Technical Evaluation Report
TO ASSIST WITH CODE COMPLIANCE

Attachment of Windows with Integral Flanges through Foam Plastic Insulating Sheathing to Wood Framing

TER No. 1304-01

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Foam Sheathing Committee (FSC) Members

Atlas Roofing Corporation – atlasroofing.com
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Division: 06 00 00 – WOOD, PLASTICS, AND COMPOSITES
Section: 06 16 00 – Sheathing

Division: 07 00 00 – THERMAL AND MOISTURE PROTECTION
Section: 07 21 00 – Building Insulation

1. **Code Compliance Process Evaluated:**
   - **1.1.** The practice of installing windows with the integral flanges placed over code-compliant foam plastic insulating sheathing (FPIS).
     - **1.1.1.** Fasteners are attached through the pre-punched nail slots or holes in the window flanges, through the FPIS and into the framing behind the window.
     - **1.1.2.** Installing windows using this method is a common practice, and this Technical Evaluation Report (TER) is intended to supplement this practice and the window manufacturer's installation instructions.
     - **1.1.3.** Where the window manufacturer's installation instructions provide additional or conflicting information, the more stringent requirements shall apply.
   - **1.2.** For the most recent version of this report, visit drjengineering.org.
2. **Applicable Codes and Standards:**[1]
   - **2.1.** *2006,2009 and 2012 International Building Code* (*IBC*)
   - **2.2.** *2006, 2009 and 2012 International Residential Code* (*IRC*)
   - **2.3.** *AAMA 2400-02 – Standard Practice for Installation of Windows with a Mounting Flange in Stud Frame Construction*

[1] Unless otherwise noted, code references are from the 2012 versions of the codes.

2.4. *2008 and 2012 National Design Specification for Wood Construction* (*NDS*)

2.5. *American Wood Council – Technical Report 12, General Dowel Equations for Calculating Lateral Connection Values*

2.6. *ANSI FS100-12 – Standard Requirements for Wind Pressure Resistance of Foam Plastic Insulating Sheathing Used in Exterior Wall Covering Assemblies*

2.7. *ASTM C578* – Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation

2.8. *ASTM C1289 – Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board*

2.9. *ASTM E330-02 (2010) – Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference*

2.10. *AAMA A440-05 – Standard/Specification for Windows, Doors and Unit Skylights*

3. Evaluation Scope:

3.1. The testing that serves as the basis of this evaluation is limited to one manufacturer, model, and size of window.

3.1.1. As such, this evaluation is intended as a proof of concept only and is not intended to be used as the sole means of approving a specific product for this application.

3.2. The intent of this TER is to provide proof of concept information regarding the ability of FPIS to serve as the sheathing layer installed directly behind window flanges. Due to the vast array of window manufacturers, window types, weights, attachment methods, etc., the manufacturer must decide whether this method of installation can be used for their respective products.

3.3. This TER examines the following structural aspects of the tested assemblies:

3.3.1. Ability of the window flanges to support the weight of the window itself.

3.3.2. Ability of the fasteners to support the weight of the window.

3.3.3. Ability to limit deflection of the fasteners (cantilevered through foam and into the framing) to 0.015"[2].

3.3.4. Ability of the windows to resist transverse wind loading when installed over foam sheathing per *ASTM E330*.

3.3.5. The following items related to window performance are outside the scope of this TER; however, many of these attributes are addressed in other testing and documentation. See individual manufacturer data for these attributes:

3.3.5.1. Protection from wind-borne debris in accordance with *IRC* Section R612.6.

3.3.5.2. Performance of glazing installed within the window and door assemblies.

3.3.5.3. Air infiltration.

3.3.5.4. Water penetration and flashing details.

3.3.5.5. Quality control inspection of FSC member manufacturing facilities and certification to *ASTM C1289* or *ASTM C578.*

4. Product Description and Materials:

4.1. The window selected for this study was a Crestline, Select 200 series, single hung window.

4.1.1. This is a vinyl window with integral flanges.

4.1.2. The actual window dimensions are 29½" wide x 41½" tall, fitting a rough opening of 30" wide x 42" tall.

4.1.3. The flange width is 1.98"

4.1.4. The flange thickness is 0.06".

4.1.5. The total window weight is 27.2 lbs.

[2] This 0.015" deflection limit is based on the assumed limit used to develop the *NDS* dowel equations.

4.2. Members of the American Chemistry Council's Foam Sheathing Committee (FSC) and the trade names of their products that meet the minimum requirements for the FPIS in this TER for use in this application are listed below.[3]

4.2.1. Polyisocyanurate Products (Polyiso) – Type I[4], ASTM C1289

4.2.1.1. Atlas Roofing Corporation – "Energy Shield®", "EnergyShield PRO" and "EnergyShield PRO 2" and "Rboard[5]"
8240Byron Center SW
Byron Center, MI 49315
616-583-1347

4.2.1.2. Dow Chemical Company – "Super TUFF-R™" and " THERMAX™"
200 Larkin Center
1605 Joseph Drive
Midland, MI 48674
989-638-8655

4.2.1.3. Rmax Operating, LLC – "R-Matte® Plus-3", "Thermasheath®-3", "Durasheath-3", "TSX8500", "TSX8510" and "Thermasheath-SI".
13524 Welch Road
Dallas, TX 75244
972-387-4500

4.2.2. Expanded Polystyrene (EPS) – Type II, ASTM C578

4.2.2.1. Atlas Roofing Corporation – " ThermalStar®"
2000 River Edge Parkway, Suite 800
Atlanta, GA 30328
800-388-6134

4.2.3. Extruded Polystyrene (XPS) – Type X, ASTM C578

4.2.3.1. Dow Chemical Company – "STYROFOAM™"
1605 Joseph Drive
Midland, MI 48674
989-638-8655

4.2.3.2. Owens Corning – "FOAMULAR®"
One Owens Corning Pkwy.
Toledo, OH 43659
419-248-8315

5. Applications:

5.1. The pertinent code sections related to this application are replicated as follows.

5.1.1. *IRC* code sections:

> **R612.1 General.** This section prescribes performance and construction requirements for exterior window and door installed in wall. Windows and doors shall be installed and flashed in accordance with the fenestration manufacturer's written installation instructions. Window and door openings shall be flashed in accordance with Section R703.8. Written installation instructions shall be provided by the fenestration manufacturer for each window or door.
>
> **R612.2 Performance.** Exterior windows and doors shall be designed to resist the design wind loads specified in Table R301.2(2) adjusted for height and exposure in accordance with Table R301.2(3).

[3] FPIS Types listed in this TER are minimums having a compressive strength of at least 15 psi. Substitution of products with equal or greater performance shall be permitted in accordance with Section 6.2.
[4] As defined in *ASTM C1289*, Type 1 products are those that are faced with aluminum foil on both major surfaces of the core foam. These products also have a minimum compressive strength of 16 psi.
[5] Atlas Rboard is a Type 2, Class 2, Grade 1 Polyisocyanurate FPIS having a minimum compressive strength of 16 psi in accordance with *ASTM C1289*.

R612.3 Testing and labeling. Exterior windows and sliding doors shall be tested by an *approved* independent laboratory, and bear a *label* identifying manufacturer, performance characteristics and *approved* inspection agency to indicate compliance with AAMA\WDMA\CSA 101/I.S.2/A440. Exterior side-hinged doors shall be tested and *labeled* as conforming to AAMA\WDMA\CSA 101/I.S.2/A440 or comply with Section R612.5.

R612.5 Other exterior window and door assemblies. Exterior windows and door assemblies not included within the scope of Section R612.3 or Section R612.4[6] shall be tested in accordance with ASTM E 330. Glass in assemblies covered by this exception shall comply with Section R308.5.

R612.7.1 Anchoring requirements. Window and glass door assemblies shall be anchored in accordance with the published manufacturer's recommendations to achieve the design pressure specified. **Substitute anchoring systems used for substrates not specified by the fenestration manufacturer shall provide equal or greater anchoring performance as demonstrated by accepted engineering practice [emphasis added].**

5.1.2. *IBC* code sections:

1405.13 Exterior windows and doors. Windows and doors installed in exterior walls shall conform to the testing and performance requirements of Section 1710.5. Windows and doors that are part of the exterior building envelope are to be tested for wind-load resistance in accordance with the methods specified in Section 1710.5.2 (see commentary, Section 1710.5.2).

1405.13.1 Installation. Windows and doors shall be installed in accordance with approved manufacturer's instructions. Fastener size and spacing shall be provided in such instructions and shall be calculated based on maximum loads and spacing used in the tests.

1710.5 Exterior window and door assemblies. The design pressure rating of exterior windows and doors in buildings shall be determined in accordance with Section 1710.5.1 or 1710.5.2.

1710.5.1 Exterior windows and doors. Exterior windows and sliding doors shall be tested and labeled as conforming to AAMA/WDMA/CSA101/I.S.2/A440. The *label* shall state the name of the manufacturer, the *approved* labeling agency and the product designation as specified in AAMA/WDMA/CSA101/I.S.2/A440. Exterior side-hinged doors shall be tested and *labeled* as conforming to AAMA/WDMA/CSA101/I.S.2/A440 or comply with Section 1710.5.2. Products tested and labeled as conforming to AAMA/WDMA/CSA101/I.S.2/A440 shall not be subject to the requirements of Sections 2403.2 and 2403.3.

1710.5.2 Exterior windows and door assemblies not provided for in Section 1710.5.1. Exterior window and door assemblies shall be tested in accordance with ASTM E 330.Structural performance of garage doors and rolling doors shall be determined in accordance with either ASTM E 330 or ANSI/DASMA 108, and shall meet the acceptance criteria of ANSI/DASMA 108. Exterior window and door assemblies containing glass shall comply with Section 2403. The design pressure for testing shall be calculated in accordance with Chapter 16. Each assembly shall be tested for 10 seconds at a load equal to 1 ½ times the design pressure.

5.2. Testing window assemblies for gravity loads is not specifically required by the building codes.

5.2.1. Most manufacturer installation instructions require that the window be fully supported at the sill.

5.2.2. As a result, the manufacturer's installation instructions and the building codes are mainly concerned with transverse wind loading and the ability of the assemblies to maintain the integrity of the building envelope in resisting penetration by wind-driven rain.

5.3. Depending on a number of factors (including the wall framing, wall cladding, window type, flange type, method of attachment, etc.), when installed over a layer of FPIS, it may be difficult or impractical to provide full support for gravity loads of the window assembly by means of a sill directly supporting the assembly (see Figure 1).

5.3.1. In this application, the window would be cantilevered outside the framing with support of the assembly provided only by the fasteners extending through the window flange and FPIS into the framing.

[6] *IRC* Section R612.4 addresses garage doors, which are outside the scope of this TER.

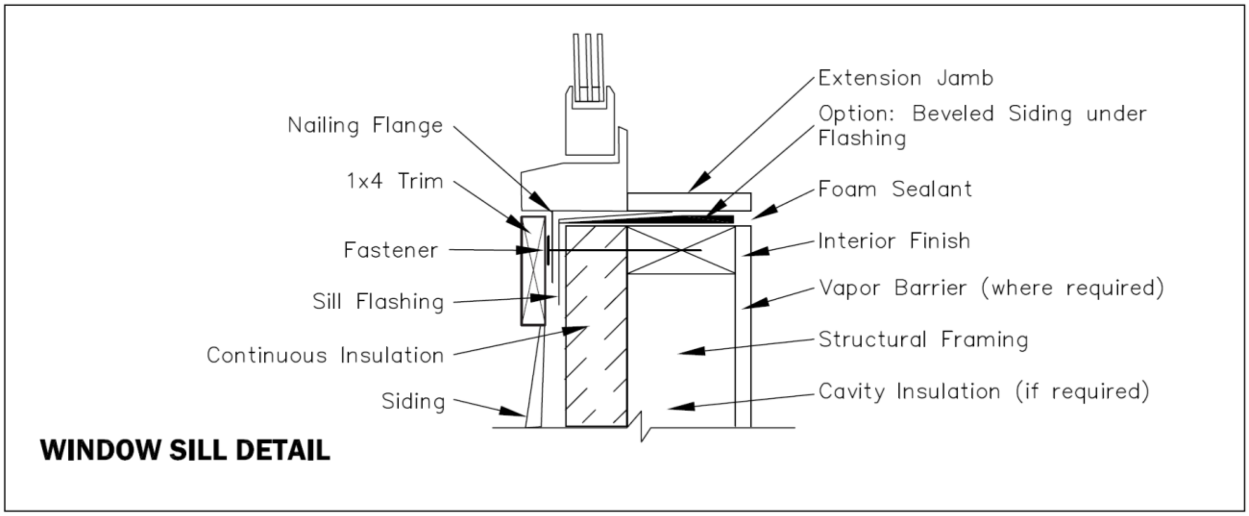

Figure 1: Window Sill Detail

5.4. As a result, FSC commissioned exploratory testing to gain an understanding of the performance of one window type and size used in this application.

5.4.1. Three series of tests were undertaken.

5.4.1.1. Series 1: Measurement of the long-term vertical deflection of a typical integral-flanged window with respect to the wall framing (see Photo 1)

Photo 1: Long-Term Deflection under Self-Weight Testing

5.4.1.2. Series 2: Proof tests to verify that the calculations used to specify fasteners and to limit deflection to 0.015" are accurate (see Photo 2)

Photo 2: Structural Loading – Fastener/Flange Capacity

5.4.1.3. Series 3: *ASTM E330* wind pressure testing to confirm resistance to wind loads of a typical integral-flanged window installed over FPIS with those installed directly to framing (see Photo 3)

Photo 3: Wind Pressure Loading Test Setup

5.5. Series 1: SBCRI testing to measure resistance to long-term deflection under self-weight

5.5.1. Three identical window frames were constructed. Windows were purchased locally and attached as follows:

5.5.1.1. All assemblies were constructed in accordance with the fastening requirements of *IRC* Table R602.3(1).

5.5.1.2. The sill of the rough opening was not installed so that no support was provided for the window other than through the fastening of the window side and top flanges. Also, no shims or supplemental anchoring devices were installed.

5.5.1.3. String pots were installed to measure the deflection at the lower corners of the window in relation to the base of the assembly.

5.5.1.4. Assembly 1: Window was attached directly to the rough opening.

5.5.1.5. Assembly 2: Layer of 1" FPIS was installed over the framing, and the window was installed with the fasteners extending through the FPIS and into the wood framing.

5.5.1.6. Assembly 3: Layer of 2" FPIS was installed over the framing, and the window was installed with the fasteners extending through the FPIS and into the wood framing.

5.5.2. The assemblies are shown in Photo 1.Test results:

5.5.2.1. After two weeks – No significant movement in any of the three assemblies.

5.6. Series 2: Proof tests to verify that the calculations used to specify fasteners and to limit deflection to 0.015" are accurate

5.6.1. Test frames, similar to those in the Series 1 tests, were constructed. As in the earlier tests, one had the window attached through 1" of FPIS, and one had the window attached through 2" of FPIS. An example is shown in Photo 2.

5.6.2. All testing was conducted using mechanical fasteners only; no sealant/adhesive was used in flange joints, as is normally required.

5.6.3. In each case, load was applied directly to the head of the window until failure of the window flange or fasteners occurred.

5.6.4. Test results:

5.6.4.1. Figure 2 shows the load deflection plots of the tests through failure. The plots show the average deflection taken from the lower left and lower right corners of the windows during the tests. Both tests reached failure with a load in the range of 3,300-3,600 lbs, showing that the window flanges and fasteners have an ultimate capacity that greatly exceeds the weight of the window and can be designed to support the weight of the windows alone. Further, there is a lot of resiliency in the connections up through $1^1/_2$" of window movement, providing a tough, strong and resilient connection.

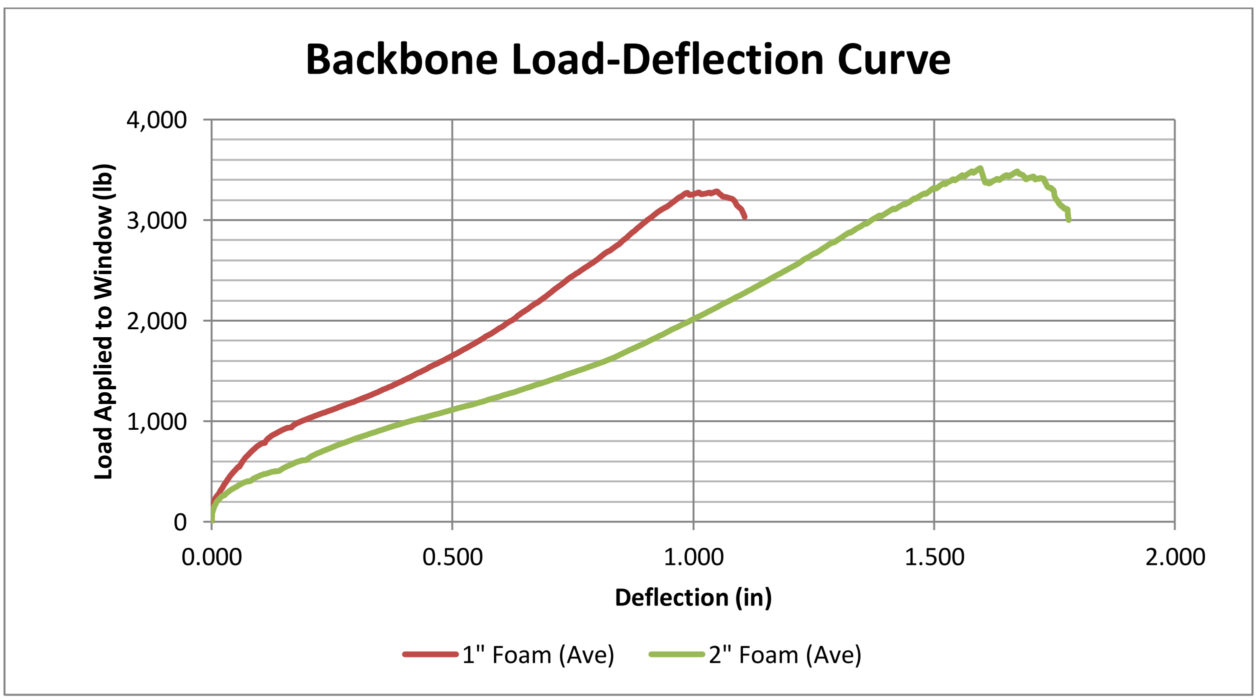

Figure 2: Backbone Load-Deflection Plot

5.6.4.2. Figure 3 shows the loads applied to the test windows through a deflection of 0.016" and the average deflection as measured at the bottom corners of the window.

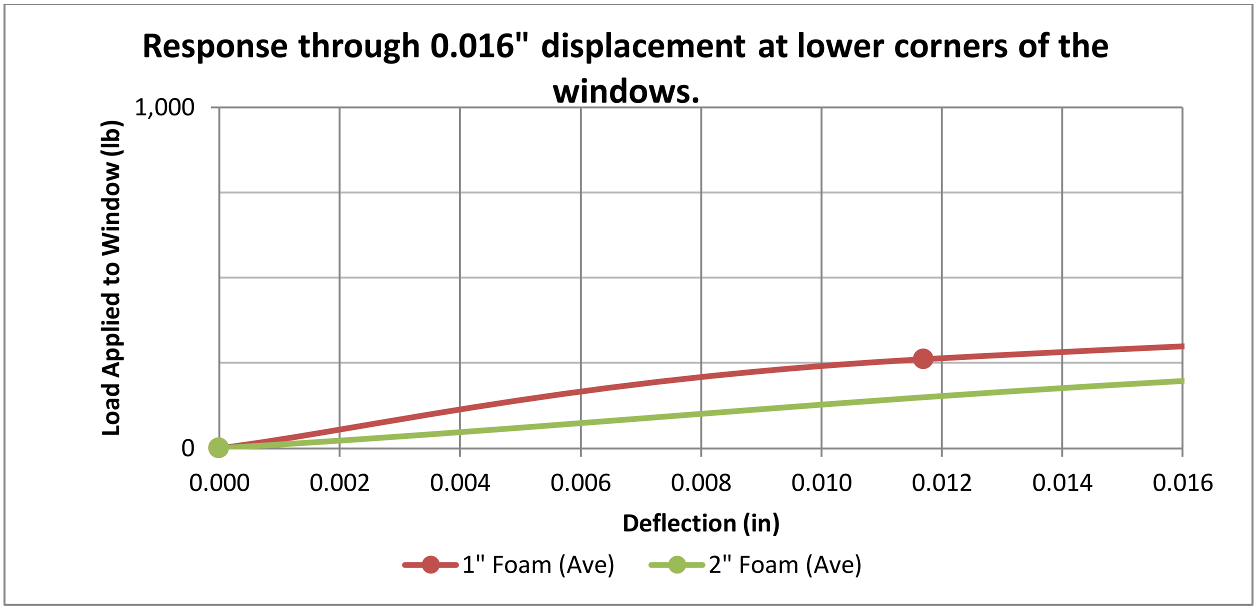

Figure 3: Response to Applied Load through 0.016" Displacement at Lower Corners of the Windows

5.6.4.3. Table 1 summarizes the structural loading required to achieve 0.015" of deflection and the corresponding load that was applied to each fastener to achieve that deflection.

5.6.4.4. Table 1 also shows the calculated load in accordance with AWC's *Technical Report 12* (*TR12*), Table 1, General Dowel Equations.

5.6.4.4.1. This calculation allows a designer to calculate the lateral resistance of fasteners where a gap exists between the side member load on the fastener and the main framing member.

5.6.4.4.2. In this application, the FPIS is installed in the gap between the side member load on the fastener and the main framing member.

5.6.4.5. This confirms that the calculations in *NDS*/*TR12* conservatively estimate the deflection and can be used to limit deflection to 0.015" in this application.

FPIS Thickness	Applied Load	Tested Load per Fastener (lbs)	Load per Fastener Calculated per *NDS*/*TR12* (lbs)[1]
2"	158	6	5
1"	280	10.7	9
1. The allowable load for these fasteners was calculated using a reduction factor of 3, versus the reduction factor of 2.2 as allowed by *NDS/TR12*, providing a higher factor of safety.			

Table 1: Test Results Comparing Tested Load per Fastener with the Calculated Load to Limit Deflection to 0.015"

5.7. Series 3: *ASTM E330* wind pressure testing to compare the resistance to wind loads of windows installed over FPIS

5.7.1. An assembly with a window unit was built to the requirements of *ASTM E330* and tested with 2" of FPIS applied. The test setup is shown in Photo 3.

5.7.1.1. Table 2 summarizes the maximum wind pressure experienced by the wall.

Wall Type	Minimum Structural Pressure Rating (STP)	Failure Load (psf)
2" Foam Sheathing	37.5	118

Table 2: Summary of Wind Pressure Test Results

5.7.1.2. The windows used in this test had a minimum design pressure (DP) rating of +/- 25 psf and a minimum structural pressure (STP) of +/-37.5 psf.

5.7.1.3. The 2" FPIS test showed significant excess capacity with respect to the code-compliant wind pressure rating for the window unit.

5.7.1.4. In addition, the tests were conducted without shims applied to jambs at the location of cross rails or any other support than the fastening of the flange through foam sheathing to the jamb studs.

6. Installation:

6.1. Proposed General Installation Requirements for Window Flange Fasteners

6.1.1. Attach to the wall framing in accordance with the window manufacturer's installation instructions.

6.1.2. Minimum penetration of the fastener into wood framing shall be 1¼".

6.1.3. Minimum lumber shall have a specific gravity (SG) of 0.42 (SPF).

6.1.4. In no case shall fasteners be spaced greater than 16" o.c., per *AAMA 2400*.

6.1.5. Fastener head shall be driven flush with the surface of the window flange for a flush and smooth fit against the foam sheathing.

6.1.6. Care shall be taken to avoid overdriving the fasteners.

6.2. General Requirements for FPIS

6.2.1. Minimum compressive strength – 15 psi

6.2.2. Maximum foam thickness – 2"

6.2.3. Compliant with *ASTM C578* or *ASTM C1289*, as applicable

6.2.4. Table 3 provides the minimum fastener size and maximum spacing for attachment of windows through FPIS and into the framing.

Minimum Fastener (or equal)	Thickness of Foam Sheathing (in)	Maximum Fastener Spacing in Flanges per Width of Window Unit	
		≤ 3'	> 3'
0.120"-Diameter Roofing Nail	½"	16" o.c.	9" o.c.
	1"	10" o.c.	5" o.c.
	1½"	7" o.c.	3.5" o.c.
	2"	6" o.c.	3" o.c.

1. Values assume integral flanges with fasteners that support 100% of window unit weight even when sill shims are installed per the manufacturer's installation instructions.
2. Table is based on a window unit weight of 7 pounds per square foot. For different weights, multiply fastener spacing by 7/w, where w is the actual weight in pounds per square foot.
3. The fastener spacing provided in this table are the maximum allowed based on support of the window unit's weight.
4. For wind load resistance, a lesser fastener spacing may be specified in the window manufacturer's installation instructions.
5. The window manufacturer's installation instructions, where more stringent, shall be followed in the event of any conflict.
6. Spacing calculations in table assume that vertical flanges support 100% of the gravity load.

Table 3: Minimum Fastener Size & Maximum Spacing along Window Flanges for Attachment to Wood Framing through FPIS

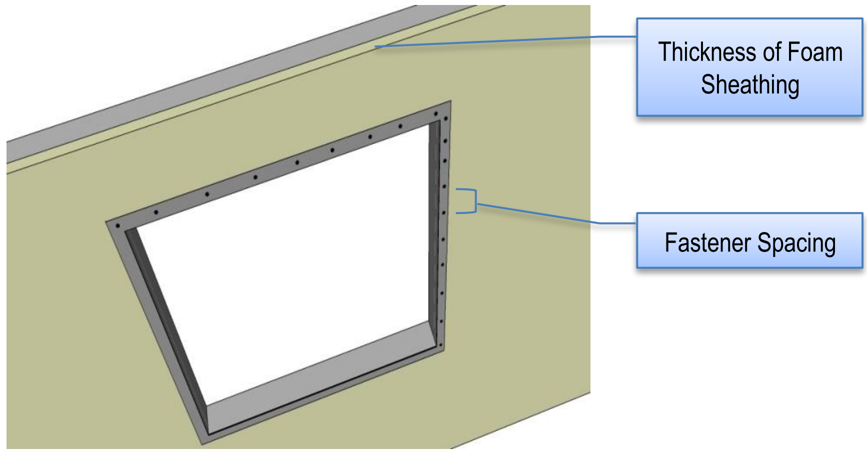

Figure 4: Window Installation over FPIS

7. Test and Engineering Substantiating Data:

7.1. FSC TER 1202-05: *Construction Details for the Use of Foam Plastic Insulating sheathing (FPIS) in Light-Frame Construction.*

7.2. FSC Tech Matters, Guide *to Attaching Exterior Wall Coverings through Foam Sheathing to Wood or Steel Wall Framing*.

7.3. Test report evaluating the wind pressure resistance of windows installed over FPIS by SBCRI.

7.4. Test report evaluating the resistance of fasteners in windows installed over FPIS and OSB by SBCRI.

7.5. Test report evaluating creep of fasteners installed into windows over FPIS and OSB by SBCRI

7.6. *Fastening Systems for Continuous Insulation*, New York State Energy Research and Development Authority (NYSERDA), April 2010.

7.7. *ASHRAE Journal*, "Installation Requirement for Attachment of Integral Flange-Mounted Window Units Over Foam Plastic Insulating Sheathing", Feb 2013.

7.8. 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.

7.8.1. DrJ does not assume responsibility for the accuracy of data provided by testing facilities, but relies on each testing agency's accuracy and accepted engineering procedures, experience, and good technical judgment.

7.9. Where appropriate, DrJ relies on the derivation of design values, which have been codified into law through the codes and standards listed in Section 2, to undertake the review of test data that is comparative or shows equivalency to an intended end use application. DrJ undertakes its engineering evaluation based on code-adopted design values, code-adopted installation details and all code-based and new product test data and analysis provided.

7.9.1. DrJ does not assume responsibility for the accuracy of any code-adopted design values but relies upon their accuracy for engineering evaluation.

7.9.2. DrJ relies upon the fact that the manufacturers of code-adopted products stand behind these legally established design values that are generated by the manufacturer of those products or the members of the associations that publish those design values.

7.10. DrJ evaluates all equivalency testing and related analysis using this engineering foundation.

8. Findings:

8.1. *IBC* Section 104.11 and *IRC* Section R104.11 specifically state that:

> 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.

8.2. When connected in accordance with this TER, fastening is sufficient to limit long-term deflection due to the self-weight of the window assembly.

8.3. Proof testing of integral-flanged window assemblies described in this TER confirm the use of Table 3 (based on *NDS*/*TR12* calculations) for the attachment of windows though FPIS.

8.4. Wind pressure tests indicate that integral-flanged windows can be installed over up to 2" of FPIS, even in the absence of shims or special anchors. However, where shims or special anchors are required by the window manufacturer, the window manufacturer's installation instructions shall be followed.

9. Conditions of Use:

9.1. The insulated sheathing products listed in Section 4 of this report comply with, or are suitable alternatives to, the applicable sections of the *IRC and IBC* (see Section 5.1) and are subject to the following conditions.

9.1.1. These products shall be installed in compliance with the manufacturer's instructions, applicable building code(s) and this TER.

10. Identification:

10.1. The foam sheathing described in this TER 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.

11. Review Schedule:

11.1. This TER is subject to periodic review and revision. For the most recent version of this report, visit drjengineering.org.

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

Appendix A:
TERs Are Comparable to, Compatible with, and Equivalent to the Purpose of an ICC-ES ESR

1. Technical Evaluation Reports (TERs), drafted and maintained by DrJ (professional engineering firm and ISO Guide 65 applicant through ANSI/ACLASS), assess how specific products comply with the provisions of the building code. DrJ is a code-defined “approved source,” and DrJ employs professional engineers and follows state professional engineering rules and regulations.

2. TERs are comparable to, compatible with, and equivalent to the purpose of an ICC Evaluation Service (ICC-ES) Evaluation Service Reports (ESRs).[7]

2.1. ICC Evaluation Service does not provide an engineer’s seal on any of its ESRs.

2.2. Furthermore, the ICC-ES Evaluation Report Purpose is defined as follows[8]:

ICC EVALUATION SERVICE

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ICC EVALUATION SERVICE, LLC,
RULES OF PROCEDURE FOR EVALUATION REPORTS

1.0 PURPOSE

These rules set forth procedures governing ICC Evaluation Service, LLC (ICC-ES), issuance and maintenance of evaluation reports on building materials and products, methods of construction, prefabricated building components, and prefabricated buildings.

ICC-ES evaluation reports assist those enforcing model codes in determining whether a given subject complies with those codes. An evaluation report is not to be construed as representing a judgment about aesthetics or any other attributes not specifically addressed in the report, nor as an endorsement or recommendation for use of the subject of the report. Approval for use is the prerogative and responsibility of the Code Official; ICC-ES does not intend to assume, nor can ICC-ES assume, that prerogative and responsibility.

2.3. ICC ESR Disclaimer[9]:

ICC-ES Evaluation Reports are not to be construed as representing aesthetics or any other attributes not specifically addressed, nor are they to be construed as an endorsement of the subject of the report or a recommendation for its use. There is no warranty by ICC Evaluation Service, LLC, express or implied, as to any finding or other matter in this report, or as to any product covered by the report.

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8 See the “ICC-ES Rules of Procedure” at www.icc-es.org/pdf/rules_evalrpts.pdf.

9 Page 1 footer of each ICC-ES report that can be found at www.icc-es.org/reports/index.cfm.

3. DrJ Sealed Engineering

3.1. DrJ engineers have undertaken the rigorous engineering and analysis work to determine the subject of this report's compliance with the codes and standards referenced in Section 2.

3.2. DrJ work:

3.2.1. Complies with accepted engineering procedures, experience and good technical judgment.

3.2.2. Is the work of an independent person, firm or corporation who is competent and experienced in the application of engineering principles to materials, methods or systems analyses.

3.3. A Technical Evaluation Report generated by DrJ is in all "code-compliance-evaluation-processing" respects equivalent to an ICC-ES ESR, as ICC-ES defines its approach, with one material difference.

3.3.1. DrJ will seal all TERs, as needed, so that responsibility for the work is well-defined.

3.3.2. The DrJ responsibility statement is identical to that provided in ICC-ES ESRs.

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Appendix B: Legal Aspects of Product Approval

1. Product Approval

1.1. In general, the model and local codes provide for the use of alternative materials, designs and methods of construction by having a legal provision that states something similar to:

> The provisions of this code/law 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/law, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the compliance official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code/law, and that the material, design, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code/law.

1.2. In concert with preserving "free and unfettered competition as the rule of trade", should this alternative material, design or method of construction not be approved, the building official shall respond in writing, stating the specific reasons for non-code-compliance and/or for non-professional engineering regulation compliance.

> Congress passed the first antitrust law, the Sherman Act, in 1890 as a "comprehensive charter of economic liberty aimed at preserving free and unfettered competition as the rule of trade." In 1914, Congress passed two additional antitrust laws: the Federal Trade Commission Act, which created the FTC, and the Clayton Act. With some revisions, these are the three core federal antitrust laws still in effect today.
>
> …Yet for over 100 years, the antitrust laws have had the same basic objective: to protect the process of competition for the benefit of consumers, making sure there are strong incentives for businesses to operate efficiently, keep prices down, and keep quality up….
>
> The Sherman Act outlaws "every contract, combination, or conspiracy in restraint of trade," and any "monopolization, attempted monopolization, or conspiracy or combination to monopolize." For instance, in some sense, an agreement between two individuals to form a partnership restrains trade, but may not do so unreasonably, and thus may be lawful under the antitrust laws. On the other hand, certain acts are considered so harmful to competition that they are almost always illegal.
>
> The penalties for violating the Sherman Act can be severe. Although most enforcement actions are civil, the Sherman Act is also a criminal law, and individuals and businesses that violate it may be prosecuted by the Department of Justice.[10]

2. Legal Validity of this TER

2.1. This TER is a code-defined (e.g., *2009 IBC* and *IRC* Section 104.11.1 and *2009 IBC* Section 1703.4.2) "research report" that provides supporting data to assist in the approval of materials, designs or assemblies not specifically provided for in this code.

2.2. Therefore, this TER is a valid research report from a professional engineering company that complies with the code definition of "approved source." If required by the authority having jurisdiction, this TER can also be sealed to comply with professional engineering laws and regulations.

[10] http://www.ftc.gov/bc/antitrust/antitrust_laws.shtm