6.1. Design wind pressure for 130 MPH Exposure D, 25 ft Mean Roof Height

6.6.1.1. Zone 5 (Effective wind area 10 ft²) = -24.0 (Table 1) adjusted for height and exposure per Table R301.2(3) by 1.61 = -38.64 (Table 2)

6.6.1.2. Stud spacing is 16 in. o.c. (gyp on interior)

6.6.1.3. Sheathing is 1 in. XPS

6.6.1.3.1. Table 9 allowable design wind pressure for 1 inch XPS with 16 in. o.c. studs (gyp interior) = 38.0.

6.6.1.3.2. It does not qualify as an approved vinyl siding backer

6.6.1.4. Vinyl Sidings from Table 10 that would qualify:

6.6.1.4.1. No siding product listed adjusted by 0.39 qualifies. A higher rated vinyl siding would have to be selected or a different FPIS product or XPS thickness

6.7. Example 4:

6.7.1. When looking for a vinyl siding with an approved design wind pressure rating for a given basic wind speed, Table 11 may be referenced for guidance:

<table>
<thead>
<tr>
<th>Basic Wind speed (mph)</th>
<th>Highest design wind pressure value (psf)</th>
<th>Adjusted design wind pressure 0.39</th>
<th>Adjusted design wind pressure 0.27</th>
</tr>
</thead>
<tbody>
<tr>
<td>110</td>
<td>-17.0</td>
<td>-43.59</td>
<td>-62.96</td>
</tr>
<tr>
<td>115</td>
<td>-19.0</td>
<td>-48.72</td>
<td>-70.37</td>
</tr>
<tr>
<td>120</td>
<td>-20.0</td>
<td>-51.28</td>
<td>-74.07</td>
</tr>
<tr>
<td>130</td>
<td>-24.0</td>
<td>-61.54</td>
<td>-88.89</td>
</tr>
</tbody>
</table>

Table 11: Design Wind pressure divided by adjustment factor

6.8. For applications outside the scope of this DRR, an engineered design is required.
DrJ Research Report

7. Test and Engineering Substantiating Data:


7.7. U.S. Department of Energy, The National Renewable Energy Laboratory (NREL), *Cladding Attachment Over Thick Exterior Insulation*

7.8. ABTG Research Report No. 1503-02, Attachment of Exterior Wall Coverings Through Foam Plastic Insulating Sheathing (FPIS) to Wood or Steel Wall Framing

7.9. Some information contained herein is the result of testing and/or data analysis by other sources, which DrJ relies on to be accurate as it undertakes its engineering analysis.

7.10. DrJ has reviewed and found the data provided by other professional sources are credible. This information has been approved in accordance with DrJ’s procedure for acceptance of data from approved sources.

7.11. DrJ’s responsibility for data provided by approved sources is in accordance with professional engineering law.

7.12. Where appropriate, DrJ relies on the derivation of design values, which have been codified into law through the codes and standards (e.g., *IRC, WFCM, IBC, SDPWS*, etc.), to undertake the review of test data that is comparative or shows equivalency to an intended end-use application.

8. Findings:

8.1. Vinyl siding may be installed over FPIS subject to the following conditions:

8.1.1. The siding product shall be installed in compliance with:

8.1.1.1. The siding manufacturer’s instructions

8.1.1.2. The foam plastic sheathing manufacturer’s instructions

8.1.1.3. The applicable building code

8.1.1.4. The vinyl siding manufacturer and foam plastic sheathing manufacturer shall provide the building official and purchaser with evidence of code compliance for matters beyond the scope of this DRR.

8.2. *IRC Section R104.11* and *IBC Section 104.11* (*IFC Section 104.9* is similar) state:

R104.11 Alternative materials, design and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code. Compliance with the specific performance-based provisions of the International Codes shall be an alternative to the specific requirements of this code. Where the alternative material, design or method of construction is not approved, the building official shall respond in writing, stating the reasons the alternative was not approved.
9. References

9.1. The Foam Sheathing Committee (FSC) of the American Chemistry Council sponsors research and tools to support the reliable, efficient, and economic design and installation of foam sheathing. This report is developed by DrJ from a grant provided by FSC. Learn more about foam sheathing at [www.continuousinsulation.org](http://www.continuousinsulation.org). DrJ is a professional engineering company, an independent approved source and an ANSI accredited 17065 certification body.

10. Conditions of Use:

10.1. Where required by the authority having jurisdiction (AHJ) in which the project is to be constructed, this report and the installation instructions shall be submitted at the time of permit application.

10.2. The insulated sheathing products listed in Section 4.1 of this report comply with the 2015 versions of the IBC and IRC, or are a code-compliant alternative as specified in the codes listed in Section 2 subject to the following conditions:

10.2.1. Installation shall comply with the manufacturer’s installation instructions and this DRR. In the event of a conflict between the manufacturer’s installation instructions and this DRR, the more restrictive shall govern.

10.2.2. The FPIS manufacturer shall provide the building official and purchaser with evidence of code compliance for matters beyond the scope of this DRR.

10.3. Design

10.3.1. Building Designer Responsibility

10.3.1.1. Unless the AHJ allows otherwise, the Construction Documents shall be prepared by a Building Designer (e.g., Owner, Registered Design Professional, etc.) for the Building and shall be in accordance with IRC Section R106 and IBC Section 107.

10.3.1.2. The Construction Documents shall be accurate and reliable and shall provide the location, direction and magnitude of all applied loads and shall be in accordance with IRC Section 301 and IBC Section 1603.

10.3.2. Construction Documents

10.3.2.1. Construction Documents shall be submitted to the Building Official for approval and shall contain the plans, specifications and details needed for the Building Official to approve such documents.

10.4. Responsibilities

10.4.1. The information contained herein is a product, engineering or building code compliance research report performed in accordance with the referenced building codes, testing and/or analysis through the use of accepted engineering procedures, experience and good technical judgment.

10.4.2. Product, design and code compliance quality control are the responsibility of the referenced company listed on Page 1. Consult the referenced company for the proper detailing and application for the intended purpose. Consult your local jurisdiction or design professional to assure compliance with the local building code.

10.4.3. DrJ research reports provide an assessment of only those attributes specifically addressed in the Products Evaluated or Code Compliance Process Evaluated section.

10.4.4. The engineering evaluation was performed on the dates provided in this DRR, within DrJ's professional scope of work.

10.4.5. The actual design, suitability and use of this research report for any particular building is the responsibility of the Owner, the Owner’s authorized agent or the Building Designer.

11. Identification:

11.1. The FPIS described in this research report is identified by a label on the board or packaging material bearing the manufacturer's name, product name, label of the third-party inspection agency, and other information to confirm code compliance.
DrJ Research Report

11.1.1. Additional technical information and related research reports can be found at the company websites listed on Page 1.

11.2. All FPIS products shall be marked in accordance with ASTM C578 or ASTM C1289 as applicable to the type of material and bear the label of an approved agency on the packaging or individual FPIS panels.

12. Review Schedule:

12.1. This research report is subject to periodic review and revision. For the most recent version of this report, visit driengineering.org.

12.2. For information on the current status of this report, contact DrJ Engineering.