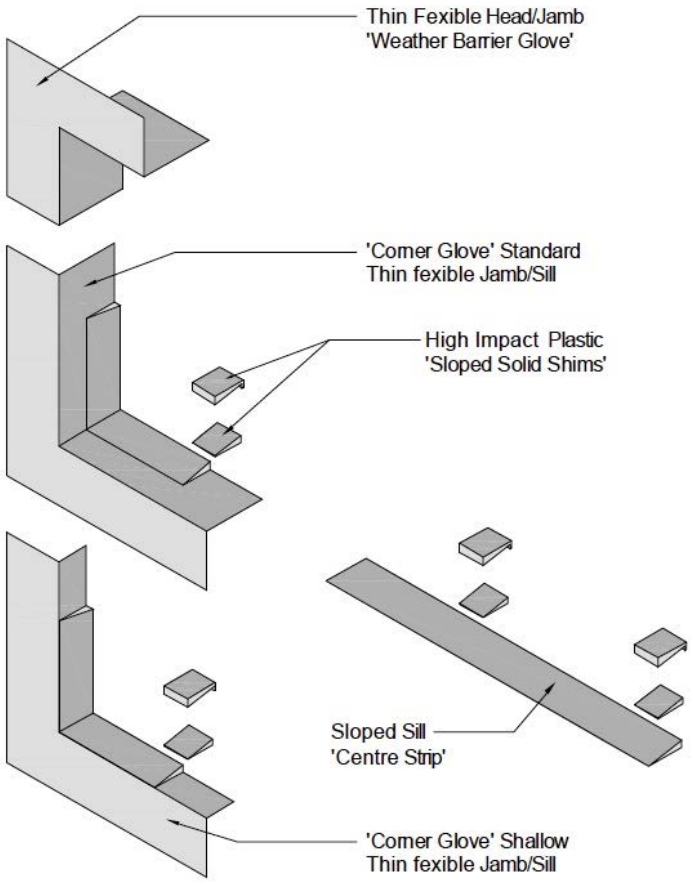
Technical Review of Fortress Installation System's Fenestration Rough Opening Details

This document provides a technical review of Fortress Installation System's fenestration rough opening details and installation specifications with respect to specific sections of the ASTM E2112-19C Standard Practice for Installation of Exterior Windows, Doors and Skylights. Fortress Installation System (FIS) is not compatible with skylights, thus a review of skylight installations in not included within this review.

The following text in BLUE are text clips directly from the ASTM E2112-19C document related to the Fortress Installation System (FIS) for comparison/discussion.

1.1 ASTM E2112-19C covers the installation of fenestration products in new and existing construction. For the purpose of this practice, fenestration products shall be limited to windows, sliding patio-type doors, swinging patio type doors, and skylights, as used primarily in residential and light commercial buildings.

5.1 Continuity—Continuity shall be maintained between elements in the fenestration product and the water-resistive barrier that provides weather protection, air leakage control, and resistance to heat flow and vapor diffusion. To ensure continuity with the water-resistive barrier, the installer shall identify the elements in the weather barrier system and the fenestration product that provide each of these functions. Where the installer is required to furnish or repair a vapor barrier, the material



FIS Fig. 5.1

FIS is a revolutionary fenestration rough opening moisture protection system that ties the fenestration into the weather resistive barrier and air barrier easier than ever before and provides a WARRANTY.

FIS proprietary components include:

- a 'Weather Barrier Glove' where the weather resistive barrier ties into the fenestration for water tightness of the rough opening and for air barrier functionality, the 'Weather Barrier Glove' can be installed at the top corners of the rough opening.

- a thin flexible pre-molded 'Corner Glove' available in standard and shallow depths, that fits into the sill/jamb bottom corners of the fenestration rough opening that simplifies and speeds up the fenestration rough opening preparation, reducing construction schedule time and labour costs.

- a semi-rigid sloped 'Center Strip'.

- high density plastic 'Sloped Solid Shims'

5.3 Moisture Entrapment—At no time shall an exterior seal be installed in a manner that will trap moisture in the perimeter cavity between the fenestration product and the wall.

While the intent of fenestration's outer seal is to prevent moisture entry into and entrapment of moisture within the fenestration's perimeter cavity, deficiencies in the exterior seal do occur on the job site from time to time, or materials break down and fail over time. FIS has you covered with a robust yet easy to install rough opening moisture protection and drainage system that is complete with a WARRANTY.

5.4 Water-Resistive Barrier—A water-resistive barrier shall be created to preclude entry of water into the fenestration product perimeter area, or promptly drain water that enters the fenestration product perimeter area, or both.

FIS is designed to be compatible with most water resistant flashing membrane products and weather resistive barrier products on the market today.

5.5 Weatherability—The capability of a building, assembly, component, product, or construction to resist the deteriorating effects of weather exposure, for example, sun, wind, rain, frost, heat, cold, high and low humidity.

FIS's rough opening protection system provides a simple solution to protecting the fenestration rough opening sill from moisture deterioration and directs ingress moisture to the exterior of the building and does so with a WARRANTY.

5.6 Construction Sequence—Effective integration and continuity of the fenestration product and other components of the building envelope is dependent on proper construction sequencing.

FIS's fully integrated rough opening protection system is designed to simplify and speed up fenestration installation by eliminating multiple layers of water roofing membranes, multiple primer applications, and time spent between membrane installation waiting for primers to flash off. All reducing fenestration rough opening preparation time and speeding up the construction schedule, saving the installing contractor money.

FIS's rough opening protection system is flexible in that it can be installed either 'after' or 'prior to' the installation of the wall's weather resistive barrier. If the weather resistive barrier is to be installed 'prior to' the fenestration rough opening protection.

5.9.1.1 The rough opening shall be larger in both width and height than the actual net dimension of the product to be installed. The installer shall obtain all available plan details and construction documents, as well as the manufacturer's rough opening requirements and instructions.

FIS required a perimeter cavity around the fenestration unit, in compliance with ASTM E2112-19C. Refer to Section 5.9.2.3.

5.9.2.1 Rough opening gaps shall be insulated following the fenestration product installation to reduce air leakage and energy loss. The material used to fill the rough opening gap shall be selected to enhance the energy-saving performance of the fenestration product installation.

5.9.2.1.1 Glass or mineral fiber insulation, one-component polyurethane foam sealants, or other code approved material shall be used to fill the rough opening gap as required by applicable codes or the contract documents or the fenestration product manufacturer.

NOTE 4—Excessive insulating material may distort the fenestration frame, requiring the removal and re-injection of the proper amount of insulation. Too little material will leave voids in the rough opening gap and permit excess air infiltration. See Annex A1 for the recommended procedure for using one-component polyurethane foam sealants.

FIS WARRANTY requires the use of low expansion spray-in-place foam within the perimeter cavity to reduce air leakage, energy loss and assist with vapour control. Refer section A1 for FIS rough opening foaming requirements as required for WARRANTY.

The FIS allows for an optional drainable mineral wool insulation to be installed within the outer cavity of the rough opening. Refer to

FIS Fig. A1.4.1 – Pressure Expansion Foam Application Using Standard Corner Glove, details 1, 2, 3 & 4,
and
FIS Fig. A1.4.2 – Pressure Expansion Foam Application Using Shallow Corner Glove, details 1, 2, 3 & 4,

5.9.2.3 Adequate clearance shall be allowed for thermal expansion of the fenestration product. Joint size will vary based on the allowance for lineal thermal expansion. Tables 1 and 2 provide guidance for determining the thermal expansion requirements of various materials.

NOTE 5—These tables are for readily available fenestration materials. Where other materials or composite materials are used, the fenestration manufacturer should be consulted for the coefficient of expansion and tolerances required. Adequate perimeter clearance must be allowed so that perimeter sealants are not damaged. A good rule of thumb is that the joint should be at least twice the expected movement dimension. See 5.18.1 for further information.

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TABLE 1 Guidance for Determining Thermal Expansion Requirements

NOTE 1—Example: If you have a 12 ft (3.657 m) wide aluminum window there would be 0.000013 in./in./°F (0.000023.4 m/m/°C) coefficient of expansion. To obtain the total movement for a 100 °F (55.5 °C) temperature change, multiply as follows:
Table factor × 100 °F × 12 in./ft. × 12 ft = movement 0.000013 × 100 × 12 × 12 = 0.19 in.
(Table Factor × 55.5 °C × 3.657 m = movement 0.000023 × 55.5 × 3.675 = 4.7 mm)

Material	Coefficient of Expansion	
	Fahrenheit	Celsius
Aluminum	13.0 × 10^{-6} (in./in./°F)	23.4 × 10^{-6} (mm/mm/°C)
Carbon steel	6.5 × 10^{-6} (in./in./°F)	11.7 × 10^{-6} (mm/mm/°C)
Fiberglass pultrusion-longitudinal	6.0 × 10^{-6} (in./in./°F)	10.8 × 10^{-6} (mm/mm/°C)
Glass	5.0 × 10^{-6} (in./in./°F)	9.0 × 10^{-6} (mm/mm/°C)
Rigid PVC	22.0 to 44.0 × 10^{-6} (in./in./°F)	39.6 to 79.2 × 10^{-6} (mm/mm/°C)
Wood–longitudinal	1.7 to 3.0 × 10^{-6} (in./in./°F)	3.06 to 5.4 × 10^{-6} (mm/mm/°C)

TABLE 2 Rates of Thermal Movement for Common Materials

NOTE 1—This table is provided through the courtesy of AAMA.

NOTE 2—Based on a 100 °F (55.5 °C) temperature change using an 8 ft (2.438 m) section of material.

Material	Range of Movement	
	(IP)	(SI)
Rigid PVC	0.22 to 0.44 in. (7/32 to 7/16 in.)	5.6 to 11.1 mm
Aluminum	0.130 in. (1/8 in.)	3.2 mm
Steel	0.065 in. (1/16 in.)	1.6 mm
Wood	0.017 to 0.025 in. (1/64 to 1/32 in.)	0.4 to 0.8 mm
Glass reinforced polyester	0.100 to 0.140 in. (3/32 to 5/32 in.)	2.4 to 4.0 mm

(Image from ASTM E2212-19C document.)

FIS WARRANTY requires the perimeter cavity for the fenestration cavity to be a minimum of ½" wide on all sides of fenestration units less than 8 feet (2,400 mm) in width or height and complies with ASTM E2112-19C for thermal expansion of the fenestration unit.

While the back height of the 'Corner Defectors' are 3/8" high/wide, the 'Corner Defectors' are manufactured from a semi-rigid material that will flex under any load from the thermal expansion of the fenestration unit and WILL NOT restrict thermal expansion of the fenestration unit and WILL NOT transfer any loads onto the fenestration unit.

The width of the perimeter cavity required for thermal expansion of fenestration units larger than 8 feet (2,400 mm) in width or height shall be calculated on occurrence as per the requirements defined in ASTM E2112-19C.

5.12.3.1.1 Refer to 11.4 and Annex A4. Self-adhesive type flashing products may not require the use of additional sealant during application to the substrate or the fenestration product as long as the flashing securely adheres to the materials. The surface that this flashing is applied to must be clean, dry, and frost-free. Where sealant is used near these materials (for example, at exterior facade installation joints), do not use sealant that contains solvent. Sealant that contains solvent can have an affect on the bond and performance of self-adhesive type flashing materials. Consult the supplier of these materials to determine what type of sealant or primer, or both, can be used with these products. Always consult the flashing supplier to determine compatibility with the various installation materials, and to obtain specific installation techniques.

5.13.1 Proper flashing and sealing are necessary to prevent water from entering between the water-resistive barrier, the fenestration product frame, and the adjacent construction materials.

5.13.3.1 Unless otherwise specified, flashing material shall provide twenty-four (24) hour minimum protection from water penetration when tested in accordance with Test Method D779 (see Appendix X1). AAMA 712 provides a specification for minimum performance criteria to evaluate mechanically attached flexible flashing products. AAMA 711 establishes test methods and minimum performance requirements for self adhered flashing (SAF) products including minimum widths. AAMA 714 establishes test methods and minimum performance requirements for liquid applied flashings.

FIS components are compatible with most flashing membranes and liquid applied membranes. If in doubt, complete a sample priming, bonding, installation mock up for review of bond and chemical compatibility prior to final installation.

FIS ‘Corner Defector’ and ‘Centre Strip’ products are manufactured from plastic resulting in very smooth surfaces. Some flashing membranes bond exceptional well to the FIS smooth plastic surfaces without the use of primers. The elimination of the need for primers speeds up installation and resolves ‘cold weather issues’ with primer products and colder temperature applications.

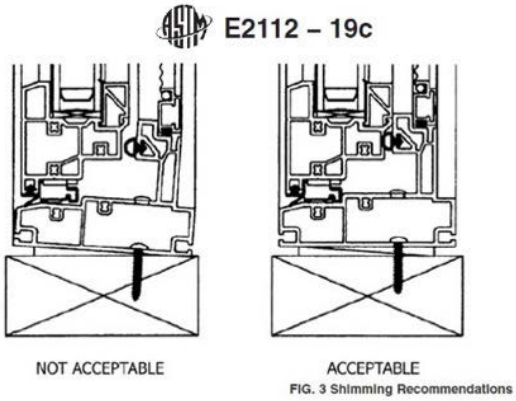
Regardless membrane manufacturer’s primer requirements for bonding, FIS WARRANTY requires all installed flashing membrane bonding to the FIS components to be rolled with a 1” roller with adequate pressure to applied to the roller to ensure a proper full bond to FIS components.

FIS WARRANTY requires the installer to follow the recommendations of the flashing membrane manufacturers for primer and pressure rolling requirements.

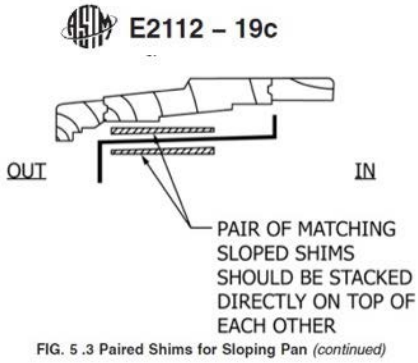
5.13.3.2 The flashing membrane shall be securely affixed to minimize any weather damage prior to the building’s exterior treatment being applied. The fenestration product and flashing shall be integrated into the overall water-resistive barrier. The fenestration and flashing manufacturers shall be consulted for any special flashing requirements unique to their products.

As the FIS is compatible with most available flashing membranes, the architect, engineer or installer shall specify or select an appropriate flashing membrane to suite the building’s adjacent components and follow the flashing membrane manufacturer’s written instructions for flashing membrane selection, primers, bonding and pressure rolling for adhesion.

5.15.2 Sill shims used with framing materials shall be made from materials capable of sustaining all loads placed on them by the fenestration products including a minimum compressive strength of 1100 psi (7600 kPa). High-impact plastic or metal shims are recommended for sill support. Wood shims under the sill are not permitted unless specifically recommended by the fenestration manufacturer.

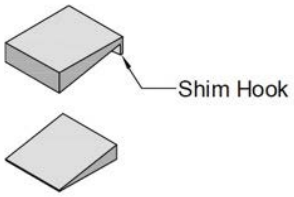


(Image from ASTM E2212-19C document.)



(Image from ASTM E2212-19C document.)

FIS tapered shims are made from high impact plastic and have been tested to loads exceeding 1,100 lbs and comply with ASTM E2112-19C. Refer to FIS Fig. 5.15.3A.



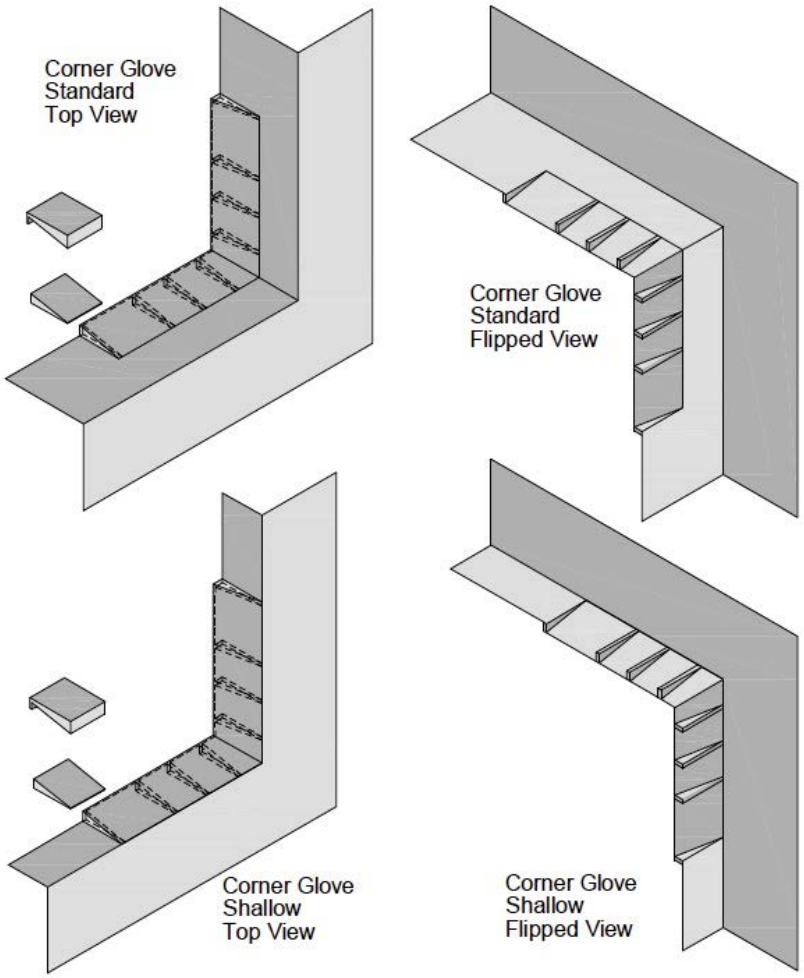
FIS Fig. 5.15.2

FIS tapered shim are designed with upper and lower shims. The lower shim fits into the back of the 'Corner Defector' and 'Centre Strip'. The upper shim is positioned on the top of the 'Corner Defector' or 'Centre Strip' after the flashing membrane has been installed. The upper shim is designed with a shim hook on the back edge to prevent the shim from sliding out of position during construction. Apply a bed of butyl to the bottom side of the upper shim and press into position over top of the location of the lower shim. Then install the fenestration unit.

The shim hook eliminates the need for a nail or staple fastener to secure the shim in place, eliminating a potential leak issue at the location of a penetrating fastener through the flashing membrane.

5.15.3 The sill shall be supported in a straight and level condition at a minimum of three points. Shims shall be located 3 in. (75 mm) from each end and at midspan, or at 3 in. (75 mm) from each end plus one point per 12 in. (300 mm) of nominal width (see Fig. 4). Shim spacing shall never exceed 12 in. (300 mm). In the absence of manufacturer's instructions, shims shall never be closer than 3 in. (75 mm) from any corner of a fenestration assembly. The sill can be supported through the use of shims, support blocking, rough opening sill, or components of the pre-existing window. Refer to the manufacturer's instructions for recommended sill support system details.

The FIS 'Corner Glove' is fabricated from a pliable polymer, flexible enough to allow for thermal expansion of the fenestration unit without damaging the fenestration unit, and rigid enough to maintain a positive sloped surface, sloping towards the exterior wall face for drainage of moisture. Refer to FIS Fig. 5.15.3A



FIS Fig. 5.15.3A

The 'Corner Glove' is available in both standard and shallow depths to suit various window depths.

Support gussets are located to allow the FIS high impact plastic 'Sloped Solid Shim' to be inserted into the bottom side of the "Corner Glove'. Locating the outer edge of the 'Sloped Solid Shim' 3-1/2" from the edge of the rough opening. With the ½" perimeter cavity, the 'Sloped Solid Shim' is located exactly 3" (75 mm) from the edge of the installed fenestration unit. No measuring, no guessing, simply insert and the shim is in the correct location.
Tack the lower shim into position with a staple or nail.

Once the sill flashing membrane has been installed, apply a bed of butyl sealant to the bottom side of the upper 'Sloped Solid Shim'. Position the shim at the end of the 'Corner Glove' over top of the previously installed lower shim and press into position. Install the fenestration unit.

The resulting location of the upper 'Sloped Solid Shim' is located 3" from the end of the fenestration unit and provides a flat bearing surface for the fenestration unit to bear on as per ASTM E2112-19C Fig. 3.

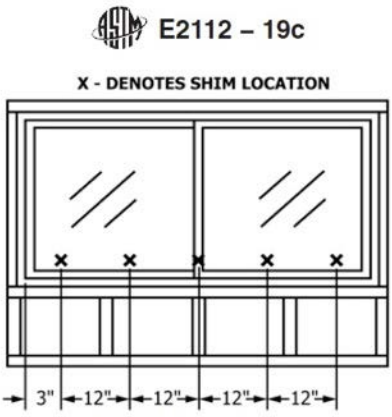
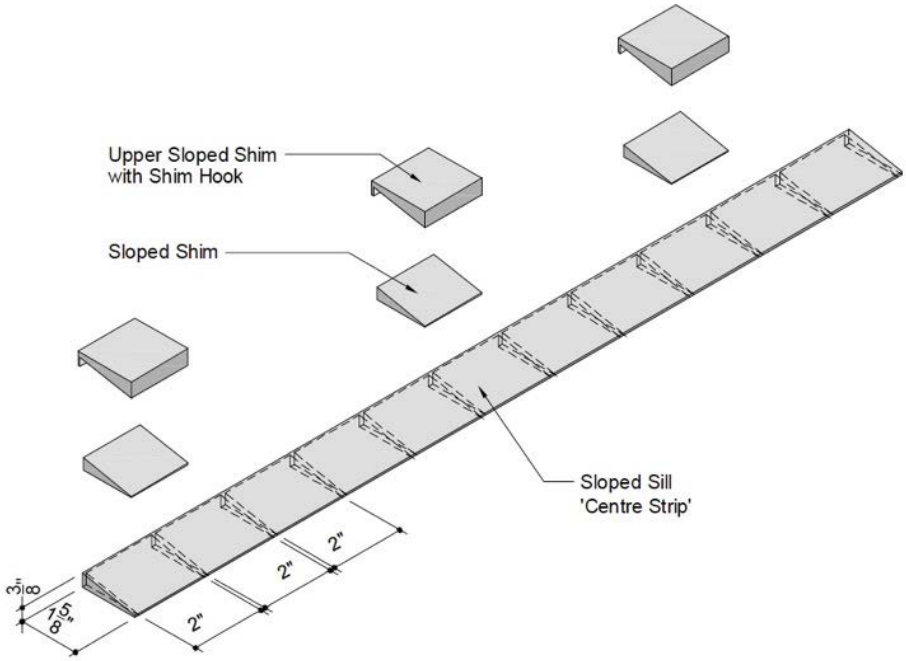


FIG. 4 Shim Locations

(Image from ASTM E2212-19C document.)



FIS Fig. 5.15.3B

The FIS 'Centre Strip' is fabricated from a pliable polymer, flexible enough to allow for thermal expansion of the fenestration unit without damaging the fenestration unit, and rigid enough to maintain a positive sloped surface towards the exterior wall face for drainage of moisture.

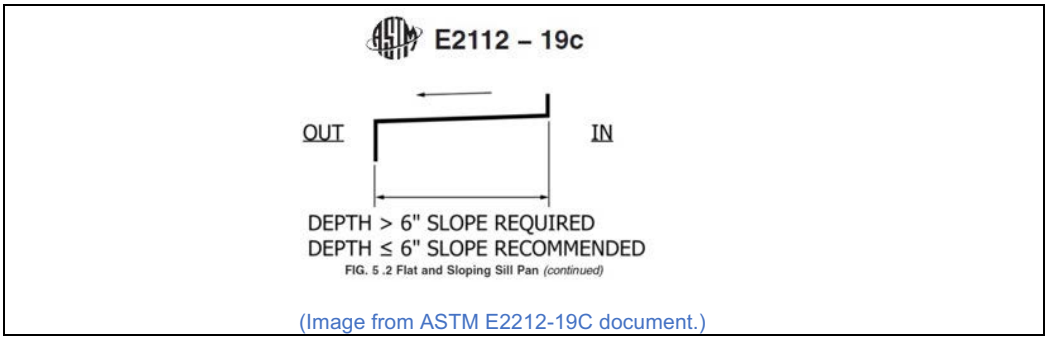
The 'Center Strip' support gussets are located to allow the Fortress Installation System high impact plastic 'Sloped Solid Shims' to be inserted into the bottom/back side as required, with a spacing to allow shims to be installed at various dimensional spacings.

Tack the lower shim into position with a staple or nail. Set the upper shim in a bed of butyl sealant and push into position above the lower shim location.

5.16 Pan Flashing Systems and Subsills for Weatherability—Where pan/sill flashings are provided, these flashings shall drain water to the drainage plane or to the exterior (see Annex A3, Figs. A3.1-A3.4). The interior side and the ends of the pan flashing shall be upturned to prevent water from flowing off the flashing into the wall or onto interior finishes. The height of the pan shall be appropriate for the fenestration product being installed, according to manufacturer's instructions or the advice of a design professional. To determine the minimum height requirements for interior height of pan flashing, refer to Annex A3. See Note 2.

FIS does not use a solid sill pan flashing as defined by ASTM E2112-19C.

5.16.1 A sloped pan, sill, and subsill is the preferred method to divert water to the drainage plane. (See Fig. 5)

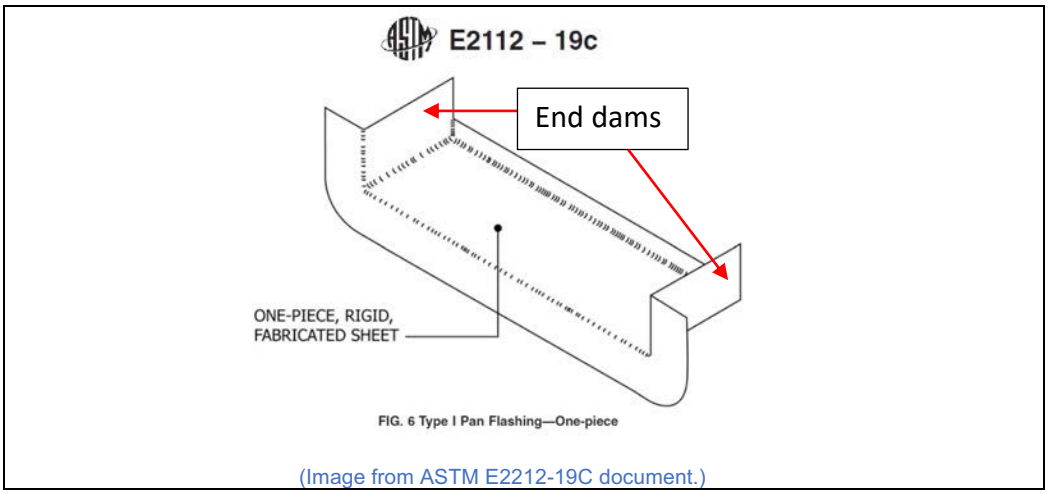


(Image from ASTM E2212-19C document.)

ASTM E2112-19C does not require a sloped sill with a drainage surface less than 6". FIS is less that 6".
FIS provides a combination semi-rigid sloped and flat protection and drainage surface depending on the fenestration unit depth.

FIS's provided flat and sloped protective sill areas meets or exceeds the minimal requirements of ASTM E2112-19C.

5.16.2 The pan flashing system and subsill ends shall prevent water from entering the walls at the lower corners of windows/doors. End dams shall be incorporated at both ends of the pan flashing system and subsills to restrict water entry. See Fig. 5, Figs. 6-11, and Annex A3, Figs. A3.2-A3.4.



(Image from ASTM E2212-19C document.)

FIS components are compatible with one piece flexible flashing membranes as seen in Fig. 6 above. However, with the FIS 'Corner Glove' installed the flexible flashing membrane does not need to extend up the jamb, as shown above.

5.16.3 Use of Pan Flashings—This practice recommends that pan flashings be used under all windows and doors, except where wall construction details incorporating fenestration drainage systems are provided by the building designer, or where wall construction details are specifically provided by fenestration manufacturers' installation instructions. Where used, pan flashings shall be integrated with the wall's water resistive barrier in shingle-lap fashion (see Fig. 5). The pan flashing shall be continuously sealed to the water-resistive barrier.

FIS components are fully compatible with door and window installations.

5.16.4 Types of Pan Flashings Materials—Pan flashings materials can be categorized as either rigid sheets or flexible membranes, or combination systems. Within each of these two categories the fabrication of the materials can be classified as either 1-piece or multiple pieces. For purposes of this standard the material and fabrication types of pan flashings are shown in Table 5. See Annex A3, Figs. A3.2-A3.4.

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TABLE 5 Types of Pan Flashing Materials and Fabrication

Rigid Sheet	1-Piece or Multiple Pieces	Type I
Rigid Sheet	Multiple Pieces	Type II
Flexible Membrane	1-Piece or Multiple Pieces	Type III
Combination Systems	Multiple Pieces	Type IV
Liquid Flashings	Fluid-Applied Coating	Type V

(Image from ASTM E2212-19C document.)

FIS components are not compatible with rigid sheet pan flashings.

FIS is compatible with most flashing membranes and liquid applied membranes. The architect, engineer or installer shall specify or select an appropriate flashing membrane to suite the building's adjacent components and follow the flashing membrane manufacturer's written instructions for flashing membrane selection, primers, bonding and pressure rolling for adhesion.

If in doubt, complete a sample of priming and bonding mock up for review of bond and chemical compatibility prior to final installation.

Regardless of the flexible flashing membrane manufacturer's primer requirements for bonding, FIS WARRANTY requires all installed flashing membrane bonding to FIS components to be rolled with a 1" roller with adequate pressure to applied to the roller to ensure a proper full bond to FIS components.

FIS is compatible with ALL of the following flexible membrane installations.

5.16.4.1 Rigid Sheet, 1-Piece or Multiple-Piece Pan Flashing (Type I)—These are typically fabricated from sheet metals, semi-rigid plastics or composites. Joints are continuously soldered, sweated, chemically or thermally welded as appropriate to achieve permanent watertightness. See Fig. 6.

5.16.4.2 Rigid Sheet, Multiple Pieces Pan Flashing (Type II) — These pan flashings are made up of pieces of metal or plastic sills and ends that are lapped or joined and continuously sealed for watertightness (For examples, see Fig. 8, Fig. 12, and Fig. 13). Warning—Sealant selection and application are critical to performance (see 5.18).

5.16.4.3 Flexible Membrane Pan Flashing (Type III) — These pan flashing systems are fabricated from one or multiple pieces of a self-adhering membrane and are applied to create a watertight end dam and rear leg. See Fig. 9.

5.16.4.4 Combination Pan Flashings (Type IV)—These pan flashings may be assembled from a variety of rigid, flexible, and self-adhering materials in order to achieve a watertight pan flashing. See Fig. 10.

5.16.5 Installation of Pan Flashings—The following are general criteria for the installation of pan flashing. The criteria and specific installation may need to be altered for specific window/door products and rough opening conditions. Pan flashings shall be integrated with the flashing system. See Fig. 32.

5.16.5.1 Rigid Sheet, 1-Piece or Multiple Pieces (Type I)—The sheet material is formed to fit into the sill rough opening and provide end dams up the jambs and a self supporting rear leg. The pan flashing extends onto the face of the sill apron and jamb face forming a closed corner. A continuous bead of sealant is applied to the back side of the down-turned leg of the pan flashing. See Fig. 5, Fig. 12, and Fig 32. Sealant selection and bead design shall be in accordance with 5.18.

5.16.5.2 Rigid Sheet, Multiple Pieces (Type II) — Apply the multiple pieces at sill and jamb corners to be lapped and sealed. The pan flashing shall be assembled, to fit into the sill rough opening and provide end dams up the jambs and a self supporting rear leg. The pan flashing extends onto the face of the sill apron and jamb face forming a closed

corner. A continuous bead of sealant is applied to the back side of the down-turned leg of the pan flashing. This will allow the flashing to seal directly to the sill flashing. See Fig. 8, Fig. 12, Fig. 13, Fig 32, and Fig 33.

5.16.5.3 Flexible Membrane System (Type III) — Apply the flashing material to adhere along the sill and wrap into the rough opening to form a watertight pan flashing. The flashing material shall extend up the jambs and shall extend into the rough opening with provisions made to support the formation of a rear leg. The flashing shall extend onto the face of the sill apron and jamb face forming a closed outside corner. See Fig. 9 and Fig. 10. See Annex A3 and Fig. A3.4 for recommended pan flashing dimensions.

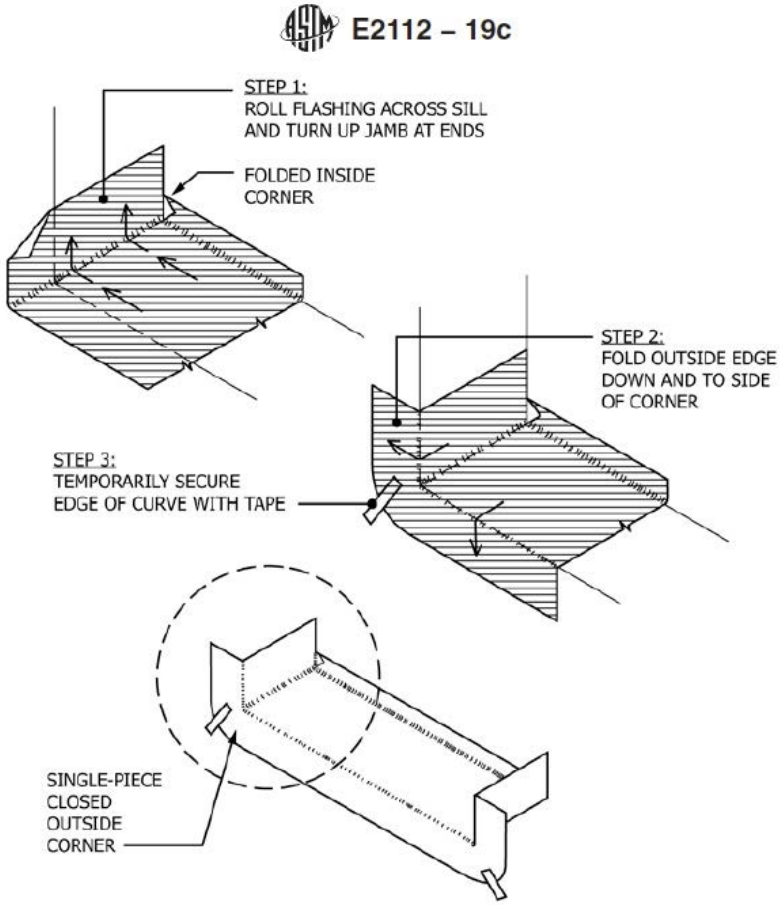


FIG. 9 TYPE III Pan Flashing—One Piece

(Image from ASTM E2212-19C document.)

5.16.5.4 Combination Systems, Multiple Pieces (Type IV) — Apply the material(s) at the sill and jamb corner in a manner that they adhere to each other. Lapped seams shall be tight and flat. The end dam shall extend up the jambs. The flashing shall extend into the rough opening with provisions made to support the formation of a rear leg. The flashing shall extend onto the face of the sill apron and jamb face forming a closed outside corner. See Fig. 11.

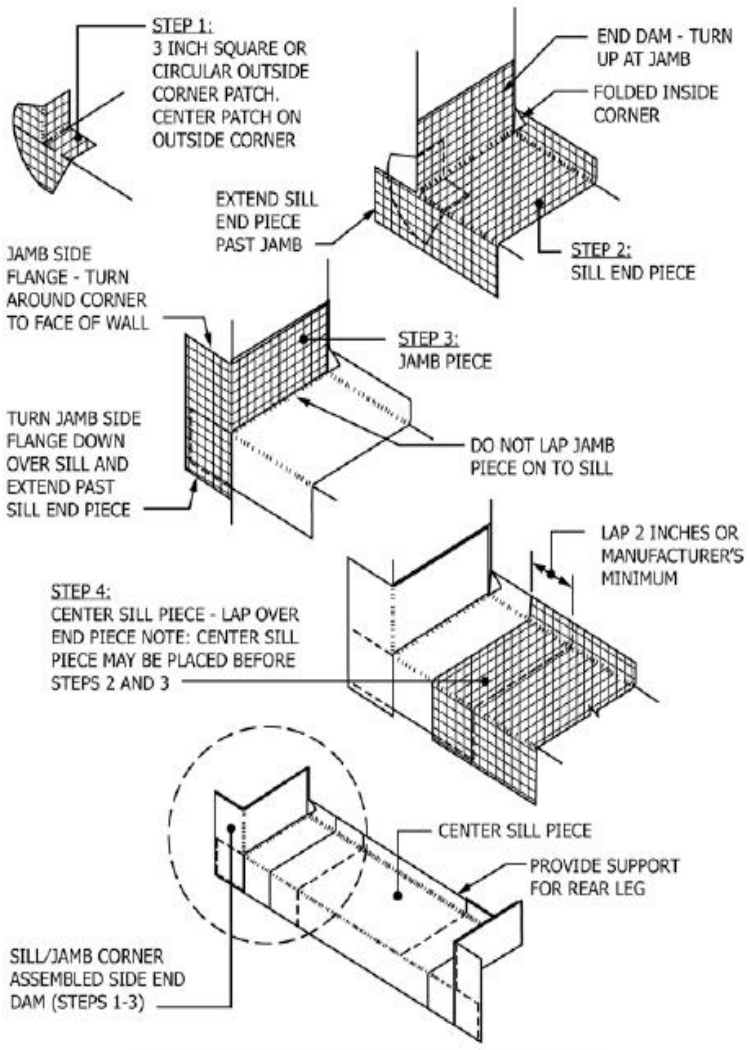
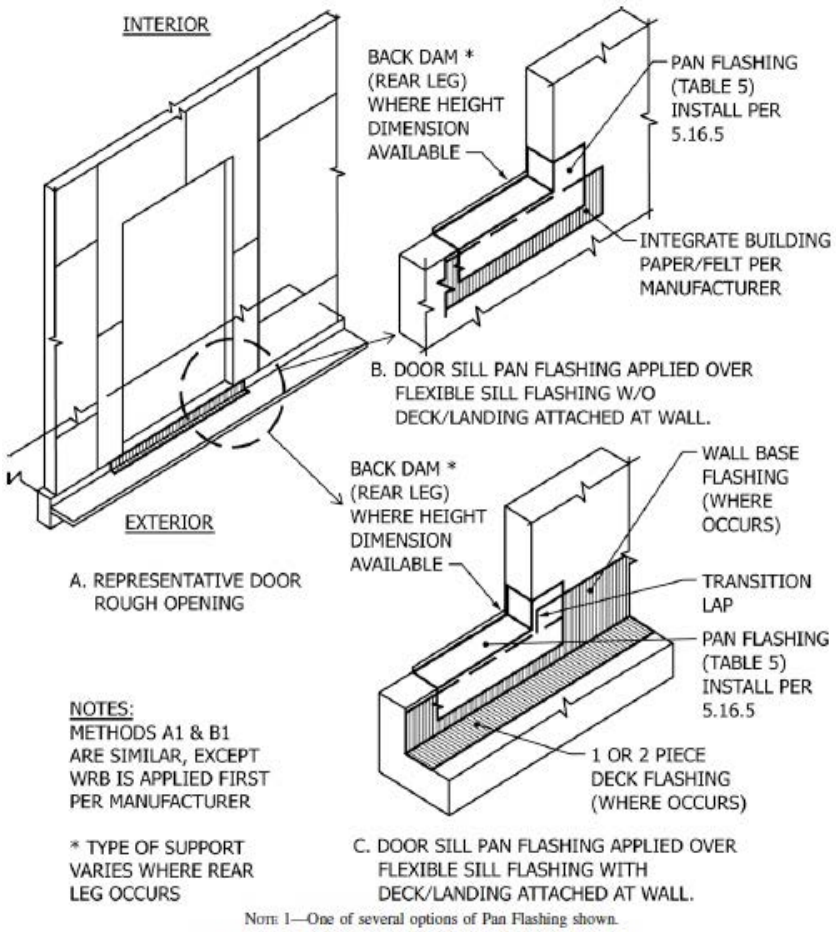


FIG. 10 TYPE III Pan Flashing—Multiple Pieces

(Image from ASTM E2212-19C document.)



NOTE 1—One of several options of Pan Flashing shown.

FIG. 13 Flexible Flashing at Sill of Door (Methods A and B)

(Image from ASTM E2212-19C document.)

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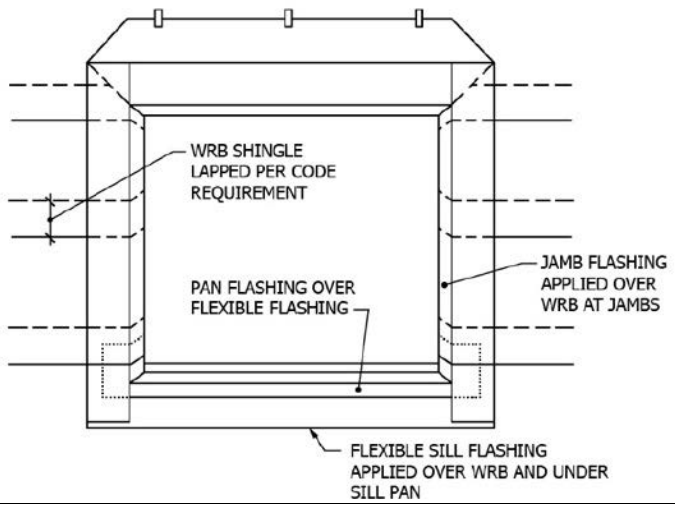
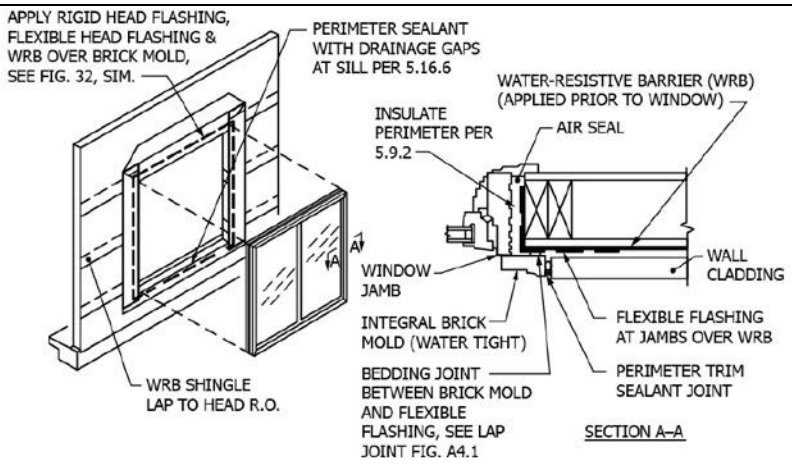


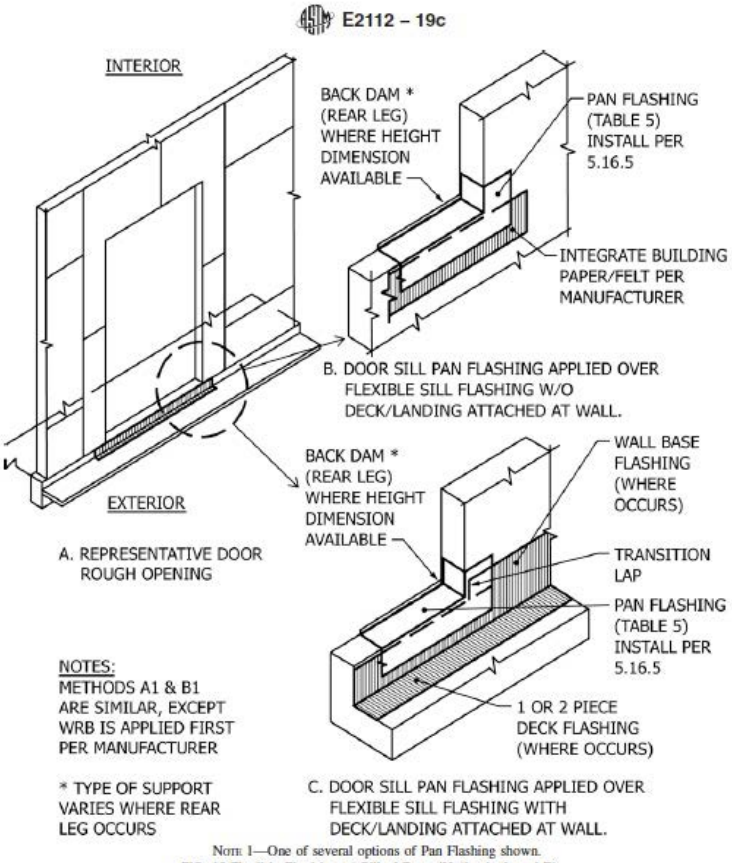


BLOCK FRAME WITH INTEGRAL BRICK MOLD INSTALLATION SHOWN (NON–INTEGRAL SIMILAR)

NOTE 1—One of several options of Jamb and Pan Flashing shown.

FIG. 12 Wrapped Jamb Surfaces (Method B1, Non-finned Window)

(Image from ASTM E2212-19C document.)



NOTE 1—One of several options of Pan Flashing shown.

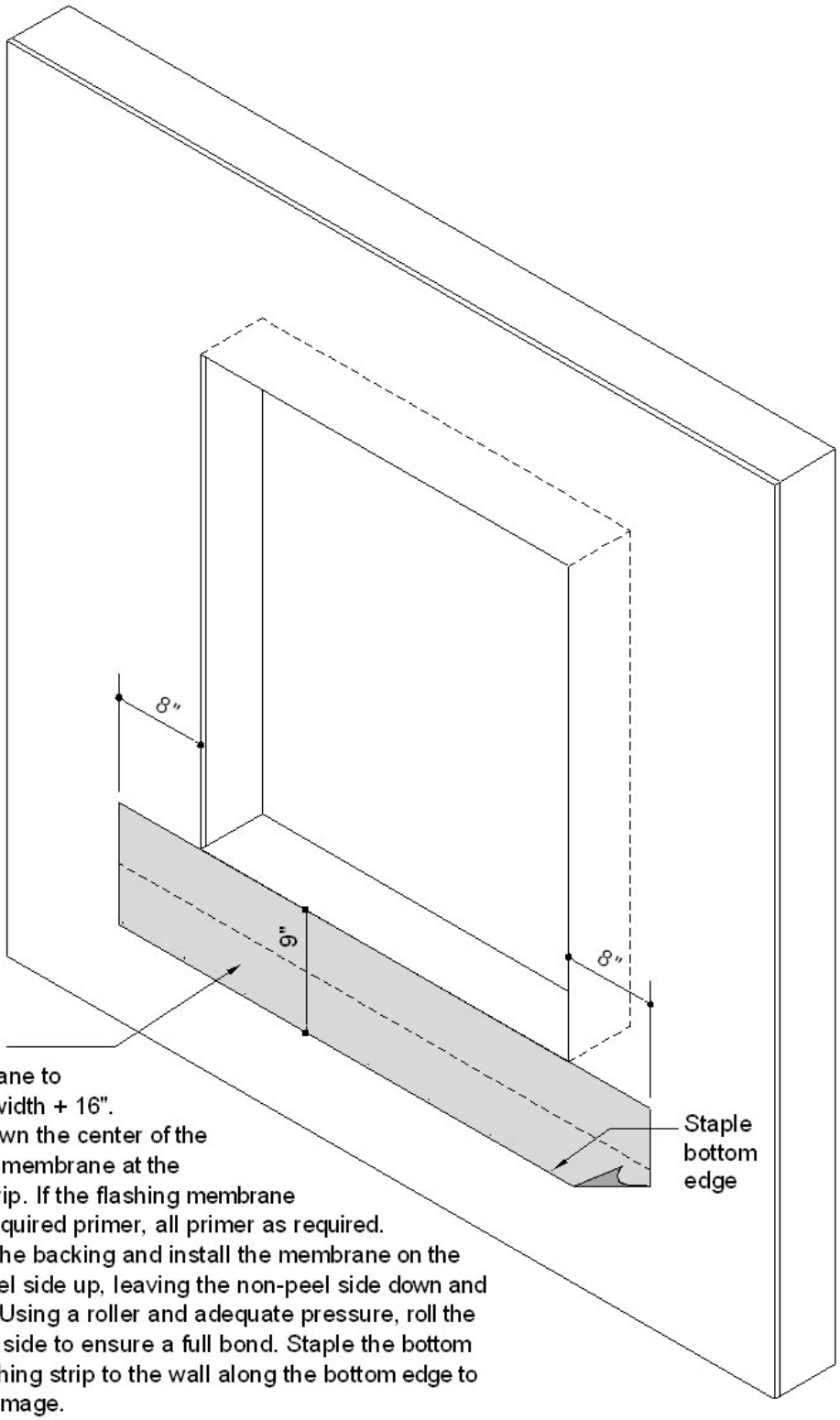
FIG. 13 Flexible Flashing at Sill of Door (Methods A and B)

(Image from ASTM E2212-19C document.)

5.16.5.5 Liquid Flashings (Type V)—Apply the liquid flashing materials at the sill, jambs, and head where applicable. Apply the material such that it upturns at the sides of the openings and extends into the rough opening with provisions to support a rear leg and forms complete and uniform coverage without voids/pinholes. The liquid flashing shall extend out of the rough opening onto the face of the sill apron (where applicable) and jamb face forming a closed outside corner. The materials shall also integrate with the air/water barrier or drainage plane of the wall, or both. Liquid flashings shall comply with AAMA 714 material specification. Apply liquid flashings in accordance with manufacturer's recommendations with the final application coverage similar in configuration to Fig. 6.

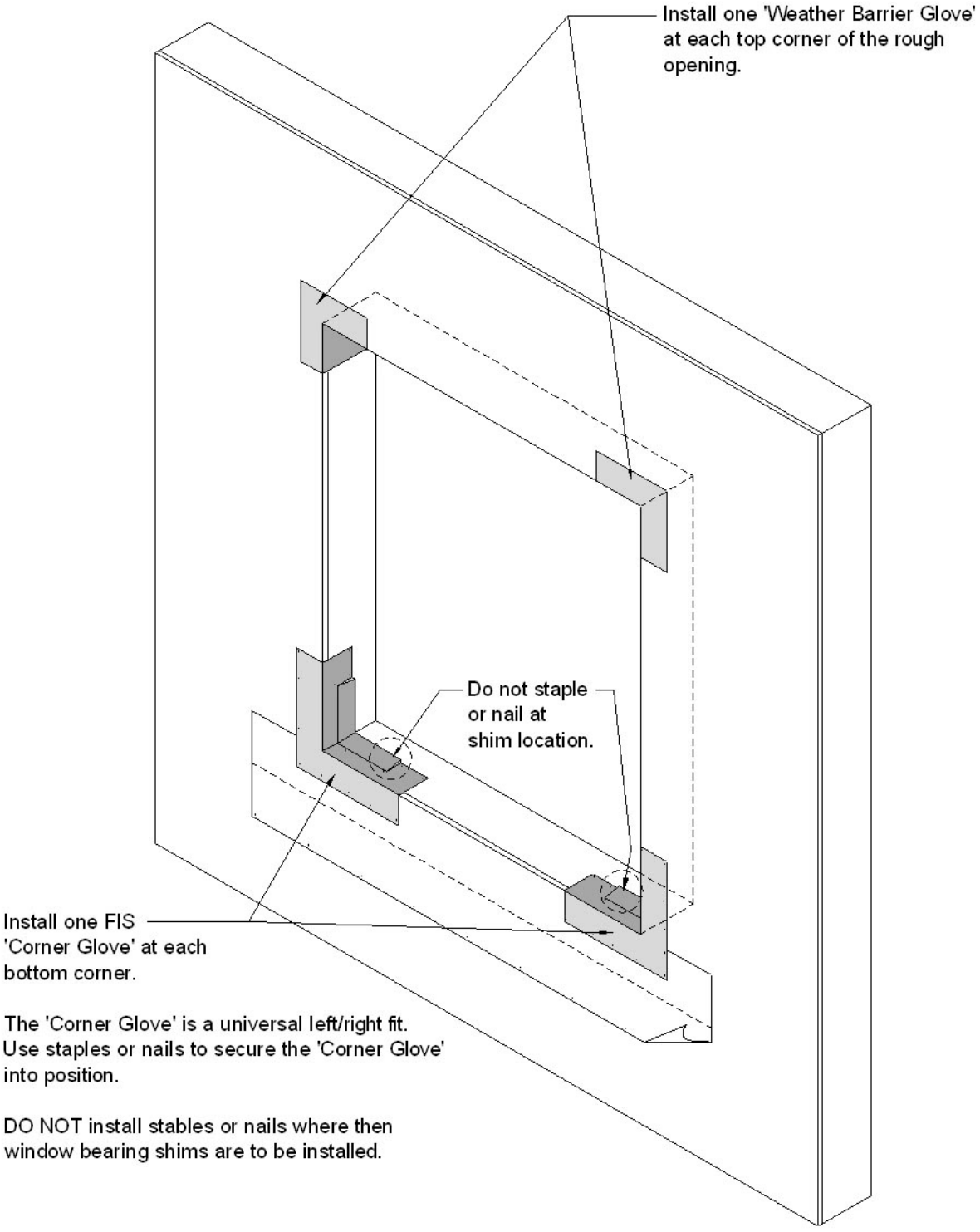
ASTM E2112-19C provides several options (as per above) for flexible flashing membrane installations.
All ASTM E2112-19C flexible flashing membrane installation types are compatible with FIS components. However, with the 'Corner Glove' installed the flexible flashing membrane is no longer required to be turned up the face of the jamb.

The following installation steps show how FIS simplifies the installation of flexible flashing membranes for a water tight rough opening sill.

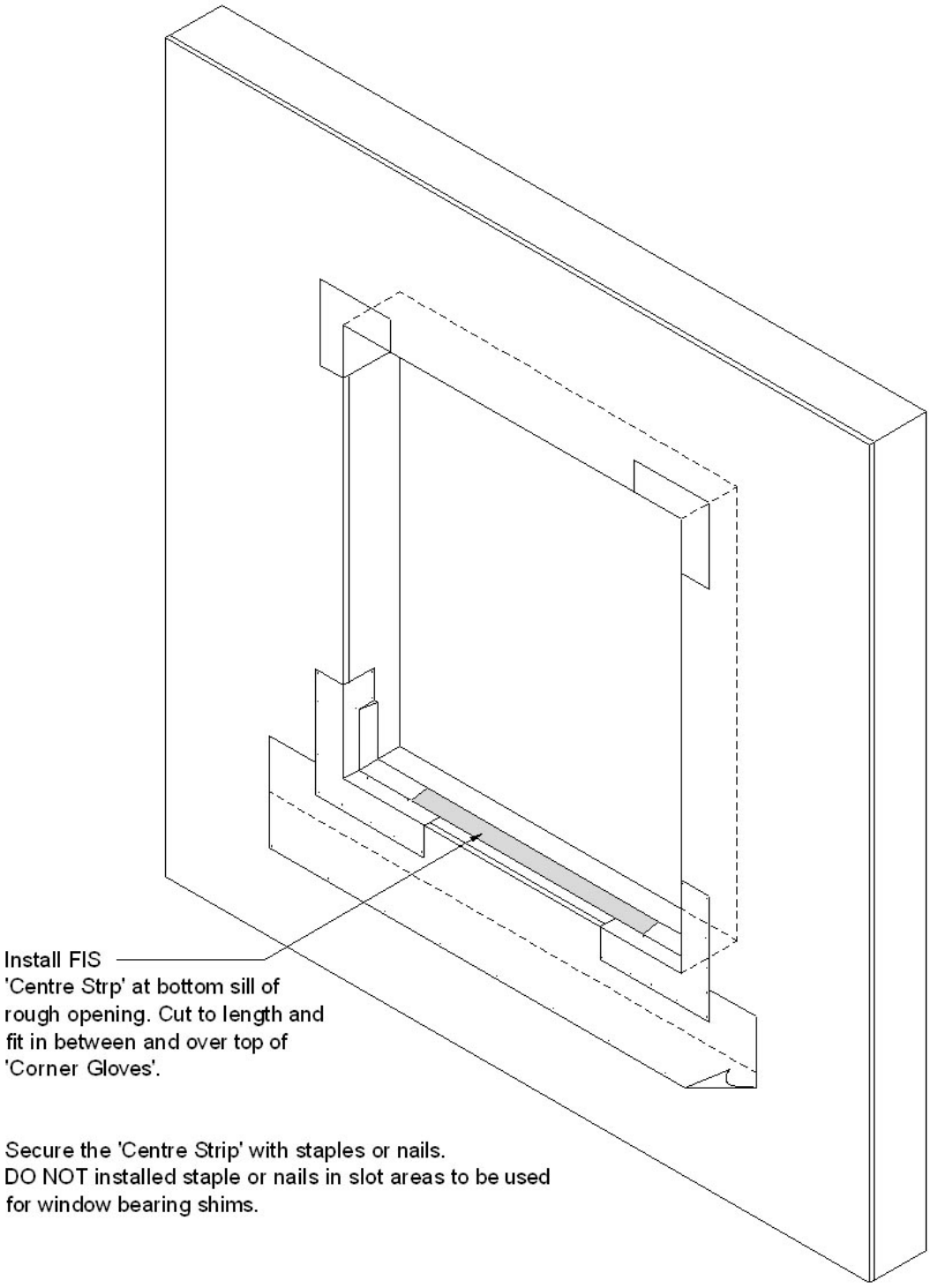


Cut length of 9" flashing membrane to rough opening width + 16". Carefully cut down the center of the strip of flashing membrane at the middle of the strip. If the flashing membrane manufacturer required primer, all primer as required. Peel off half of the backing and install the membrane on the wall with the peel side up, leaving the non-peel side down and facing the wall. Using a roller and adequate pressure, roll the peel membrane side to ensure a full bond. Staple the bottom edge of the flashing strip to the wall along the bottom edge to prevent wind damage.

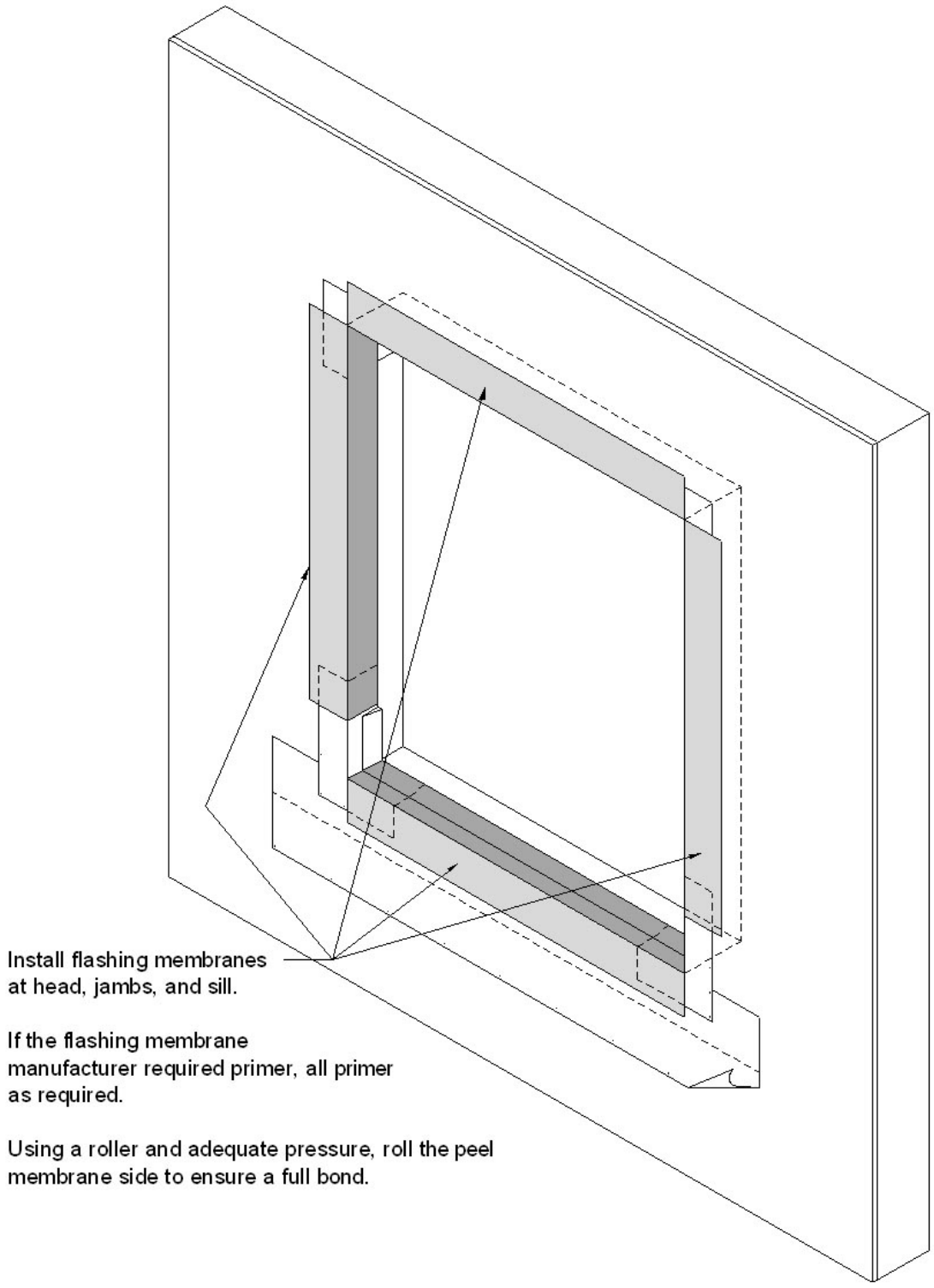
FIS Installation – Step 1



FIS Installation – Step 2 - Standard “Corner Gloves’



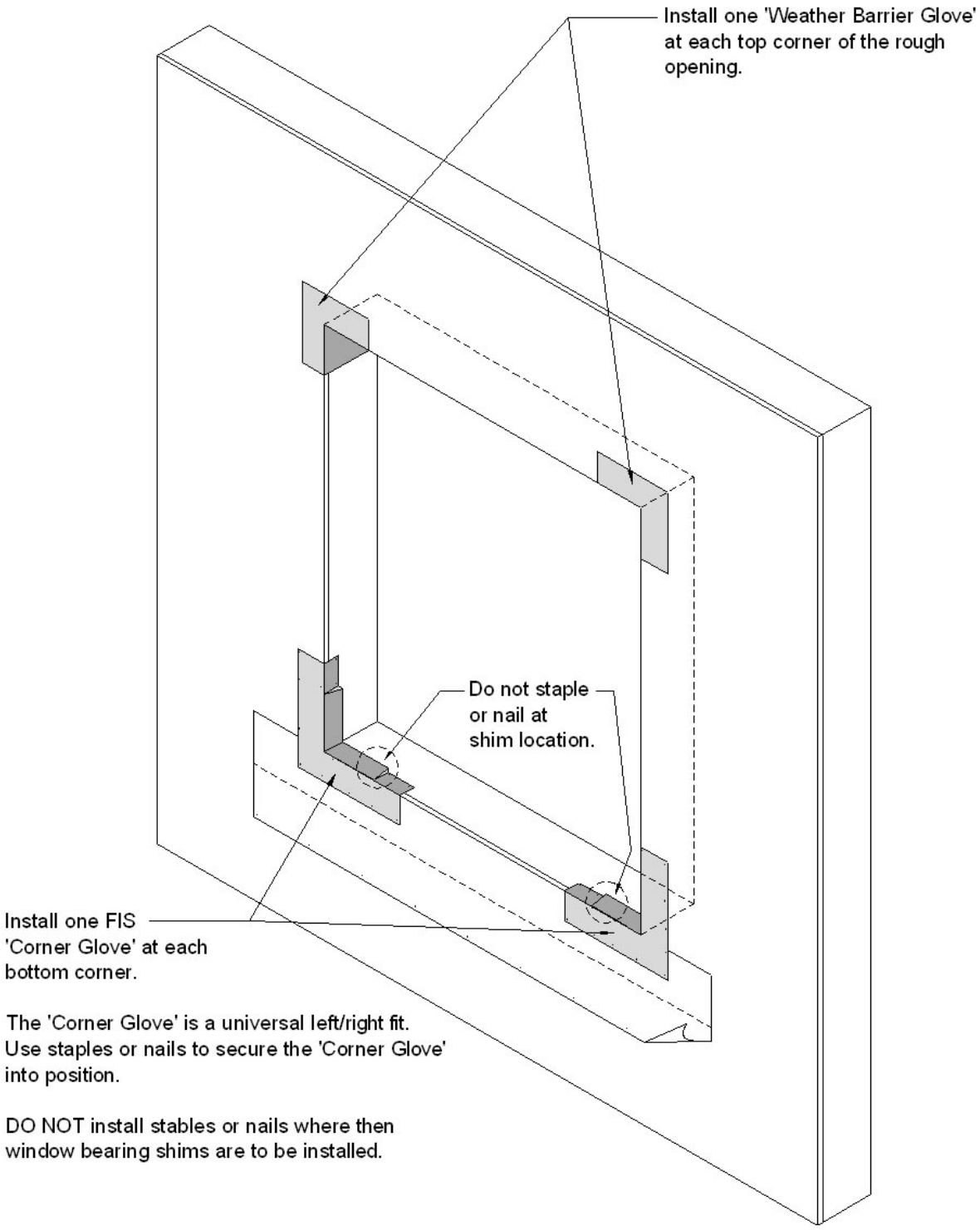
FIS Installation – Step 3 - Standard “Corner Gloves’



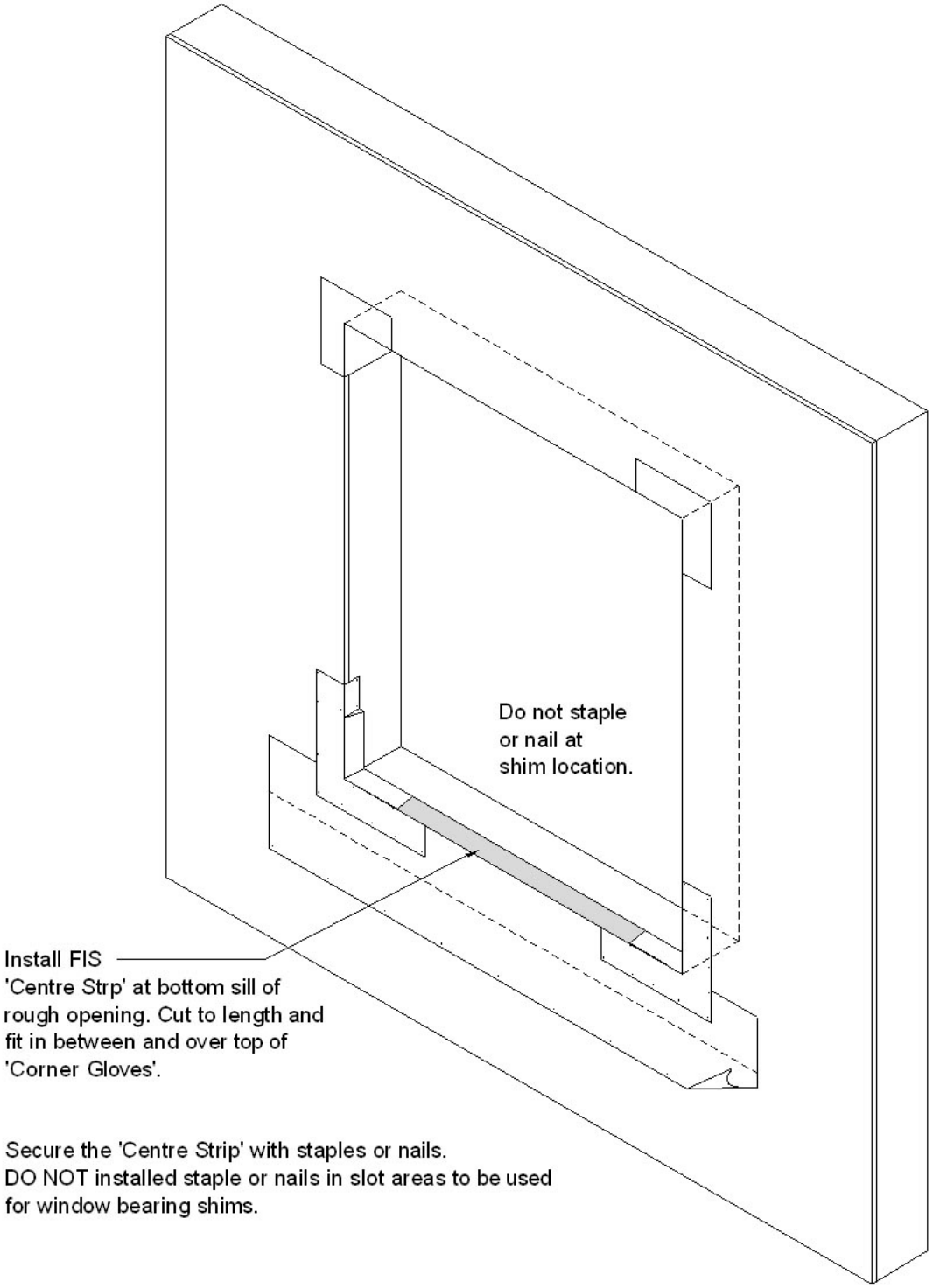
FIS Installation – Step 4 - Standard “Corner Gloves’

There are many different flexible membrane options that FIS is compatible with, providing the selected membrane is installed as per the membrane manufacturer’s requirements.

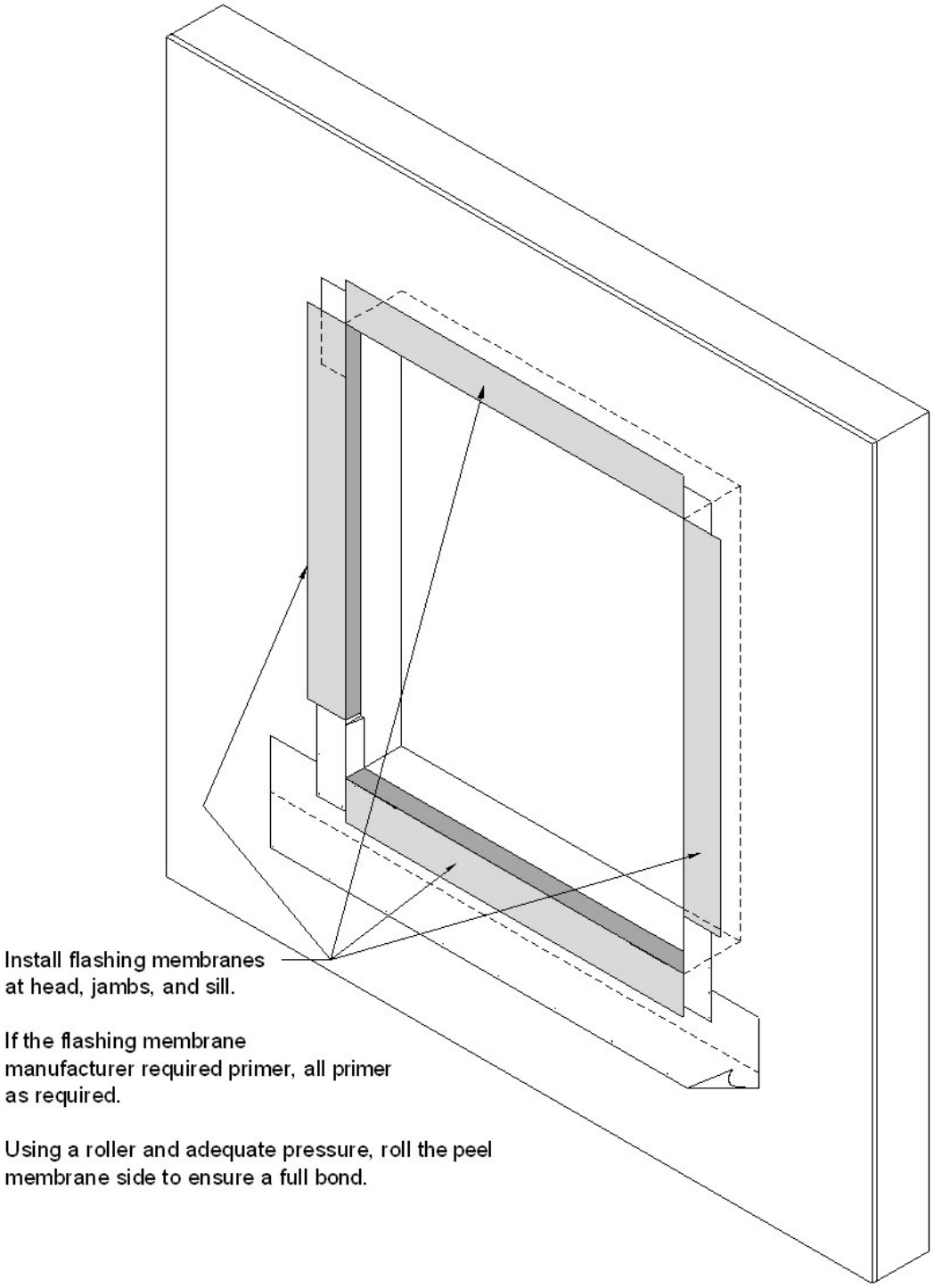
The installation of all head, jamb and sill flashing membranes are simplified as the flashing membranes no longer needs to be turned up and onto the adjacent face. This reduces the amount of flashing membrane required and installation time, speeding up the construction schedule and reducing costs.



FIS Installation – Step 2 – Shallow ‘Corner Gloves’



FIS Installation – Step 3 – Shallow ‘Corner Gloves’



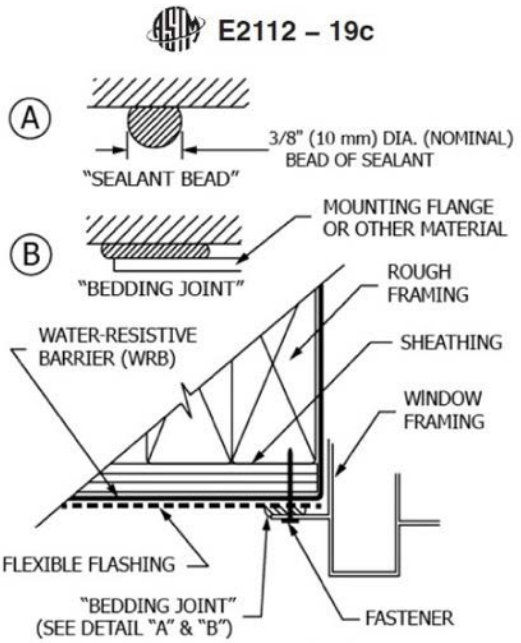
FIS Installation – Step 4 – Shallow 'Corner Gloves'

There are many different flexible membrane options that FIS is compatible with, providing the selected membrane is installed as per the membrane manufacturer's requirements.

The installation of all head, jamb and sill flashing membranes are simplified as the flashing membranes no longer needs to be turned up and onto the adjacent face. This reduces the amount of flashing membrane required and installation time, speeding up the construction schedule and reducing costs.

5.18.1.4 In barrier wall systems, the exterior joints between fenestration product frames and the building envelope shall be sealed.

5.18.6 Applications where flashing, building paper, water resistive barriers, or fins are bedded with sealant are typically low movement lap type joints where adhesion and compatibility are the primary sealant considerations. In a lap or guttering joint the sealant shall be non-hardening. For liquid-applied sealants, recommendations from the manufacturers of the components shall be followed. An application of a nominal 3⁄8 in. (10 mm) diameter bead of sealant is recommended. Preformed butyl tape sealants shall meet Specification C1281 or AAMA 804.3. See also 5.18.3.1. See Fig. 14.



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NOTE 1—Compress flange and look for squeeze out of sealant to confirm adequate bedding quality.

FIG. 14 Bedded Joint

(Image from ASTM E2212-19C document.)

Bedding joints for fenestration units are outboard of the rough opening and compatible with FIS.

5.18.8 For door sill sealant (where no sill pan occurs), a minimum of two 3⁄8 in. (10 mm) parallel beads of sealant shall be applied below door sills, one on the exterior side and one on the interior side. Both beads of sealant shall make continuous contact with the door sill and substrate. The two continuous beads of sealant must be connected at both jambs, and not left open. The heads of the attachments through the sill must be thoroughly sealed. The continuous beads of sealant are to stop blow-through water. The door sill anchor or other structural attachment system shall be between the lines of sealant. See Section 9 and Fig. 36.

NOTE 17—Where pan flashing is used, care must be taken to ensure a drainage path between the door and the sill pan. Therefore, the bead of sealant on the mounting flange at the sill must have at least 2 gaps at least 2 in. (50 mm) wide to permit drainage from the sill pan to the exterior or the drainage plane. The gaps in the bead of sealant must be no more than 4 ft (120 cm) apart, such that additional gaps are required for windows/doors wider than four feet wide.

FIS is compatible with door installations.

Note: As the 'Center Strip' and FIS fenestration bearing/blocking shims provide a bearing elevation 1/2" higher than the bottom of the rough opening, this will set the door threshold up and additional ½" above the finished floor height, as opposed to setting the threshold down into a double bead of butyl sealant.

Note: Depending on the depth of the threshold, additional blocking may be required below the inner side of the threshold, on the interior side of the sloped 'Center Strip' to support the inner side of the threshold.

6.5 When installing retrofit/replacement fenestration products into an existing building, the installer should clearly understand the existing weather barriers, exercising care to ensure that the fenestration product has been installed into the previously designed and existing building envelope. Exercise precaution to ensure that the retrofit/replacement installation does not impair the existing system from working properly, or destroy the weatherability of the existing system.

FIS is compatible with retrofit projects using the above noted FIS installation methods.

Note: Caution should be noted to adjust fenestration outside measures (OSM) to accommodate the FIS required ½" perimeter cavity.

7.1.2 Membrane/Drainage Systems can be identified as systems which employ first surface water barriers and a water-resistive barrier. Examples include the types of building envelopes whose exterior surfaces are made from stucco, siding, veneers, panels, shingles, wood shakes, metal panels, tile or other applied exterior surfaces. In these applications the weather-resistive or backup surfaces behind the first surface become the area where the drainage or membrane system has been utilized. Building envelopes whose wall systems include a cavity between the exterior cladding system and the wall sheathing, are generally included in this definition (see Fig. 19). In membrane/drainage walls, fenestration units are integrated with, and sealed to the water-resistive barrier; this includes the sealing of the flashing system and any installation accessories (see Fig. 18). Flashing systems shall direct all incidental water to the outer surface of the wall. The design of membrane/drainage wall systems may allow the flashing system to route incidental water to the drainage plane only. Use of pan flashing to direct incidental water onto the outer wall surface in membrane/drainage systems is acceptable and may be preferable.

7.1.2.1 The installer shall ensure that his installation does not allow moisture to penetrate the membrane/drainage wall. The installer, when installing into a multi-surface barrier system, shall ensure that the fenestration product has been tied homogeneously into the designed membrane/drainage system at the surface of that membrane/drainage cavity; that is, on the exterior surface of the interior wall or the exterior of the roof sheathing, using flashings, counter-flashings, and sealants that connect the fenestration product's first surface water shedding area directly to the membrane/drainage system employed.

7.1.2.3 This practice requires sealing and integration between the fenestration unit and the concealed WRB if the unit is being installed in a membrane/drainage system. More specifically, it does NOT recognize as acceptable the substitution of a seal between the unit and the outermost surface of the cladding in lieu of sealing and integration between the unit and the concealed WRB. (Warning—Installation to first surface architectural exterior surface walls such as stucco, siding, and veneers may inhibit and otherwise trap water inside the rain-shield system, allowing such water to drain to the interior of the building.)

FIS fenestration protection is compatible with and can be tied into most weather resistive barrier installations.

8.1 Windows in Walls Utilizing a Membrane/Drainage System:

8.1.1 Windows with Perimeter Mounting Flanges (Nail Fins) in Drainage Type Wall Construction:

8.1.1.1 Windows with perimeter mounting flanges shall be installed with flashing, which shall be applied so as to integrate with the flanges on the window unit and with the water resistive barrier materials in a shingle-lap manner. Four different methods (A, B, A1, and B1) may be used. These methods are described in this section.

8.1.1.1.1 Not all flanges are considered structural by the manufacturer; however, they still are integrated into the wall using the following procedures. Flanges are classified into the following categories:

(1) Integral, structural flanges;
(2) Integral, non-structural flanges;
(3) Applied, structural flanges; and
(4) Applied, non-structural flanges.

In this classification scheme, integral implies permanence, continuity, seamlessness, and being waterproof. Applied flanges may require more elaborate flashing and sealing details to ensure weather protection of the installed unit. When using applied flanges, follow the manufacturers' instructions for sealing the flange to the frame (see Fig. 20).

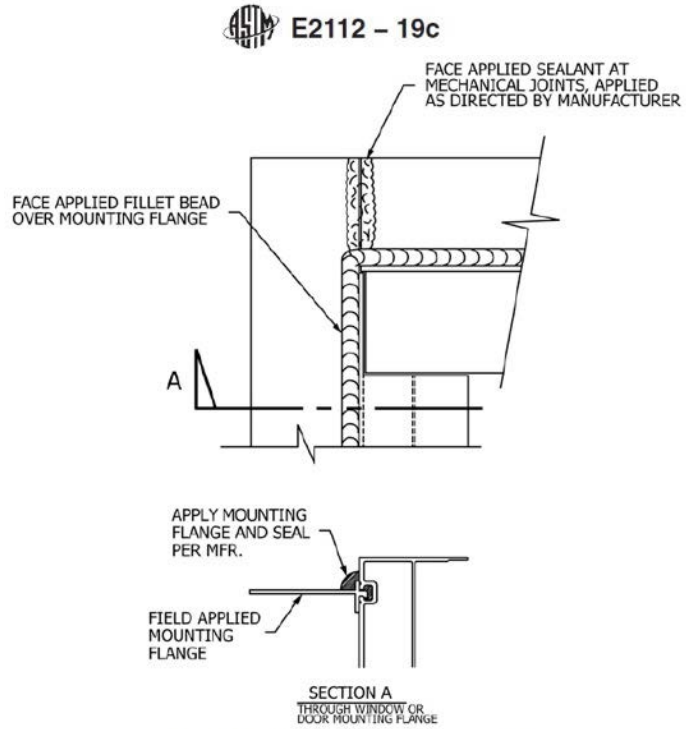

FIG. 20 Applied Flanges and Mechanical Joints

(Image from ASTM E2212-19C document.)

Structural implies that the flange can be used as an anchoring device or nailing flange and that the flange is capable of sustaining the structural load requirements of the fenestration unit in its location in the building. Non-structural flanges must not be used as the sole means of anchoring the window. Follow manufacturer's instructions for anchoring the unit.

8.1.1.1.2 Selection of an installation method (A, B, A1 or B1) is based on the relative order in which materials are installed, and on whether the pieces of flashing sheet used alongside the window (the jamb sheets) are applied over or behind the window unit's side flanges. Windows with integral installation flanges may be installed either before or after the water-resistive barrier. Although window installers often do not install the water-resistive barrier, the window installation shall be integrated properly with the membrane. To avoid confusion between membrane installation and window installation

crews, it is recommended that the relative order of their work be identified in advance and that the identified order be maintained for either an entire project or for clearly demarcated portions of the project. This will allow selection of an installation method for the project, and help eliminate errors caused by installers having to switch between methods. Once a method is selected, all of the procedures of that method shall be performed in the sequence indicated. Mixing or matching methods or altering the sequence of operations within a method is prohibited.

Bedding joints for fenestration are outboard of the rough opening and are compatible with FIS. Bedding joints are not covered under the FIS WARRANTY and requirements for 'bedding joints' are required to comply with ASTM E2112-19C.

8.1.1.1.3 The references to the application of sealant under or over the mounting flanges refer to the use of "bedding joints." A bedding joint consists of the application of a bead of sealant which is later compressed against the substrate or flashing materials. All bedding joints are to have a nominal diameter of 3⁄8 in. (10 mm) prior to compression. During compression of a bedding joint, the installer should look for the sealant to "bleed out" or appear along the edge to ensure adequate bedding quality.

Bedding joints for fenestration are outboard of the rough opening and are compatible with FIS. Bedding joints are not covered under the FIS WARRANTY and requirements for 'bedding joints' are required to comply with ASTM E2112-19C.

8.1.1.1.4 Use the flashing cut formulas (see Table 7) to determine the length of each strip of flashing for each window. The ASTM standard requires a flexible flashing minimum roll width of 9 in. (230 mm). Wider flashing materials, (for example, 12 in. (300 mm)) may be used, however the actual cut lengths figured by using the chart will increase. The use of self-adhesive type flashing is acceptable. Use of self-adhered flashings in widths other than 9 in. (230 mm) shall be permitted when accepted in writing by the window manufacturer and the flashing manufacturer or specified by the design professional. Self-adhesive type flashing seals itself to the water-resistive barrier and to the mounting flange without the need for additional sealant applied to the exterior face of the flange. Self-adhesive type flashing materials must properly adhere, (creating a water tight joint) to the (WRB) and to the mounting flange material in order to be acceptable for use. Refer to 5.12.3.1. (See Note 22). All notations of flashing placement, (for example, 8 1⁄2 in. (220 mm) up and 8 1⁄2 in. (220 mm) over) are based on the use of a 9 in. (230 mm) wide flashing.

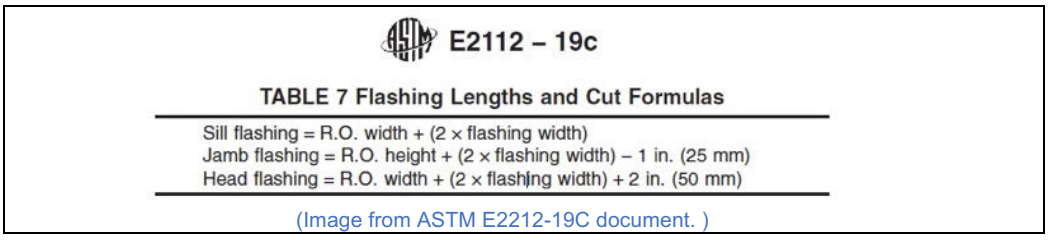

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TABLE 7 Flashing Lengths and Cut Formulas

Sill flashing = R.O. width + (2 × flashing width)
Jamb flashing = R.O. height + (2 × flashing width) – 1 in. (25 mm)
Head flashing = R.O. width + (2 × flashing width) + 2 in. (50 mm)

(Image from ASTM E2212-19C document.)

FIS WARRANTY requires 9" wide strip membranes matching the ASTM E2112-19C strip membrane width requirements. Lengths of membranes are required to meet or exceed the ASTM E2112-19C Table 7.

If the fenestration manufacturer and flashing manufacturer, or design professional alters the width requirement of the strip flashing membrane they do so at their own RISK and assume all liabilities for such revisions.

8.1.1.2 Table 8 can be used to select the appropriate installation method.

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TABLE 8 Installation Procedure Selection Chart (Finned Windows)

NOTE 1—Based on windows with integral fins being installed in drainage type wall systems.

	Head and jamb flashing will be applied over the face of the integral mounting flange	Jamb and sill flashing will be applied behind the face of the integral mounting flange
Water-resistive barrier is to be applied after window installation	use Method A	use Method B
Water-resistive barrier is to be applied prior to window installation	use Method A1	use Method B1

(Image from ASTM E2212-19C document.)

8.1.1.2.1 Alternate Installation Methods—Refer to Appendix X4 for examples of other installation methods that have a successful performance history or are based on sound waterproofing principles.

8.1.1.2.1 Alternate Installation Methods—Refer to Appendix X4 for examples of other installation methods that have a successful performance history or are based on sound waterproofing principles.

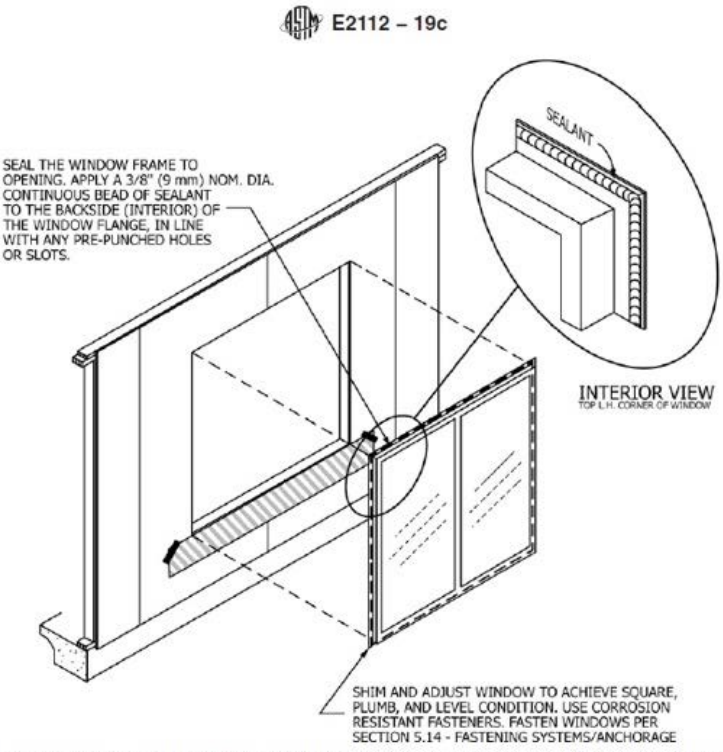
NOTE 23—All methods described below require the use of a 9 in. (230 mm) (minimum) wide approved flashing material. Flashing cut lengths are to be increased respectively depending on the actual width of the flashing used on the job. Flashing is always to be lapped in a water shedding (weather board, shingle, or ship-lapped) fashion.

FIS WARRANTY requires 9” wide strip membranes matching the ASTM E2112-19C strip membrane width requirements. Lengths of membranes are required to meet or exceed the ASTM E2112-19C Table 7.

If the fenestration manufacturer and flashing manufacturer, or design professional alters the width requirement of the strip flashing membrane they do so at their own RISK and assume all liabilities for such revisions.

Alternate Method A:
Water-Resistive Barrier Applied after the Window Installation
Flashing Applied Over the Face of the Mounting Flange

8.1.1.3.1 Method A: Water-Resistive Barrier Applied after the Window Installation—Flashing Applied Over the Face of the Mounting Flange:



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NOTE 1—For Method A1 the water-resistive barrier has been installed. A flap at the head of the window has been temporarily taped out of the way to allow for flashing and window installation.

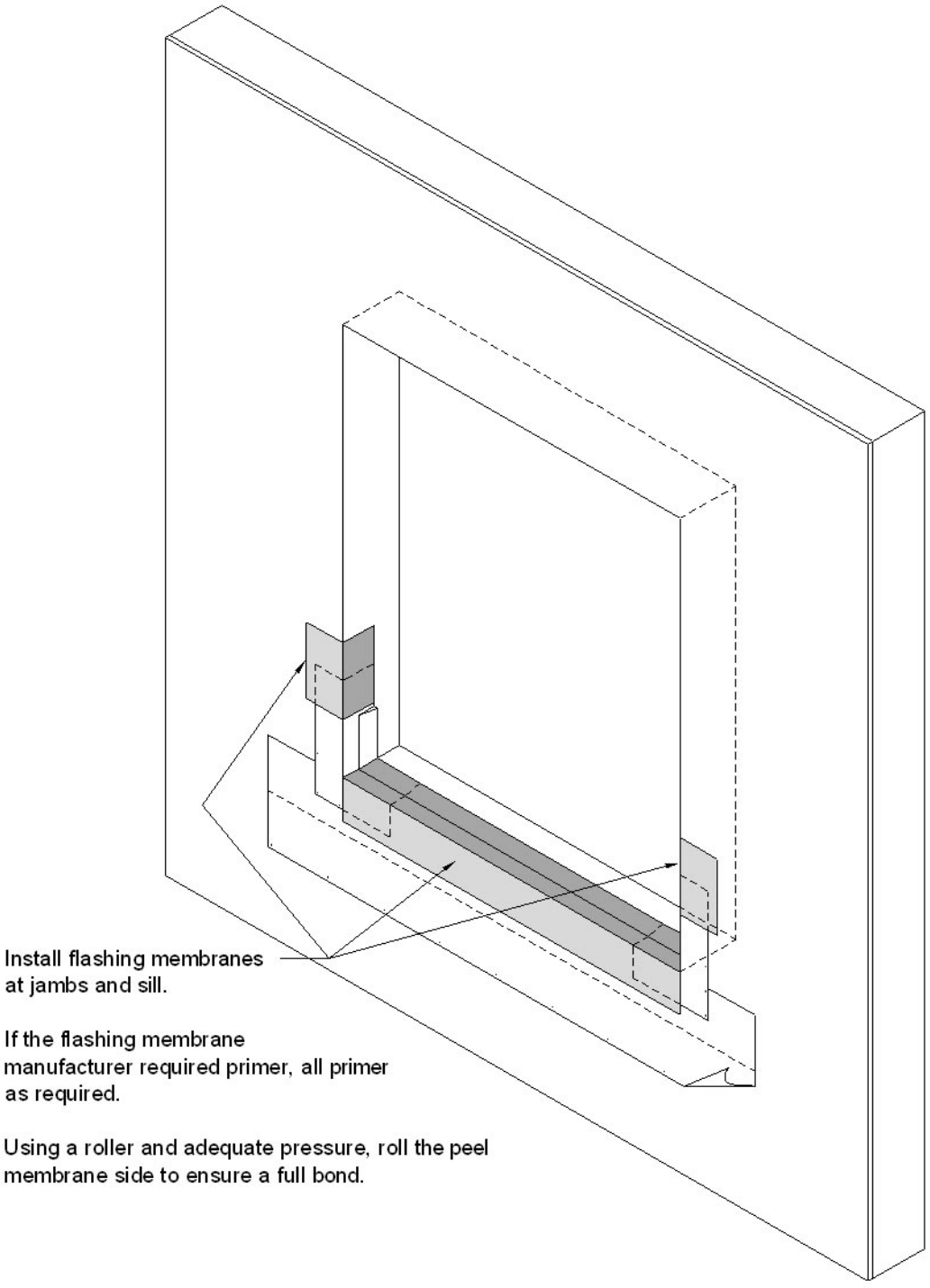
FIG. 22 Window Installation (Method A)

(Image from ASTM E2212-19C document.)

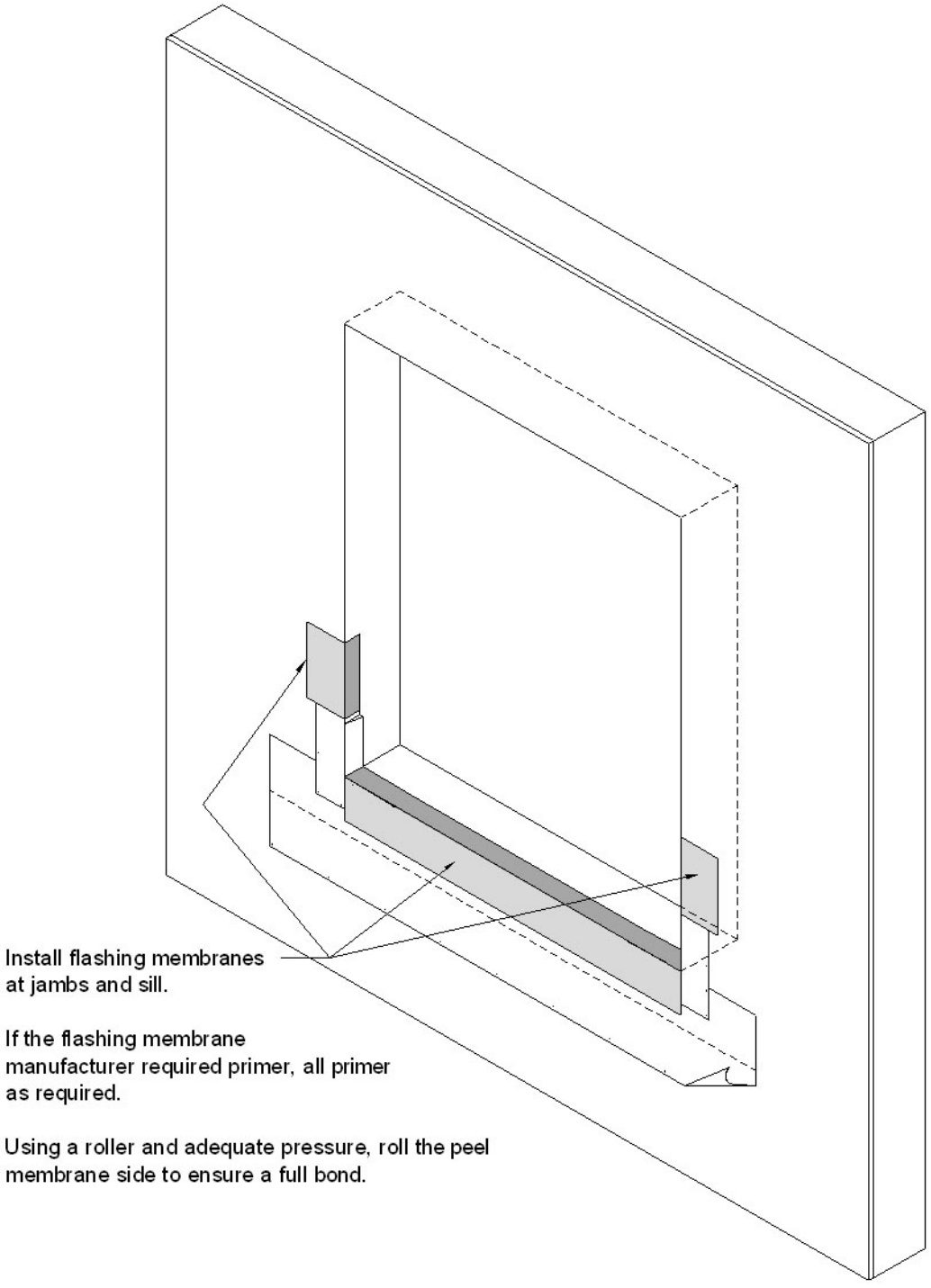
FIS WARRANTY does not support ASTM E2112-19C METHOD A.

It is FIS's opinion that ASTM E2112-19C METHOD A is an inferior fenestration installation detail. METHOD A does not have a moisture protecting drainage membrane installed within the bottom of the fenestration's rough opening to protect and direct moisture out of the rough opening to a location outboard of the weather resistive barrier. Moisture within the rough opening can occur due to a failing fenestration unit, or from condensation moisture within the rough opening.

Refer to figures FIS 8.1.1.3.1.1 and FIS 8.1.1.3.1.2 below for hybrid METHOD A options using FIS.



FIS 8.1.1.3.1.1 – METHOD-A-FIS-HYBRID with standard Corner Glove

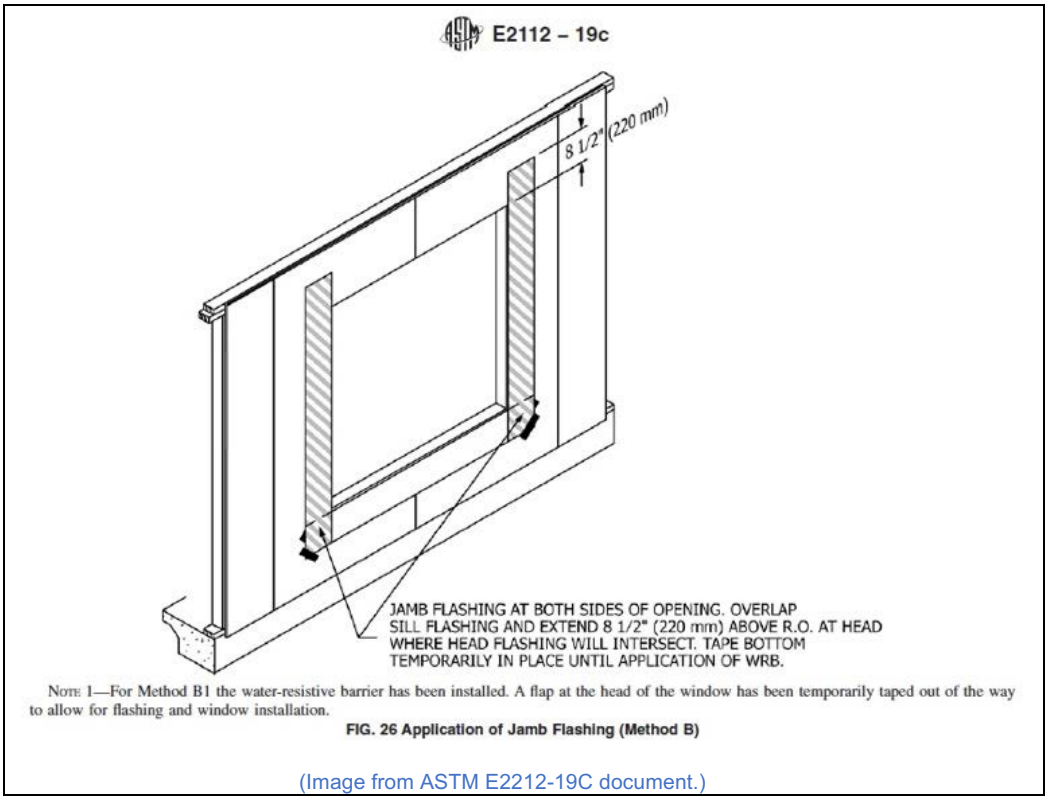


FIS 8.1.1.3.1.2 – METHOD-A-FIS-HYBRID with shallow Corner Glove

FIS WARRANTY does accept a METHOD A-FIS-HYBRID installation combination consisting of the FIS 'Corner Gloves', 'Centre Strip', and "Sloped Solid Shims' installed at the sill of the rough opening with a flashing membrane installed at the top edge of the 'Corner Glove' as seen above, along with the remained of ASTM E2112-19C's METHOD A requirements for bedding joints and fenestration installation.

Alternate Method B:
Water-Resistive Barrier Applied after the Window Installation

8.1.1.3.2 Method B:
Water-Resistive Barrier Applied after the Window Installation
Flashing Applied Behind the Face of the Mounting Flange:



NOTE 1—For Method B1 the water-resistive barrier has been installed. A flap at the head of the window has been temporarily taped out of the way to allow for flashing and window installation.

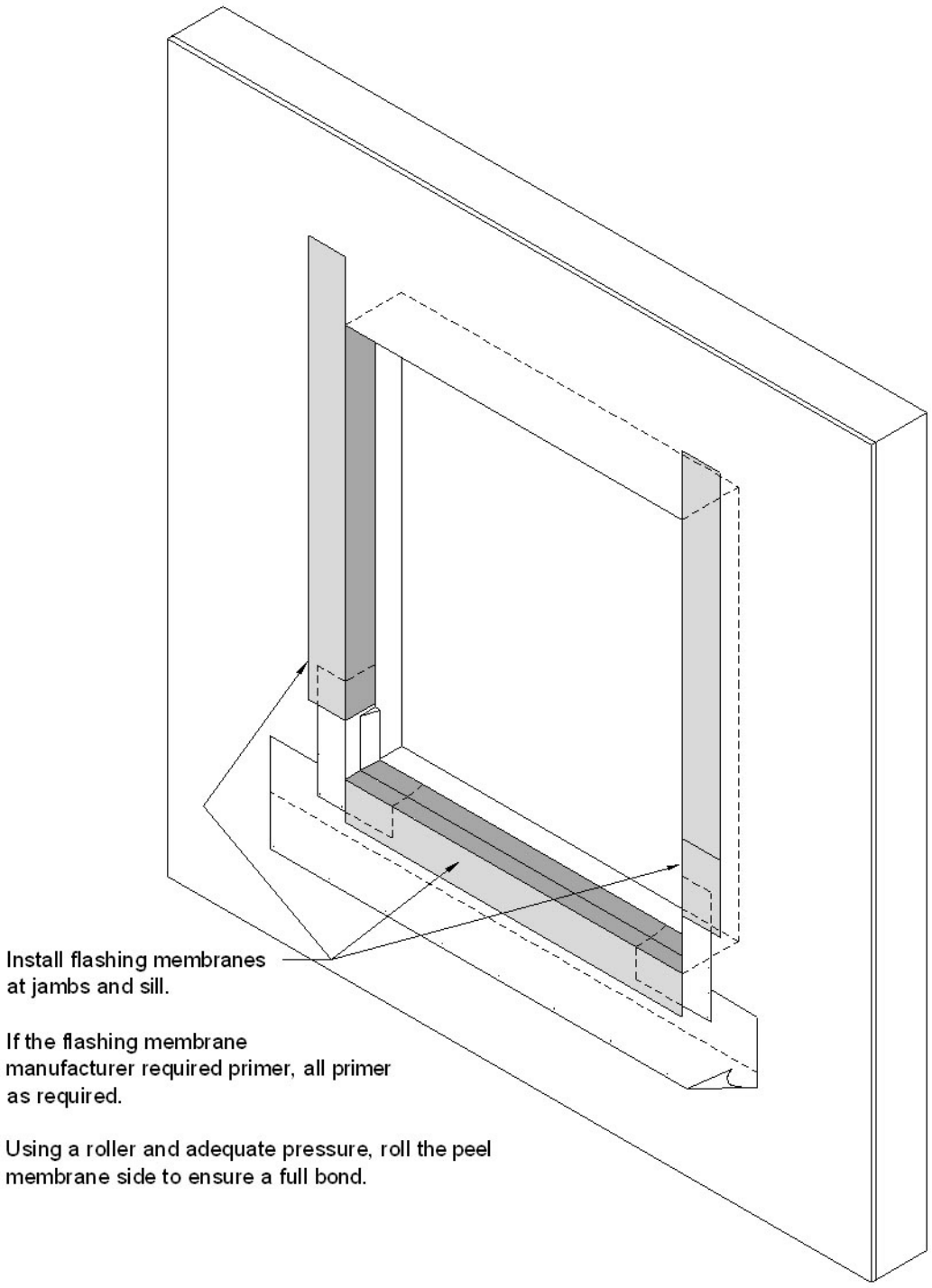
FIG. 26 Application of Jamb Flashing (Method B)

(Image from ASTM E2212-19C document.)

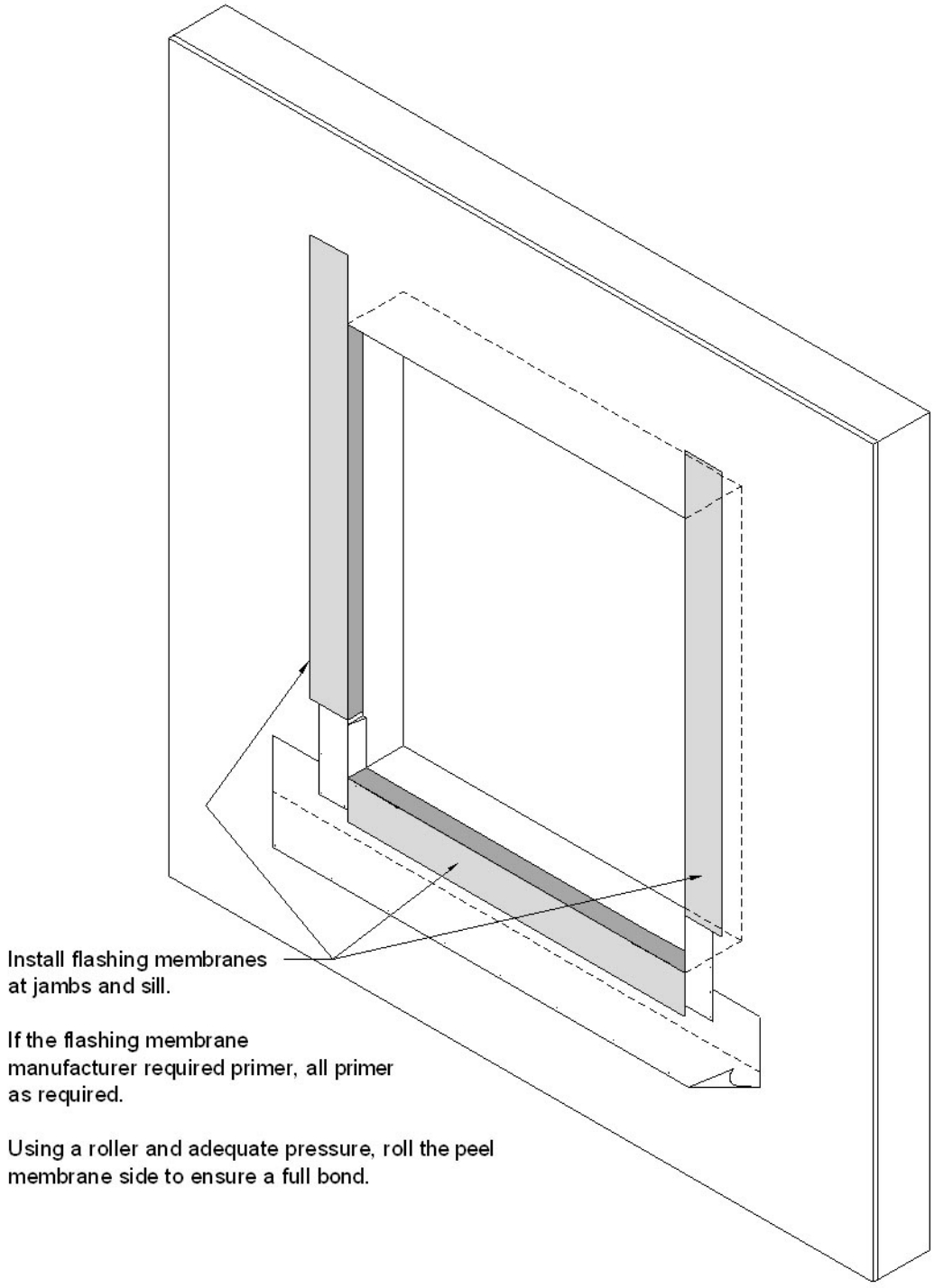
FIS WARRANTY does not support ASTM E2112-19C Method B.

It is FIS's opinion that ASTM E2112-19C Method B is an inferior fenestration installation detail. Method B does not have a moisture protecting drainage membrane installed within the bottom of the fenestration's rough opening to protect and direct moisture out of the rough opening to a location outboard of the weather resistive barrier. Moisture within the rough opening can occur due to a failing fenestration unit, or from condensation moisture within the rough opening.

Refer to figures FIS 8.1.1.3.2.1 and FIS 8.1.1.3.2.2 below for hybrid METHOD A options using FIS.



FIS 8.1.1.3.2.1 – METHOD-A-FIS-HYBRID with standard Corner Glove



FIS 8.1.1.3.2.2 – METHOD-A-FIS-HYBRID with shallow Corner Glove

FIS WARRANTY does accept a METHOD-B-FIS-HYBRID installation combination consisting of the FIS ‘Corner Gloves’, ‘Centre Strip’, and “Sloped Solid Shims’ installed at the sill of the rough opening with a flashing membrane installed lapping the top edge of the ‘Corner Glove’ and extending to min 8” above the rough opening, as seen above, along with the remained of ASTM E2112-19C’s METHOD B requirements for bedding joints and fenestration installation.

Alternate Method A1:
Water-Resistive Barrier Applied After the Window Installation
Flashing Applied Over the Face of the Mounting Flange
in a 36” to 42” Wide Weather Resistive Barrier Application

8.1.1.3.3 Method A1:
Water-Resistive Barrier Applied Prior to the Window Installation
Flashing Applied Over the Face of the Mounting Flange

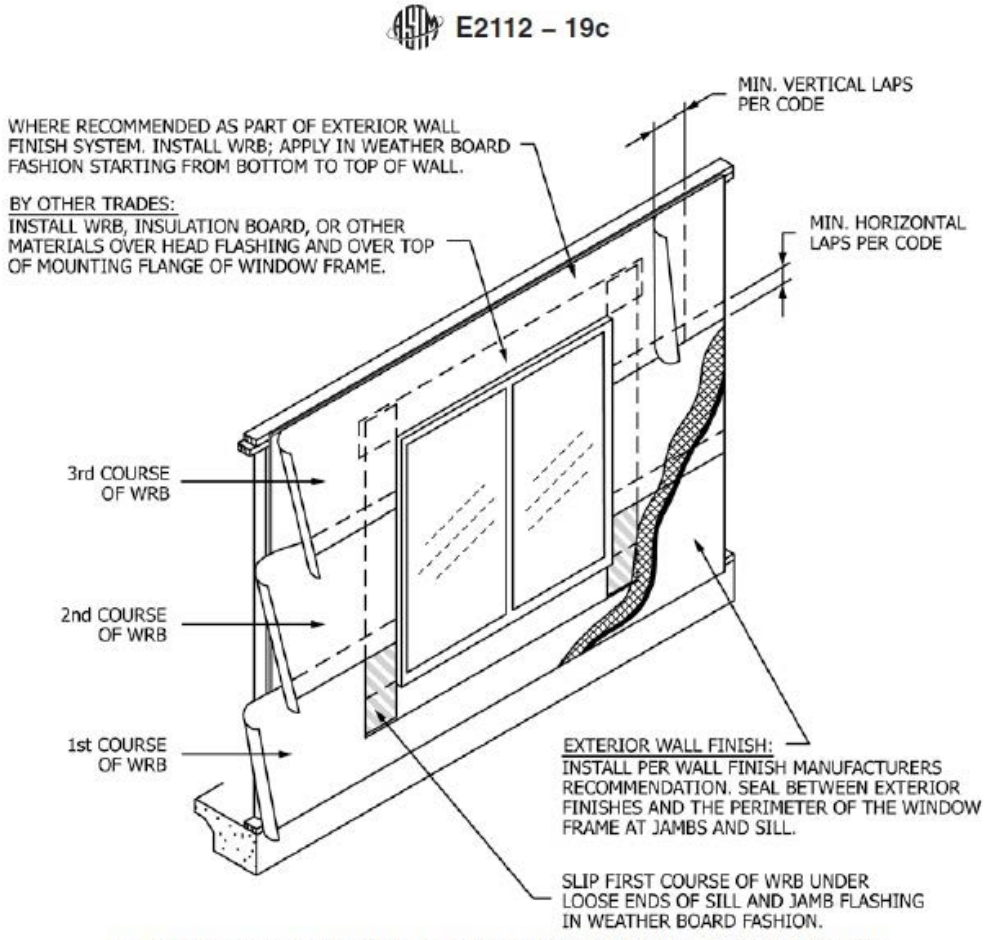


FIG. 25 Water-Resistive Barrier Application (Method A Shown—Method B Similar)

(Image from ASTM E2212-19C document.)

ASTM E2112-19C METHOD A1 describes the installation of the weather resistive barrier over top of an ASTM E2112-19C METHOD A or B previously installed window. The weather resistive barrier is installed in an overlapping, outboard shingled direction around a fenestration unit that was previously installed.

FIS is compatible with ASTM E2112-19C METHOD A1 providing the fenestration units was installed as per a METHOD-A-FIS-HYBRID or METHOD-B-FIS-HYBRID installation noted herein.

Weather resistive barriers are not covered under the FIS WARRANTY and requirements for weather resistive barriers are required to comply with ASTM E2112-19C.

Alternate Method B1:
Water-Resistive Barrier Prior to the Window Installation
Flashing Applied Behind the Mounting Flange
in a 8 foot Wide Weather Resistive Barrier – House Wrap Application

8.1.1.3.4 Method B1: Water-Resistive Barrier Applied Prior to the Window Installation—Flashing is Applied Behind the Mounting Flange:

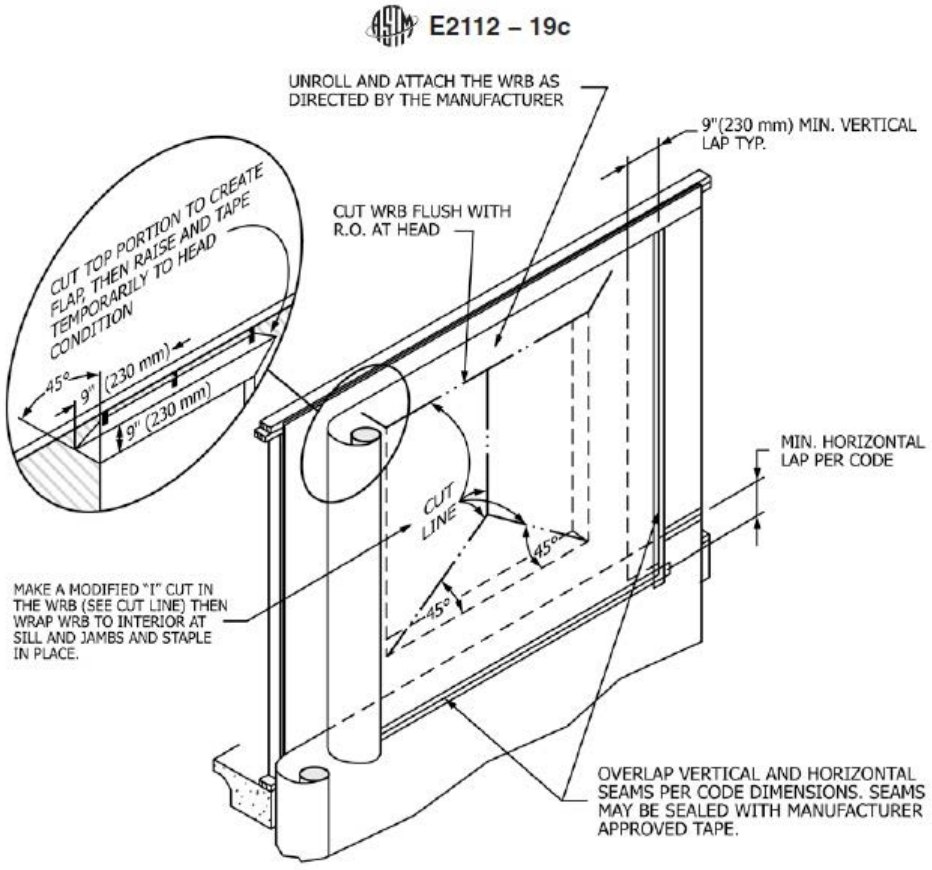


FIG. 28 Water-Resistive Barrier-House Wrap

(Image from ASTM E2212-19C document.)

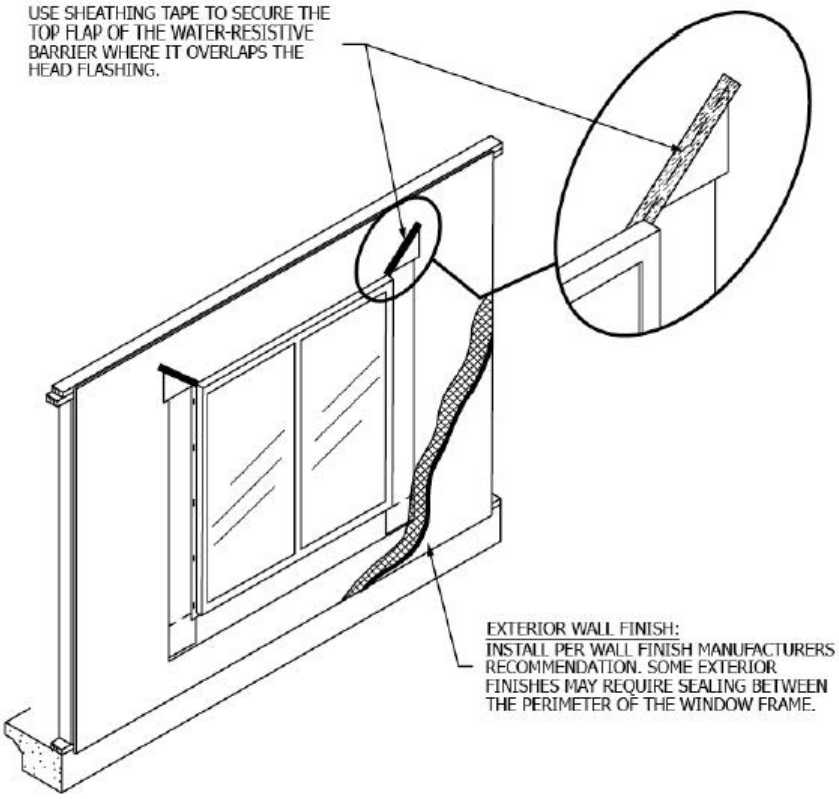


FIG. 29 Secure WRB at Head (Method A1 and B1)

(Image from ASTM E2212-19C document.)

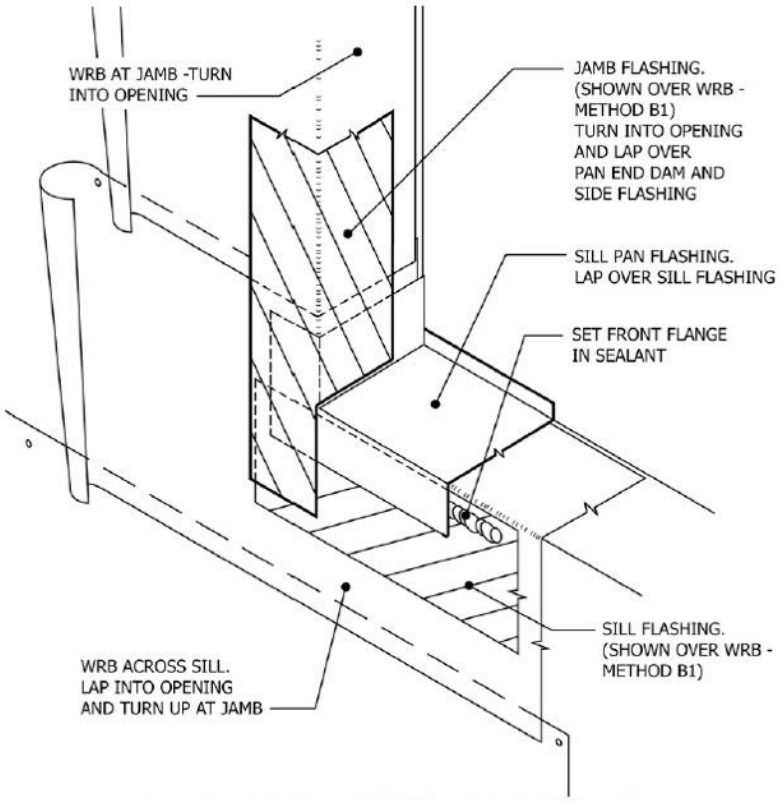


FIG. 30 .1 Sill-Jamb Corner with Sill Pan Flashing (Method B1) *(continued)*

(Image from ASTM E2212-19C document.)

ASTM E2112-19C METHOD B1 describes the installation of the weather resistive barrier over top of an ASTM E2112-19C METHOD A or B previously installed window. The weather resistive barrier is installed in an overlapping, outboard shingled direction around a fenestration unit that was previously installed.

FIS is compatible with ASTM E2112-19C METHOD B1 providing the fenestration units was installed as per a METHOD-A-FIS-HYBRID or METHOD-B-FIS-HYBRID installation noted herein.

Weather resistive barriers are not covered under the FIS WARRANTY and requirements for weather resistive barriers are required to comply with ASTM E2112-19C.

A1 Low Pressure Aerosol Foam Sealants and Pre-Compressed Foam Tapes Used for Air Control in the Rough Opening gap.

Type A Material = Aerosol Foam Sealants
Type B Material = Pre-Compressed Cellular Tapes

A1.2 Low Pressure foam sealants (Type A) and Low Pressure pre-compressed cellular (Type B) tapes are used to insulate and reduce air leakage through the rough opening gap. When using these seals and sealants, the installer should consider the following factors prior to installation:

All low expansion spray foams are not equal.
FIS Warranty requires the use of high performance low pressure aerosol foam sealants that meet the following requirements:

- Minimum R-value of 4.2 per inch
- High percentage closed cell structure
- Develop a final cured skin of high closed cell percentage that resists air, moisture and vapour penetration.

The following products are acceptable products for the FIS WARRANTY

- Handifoam Low Expansion One-Component Polyurethane Foam Sealant (OCF)
  (www.handifoam.com)
  R-Value: R-4.7 per inch
  Density 1.1lb./ft3 (17.7 kg.m3)
  67% Closed Cell
  Application temperature range:
  Ready to cut > 1 hour

- Hilti CF 812 Window & Door Low Pressure Filler Foam
  R-Value: R-4.27 per inch
  High percentage closed cell structure
  Application temperature range: 41 °F to 95 °F (5 °C to 35 °C)
  Ready to cut after 20 minutes

- LaPage Quad Foam Window and Door Installation Foam
  R-Value: R-5 per inch
  High percentage closed cell structure
  Product should be stored above 5°C (41°F) at least 12 hours before application. During application, working environment and substrates should be between -10°C (14°F) and 30°C (86°F).
  Ready to cut in 25-35 minutes
  Does not bond to polyethylene, polytetrafluoroethylene (PTFE)/Teflon® or siliconized surfaces

- Sika Boom AS, All Season, Multipurpose, Low Expansion Polyurethane Foam
  R-Value: R-4.7 per inch
  Density: 22 kg.m3
  High percentage closed cell structure
  Application temperature range: May be applied year around at temperatures ranging between -12 °C and 30 °C
  Ready to cut 30-45 minutes

A1.2.1 “Low Pressure” refers to type A and B material and is the force exerted by the material on the fenestration frame during its curing time and or recovery time.

A1.2.2 Choose a low-pressure aerosol foam sealant or low pressure pre-compressed foam tape.

FIS WARRANTY requires the use of low pressure expansion foams only.

A1.2.3 Select a material that provides an airtight seal of the gap.

FIS WARRANTY requires the use of low pressure expansion foam with a high percentage of closed cells to resists air, moisture, and vapour penetration. A list of acceptable products is noted above.

A1.2.4 The foam applicator for aerosol foam sealant should be controllable in terms of foam volume and foaming rate (see Figs. A1.1 and A1.2).

A1.2.5 The gap should not be over filled.

DO NOT OVER FILL THE PERIMETER CAVITY GAP.

FIS WARRANTY requires that the low pressure expansion foam be installed in smaller applications as seen in FIS FIS Fig. A1.4.1 – Low Pressure Expansion Foam Application and the following details 1, 2, 3 & 4 below in this section) where smaller widths of foam are installed to fill the perimeter cavity in multiple applications.

The reason for smaller and more applications is that the skin of the expanded foam MUST REMAIN ENTACT as the skin is the densest with the highest percentage of closed cells. The skin provides the highest resistance to air, moisture, and vapour penetration. While the skins of the higher performance low pressure expansion spray foam are not rated as less than 1 PERM to function as a Type II vapour retarder, the vapour permeability of the skin is significantly lower than the core of the low pressure expansion foam, significantly reducing the vapour drive into the fenestration's perimeter cavity. The increased number of skins within the perimeter cavity serves to further increase resistance to air, moisture, and vapour penetration.

Therefore, DO NOT over fill the entire cavity with one heavy spray and have it expand out of the perimeter cavity and then must cut off the excess foam, as then the air, moisture, and vapour sealing skin has then been removed allowing a significantly higher rate of air, moisture, and vapour to drive into the perimeter cavity.

With the interior skin cut off, the most restrictive vapour permeable portion of the spray foam will be the skin on the outer side, basically placing the most restrictive vapour retarding material on the exterior cold side of the wall assembly. This will lead to increased vapour condensation within the outer spray foam's core and deterioration of materials within the perimeter cavity via freeze/thaw ice lensing cycles and moisture damage.

If the perimeter cavity is over filled, FIS requires cutting out the foam and re-applying the foam in smaller applications so the skin can remain. Or, cut out the foam to a ½" depth, clean the side surfaces of foam, and install a sealant product over top of the foam to seal the interior side of the perimeter cavity gap.

A1.2.6 A suitable installed foam (Type A or B) fill should not distort the fenestration frame more than 1⁄16 in. (1.5 mm) along any side. Before any material is used to fill the rough opening gap, test the window for ease of operation and cut off the excess portions of the shims.

A1.3.4 The rough opening gap should be at least wide enough to permit insertion of the barrel of the foam applicator for Type A material. Gaps smaller than that recommended by the foam manufacturer should be sealed only at the interior face of the gap with a minimal size bead. A1.3.5 Foam between the new frame and the old frame in a replacement window application (see Fig. A1.3). A1.3.6 If the rough opening gap is overfilled, preventing the installation of trim members, the foam must be trimmed to remove the excess. Type A material must be manually removed using a sharp knife after it cures.

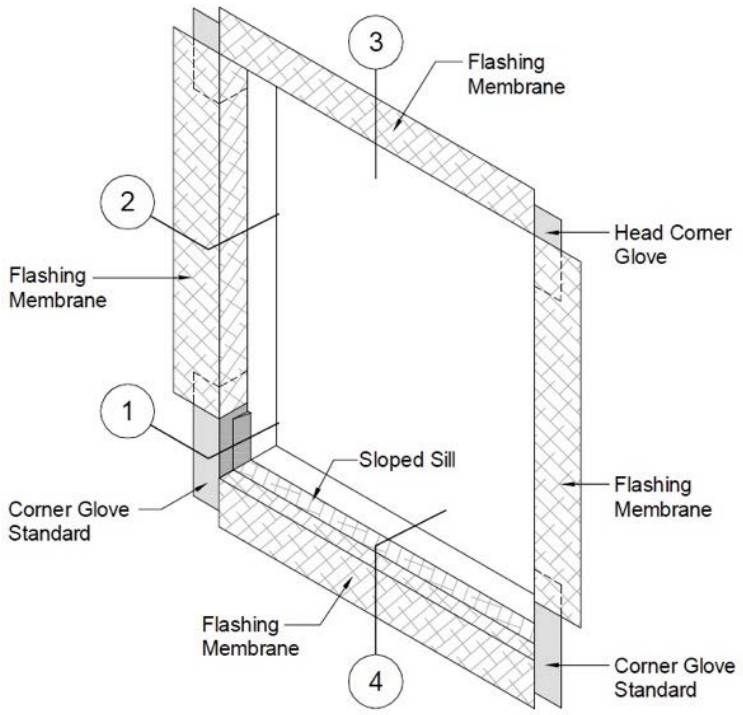
A1.3.7 If the rough opening gap is over 2 in. (50 mm) deep, the installer may decide to inject a second optional bead of Type A foam around the entire fenestration product perimeter creating an air sandwich (see Note A1.2). The first bead is allowed to become tack-free (at least 10 min) before the second bead is applied. On some fenestration products, one bead is applied from the outside and another from the inside. If windows are flanged, both beads are applied from the inside leaving an air gap between them (see Fig. A1.4).

A1.4 Precautions:

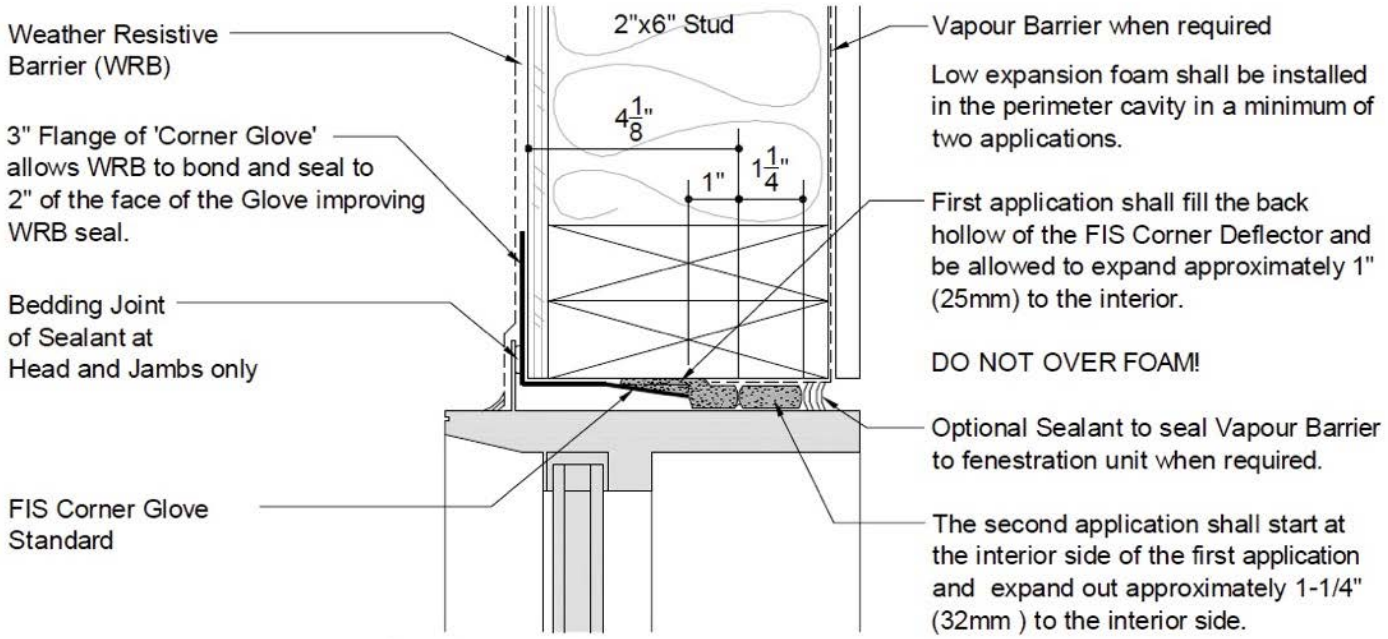
A1.4.1 DO NOT OVERFILL THE CAVITY. With Type A material, allow for foam expansion during cure.

A1.4.3 Wait until foam has cured when using Type A material (consult manufacturer's recommendation) before cutting excess foam flush with wall and installing trim (see Fig. A1.5). Check operation of window or door one final time. (Warning—Foam cleaners or solvents may not be compatible with all fenestration materials. Consult the fenestration manufacturers' recommendations before using cleaners on fenestration products.)

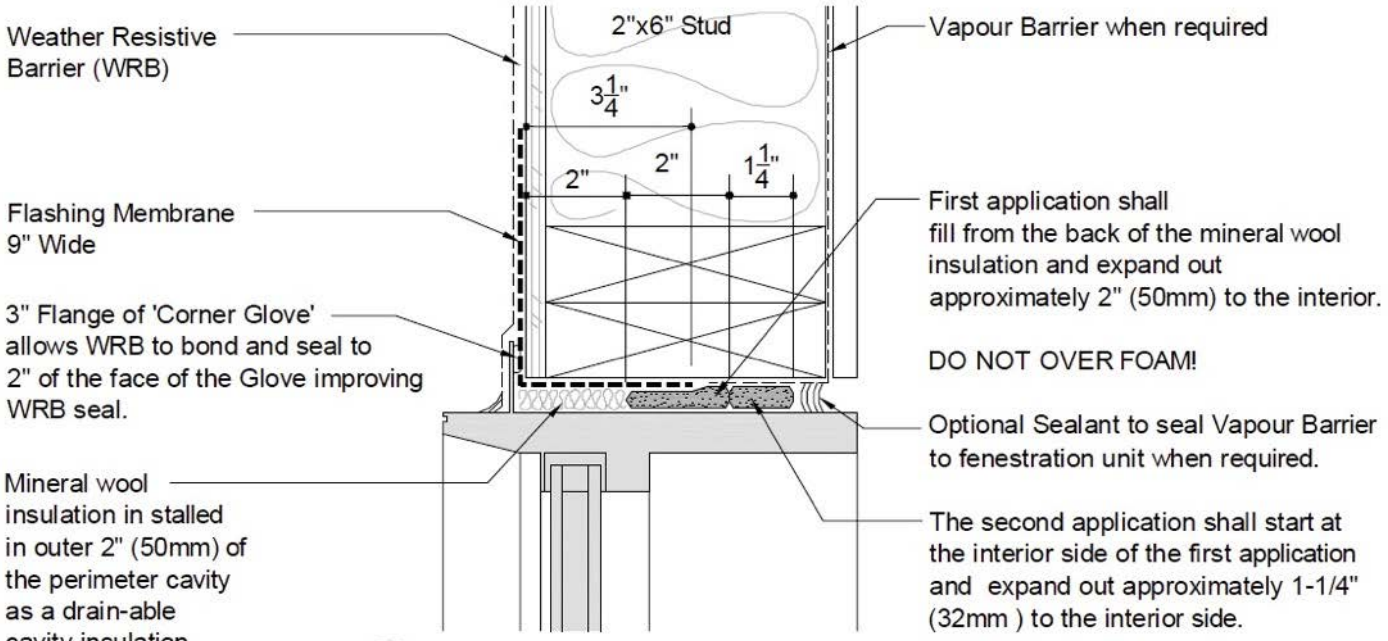
FIS requires the use of spray-in-place low pressure expansion foam.



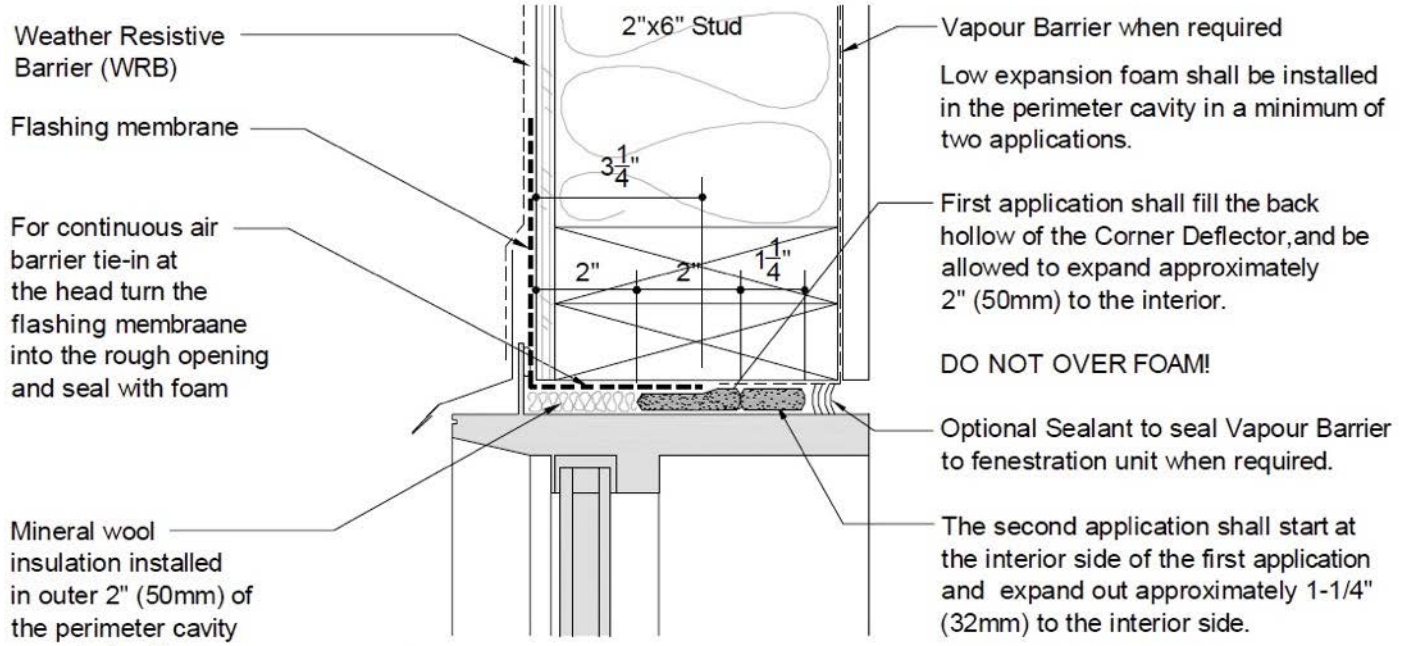
FIS Fig. A1.4.1 – Low Pressure Expansion Foam Application Using Standard Corner Glove
Refer also to detail 1, 2, 3 & 4 below.



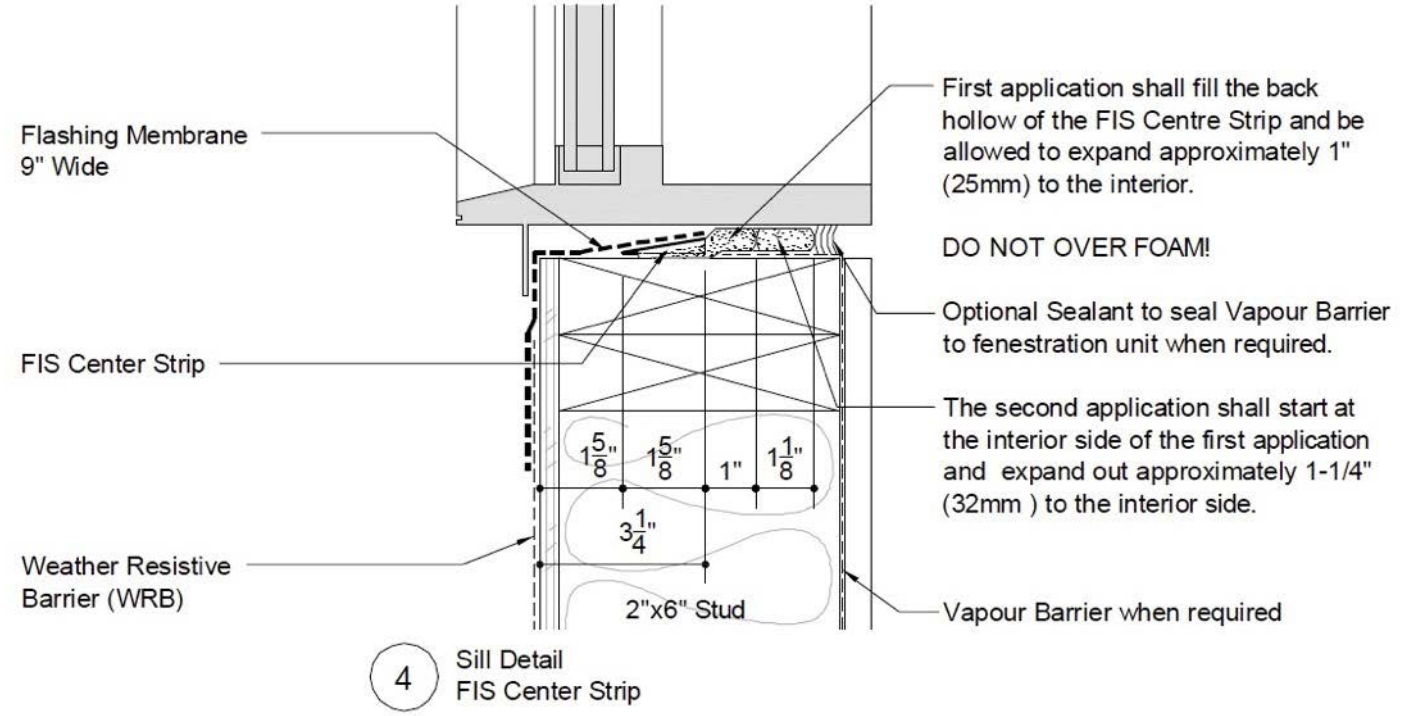
1 Jam Detail at Lower FIS Corner Glove Standard



2 Jam Detail above FIS Corner Glove Standard

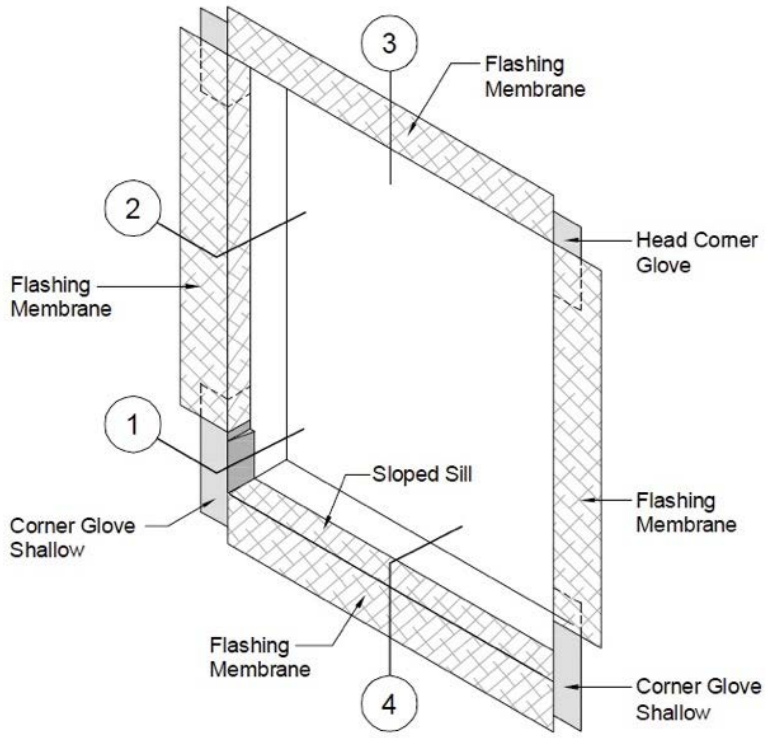


3 Head Detail
FIS Corner Glove Standard

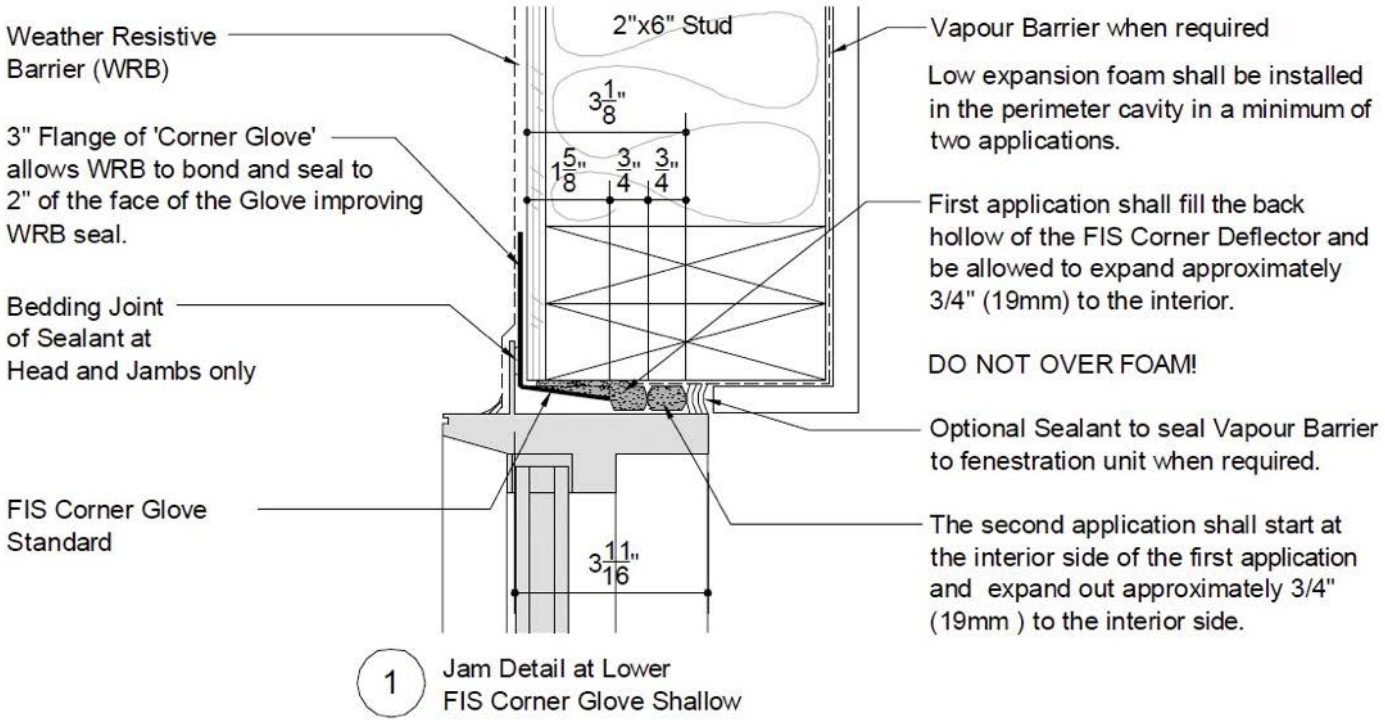


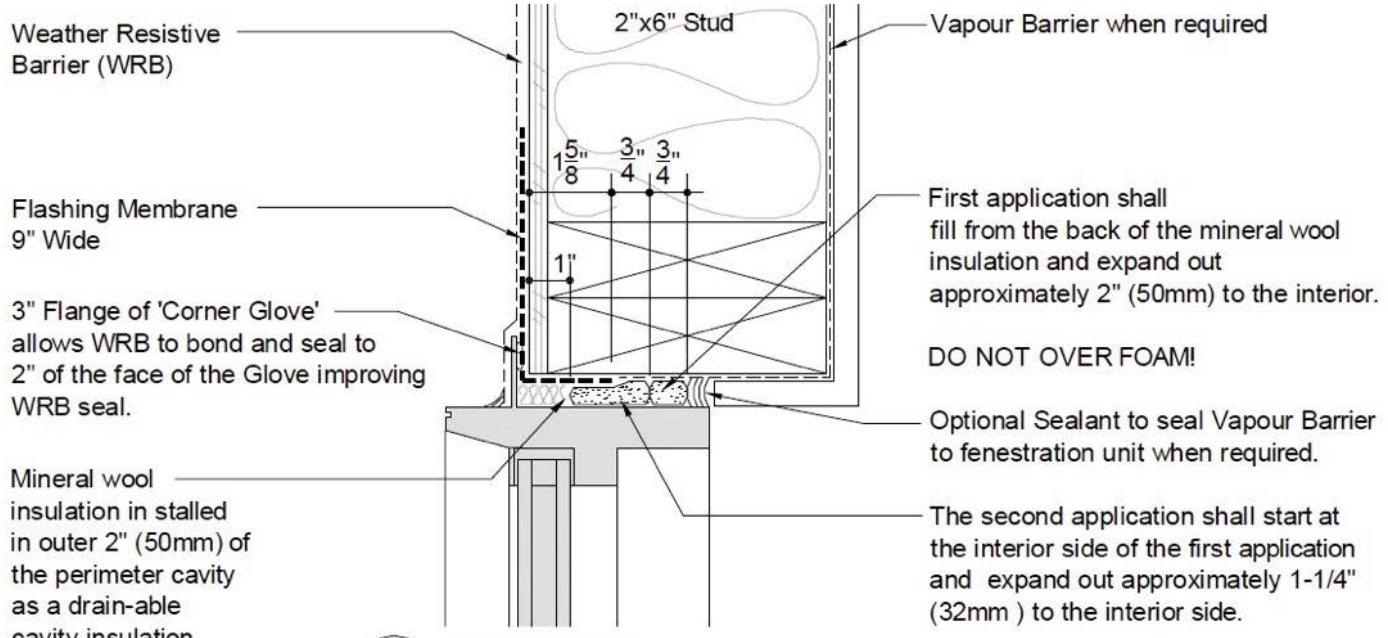
4 Sill Detail
FIS Center Strip

FIS requires the use of spray-in-place low pressure expansion foam.

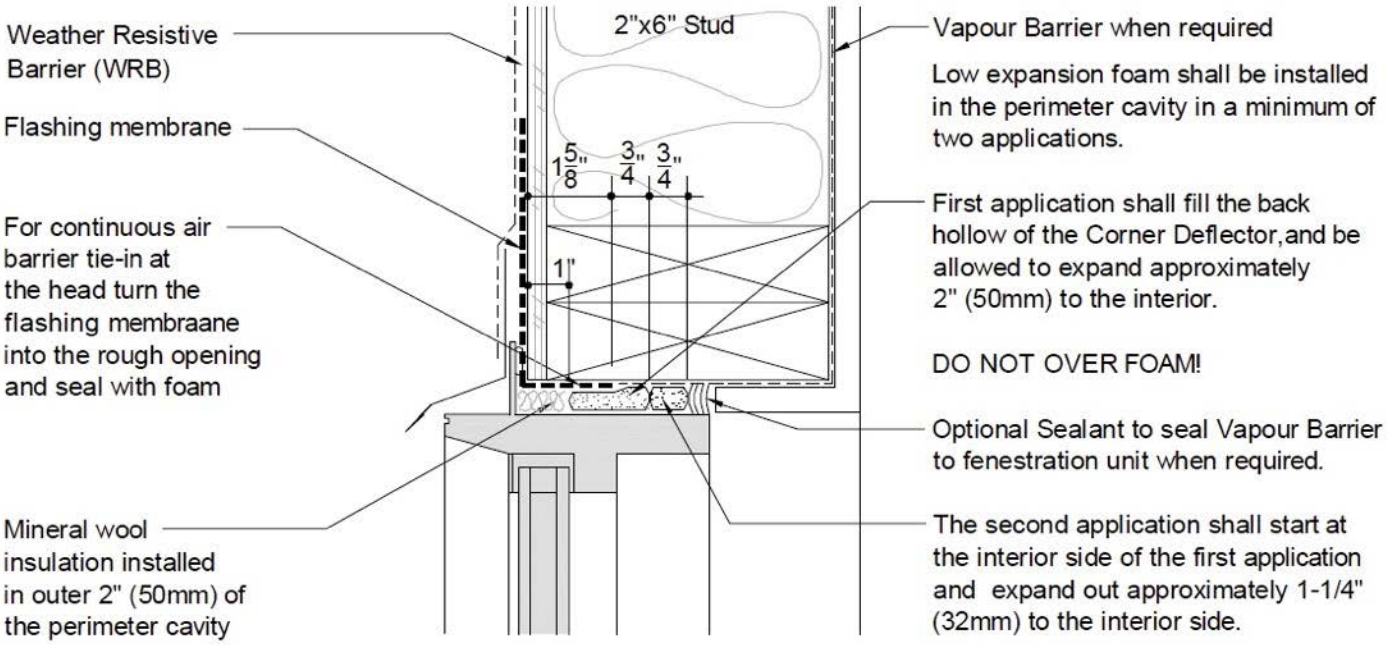


FIS Fig. A1.4.2 – Low Pressure Expansion Foam Application Using Shallow Corner Glove
Refer also to detail 1, 2, 3 & 4 below.

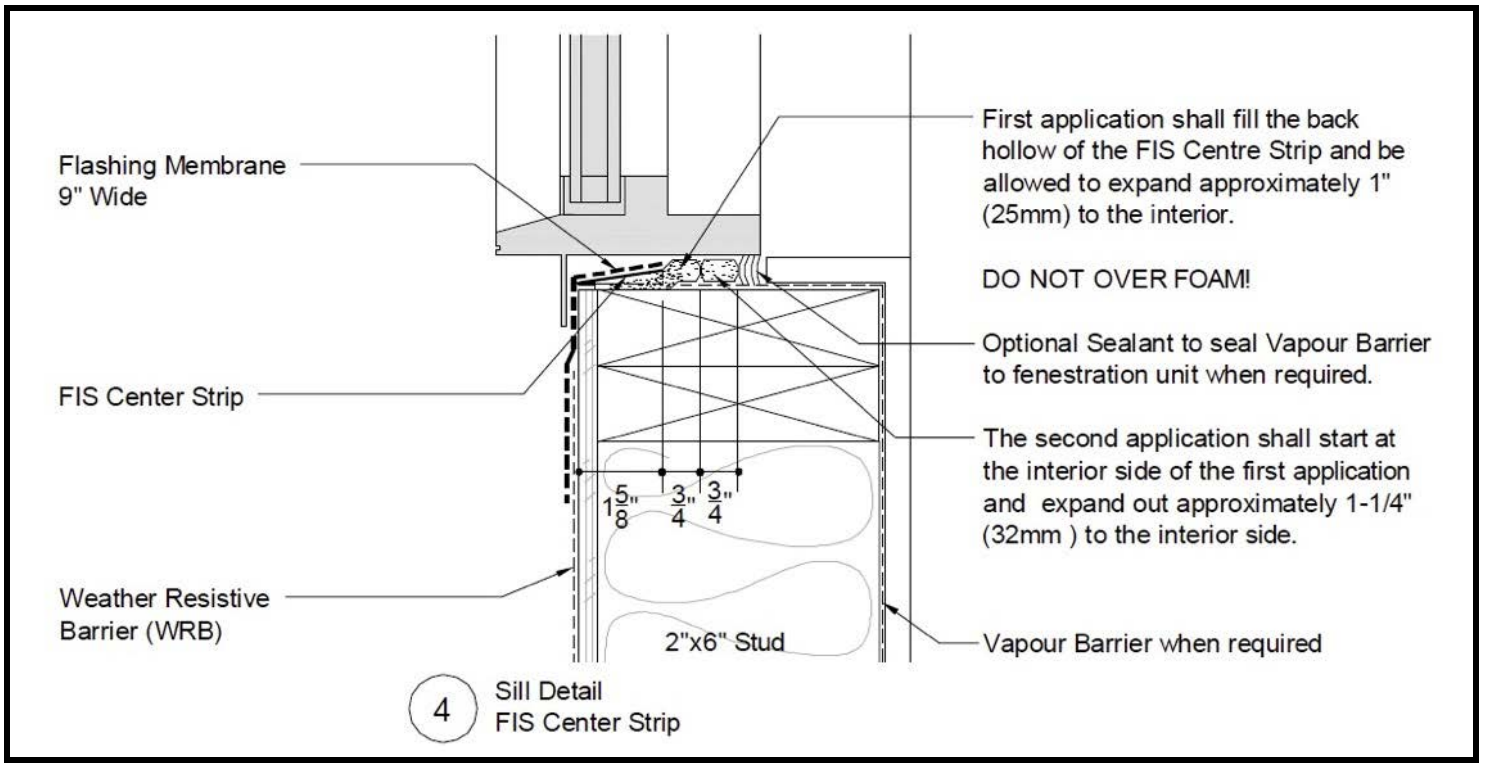




2 Jam Detail above FIS Corner Glove Shallow



3 Head Detail FIS Corner Glove Shallow



A4. Sealants

A4.1 The following tables are provided to aid in sealant selection. This information should be used only as a general guideline to narrow down the number of sealants that may be suitable for a given use and substrate materials.

A4.2 Uses and applicable specifications are given in Table

A4.1. It should be recognized by the purchaser or design professional that not all sealants meeting a listed specification are suitable for the intended use. Commercially available products meeting a listed specification vary considerably in performance characteristics. Suitability of a specific product should be verified with the sealant supplier following the guidelines in 5.10.1.

A4.3 Table A4.2 provides general adhesion characteristics for the most commonly used types of sealants. A wide variety of materials exists within most of the listed substrate categories, and commercially available sealant products within any one sealant type can vary considerably in adhesion to a given material. A range is provided where a significant variation in adhesion between products can be expected. For further information see Terminology C717. (See AAMA 800).

E2112 – 19c

TABLE A4.1 Applicable Specifications

NOTE 1—Where more than one specification is listed for an application, the sealant is required to meet at least one of the specifications.

NOTE 2—X = Applicable Specification.

Use	Perimeter Joints Total Cyclic Movement		Bedding of Fin, Flashing, Etc	Thresholds	Sills	End Dams Panning
Specification	>15 %	<15 %				
Specification C834 Emulsion (Latex)		X and AAMA 808				
Specification C920 Elastomeric	X	X and AAMA 808	X	X	X	X
Specification C1085 Butyl Solvent Release		X and AAMA 808	X	X	X	X
Specification C1311 Solvent Release		X and AAMA 808	X	X	X	X
AAMA 804.3 Butyl Tapes			X			
AAMA 808.3 Ext. Perimeter		X with above	X			
AAMA 809.2 Non-Drying			X			X
Applicable Sections	5.10.3.1, 7.2	5.10.3.2, 7.2.3	5.10.6, 8.1.1, 10.2.1	5.10.8	5.10.8.1, 5.10.8.2	5.10.8.2

NOTE 1—N/A = Not Applicable
N/R = Not Recommended
G = Good = Adhesion of 5 PLI and 75 % cohesive failure minimum as measured by Test Method C794
F = Fair = Adhesion of 5 PLI and less than 75 % cohesive failure as measured by Test Method C794
P = Poor = Adhesion less than 5 PLI and predominantly adhesive failure

Sealant Type	Silicone	Latex		Poly-ure-thane	Solvent Release		Butyl Tape	Notes About Substrates
Specification	C920	C920	C834	C920	C1085	C1311	AAMA 809	AAMA 804	
Aluminum Mill Finish	G	G	F	G	G	P-G	G	G	
Aluminum Anodized	G	G	F	G	G	P-G	G	G	
Building Paper (Asphalt)	P-G	P-G	P-G	P-G	P-G	P-G	G	G	Compatibility with solvent release sealants shall be verified
Brick	G	G	F	G	G	P-G	NA	NA	
Concrete	F-G	F-G	P-F	G	G	P-G	G	P	Adhesion in areas of prolonged moisture exposure shall be verified
Copper	P-G	P-G	P-F	F-G	G	P-G	G	G	Some sealants can produce corrosion
EIFS	F-G	F-G	P-F	F-G	NR	NR	NA	NA	Test Method C1382 is used to determine adhesion to finish or base coats
Steel Galvanized	P-G	P-G	P-F	P-G	G	P-G	G	G	
Glass	G	G	F	P-G	F	P-G	NA	G	Test Method C794 after ultraviolet exposure is used to determine adhesion
Painted Surfaces	P-G	P-G	P-G	P-G	P-G	P-G	G	P-G	Adhesion of a specific sealant product and job site coating(s) should be verified
Polyethylene	P	P	P	P-G	P-G	P-F	G	G	
Stone	G	G	F	G	G	F-G	G	P-F	Resistance to vehicle migration and staining should be verified
Stucco	G	G	F	G	F-G	F-G	NA	NA	
Vinyl	P-G	P-F	P-F	P-G	P-G	P-G	G	P-G	Cleaning by Isopropyl Alcohol wipe is recommended
Wood Raw	G	G	F-G	G	F-G	P-G	G	P-G	
Wood Treated	G	G	F-G	G	F-G	P-G	G	P-G	

(Image from ASTM E2212-19C document.)

FIS is compatible with most available sealants. The architect, engineer or installer shall specify or select an appropriate sealant based on ASTM E2112-19C Table A4.1 to suite the building's adjacent components and follow the sealant manufacturer's written instructions for sealant selection, primers, and installation.

X4. Alternative Installation Methods

The following illustrates schematic flashing Methods C and C1 that combine flashing techniques from ASTM E2112 Methods A, B, A1, and B1. Methods D and D1 add sill pan flashing or rigid head flashing, or both, to the details of C and C1.

X4.1 Basis of Design

X4.1.1 Methods C, C1, D, and D1 include a framed wall, typically wood studs or light-gauge metal framing; an exterior wall sheathing typically wood-based, gypsum core, or cement fiber; a single (punched) window or door opening; sealant; nail-on (finned) window or door frame; perimeter R.O. (rough opening) flashing and a sheet-applied water-resistive barrier (WRB).

X4.1.2 The schematic sequences of C and C1 do not include a complete sill pan flashing or a rigid head flashing (drip cap). When the schematic sequences include a complete sill pan flashing or a rigid head flashing (drip cap), these methods are identified as Methods D and D1.

X4.2 Perimeter Flashings

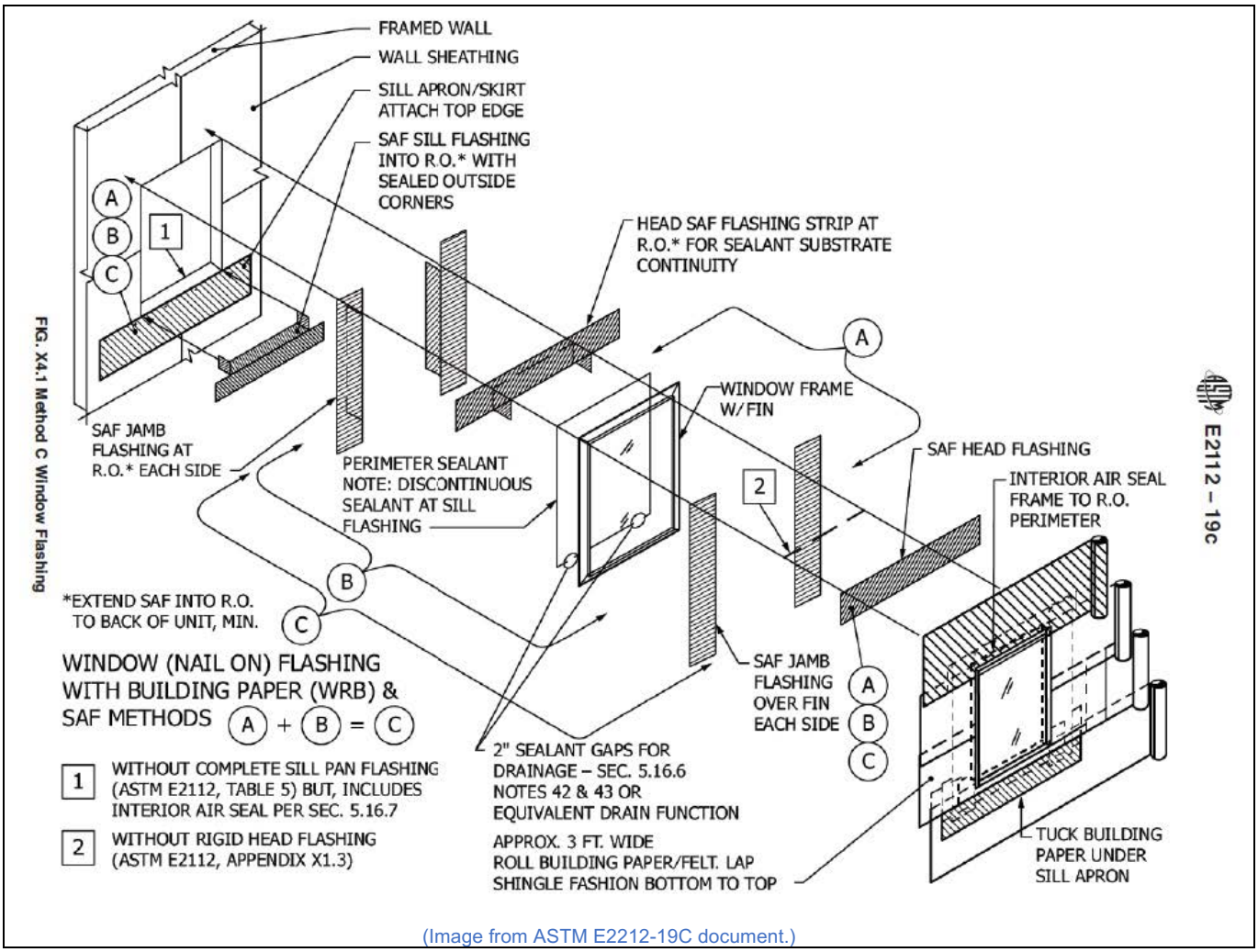
X4.2.1 Methods C, C1, D, and D1 show self-adhered flashings (SAF) as the perimeter flashing under and over the window or door fins. To provide air and water barrier continuity, the SAF is extended into the rough opening (R.O.) at jambs, head, and sill to at least the back of the fenestration unit to receive an interior air seal between SAF and the back of the unit frame. Prior to the window installation, a strip of SAF is applied along the top of the R.O. head for continuity of the sheathing substrate SAF around the opening. A uniform substrate before the window installation provides consistency for the fin bedding sealant application. The SAF conforms to Appendix X1.2 and AAMA 711.

X4.3 WRB

X4.3.1 Methods C, C1, D, and D1 utilize a water-resistive barrier of building paper (or building felt) of approximately 3 ft. wide rolls for Methods C and D. Method C1 and D1 utilize polymeric-type WRB in approximately 9 ft. wide rolls. Other widths of WRB can be used for Methods C, C1, D, and D1. Each method anticipates a mechanically attached sheet-applied material for the WRB applied in a shingle fashion.

X4.4 Installation

X4.4.1 Unless otherwise noted in the figures, standard installation techniques described in the text of Practice E2112 or contained in the manufacturer's instructions apply to complete these alternate methods.

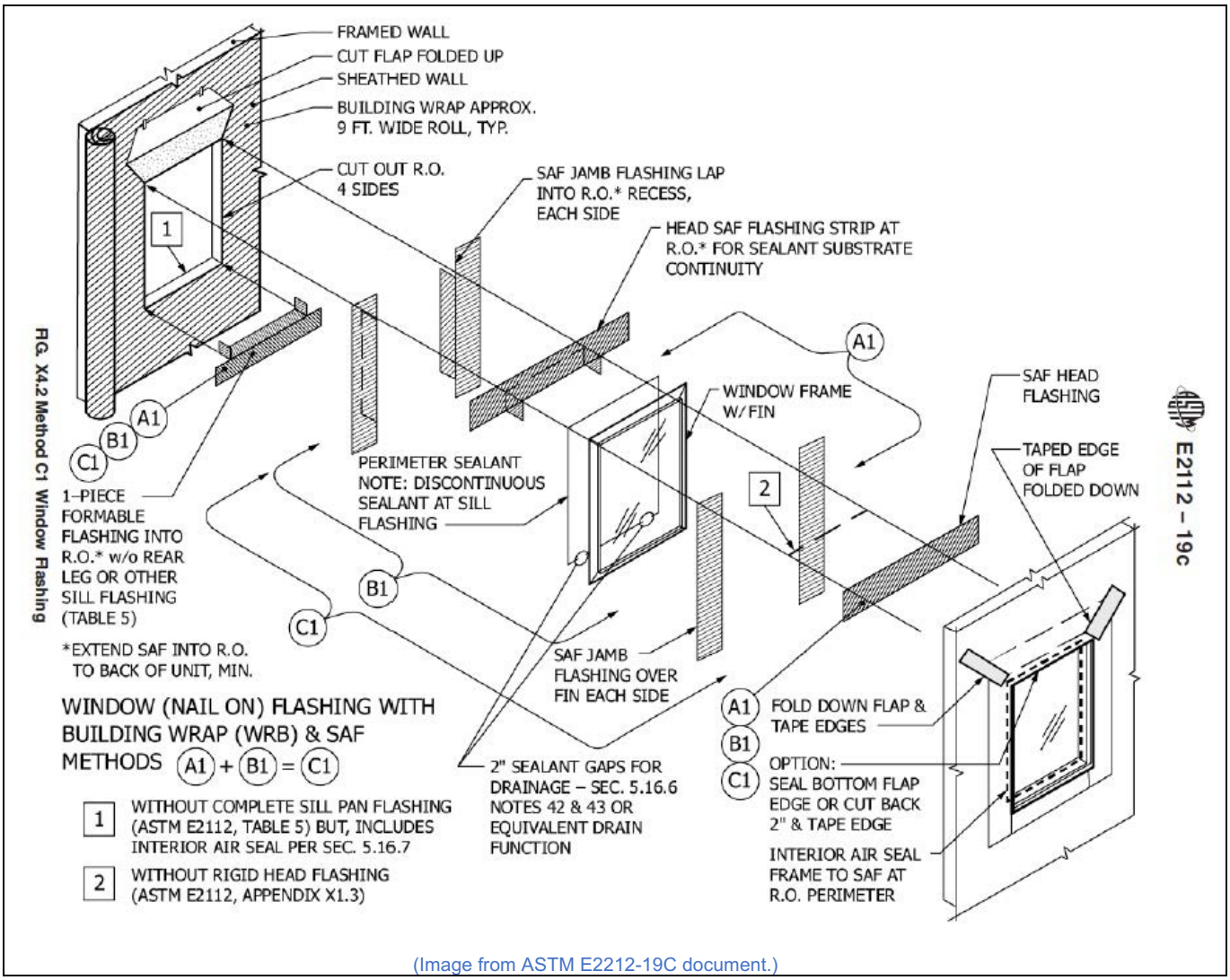


(Image from ASTM E2212-19C document.)

ASTM E2112-19C METHOD C describes the installation of the fenestration unit, flashing membranes and the installation of the weather resistive barrier over top of an ASTM E2112-19C METHOD A or B previously installed fenestration unit. The weather resistive barrier rolls are installed in strips in an overlapping, outboard shingled direction around the fenestration.

FIS is compatible with ASTM E2112-19C METHOD C providing the fenestration units was installed as per the METHOD-A-FIS-HYBRID or METHOD-B-FIS-HYBRID installation noted herein as seen in figures;

FIS 8.1.1.3.1.1 – METHOD-A-FIS-HYBRID with standard Corner Glove
FIS 8.1.1.3.1.2 – METHOD-A-FIS-HYBRID with shallow Corner Glove
FIS 8.1.1.3.2.1 – METHOD-B-FIS-HYBRID with standard Corner Glove
FIS 8.1.1.3.2.2 – METHOD-B-FIS-HYBRID with shallow Corner Glove

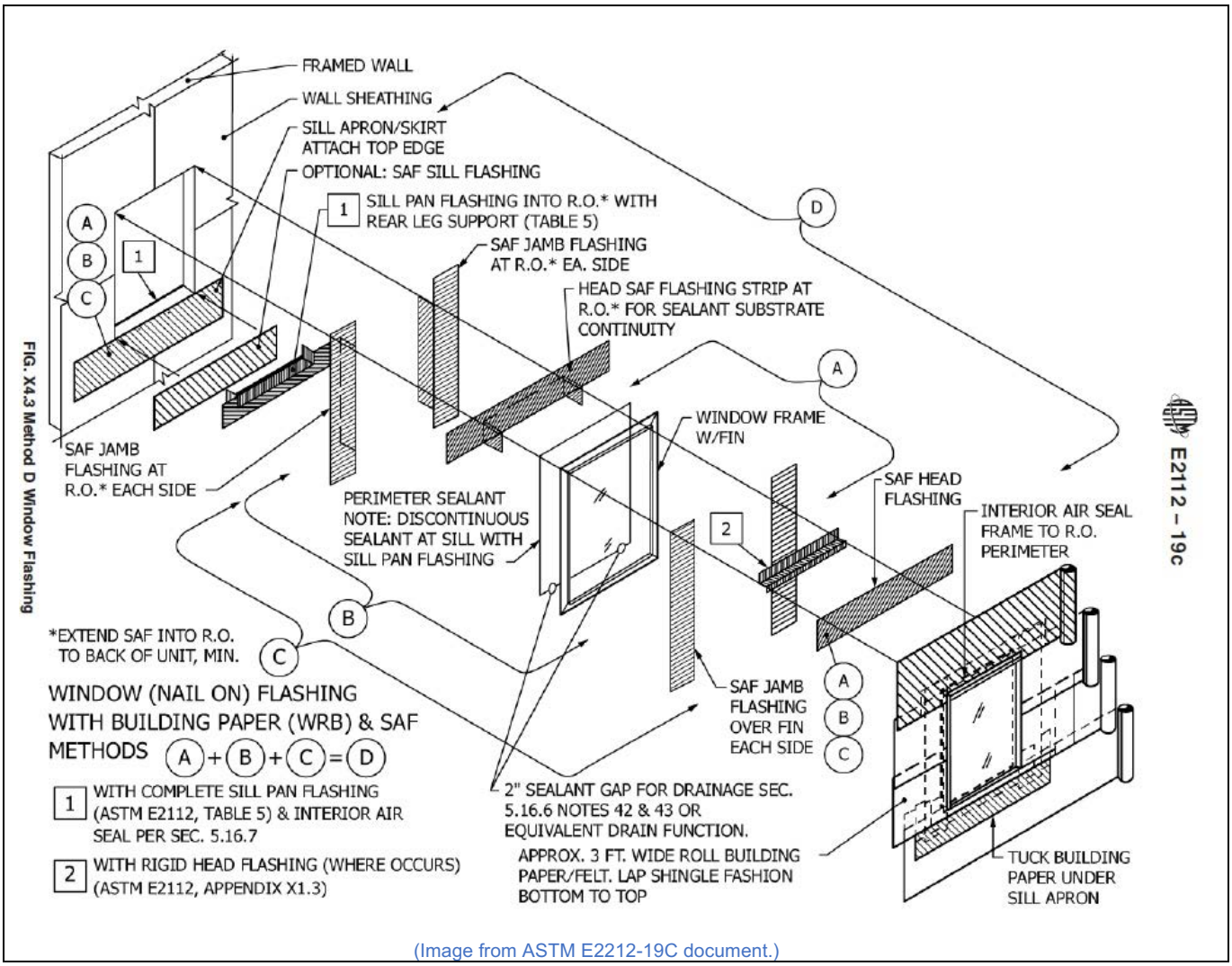


(Image from ASTM E2212-19C document.)

ASTM E2112-19C METHOD C1 describes the installation of the fenestration unit, flashing membranes, and the installation of the weather resistive barrier over top of an ASTM E2112-19C METHOD A or B previously installed fenestration unit. The weather resistive barrier is installed in a larger sheet, with the opening for the fenestration unit cut into the field of the weather resistive barrier, with flashing membranes installed tucked in under, and in an overlapping, outboard shingled direction around the fenestration unit.

FIS is compatible with ASTM E2112-19C METHOD C1 providing the fenestration units was installed as per the METHOD-A-FIS-HYBRID or METHOD-B-FIS-HYBRID installation noted herein as seen in figures;

FIS 8.1.1.3.1.1 – METHOD-A-FIS-HYBRID with standard Corner Glove
FIS 8.1.1.3.1.2 – METHOD-A-FIS-HYBRID with shallow Corner Glove
FIS 8.1.1.3.2.1 – METHOD-B-FIS-HYBRID with standard Corner Glove
FIS 8.1.1.3.2.2 – METHOD-B-FIS-HYBRID with shallow Corner Glove

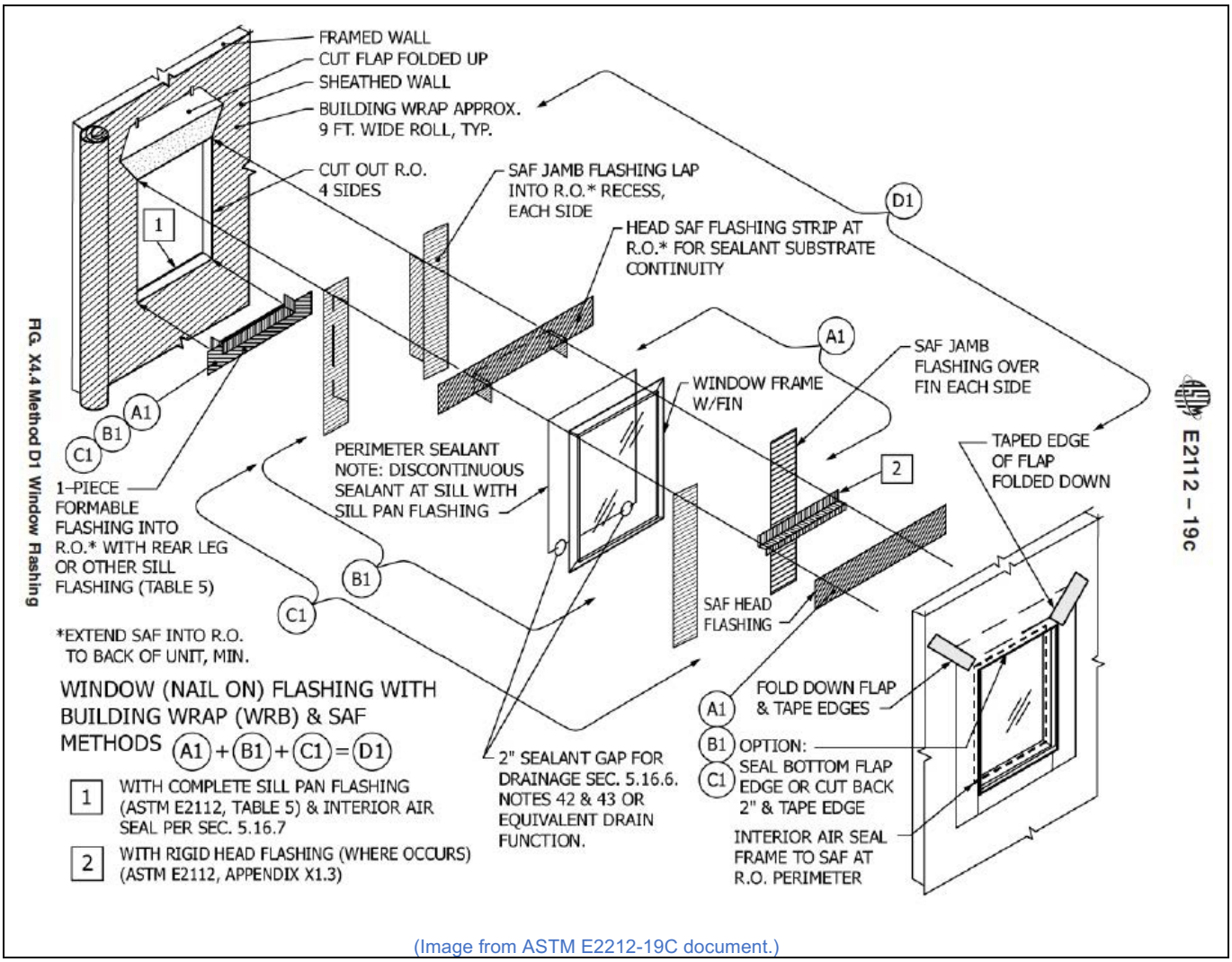


(Image from ASTM E2212-19C document.)

ASTM E2112-19C METHOD D describes the installation of the fenestration unit, flashing membranes and the installation of the weather resistive barrier over top of an ASTM E2112-19C METHOD A or B previously installed fenestration unit. The weather resistive barrier rolls are installed in strips in an overlapping, outboard shingled direction around the fenestration.

FIS is compatible with ASTM E2112-19C METHOD D providing the fenestration units was installed as per the METHOD-A-FIS-HYBRID or METHOD-B-FIS-HYBRID installation noted herein as seen in figures;

FIS 8.1.1.3.1.1 – METHOD-A-FIS-HYBRID with standard Corner Glove
FIS 8.1.1.3.1.2 – METHOD-A-FIS-HYBRID with shallow Corner Glove
FIS 8.1.1.3.2.1 – METHOD-B-FIS-HYBRID with standard Corner Glove
FIS 8.1.1.3.2.2 – METHOD-B-FIS-HYBRID with shallow Corner Glove



(Image from ASTM E2212-19C document.)

ASTM E2112-19C METHOD D1 describes the installation of the fenestration unit, flashing membranes, and the installation of the weather resistive barrier over top of an ASTM E2112-19C METHOD A or B previously installed fenestration unit. The weather resistive barrier is installed in a larger sheet, with the opening for the fenestration unit cut into the field of the weather resistive barrier, with flashing membranes installed tucked in under, and in an overlapping, outboard shingled direction around the fenestration unit.

FIS is compatible with ASTM E2112-19C METHOD D1 providing the fenestration units was installed as per the METHOD-A-FIS-HYBRID or METHOD-B-FIS-HYBRID installation noted herein as seen in figures;

FIS 8.1.1.3.1.1 – METHOD-A-FIS-HYBRID with standard Corner Glove
FIS 8.1.1.3.1.2 – METHOD-A-FIS-HYBRID with shallow Corner Glove
FIS 8.1.1.3.2.1 – METHOD-B-FIS-HYBRID with standard Corner Glove
FIS 8.1.1.3.2.2 – METHOD-B-FIS-HYBRID with shallow Corner Glove

Warranty

www.fortinsyst.com

Our system carries a limited lifetime warranty that is based on the life of the building or structure, it is fully transferable whether you are involved in the construction or are the 3rd-5th owner you are under warranty as long as the system is installed as per our instructions. You will carry no liability for leaks in the pan area that infiltrate your buildings wall assembly. Such leaks can be responsible for mold and rot causing structural damages forcing additional costs on the homeowner for future upkeep.