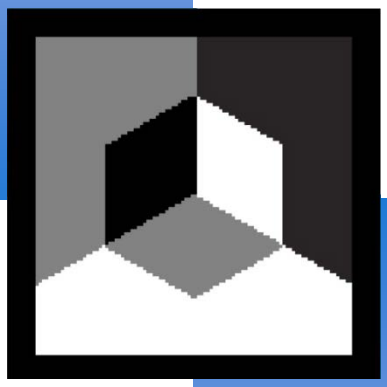
AMERICAN ARCHITECTURAL

FMA/AAMA/WDMA 500-16

Standard Practice for the Installation of Mounting Flange Windows into Walls Utilizing Foam Plastic Insulating Sheathing (FPIS) with a Separate Water-Resistive Barrier (WRB)



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FOREWORD

This standard practice encompasses procedures for the installation of windows into walls utilizing foam plastic insulating sheathing (FPIS); and addresses installations for residential and light commercial buildings of not more than three stories above grade plane in height.

This standard practice is to address: attachment and continuous support of the window and water management principles for windows installed with FPIS.

1.0 SCOPE

1.1 This standard practice addresses residential and light commercial buildings in new construction of not more than three stories above grade plane in height, utilizing a water-resistive barrier (WRB) and FPIS. It is expected that all referenced components shall meet code requirements in force at the time of installation.

1.2 The provisions in this standard practice are not intended to prevent use of alternative constructions following rational methods of evaluation in accordance with accepted engineering practice, test methods, and building code requirements.

1.3 To simulate installation conditions, and demonstrate the effectiveness of the standard practice, installation methods that are consistent with this document that employ sill drainage have been water tested up to a test pressure of 360 Pascals (7.50 psf) using the ASTM E547 water test. The installation methods described in this document that employ a continuous seal around the entire exterior perimeter of the window have not been tested. This does not advocate field or lab testing to those levels as a requirement for this standard practice.

1.4 This practice applies to windows which employ a mounting flange when installed in wood frame construction with exterior insulating sheathing. When mounting flanges are used, they may be attached to the exterior window perimeter frame, with or without a mounting flange on the sill, and are designed as an installation appendage. Non-flanged and brick mold windows are beyond the scope of this practice. See manufacturer's instructions for those applications.

1.5 This practice addresses scenarios in which the FPIS may be installed over or under a separate water resistive barrier (WRB) layer; and the resulting water management considerations are discussed. The FPIS referenced in this standard practice is being utilized for its thermal value. The use of FPIS as an air barrier, drainage plane, structural window support or structural sheathing is beyond the scope of this practice.

***CAUTION**: This standard practice's tested method is limited to a WRB or drainage plane that consists of a correctly shingled mechanical lap of a water-resistive material over any joints or seams in the structural sheathing or FPIS.*

1.6 This standard practice covers the installation process for windows from pre- to post-installation. It does not include factory or field fabrication techniques that would be required to join individual windows to each other, either horizontally or vertically.

1.7 This standard practice provides recommended requirements for window installation. If the window manufacturer provides installation instructions, the manufacturer's instructions shall take precedence.

1.8 This standard practice addresses water management concerns at the rigid insulating sheathing and window interface. Issues regarding the adequacy of anchorage and structural support for windows are beyond the scope of this document. Consult window manufacturer's installation instructions or an approved design for direction on anchorage and structural support.

1.9 This standard practice allows for the FPIS to be installed before or after the window installation. The FPIS and WRB are required to be properly installed according to the FPIS and WRB manufacturer instructions.

1.10 This standard practice does not address safety concerns, either from the installation process or those that may be present at the building site. It shall be the responsibility of the user of this standard practice to ensure that all appropriate health and safety practices have been implemented.

1.11 Accessibility requirements (such as the Americans with Disabilities Act - ADA) are beyond the scope of this standard practice.

1.12 This standard practice does not address issues with drainage requirements of adjacent cladding or with integrating drainage requirements of the installation with the adjacent cladding. In all circumstances, the General Contractor is expected to follow best practices for integration with membrane/drainage wall systems.

1.13 This document provides details for installation methods that feature drainable sill flashing systems. For installations that feature a water-seal around the full exterior perimeter of the window frame, consult the manufacturer's instructions.

1.14 This document was developed in an open and consensus process and is maintained by representative members of FMA, AAMA and WDMA as advisory information.

2.0 REFERENCED PUBLICATIONS

2.1 References to the standards listed below shall be to the edition indicated. Any undated reference to a code or standard appearing in the requirements of this standard shall be interpreted as referring to the latest edition of that code or standard.

2.2 American Architectural Manufacturers Association (AAMA)

AAMA 711-13, Voluntary Specification for Self Adhering Flashing Used for Installation of Exterior Wall Fenestration Products

AAMA 712-14, Voluntary Specification for Mechanically Attached Flexible Flashing

AAMA 713-08, Voluntary Test Method to Determine Chemical Compatibility of Sealants and Self-Adhered Flexible Flashings

AAMA 800-10, Voluntary Specifications and Test Methods for Sealants

AAMA 812-04(2010), Voluntary Practice for Assessment of Single Component Aerosol Expanding Polyurethane Foams for Sealing Rough Openings of Fenestration Installations

2.3 ASTM International (ASTM)

ASTM C794-15a, Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants

ASTM C920-14a, Standard Specification for Elastomeric Joint Sealants

ASTM C1281-14, Standard Specification for Preformed Tape Sealants for Glazing Applications

ASTM E547-00(2009), Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference

2.4 Fenestration Manufacturers Association (FMA) & American Architectural Manufacturers Association (AAMA)

FMA/AAMA 100-12, Standard Practice for the Installation of Windows with Flanges or Mounting Fins in Wood Frame Construction for Extreme Wind/Water Conditions

2.5 International Code Council (ICC)

ICC IRC 2012, International Residential Code

3.0 DEFINITIONS

AIR AND WATER SEAL, n. – A continuous seal put into the gap area around the interior side, exterior side or both sides of the window perimeter to restrict air and/or water infiltration or air exfiltration past the fenestration product.

BACK DAM, n. – The rear upturned leg of a sill, sill pan or subsill designed for the purpose of diverting liquid water. A sealant joint can also be used to form a back dam provided it is part of a continuous air seal.

COMPATIBILITY, n. – The condition of materials maintaining physical and functional properties when in direct contact or close proximity to each other.

DRIP CAP/DRIP MOLDING, n. – A molding or flashing installed over windows and doors to direct water away from the building to prevent water intrusion.

END DAM, n. – Any means provided to stop the flow of water out of the ends of a sill, panning system or subsill and into the wall cavity; such as sealant, upstands, plates or gasketing. End dams must be of a height equal to the height of the back dam or higher.

EXTERIOR CASING/BRICK MOLD (BMC), n. – Casing applied around a window or door through which fasteners may be driven to install the unit. BMC covers the gap between the frame & masonry opening. Siding or brick is installed adjacent to the edge of the BMC.

FLASHING, n. – Water resistive material that bridges the joint between the window frame and the adjacent construction to prevent water penetration. See *Mechanically Attached Flashing*, *Self Adhering flashing*, *Pan Flashing*, *Liquid Applied Flashing.*

FOAM PLASTIC INSULATING SHEATHING (FPIS), n. – An insulating board with a core material having a minimum R value of R-2 (per 2012 IRC).

LIQUID APPLIED FLASHING, n. – A material that is fluid at the time of application that provides a water-resistive seal around building openings at or near the interface between the through-wall penetration and the building envelope and meets the performance requirements of this specification.

MECHANICALLY ATTACHED FLASHING, n. – Flashing which is permanently attached using screws, staples or other mechanical fasteners.

MEMBRANE/DRAINAGE SYSTEM, n. – A wall system employing a concealed water-resistive barrier in which the exterior building surface, e.g., stucco, brick veneer, siding, is not the sole method of protecting the building from moisture penetration.

MOUNTING FLANGE **(a.k.a. *mounting fin, nailing fin*)**, n. – An appendage protruding from the body of a window or door frame, projecting parallel to the plane of the wall, used either as an installation attachment feature or part of the water-resistive barrier interface between the product and the wall, or both. Mounting flanges can be either integral or applied to the frame, and may be structural or non-structural.

PAN FLASHING **(a.k.a. *sill pan*)**, n. – A type of flashing used at the base of a rough opening to divert water to the exterior or to the exterior surface of a concealed WRB. Pan flashings have upturned legs at the rear interior edge (back dam) and right and left sides (end dams), to form a three-sided pan that has the front open for drainage. They are intended to collect and drain incidental water toward the exterior, including water that may enter through the window unit or around the window (between the rough opening and the fenestration).

Pan flashing can be made from self-adhered flashing or from rigid or semi-rigid material, such as corrosion-resistant metal or a semi-rigid polymer.

DISCUSSION*: The pan flashing shall be integrated with other flashings, the WRB or drainage plane, and the window assembly to capture water that may otherwise penetrate to the sill framing and allow it to freely drain to the exterior. For this reason, sill pans shall not be sloped to the interior. The window, flashings and pan flashing shall be installed and sealed in a manner that reliably inhibits air and moisture flow to the interior.*

ROUGH OPENING EXTENSION SUPPORT ELEMENT (ROESE), n. – A projection ("bump-out") or extension to the structural wall framing at the rough opening perimeter. The function of the ROESE is to: 1) support the weight of the window, 2) allow direct structural attachment of the window in order to transfer wind loads to the structure, and 3) enable window alignment with the exterior plane of the FPIS for proper integration with cladding and/or WRB. It shall consist of a material and fastening method capable of maintaining structural continuity between framing and the window.

SEALANT (CONSTRUCTION), n. – Any of a variety of compounds used to fill and seal joints or openings. For the purpose of this standard practice, sealant shall have the capability of allowing for joint movement and appropriate adhesion as required for construction applications.

SEALANT, AEROSOL FOAM, n. – In building construction, a sealant that expands in volume as it is dispensed from a container, using propellant under pressure, to form a rigid or semi-rigid cellular mass.

SELF ADHERING FLASHING, n. – Flashing which is coated completely or partially on at least one side with an adhesive material and which does not depend on mechanical fasteners for permanent attachment.

SHIM, n. – A material used to raise, level, or plumb a fenestration frame. Lateral shims are placed in the rough opening adjacent to the frame jambs. Setting shims are placed in the rough opening beneath the sill.

WATER-RESISTIVE BARRIER (WRB), n. – a material behind an exterior wall covering that is intended to resist liquid water that has penetrated behind the exterior covering from further intruding into the exterior wall assembly. (per IRC 2012)

WEEP SCREED, n. – A permanent member with gaps designed to allow liquid water to exit from the membrane drainage plane to the exterior of a building; located at the bottom of wall claddings between the membrane drainage plane and the cladding.

4.0 SIGNIFICANCE AND USE

4.1 This standard practice recognizes that the effective performance of installed window products is highly dependent upon following proper installation procedures, using appropriate materials, and quality workmanship.

4.2 This standard practice recognizes that the coordination of trades and proper sequencing are essential for effective window installation. *Responsibilities of trades are outlined in Appendix A.*

4.3 This standard practice provides methods for installation of window units to minimize problems due to any or all of the following: air infiltration, water penetration, or condensation.

4.4 This standard practice presumes that the installer/contractor has a working knowledge of applicable federal, state and local codes and regulations; specifically, but not limited to required means of egress, requirements for safety glazing materials, and structural requirements based on the applicable codes.

4.5 This standard practice presumes that the installer has a working knowledge of the tools, equipment and methods necessary for the installation of specified fenestration products. It further requires the installer to have familiarity with flashing and sealing techniques, application of caulking and sealants, finishes (where applicable), and an understanding of the fundamentals of construction that affect the installation of these units, including their compatibility with other materials.

4.6 This standard practice presumes that the products supplied have been furnished for the applicable installation and that their locations within the structure have been pre-determined to comply with all the applicable building codes and regulations.

5.0 RELATED ISSUES AND PROCEDURES

5.1 CONTINUITY

Continuity shall be maintained between the window product, window flashing, and the drainage plane with an uninterrupted line of protection.

5.2 JOINTS AND ANCHORAGES

Joints and anchorages between the building envelope (water-resistive barrier assembly) and window shall be designed to accommodate differential thermal expansion and contraction, as well as the structural requirements within the window/wall assembly.

This standard practice demonstrates methods for the window to be anchored to structural framing within or extended from the rough opening.

5.3 CONSTRUCTION DAMAGE
The building shall be constructed in such a manner as to secure or support the installation materials, including the flashing and water resistive barrier, to prevent damage prior to installation of the cladding. The walls shall not be left unprotected or uncovered without cladding for longer than recommended by the FPIS/WRB/flashing manufacturers. The FPIS, water-resistive barrier and flashing near the window rough opening shall be protected from damage during construction. Any damage to components at or around the window, which would affect the performance (which includes air/water/thermal/structural) of the installation, shall be repaired prior to completing the installation of the window and/or applying the exterior cladding.

5.4 CHEMICAL COMPATIBILITY
All materials, such as, but not limited to coatings, flashings and sealants that come into contact with each other and windows shall exhibit chemical compatibility, per AAMA 713.

5.5 SEALANT SELECTION & JOINT DESIGN
The sealant joint shall be designed to accommodate the joint gap and expected joint movement between window and the wall opening, using a sealant appropriate for and compatible with the materials being joined. Sealant selection is complex, and proper selection also involves the window manufacturer, builder/architect that is specifying the adjoining wall materials, the sealant manufacturer, and/or a design professional who is capable of designing the sealant joint to accommodate the expected movement as well as ensure chemical compatibility with the adjoining materials.

5.5.1 SEALANT PERFORMANCE SPECIFICATIONS

5.5.1.1 Gunnable sealants shall have adequate adhesion, as defined by compliance with AAMA 808.3 (AAMA 800, Section 1.4) or ASTM C920 Class 25 Grade NS or greater for proper joint expansion and contraction. If preformed tapes are used, they shall meet ASTM C1281.

5.5.1.2 Low expansion/low pressure aerosol or spray foams may be used as the interior seal material. Foam shall be low expansion, predominantly closed cell, non rigid, tested in accordance with AAMA 812 and approved by the manufacturer for use as an interior air seal.

5.6 EXTERIOR WALL CLADDING
The window, ROESE and flashing shall be installed prior to any exterior wall cladding.

5.7 SHIMS
Shims shall be installed per window manufacturer's instructions between the window frame and the rough opening in such a manner to support the product in a plumb, level and square position.

6.0 WINDOW PRE-INSTALLATION PROCEDURES

6.1 ROUGH OPENINGS

6.1.1 Size and tolerances of the rough openings shall be determined from the window manufacturer's instructions and this standard practice. Remedy any discrepancies.

CAUTIONARY NOTE 1*: Rough opening dimensions may require slight enlargement to accommodate the overlap of thick flashing materials, mullion gusset plates, rigid sill pans and/or shims.*

6.1.2 The rough opening shall be plumb, level, square and true prior to the installation of the window. Unless otherwise specified by the manufacturer's installation instructions, no more than 6 mm (1/4 in) deviation from square shall be allowed when comparing the diagonal measurements.

6.2 INSTALLATION CONSIDERATIONS

6.2.1 Different methods of installation are available to accommodate windows placed directly in the opening or installed utilizing the ROESE and the sequencing of component installation. Each of these methods allows for the window to be installed before or after the WRB. The choice of installation methods will rely on the construction sequencing and the alignment of the window with the interior and exterior façade. These options are summarized in Table 1. Component

selection is critical to the installation aligning correctly. Each method presented within this document includes diagrams to illustrate which layer is operating as the WRB. The following items shall be determined prior to window installation:

1. Exterior cladding material
2. Wall, Foam, and *rough opening extension support element* (ROESE) dimensions
3. Window alignment relative to the attachment plane
4. Trim components

6.2.2 Methods A and B in this guide require windows to be installed into a structural frame at the rough opening, or *ROESE, in accordance with applicable building code requirements.*

6.2.3 All trim, cladding options, and installation methods shall be carefully considered based on window selection and cladding type.

6.2.4 FPIS in all of the methods shall be installed according to the FPIS manufacturer instructions.

	WINDOW POSITIONING RELATIVE TO EXTERIOR PLANE OF WALL	***FPIS RELATIVE TO WRB***	***WRB/WINDOW SEQUENCE***
A	Window in ROESE in plane with exterior wall.	FPIS interior of WRB	WRB Before and After
B		FPIS exterior of WRB	WRB Before or After is the same
C1	Window mounted directly onto structural sheathing; Outermost plane of the window protruding relative to FPIS exterior by at least ¾”.	FPIS exterior to WRB	WRB Before and After
C2	Window mounted directly onto structural sheathing; Outermost plane of the window recessed or protruding by less than ¾” relative to FPIS exterior.		

TABLE 1: Summary of Installation Methods

6.3 METHODS OF INSTALLATION

6.3.1 Method A describes a window that will be installed into a ROESE and the FPIS is interior to the WRB, as illustrated in Figure 1

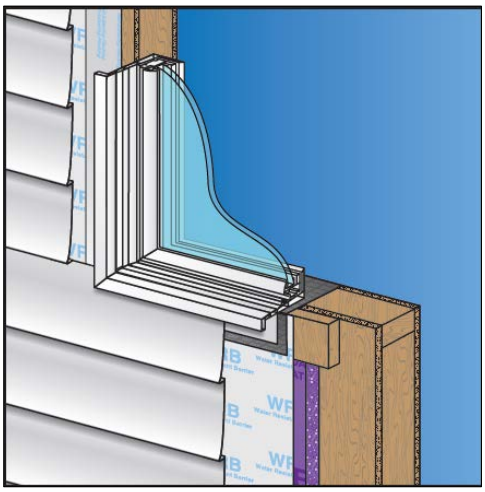

FIGURE 1: Method A Schematic (see Section 7.2 for more detail)

6.3.1.1 Method A has options for installing the window before and after the WRB.

6.3.2 Method B describes a window that will be installed into a ROESE and the FPIS is exterior to the WRB. This method demonstrates a combination of liquid applied and self adhered flashing, although either flashing system is acceptable, as illustrated in Figure 2.

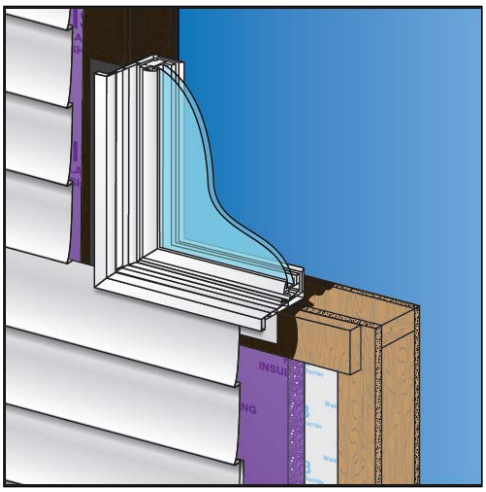

FIGURE 2: Method B Schematic (See Section 7.3 for more details)

6.3.3 Method C describes a window that is installed such that the mounting flange is in the plane of the structural sheathing. The window may be installed before or after the WRB. Methods C1 (Figure 3) and C2 (Figure 4) describe two different conditions for the position of the window exterior plane relative to the FPIS.

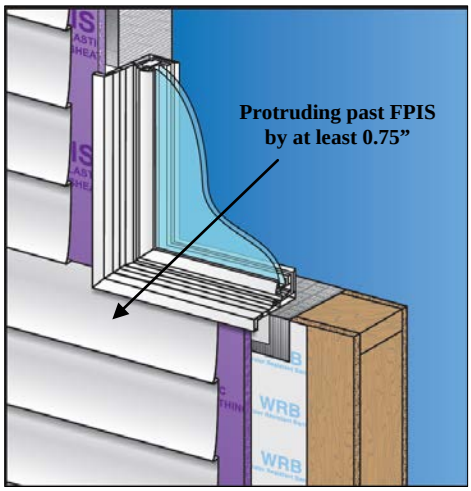

FIGURE 3: Method C1 Schematic (See Section 7.4 for more detail)

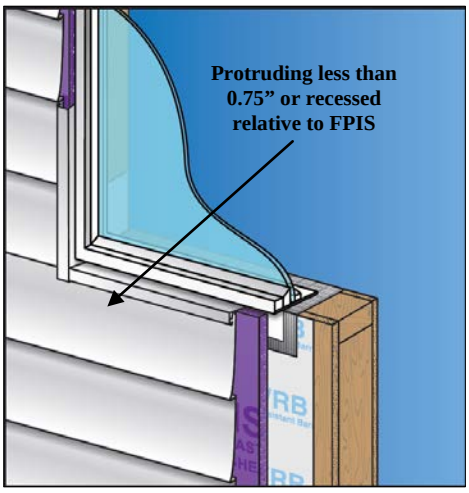

FIGURE 4: Method C2 Schematic (see Section 7.4 for more detail)

6.3.3.1 Method C, like Method A, has options for installing the window before and after the WRB.

6.4 GENERAL CONSIDERATIONS

6.4.1 Where FPIS is installed over the drainage plane created by the WRB, this practice recommends use of WRB with enhanced drainage features.

6.4.2 In some instances such as with applied flanges, brickmold, or mulled assemblies, window manufacturers may require head flashing or drip caps. These would typically be installed with the window and need to be appropriately integrated with the drainage plane. Consult the window manufacturer for guidance.

7.0 WINDOW INSTALLATION PROCEDURES

7.1 Rough Opening Extension Support Element (ROESE) Preparation for Methods A and B

7.1.1 Both Method A and B describe a window being installed into a ROESE that is built out and protruding from the sheathing such that the window aligns with the exterior face of FPIS. This alignment facilitates proper integration with exterior cladding as well as proper support for the window. The provisions for the ROESE are not intended to prevent use of alternative constructions, provided that they are at least the equivalent of that prescribed in this standard practice.

7.1.2 The ROESE depth shall be no less than the FPIS thickness, and of adequate depth to accommodate the trim accessory details.

7.1.3 At a minimum, the ROESE width shall accommodate the window flange/nailing fin.

***NOTE 2**: The width may need to be sufficient to accommodate flashing, as well as trim components and/or cladding attachments, if it is necessary to attach these components into a structural component.*

7.1.4 To prevent air and water infiltration, the ROESE shall be sealed to the structural framing or sheathing using an appropriate sealant as outlined in Section 5.5, and as shown in Figure 5. Figure 6 illustrates the correct lap of structural elements that make up the ROESE frame.

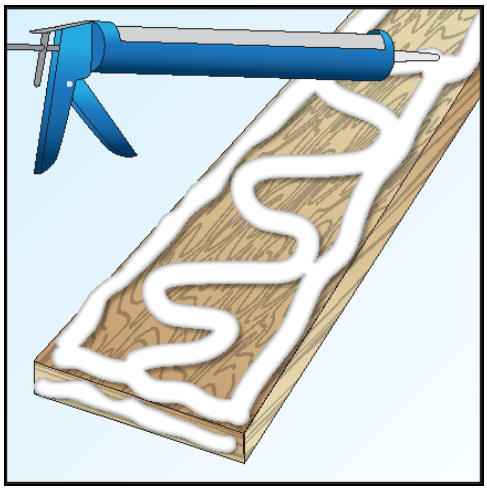

FIGURE 5

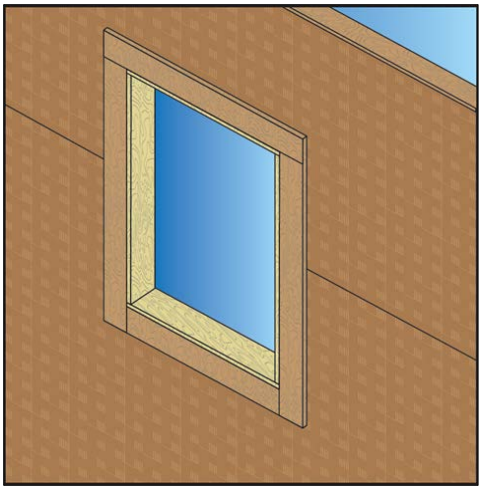

FIGURE 6

7.2 METHOD A

7.2.1 Method A - Window installed after WRB

7.2.1.1 Install ROESE per guidelines in Section 7.1.

7.2.1.2 Apply a fillet bead of sealant around the perimeter (see Figure 7) of the ROESE to protect from potential water intrusion behind the FPIS.

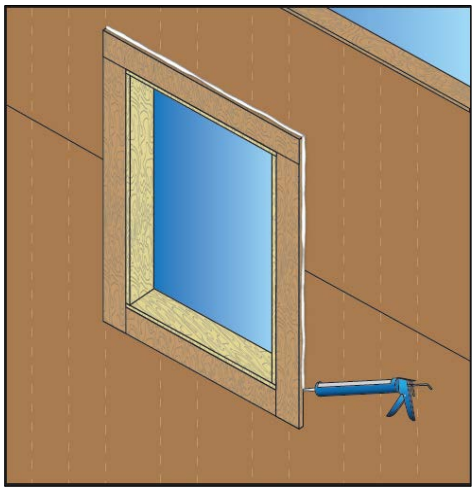

FIGURE 7

7.2.1.3 Install FPIS per FPIS manufacturer's instruction, butting up to the edge of the ROESE; see Figure 8.

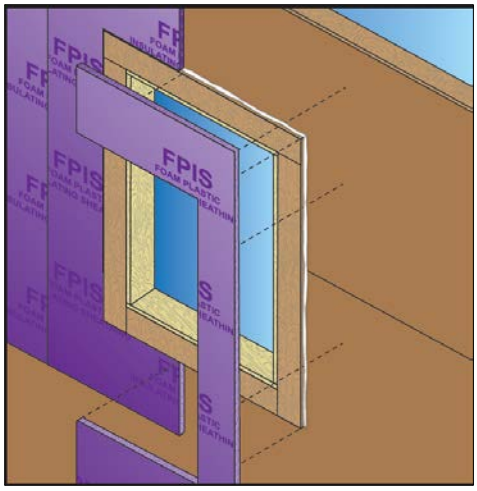

FIGURE 8

7.2.1.4 Preparation for WRB (for all installation methods) Install WRB per WRB manufacturer's guidelines and apply appropriately for the exposure conditions (extreme exposure conditions are detailed in FMA/AAMA 100). To create a WRB flap at the head of the opening for proper shingling with the head flashing, starting at the top corner of the exterior (rough) opening, measure from the corner horizontally and then vertically a distance equal to the roll width of the flashing to be applied. At a 45° angle, carefully cut the WRB on a diagonal (see Figure 9). Repeat this step on the opposite corner. Trim the bottom of the WRB head flap in such a manner that leaves 25 mm (1 in) of material to lap over the head flange of the window. Raise the bottom edge of the flap created in the WRB up and temporarily tape to the exterior face of the WRB above (see Figure 10). This is done in order to allow for installation of the exterior window and head flashing later.

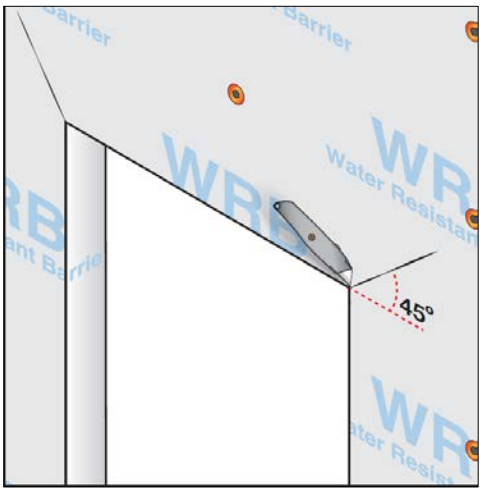

FIGURE 9

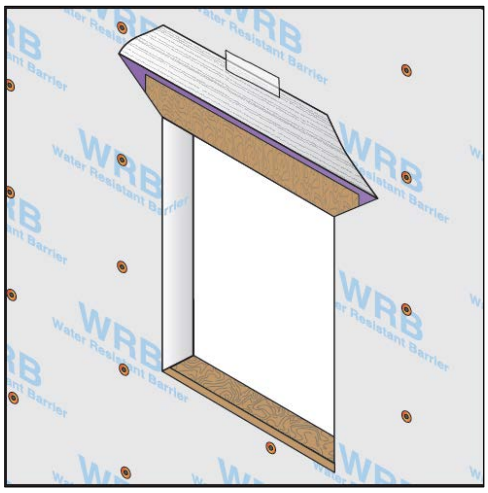

FIGURE 10

NOTE 3*: Other WRB wrap methods as described in FMA/AAMA 100 may be used.*

7.2.1.5 Apply sill flashing, covering the entire sill area to create a sill pan (see Figure 11).

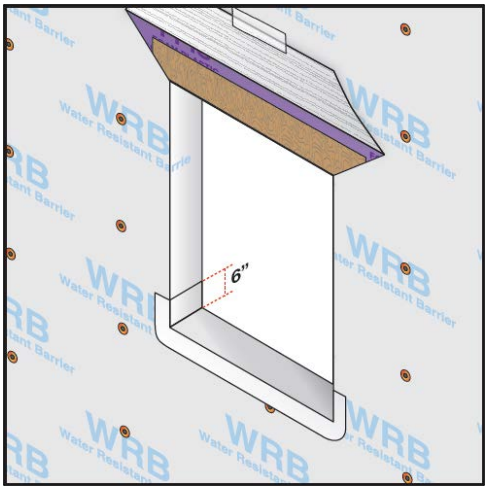

FIGURE 11

7.2.1.6 Install window per window manufacturer's instructions. Place shims as directed and anchor to ensure that the window is plumb, level and square.

NOTE 4*: Drainable installations rely on an interior seal that is critical to air and water infiltration performance.*

7.2.1.7 Inspect and clean the back side (interior surface) of the exterior window mounting flange. Look for any sealant gaps or misaligned welding (particularly for vinyl products) at the corner joinery. If corner seals of the flange are missing in whole or in part, contact the window manufacturer for the recommended remedy.

7.2.1.8 After cleaning the mounting flange, carefully run a continuous 9 mm (3/8 in) nominal diameter bead of sealant on the back surface (interior face) of the mounting fin (see Figure 12) of the window at the head and both jambs. Apply sealant in line with any pre-punched holes or slots in the mounting flange. Connect that bead of sealant across any joinery on the window frame at all four corners. As an option, the sealant shall be permitted to be applied to the wall surface as opposed to the back of the mounting flange.

FIGURE 12

7.2.1.9 For drainage installations, the exterior bead of sealant at the sill shall be discontinuous, leaving two 50 mm (2 in) voids within 100 mm (4 in) of each jamb (see Figure 13). Any alternative to the discontinuity in the bead of sealant at the exterior sill area shall be approved by the window manufacturer.

For exterior barrier installations, the bead of sealant behind the mounting flange shall be continuous at the sill and around the entire perimeter of the window (see Note below). Because there are no drainage gaps in the sealant at the sill, the exterior barrier method may not require the interior perimeter air & water seal described in Section 7.5.

***NOTE 5**: Although not specifically detailed in illustrations, barrier installations may also be acceptable. In general, drainage installations should be utilized for systems that are susceptible to high moisture exposure, moisture sensitive materials, and potential leakage around the interface. It is essential that a robust air/water seal around the interior perimeter of the window/wall cavity interface is achieved in drainage installations (per Section 7.5). However, there are cases where barrier installations can be utilized successfully, particularly in such cases where the robust interior air/water seal is difficult to achieve.*

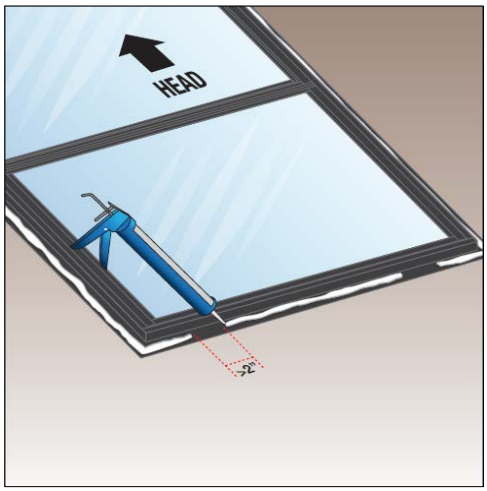

FIGURE 13

7.2.1.10 Immediately set the window in the opening, shim as directed to ensure the window is plumb, level and square, and secure with fasteners according to the window manufacturer's instructions.

7.2.1.11 Apply jamb flashing along the sides first, followed by head flashing as shown in Figure 14 and Figure 15.

See FMA/AAMA 100-12 for correct lapping of various types of flashing.

FIGURE 14

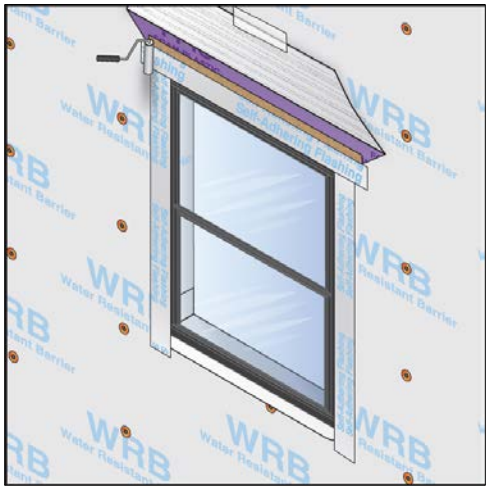

FIGURE 15

7.2.1.12 Secure the prior taped flap in the WRB at the head as shown in Figure 16.

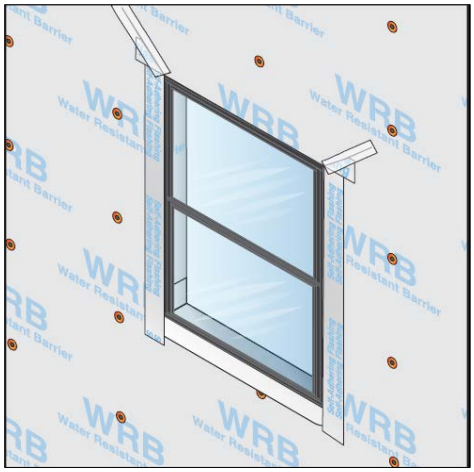

FIGURE 16

7.2.1.13 The steps of Method A - window installed after WRB, are summarized in Figure 17.

7.2.1.14 The installation is completed by the application of a continuous interior air and water seal as described in Section 7.5.

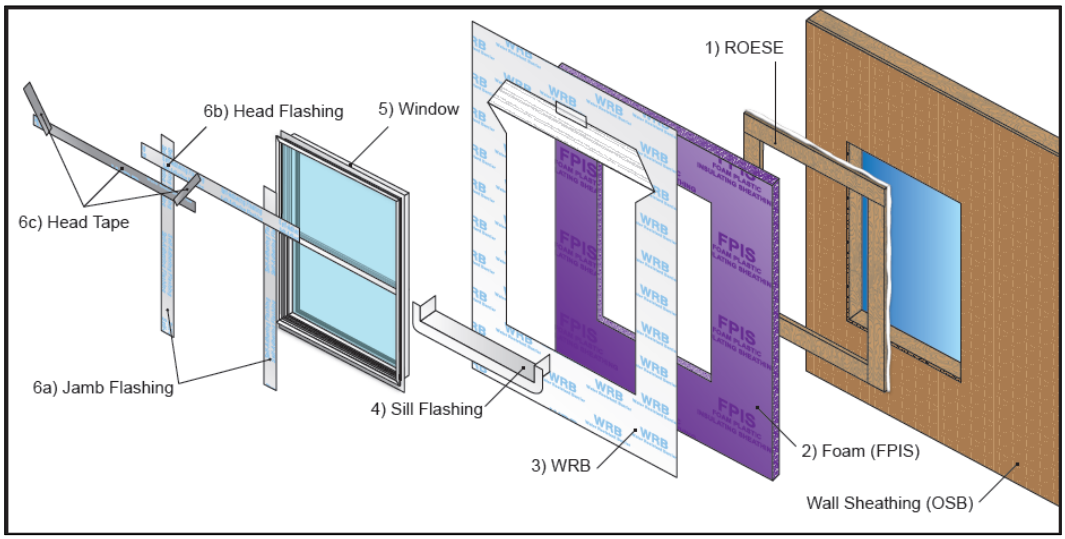

FIGURE 17: Method A; Window installed after WRB

7.2.2 Method A, Window installed before WRB

7.2.2.1 Install ROESE per guidelines in Section 7.1.

7.2.2.2 Install FPIS up to the edge of the ROESE per Section 7.2.1 (see Figure 8).

7.2.2.3 Prepare WRB skirt measuring at least 500 mm (20 in) wider than the rough opening at the sill. Install sill skirt at the exterior face of the sheathing below the sill of the rough opening, extending 250 mm (10 in) to either side of the sill (see Figure 18).

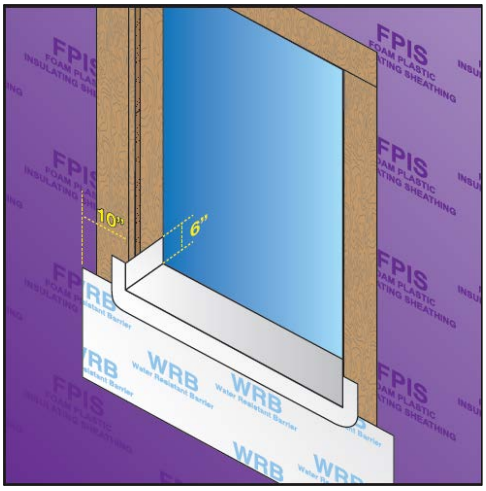

FIGURE 18

7.2.2.4 Install sill pan flashing covering the entire sill area to create a sill pan (see Figure 18).

7.2.2.5 Install window per Section 7.2.1.6 through Section 7.2.1.10

7.2.2.6 Apply jamb (5A as shown in Figure 19) and head (5B as shown in Figure 19) flashing.

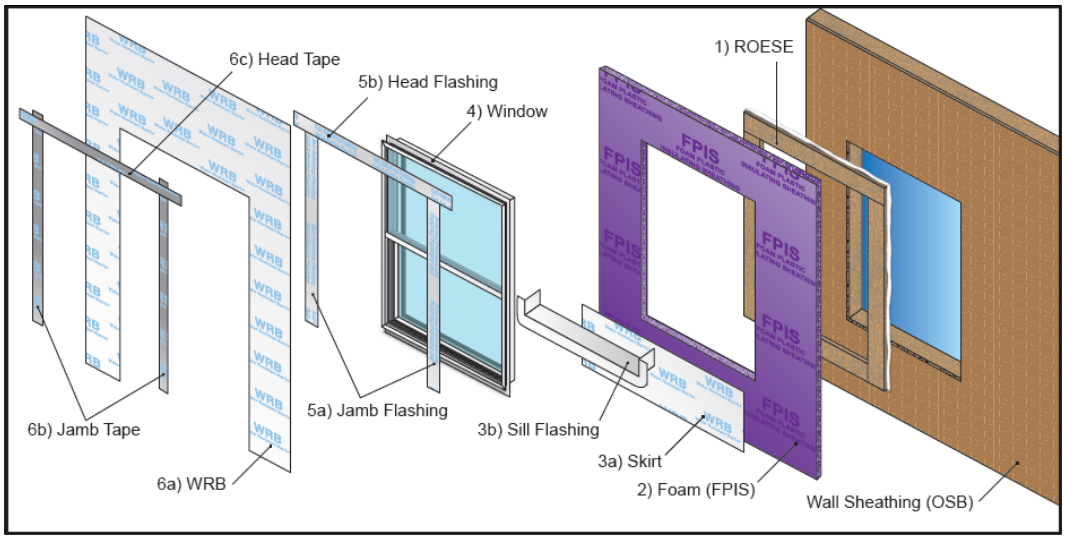

FIGURE 19: Method A; Window installed before WRB

7.2.2.7 Apply WRB per manufacturer's instructions as appropriate for the exposure conditions; see Figures 20, 21 and 22 for recommended practice.

***NOTE 6**: Be careful not to cut the head/jamb flashing when trimming the WRB.*

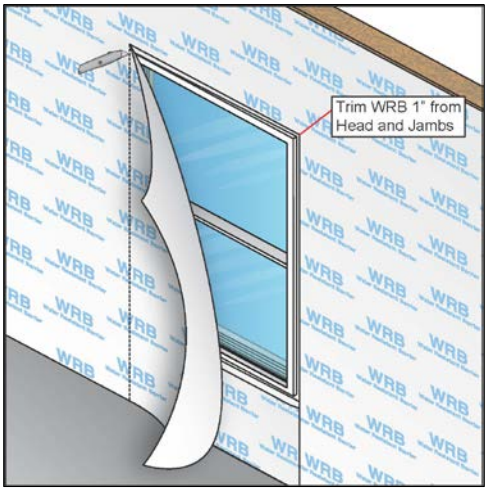

FIGURE 20

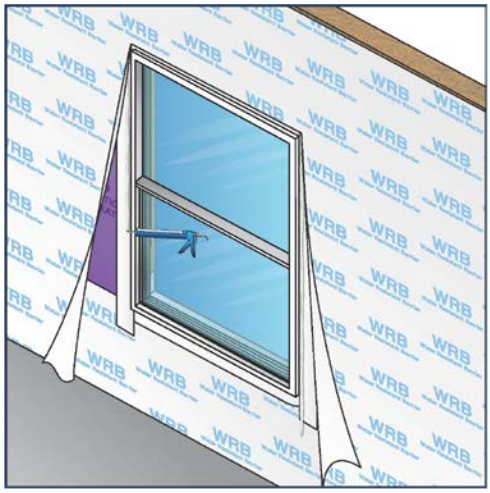

FIGURE 21

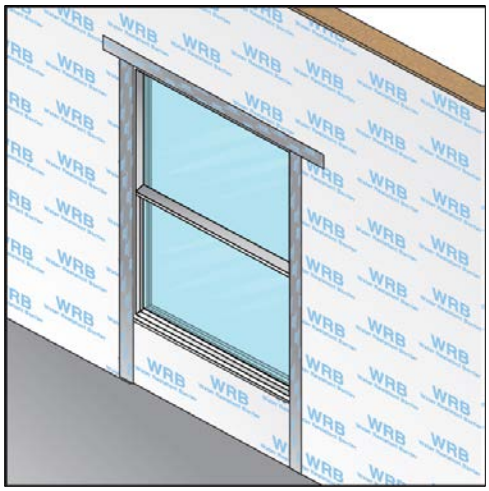

FIGURE 22

7.2.2.8 The steps of Method A - window installed before WRB, are summarized in Figure 19 above.

7.2.2.9 The installation is completed by the application of a continuous interior air and water seal, as described in Section 7.5.

7.3 METHOD B

7.3.1 Method B – FPIS exterior to WRB, Window installed onto ROESE

7.3.2 This method utilizes Self Adhered Flashing, Liquid Applied Flashing, WRB and Sealants in combination. Consult the manufacturers of these components to ensure adhesion and compatibility between all the materials. The method is the same whether window is installed before or after WRB.

7.3.3 Install ROESE per guidelines in Section 7.1.

7.3.4 Install WRB. The WRB shall be cut around the perimeter of the ROESE, leaving 25 mm – 50 mm (1 in – 2 in) of exposed structural sheathing at the edge of the ROESE (see Figure 23).

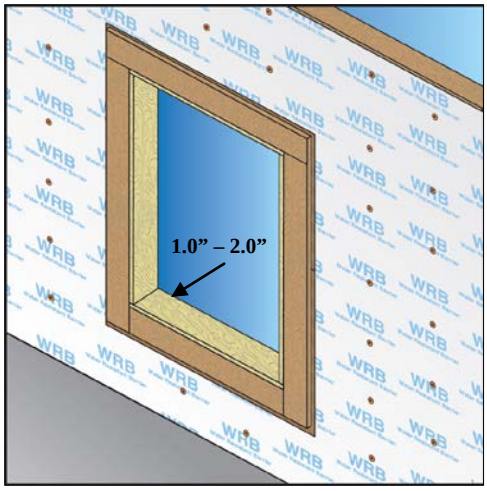

FIGURE 23

7.3.5 Apply 100 mm (4 in) self-adhered flashing around perimeter, starting with the sill, then jambs, and then the head of the ROESE (see Figures 24 and 25).

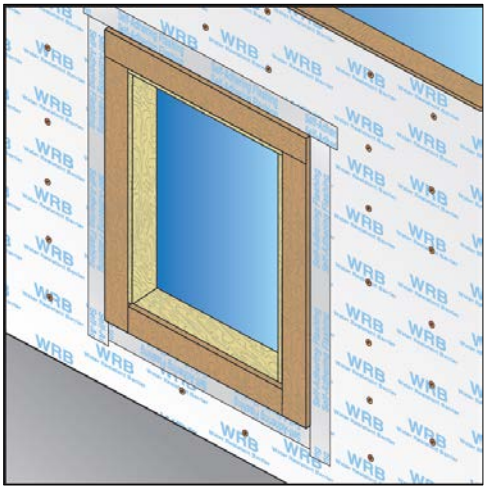

FIGURE 24

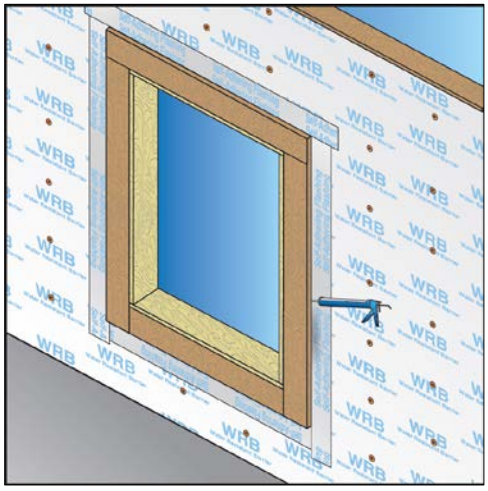

FIGURE 25

7.3.6 Apply sealant fillet bead around the ROESE/flashing interface perimeter and at joints in the ROESE (see Figure 25). Ensure the sealant is compatible with the liquid applied flashing.

7.3.7 Apply liquid applied flashing onto the ROESE and rough opening return, including the entire sill area, lapping 25 mm – 50 mm (1 in – 2 in) onto self-adhered flashing surrounding ROESE perimeter (see Figure 26). Refer to manufacturer recommendations for application guidelines, including thickness. Avoid applying the liquid applied flashing to the WRB or other materials unless compatibility and adhesion is verified. This step may be completed before installation of WRB if approved by the flashing manufacturer(s).

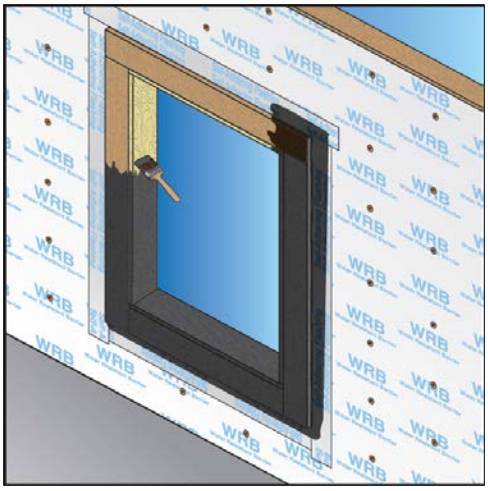

FIGURE 26

***NOTE 7**: Self adhered flashing to protect the ROESE and integrate with the WRB may be used; consult flashing manufacturer for details.*

7.3.8 Install window after liquid applied flashing skins over or cures (per liquid applied flashing manufacturer's guidelines), with compatible sealant under flange (see Figure 12), leaving two 50 mm (2 in) gaps at sill for drainable installations (see Figure 13).

***NOTE 8**: Drainable installations rely on an interior seal that is critical to air and water infiltration performance. Exterior barrier installations may also be utilized, per Section 7.2.1.9 and NOTE 5.*

7.3.8.1 Window manufacturers or building codes may recommend or require head flashing or drip caps when applied flanges, brickmold, or mulled assemblies are used, which would typically be installed with the window and need to be appropriately integrated with the drainage plane. Consult window manufacturer for guidance.

7.3.9 Apply liquid applied flashing over the window flange at the head and the jambs to integrate with liquid applied flashing at the ROESE (see Figure 27). For drainable installations, the sill flange should not be covered by the liquid applied flashing.

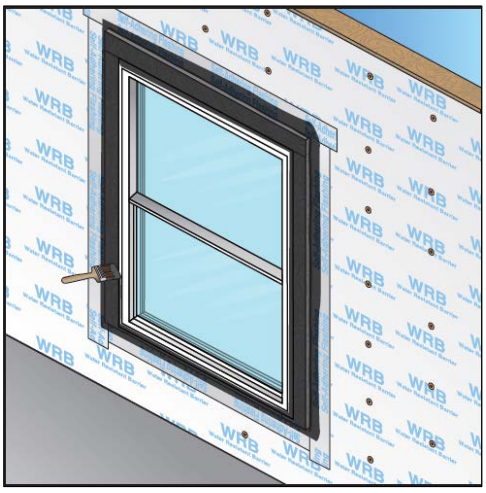

FIGURE 27

7.3.10 Install FPIS up to the edge of the ROESE (see Figure 28).

7.3.11 The installation is completed by the application of a continuous interior air and water seal, as described in Section 7.5.

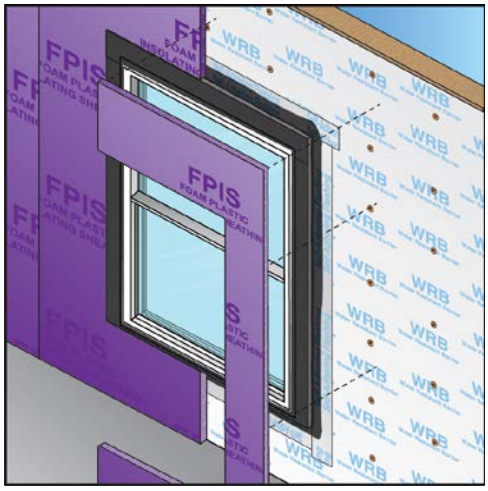

FIGURE 28

7.4 METHOD C

This is an installation procedure in which the mounting flange is in plane with the structural sheathing, and the WRB is installed interior to the FPIS. The window may be installed before or after the WRB. Integration of the final assembly to the exterior wall cladding presents unique challenges.

There are two conditions covered in this method that apply to windows installed both before and after the WRB. Method C1 is where the outermost plane of the window frame protrudes at least 20 mm (¾ in) beyond the exterior surface of the FPIS (see Figure 3). Method C2 is where the outermost plane of the window frame is flush, recessed or protrudes less than 20 mm (¾ in) from the exterior surface of the FPIS (see Figure 4). Method C2 will require additional steps and components in order to provide space at the interior perimeter of the FPIS around the rough opening to properly integrate the exterior wall covering or siding with the window.

7.4.1 Method C - Window installed after WRB (applies to both C1 and C2)

7.4.1.1 Install the WRB, sill flashing, window, window flashing and interior seal and tapes per section 7.2.1.4 through 7.2.1.12 with the exception that the WRB is installed directly to sheathing rather than the FPIS. This is also detailed, along with various WRB wrap methods, in FMA/AAMA 100.

7.4.1.2 Install FPIS, ensuring the gap between the foam and window frame allows for appropriate clearance for trim accessories or components used to install cladding. This may require trimming the foam (see Section 7.4.3).

7.4.1.3 Figure 29 provides an illustrated overview of each sequential step described above. Apply tape or head flashing across the head as shown in Figure 29, item 4C.

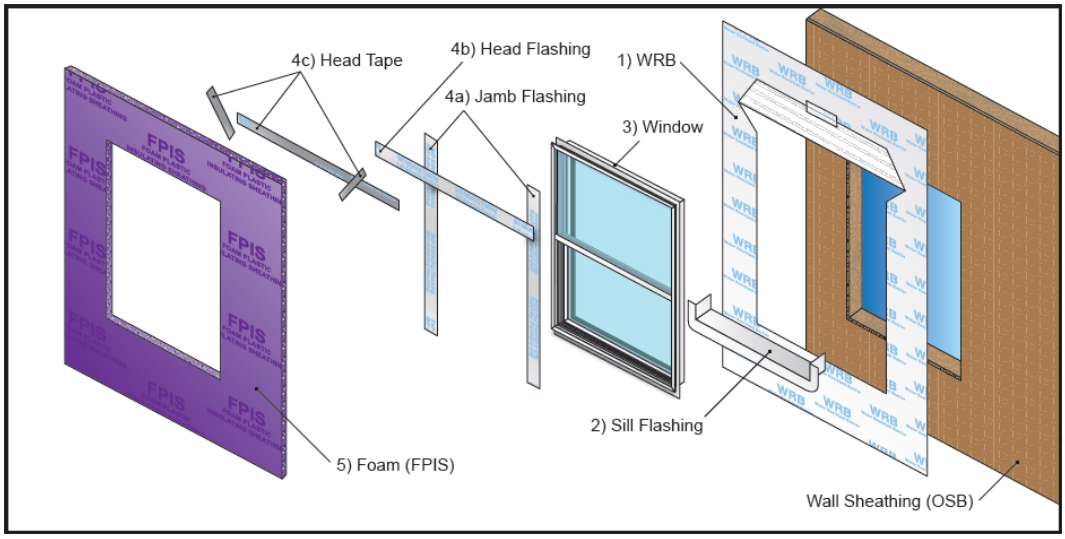

FIGURE 29: Method C, Window installed after WRB

7.4.1.4 Window manufacturers or building codes may recommend or require head flashing or drip caps when applied flanges, brickmold, or mulled assemblies are used, which would typically be installed with the window and need to be appropriately integrated with the drainage plane. Consult window manufacturer for guidance.

7.4.1.5 At any time during installation, if trimming of FPIS is required, special care must be taken not to cut into any of the other installation materials, such as WRB and flashing.

7.4.1.6 Install exterior trim components as appropriate to integrate the cladding with the window frame.

7.4.1.7 The installation is completed by the application of a continuous interior air and water seal, as described in Section 7.5.

7.4.2 Method C - Window installed before WRB (applies to both C1 and C2)

7.4.2.1 Install the WRB skirt, sill flashing, window, window flashing, WRB and interior seal and tapes per Sections 7.2.2.3 to 7.2.2.7 (see Figures 18-22), with the exception of installing the WRB directly onto the sheathing instead of the foam.

7.4.2.2 Figure 30 provides an illustrated overview of each sequential step described above.

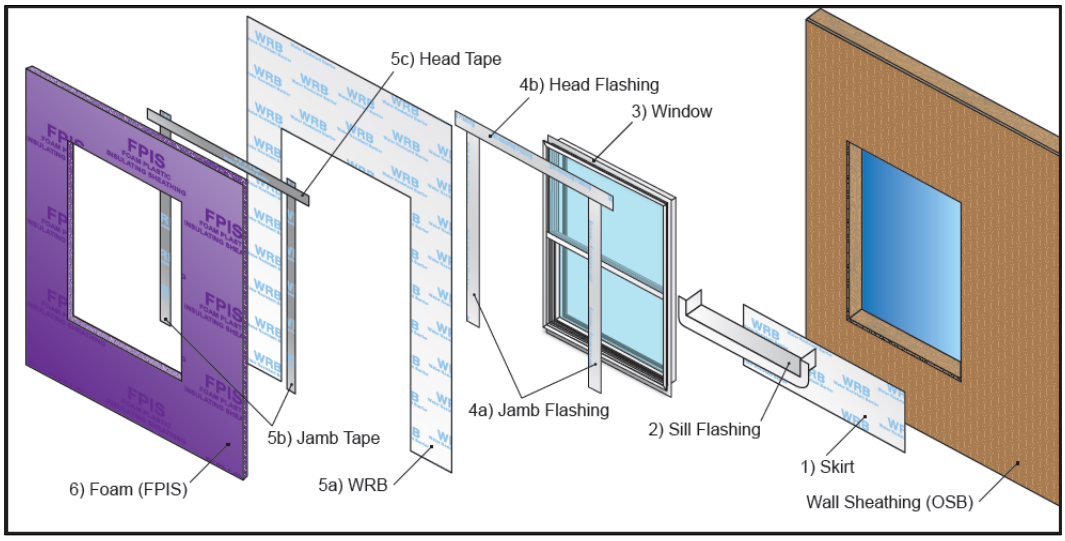

FIGURE 30: Method C; Window installed before WRB

7.4.2.3 At any time during installation, if trimming of FPIS is required, special care must be taken not to cut into any of the other installation materials, such as WRB and flashing.

7.4.2.4 Install exterior trim components as appropriate to integrate the cladding with the window frame (see Section 7.4.3 for further details).

7.4.2.5 The installation is completed by the application of a continuous interior air and water seal, as described in Section 7.5.
7.4.3 The following describes the integration of the window/trim components with the exterior wall covering when the window is installed before or after WRB (see discussion on Method C1 and C2 in Section 7.4).

7.4.3.1 For Method C1, no special considerations are necessary, since the FPIS will not interfere with the standard integration of window/trim components with the exterior wall covering or siding. Care must be taken to ensure there is at least 20 mm (¾ in) projection from the window/trim components and the exterior plane of the FPIS to allow for integration with the exterior wall covering or siding.

7.4.3.2 For Method C2, the following steps are required for the integration of window/trim components with the exterior wall covering or siding.

7.4.3.3 Cut (relieve) the back side of the FPIS enough to allow for clearance of the trim components (i.e. J-channel, F-channel, exterior extenders, or other). Additionally trim the perimeter of the FPIS such that when the trim is applied it allows room for a 10 mm (3/8 in) thick exterior perimeter sealant bead adjacent to the window. The installer shall be permitted to do this during the installation of the FPIS.

7.4.3.4 Insert components in a secured fashion.

7.4.3.5 Trim components, including their corners, shall be sealed to the sheathing, the window and the FPIS in order to prevent bulk water intrusion behind the FPIS and/or into the wall cavity. For Method C2, the integration of the window frame, WRB, flashing, FPIS, trim, and siding must be properly detailed as a system by a qualified design professional. Proper integration of the window with the wall cladding will require custom trim components, as applicable. (see Cautionary Note 9). See Figures 31-33 for head, jamb, and sill details with J-channel integration and Figures 34-36 for head, jamb, and sill details with window trim components.

***CAUTIONARY NOTE 9**: Contact a qualified design professional for guidance before proceeding with this installation method.*

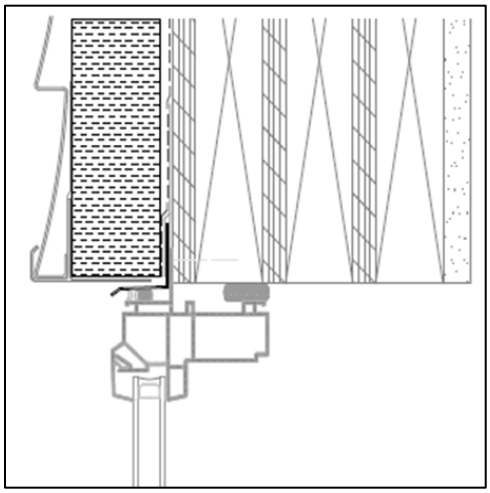

FIGURE 31: Method C2 Head Detail with J-Channel

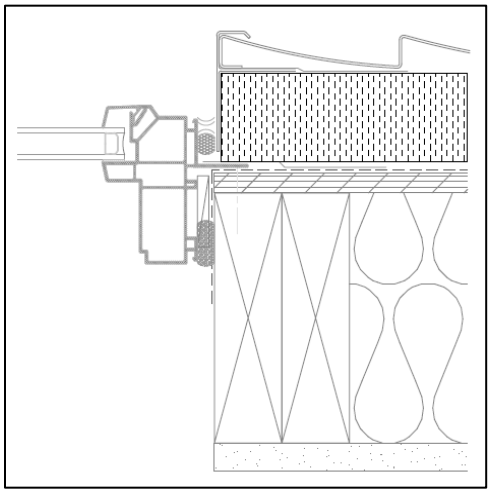

FIGURE 32: Method C2 Jamb Detail with J-Channel

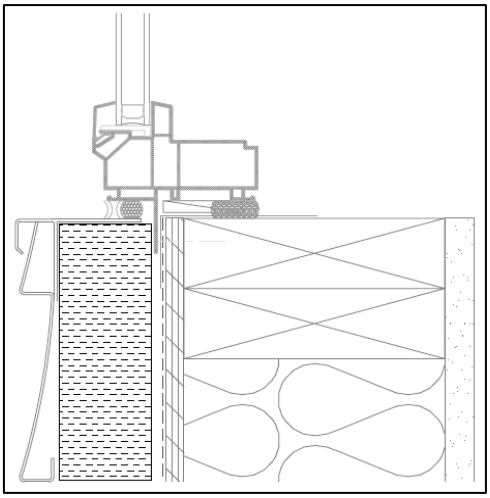

FIGURE 33: Method C2 Sill Detail with J-Channel

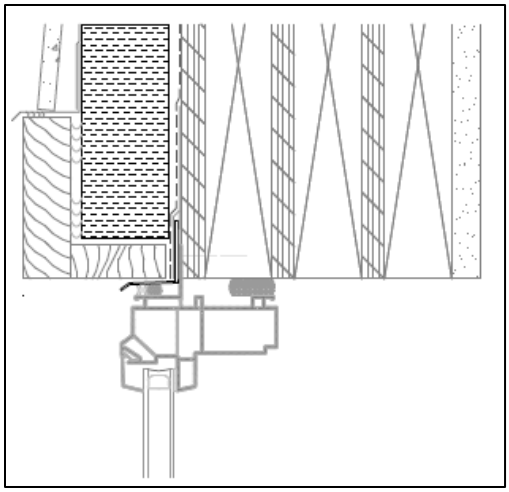

FIGURE 34: Method C2 Head Detail with window trim components

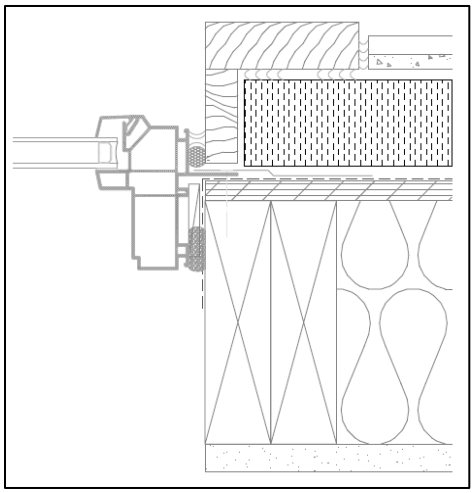

FIGURE 35: Method C2 Jamb Detail with window trim components

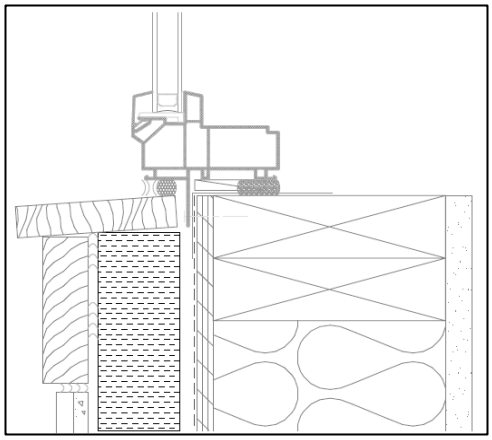

FIGURE 36: Method C2 Sill Detail with window trim components

7.5 Application of Interior Air and Water Seal

At the interior, using a sealant recommended in Section 5.5 and appropriate bond breakers or backer rod, apply a bead of sealant (see Figures 37 and 38), or low expansion aerosol foam sealant (see Figure 39), or other window manufacturer approved material between the window and the rough opening on all sides to form a continuous air and water seal.

FIGURE 37

FIGURE 38

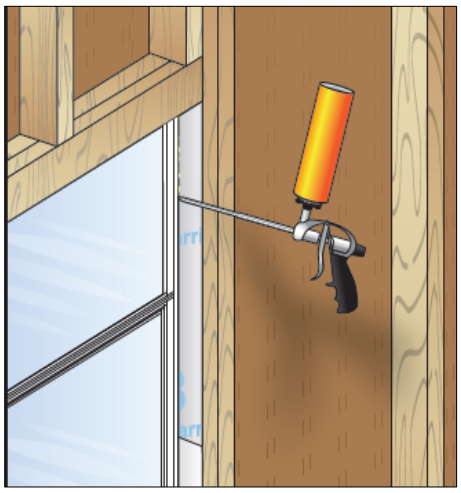

FIGURE 39

7.5.1 For drainage sill pan methods, this interior seal effectively forms a back dam to prevent water intrusion into the interior, thus the integrity (adhesive bond strength) of this seal is critical. A raised upturned leg on the interior plane of the sill pan made from a rigid material can be also be used, if properly sealed. If a rigid or semi-rigid sill pan is used, recheck the seal between the sill of the window and the upturned leg of the sill pan and reseal as needed.

7.5.2 In cases where shims, clips, or anchoring devices cause interference with the application of the interior air and water seal, trim the shim or take steps necessary to seal such obstructions to allow for a continuous air/water seal (see Figure 40). In all cases make sure the entire perimeter joint has been sealed, creating an air/water tight condition.

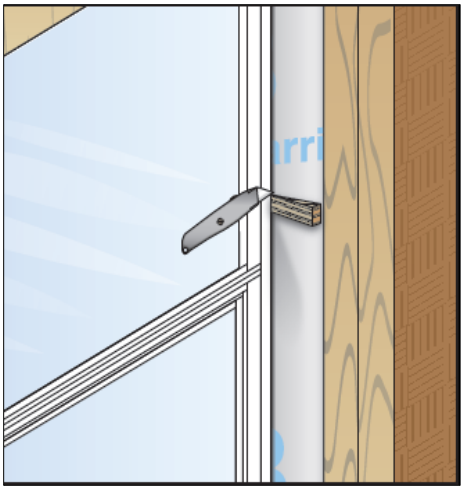

FIGURE 40

8.0 POST INSTALLATION PROCEDURES

8.1 Verify that the window frame and sash are installed plumb, level, square and true, within the specified tolerances (see Section 6.0).

8.2 Check of Operable Elements —Verify that all sash move freely within their frames and that weather stripping or compressible seals make full contact with mating surfaces.

8.3 Verify that operable hardware such as locks, rollers, latches and hinges operate smoothly and that all locking mechanisms engage and operate properly.

8.4 Verify that all accessories and other components of the window assembly are present, such as screens and hardware as applicable.

8.5 Verify that drainage holes are free from any blockages or obstructions.

9.0 KEYWORDS

9.1 Flashing; FPIS (Foam Plastic Insulating Sheathing); WRB, Sealant; Sill pans; ROESE (Structural Rough Opening Extension); Trim and Accessories; Window installation; WRB (Water-Resistive Barrier);

APPENDIX A

A1.0 This appendix provides users of this standard practice with general guidelines for determining which entities involved in construction projects are typically responsible for various tasks or functions. These guidelines are informative only and are not intended to be mandatory. It is recommended that specific responsibilities for any given project be agreed upon by all involved entities, and be documented in applicable project contracts.

A2.0 GENERAL CONTRACTOR / DESIGN PROFESSIONAL
The General Contractor/Design Professional is typically responsible for the following:

A2.1 The necessary coordination of all trades.

A2.2 The proper sequencing of construction activities.

A2.3 Ensuring that all framed rough openings and ROESEs are the correct size, square, plumb and true, per Section 6.1. 2.

A2.4 Remedying any discrepancies identified by the Installation Contractor during the pre-installation inspection described in Section 6.1.1.

A2.5 Determining and specifying appropriate performance requirements of the window units as required by local code per Section 4.6.

A3.0 INSTALLATION CONTRACTOR
The Installation Contractor is typically responsible for the following:

A3.1 Conducting the pre-installation inspection of the framed opening per Section 6.1.1 and notifying the General Contractor of any discrepancies.

A3.2 Installing the WRB per Section 6.4 and 7.2.1.4.

A3.3 Selecting appropriate trim, cladding options, and installation methods based on window and cladding types.

A3.4 Installing the window per Section 7.0.

A3.5 Verifying the window is properly installed per Section 8.0.

A4.0 WINDOW MANUFACTURER
The Window Manufacturer is typically responsible for the following:

A4.1 Providing window products that are designed to comply with the performance requirements specified by the General Contractor/Design Professional for the project.

A4.2 Providing guidance regarding suitable trim and accessories.

A4.3 Providing suitable instructions for proper window installation.

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