WEB BASED CORE APPLICATION SPECIFIC INSTALLATION INFORMATION AND METHODS

Installation Methods and Best Practices

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AWDI General Window Installation Guidelines-Version 3.1

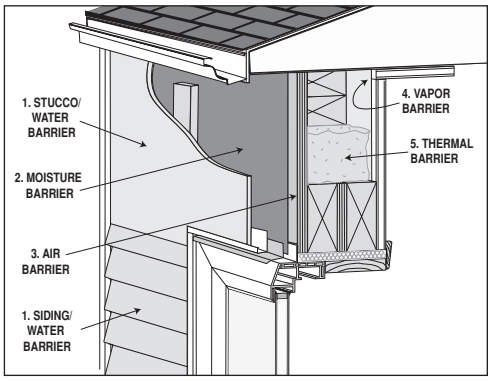
The 5 Critical Barriers in Walls

There are 5 critical barriers built into every wall separating the exterior environment from the interior.

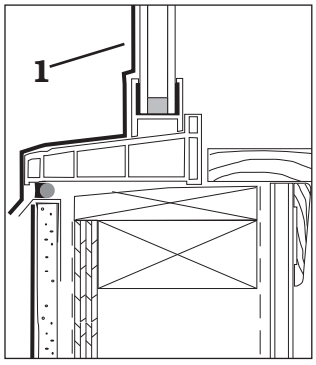
All "walls" have them: exterior walls, roof systems, even floor systems.

- **Water** – Exterior water such as rain, snow, etc.
- **Moisture** – semi liquid "water" trapped behind the exterior siding caused by natural evaporation or condensation within wall components
- **Air** – Movement of air by wind or pressure differential
- **Thermal** – Material Heat transfer
- **Vapor** – Migration of warm moist air to drier cooler air (producing damaging condensation at dew point)

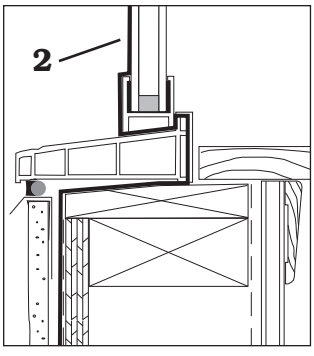
There are similar barriers designed into the components of every window and door. These barriers are meant to control the environmental conditions and manage their impact on the interior comfort.



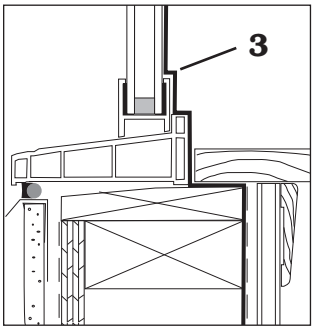
The 5 Critical Barriers in Fenestration



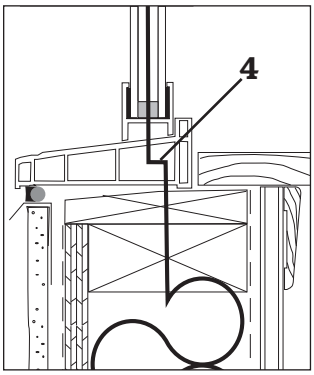
1. Water Shedding Barrier: The water barrier is provided by the glazing, the glazing tape between the glazing and window frame, the exterior surface of the window frame, the sealant between the window frame and the sill drip flashing, the sill drip flashing, the drip cap, and the exterior surface of the wall cladding.



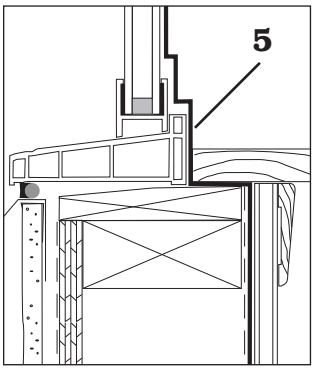
2. Moisture Barrier: The exterior moisture barrier function is provided by the exterior glazing, the seal between the glazing and the window frame, the seal between the window frame and the sub-sill membrane, the sub-sill membrane, and the exterior building paper (house wrap).



3. Air Barrier: The air barrier function (resisting the flow of air in either direction) is provided by the drywall, seal to the sub-sill, seal between the sub-sill and the window frame, the seal between the window frame and the glazing, and the glazing.



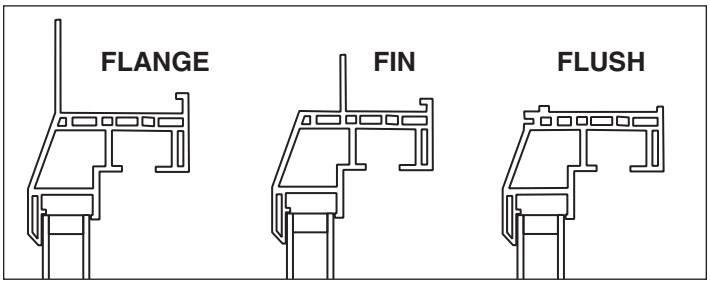
4. Thermal Barrier: The thermal barrier consists of the chambered frame, the insulating glazing package, and the insulated wall assembly. The interfacing of the thermal barrier can be achieved filling cavity voids between window and wall with foam insulation and any sealing of interior and exterior creating a dead-air space.



5. Vapor Barrier: The vapor barrier (resisting vapor diffusion) is provided by materials of low vapor permeability located near the interior of the wall and window assemblies and include a polyethylene sheet or insulation liner, window frame, builders tape between jamb, sill, header and wall, and the interior glazing.The ideal installation is achieved when each of the 5 barriers in the wall, is integrated with the corresponding barrier in the window.

The 3 Mounting Choices

Window frames come in three basic shapes to facilitate mounting in various openings. Flange Mount provides frontal flange which is useful in Jump-Frame applications; Fin Mount provides a recessed nailing flange to allow overlap of siding; and Flush Mount is a box frame used for pocket, wood buck and other installations. These variations are used for all frame materials.



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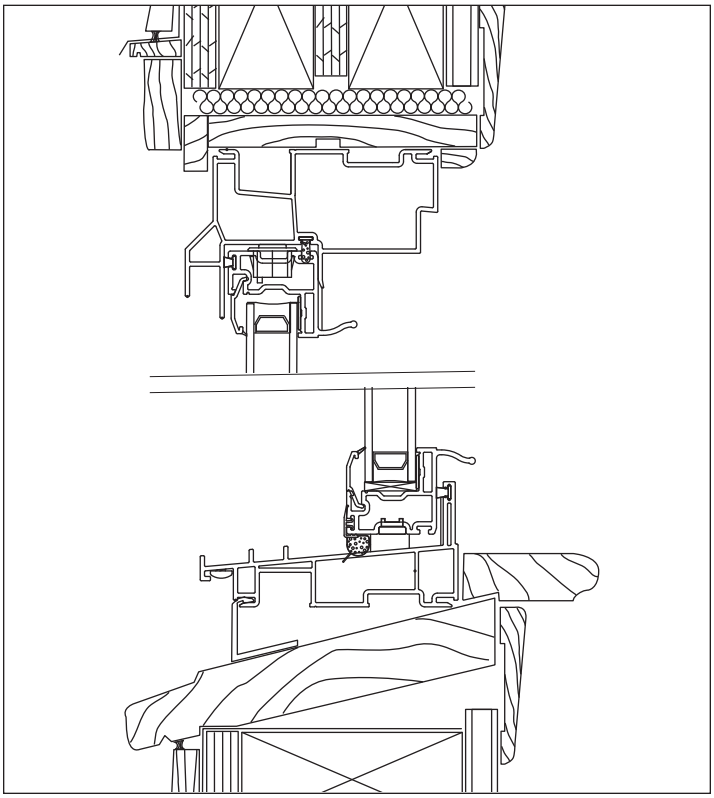
Flange mounts generally use screws through the frame; Fin mounts use nails through the fin; and Box Frames use screws through the frame or mounting clips.

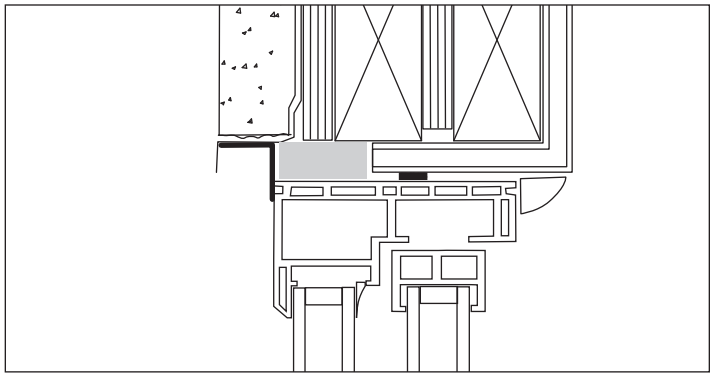
Installation Definitions:

A. Replacement Application: The old frame is left in the opening, as is inherent in a window stop and sash removal, or a door slab replacement. Sometimes called a "Sash Retro-Fit", or “Frame-In”.

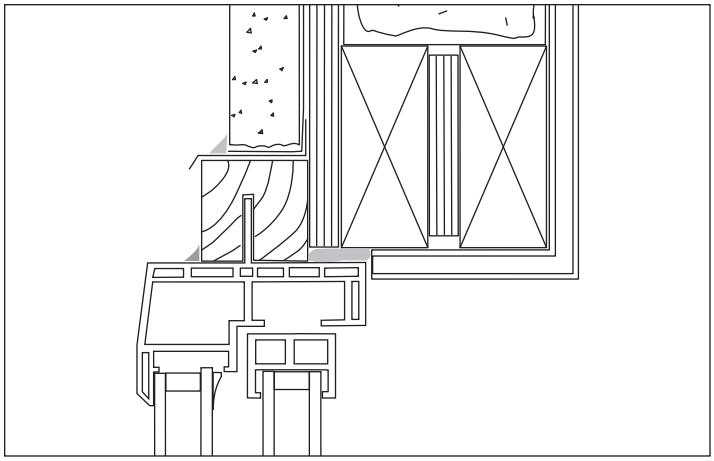


Replacement Details
Frame-In Pocket Install

B. Renovation Application: The old frame is completely removed - including removal of all fasteners, obstructions, or protrusions that will interfere with the installation of the new unit. Sometimes called a "Sash & Frame Retro-Fit", or “Frame-Out. Removal can be of a wood, aluminum, or steel window.

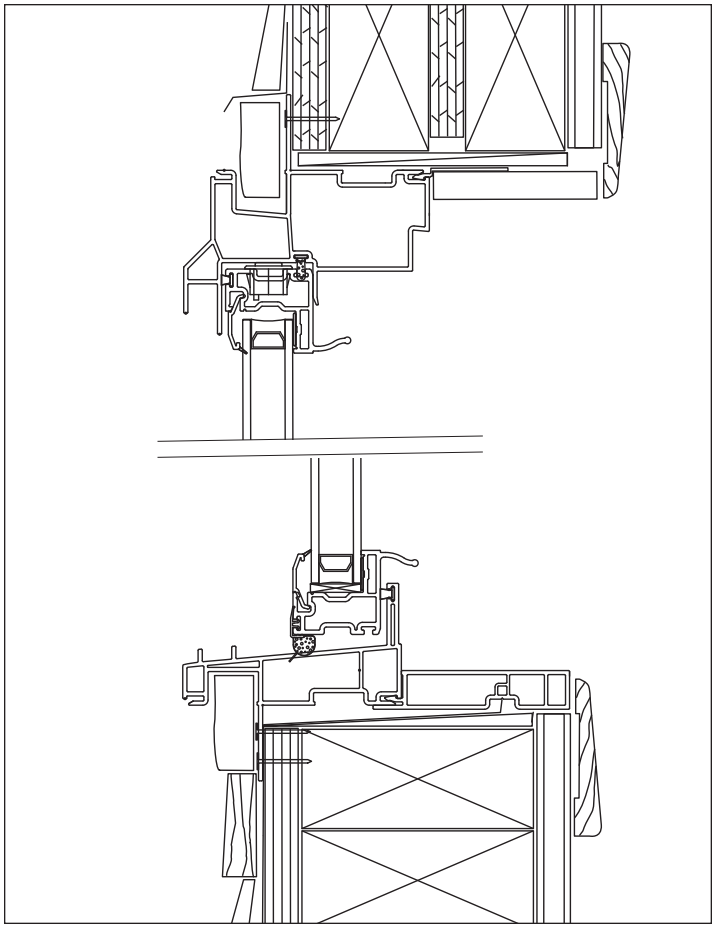


Renovation Details
Frame-Out Flush Mount with Exterior Trim/Seal



Renovation Details
Frame-Out Kerfed Exterior Moulding over Fin to Fit Narrow Opening

C. New Construction Application: The old window or door and frame is completely removed and the size of the existing opening is changed; or a new opening is made in the perimeter wall. This type is usually "Fin" or "Brickmould" mounted in wood, Masonry, or Brick veneered wood frame construction.



New Construction Details
Frame-Out using Nailing/Mounting Fin Against Sheathing

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AWDI Best Practice Core Guidelines for Replacement, Renovation and New Construction Window and Door Installation - Version 3.1

I. Fitness for a Particular Purpose

Though the product to be installed may have been specified and/or approved by others, no product shall be knowingly installed that violates any current, applicable code requirement; and no installation techniques, procedures, or materials shall be used that violate existing applicable codes, or that will render the finished installation in violation of any existing applicable codes.

II. Inspection of the Existing Structure

Before, and during the Installation, the condition of the surrounding structure shall be inspected for serviceability. Any faulty materials shall be reconditioned, or replaced, to insure proper performance of the finished building envelope.

The ability of the building to properly support the newly installed window or door system shall be determined; and where necessary provision shall be made to add structural members, or modify existing components to provide proper support in accordance with local codes, accepted building practices, and the manufacturer's supplied instructions.

III. Removal of Existing Unit

The old window or door shall be removed so as to minimize damage to the remaining structure, and to allow the existing mouldings, trim, wallboard, sheathing, or other materials to be returned to a condition equal to or better when installation is competed.

IV. Preparation of the Opening

The opening shall be properly cleaned and prepared to receive the new window or door. The opening must be structurally adequate to receive sufficient fastening to securely anchor the new window or door under service conditions of weight, wind load, environment, and use.

A. If the old frame is left in the opening *Replacement)*, all holes or cracks shall be sealed to prevent water, air, or moisture penetration.

B. If the old frame is completely removed (*Renovation),* the exposed opening shall be checked for structural integrity, and any voids created by the removal of the old unit frame shall be sealed to prevent any water, air, or moisture penetration.

C. If the existing opening is changed, or a new opening is made in the perimeter wall *(New Construction)* which alters the structural support system of the perimeter bearing wall, the rough opening shall be framed in a square, plumb, and level condition to comply with all applicable building codes.

V. Installation of the New Window or Door Unit

A. Sizing: For any installation, the width or the height of the new unit shall conform to AWDI Sizing Recommendations.

Sizing is critical in a Replacement application if the existing frame is out of square. Follow the manufacturer's guidelines for custom sizing for out-of-square openings. Under no circumstances should a new window or door unit be installed where an out of square opening will force the new window to be installed out of square; nor should a window or door unit be excessively undersized so as to leave excessive voids (1/2" or larger at the sides and 3/4" at the top) between the old window frame and the new window or door unit.

SIZING RECOMMENDATIONS

The difference between the unit size and the opening in which it will be mounted shall not exceed:

TYPE	WIDTH	HEIGHT
Replacement	1/2 inch	3/4 inch
Renovation or New Construction	1/2 inch	3/4 inch
Bay, Bow or Garden	1/2 inch	1-1/4 inch

These sizes apply to all window openings 8 foot wide or less, and/or 5 foot high or less. For larger units, if the difference between the unit and the opening is larger than shown the chart, the space must be filled in a manner to allow proper mounting and shimming, and to allow proper sealing as outlined in Section IV.

B. Application: The mainframe of the new unit shall be installed in the plumb, level, and square manner. Make sure loads from the wall above are not transferred to the window or door.

C. Shimming: All shimming shall be done with the proper pressure to the mainframe of the newly installed window or door so as to guarantee the proper operation of the window sashes or door slab. The location of the shims will vary depending upon the window or door type, but there must be sufficient shims, properly located to minimize deflection of the frame or sill.

At no time shall a window rest on the subsill without proper shimming keeping the sill level, and providing a drainage path under the sill. The subsill should be fitted with proper back and side dams to prevent water back-up into the building.

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The shims should be made of a material that is hard enough to support the window or door, provide good thermal insulation, resist decay, and allow for fastening to run through. If tapered shims are used they need to be installed is pairs to maintain level.

D. Fastening: Fastening to the opening shall be with corrosion resistant fasteners of sufficient size and length to permanently anchor the new window or door with minimum bite of 1-1/4" into substrate. No fastening shall be used through the sill of a window or door to avoid water paths.

1. Fastening Replacement or Renovation: Fastening shall be into jambs, and/or head sections using corrosion resistant screws, or nails when conditions permit. Non-tapered shims shall be used, as needed, and shall be installed at all fastening points.

2. Fastening New Construction: Fastening shall be through an integral or applied fin, or other manufacturer's standard attachment accessories (i.e., masonry clips); or through casing surrounding the perimeter of the new unit, and/or through the head and side jamb, by nailing or screwing into the opening structure.

Any gap present between the new unit and the opening shall be shimmed, as needed.

E. Sealant:

1. Replacement: Sealant shall be used during mounting of replacement windows as follows:

a. Inside/Out Application- Sealant shall be applied to the back of the exterior stop, and against the outside face of the stool. Leave 2 spaces to allow sill drainage.

b. Outside/In Application- Sealant shall be applied to the back of the interior stop, and under the sill when the newly installed window is mounted against the interior stop. Leave 2 spaces to allow sill drainage.

2. Renovation & New Construction: Sealant is not recommended for use during renovation or remodeling installation. Weathersealing of Renovation and/or New Construction installations is covered under the recommendations in Section VI.

VI. Perimeter Insulation, Vapor Barrier, Capping, and Interior and/or Exterior Sealing

A. Insulation: After the new window or door unit is mounted in the opening, fiberglass insulation, or equal, shall be used to insulate any perimeter voids between the mainframe of the new window or door, and the opening. At no time shall the insulation be compressed into the void(s) in a manner that lessens its insulation effectiveness, or as with spray foam, in a manner that will exert pressure on the frame of the newly installed unit that will distort the frame or in any way impede smooth operation of the window or door.

It is also recommended that a proper air seal on the warm side of the insulation be provided.

B. Interior Air/Moisture Seal: An air and moisture seal on the interior side of the rough opening gap shall be provided using one of the following methods: Sealant, Barrier Tape, or non-moisture absorbing Skirt. To prevent drafts, heat loss, and further reduce the potential for the formation of condensation between the wall and the new window or door, it is essential that the rough opening gap doesn't allow air and moisture to pass between the newly installed unit and the existing wall into the opening cavity.

1. Sealant Method: Caulk/Sealant shall be applied to the interior side of the rough opening in a continuous manner to provide an even, unbroken sealant bead sufficient to fill the gap between the new window or door unit and the rough opening. Where needed, foam or rubber backer rod shall be used as a "bond breaker" ensuring that the sealant only bonds to the newly installed unit's frame and the rough opening. The backer rod should be pushed in a distance equal to about one half the width of the joint, and sealant is applied over the rod until flush with the window or door frame.

2. The Barrier Tape Method: Tape that is impervious to air and moisture, with adhesive of sufficient strength to adhere to wood, vinyl, metal, or plastic shall be placed across the rough opening gap on the interior dry wall and the interior surface of the window or door frame, or between the new unit's frame and the existing frame. Interior Moulding, Stops or Casing trim is then installed over the tape.

For New Construction Applications, (fin or brickmould applications), suitable, and properly lapped, building paper, sealing and flashing materials and procedures shall be used. Integral nailing fins or brickmould shall be continuous around all corners.

In the event that snap-on nailing fins leave open corners, a 12 " wide moisture resistant material shall be installed on all sides, covering the fin and attaching to the sheathing - apply first to the sill; then apply to the jambs to overlap the sill; then apply to the header to overlap the jamb flashing.

3. The Pre-applied Skirt or Apron Method: Some manufacturers supply an applied apron or skirt, which when installed according to their instructions can effectively prevent air/moisture leakage through the rough opening.

C. Exterior Weather Seal: A barrier shall be created to preclude the entry of water into the wall cavity and/or the gap between the rough opening and the window or door. It consists of exterior flashing and seals. Flashing shall be installed to drain water away from the window or door, while the seal shall be installed to prevent entry of water, snow, dust, and insects in the rough opening gap.

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The installed weather-seal should not interfere with drainage holes in the window or be installed in such a manner as to function as an exterior and/or secondary vapor barrier which could trap moisture in the perimeter cavity.

1. Flashing: The flashing configuration will depend on the surrounding construction. Where required, the flashing will be provided before or after the new window or door is placed in the rough opening. Either way, the flashing must be installed in a manner to preclude entry of water into the wall cavity and the rough opening gap. In some cases, the window or door manufacturer may supply special moulding or flashing for the window or door.

In other cases, flashing materials will be used in conjunction with the application of the finish siding.

Header Drip Cap: At the head of the window or door, it is recommended that a drip cap be installed from under the sheathing paper at the header, to beyond the exterior face of the window or door. It should also extend past the trim at the sides of the window or door.

Install a continuous piece of aluminum or galvanized flashing material onto the building sheathing, tucked under the sheathing paper, with a 90 degree bend to extend over the newly installed window or door header.

A 1/4" return bend is applied down the face of the unit's header. To finish, the siding veneer or trim shall overlap the header flashing.

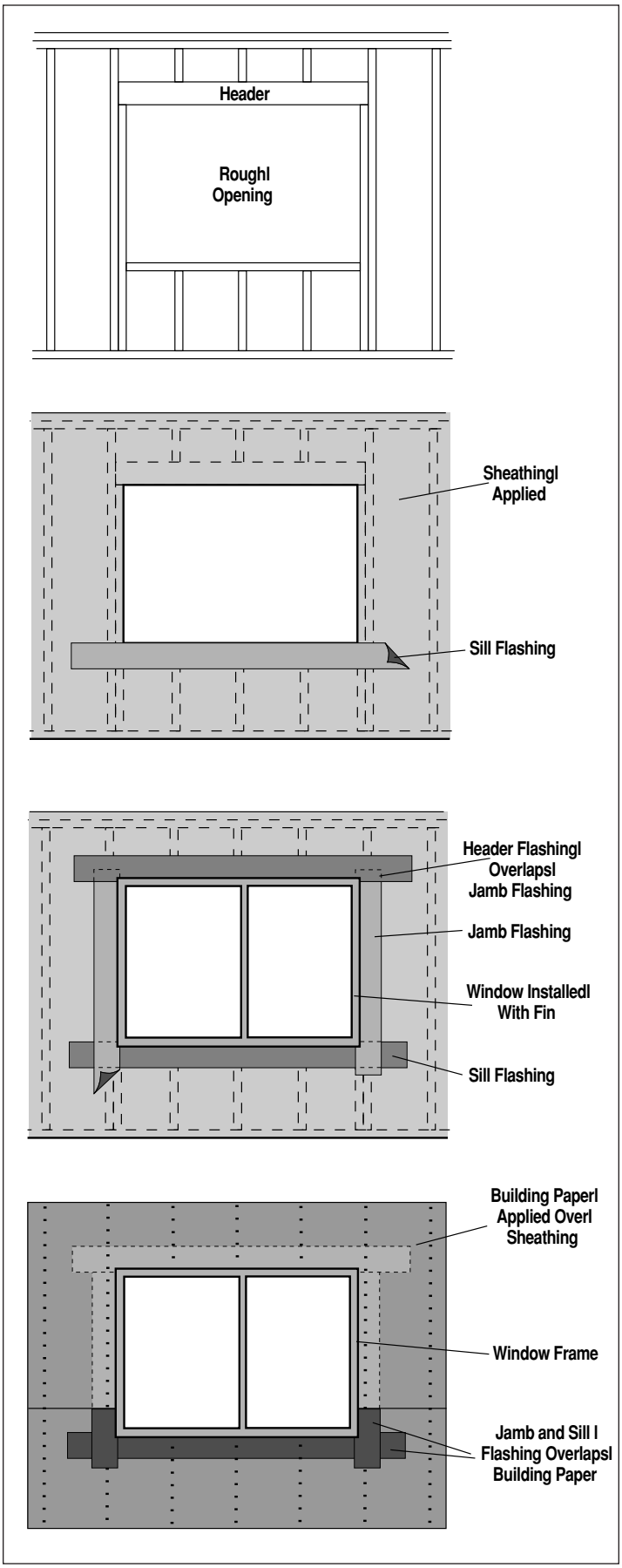
Penetration Flashing: Material for flashing shall be barrier coated reinforced flashing material and shall provide for 4-hour minimum protection from water penetration when tested in accordance with ASTM D-779 or better.

Flashing material shall carry continuous identification. Sealant used with penetration flashing techniques shall comply with Federal Spec TT-S-1657 or better.

Application: To flash against water penetration in a wood frame and sheathing application, a strip of approved flashing material, at least 9" wide, shall be applied in overlapping, weatherboard fashion (counter flashing), on all sides of the opening.

The first strip is applied horizontally immediately underneath the sill - before the window is installed. It should be sufficiently long to extend past each side of the window, door, or vent, to enable it to project beyond the jamb flashing when it is applied.

Fasten the top edge of the sill flashing to the sill, but do not secure the middle or lower edge so that building paper, later applied, may be slipped up and underneath the bottom of the applied sill flashing.



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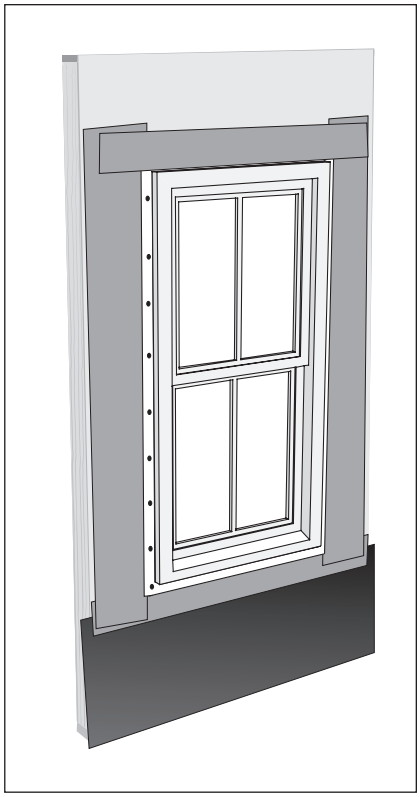
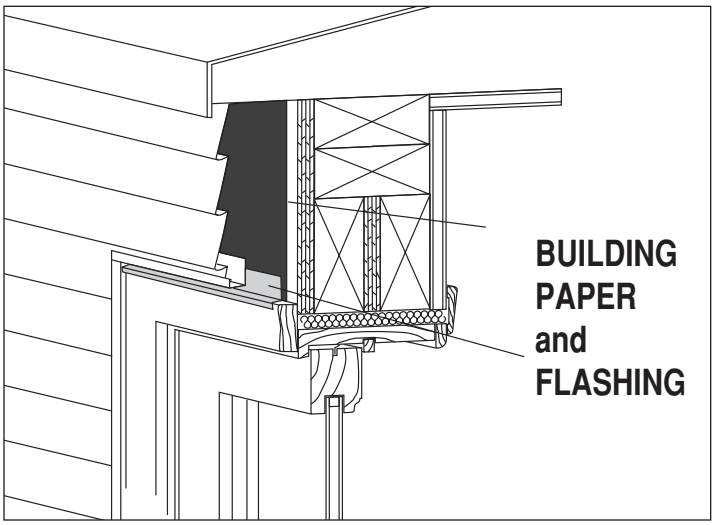
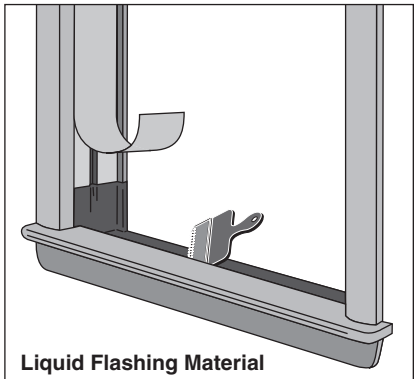
Next cut and apply the two vertical jamb flashing segments, again making them 9 inches wide, and sufficiently long enough to extend above the to be applied header flashing, and to extend below the already applied sill flashing.



The jamb flashings should overlap the applied sill flashing. Fasten only the top portion of the jamb flashing so that the lower section(s) will allow the to be applied building paper to be slipped up and underneath the jamb flashing ends as well as the sill flashing.

Using approved sealant, apply a continuous bead to the underneath side of the nailing fin of the window or door unit. Press the window or door unit into the opening and secure the unit as prescribed in the manufacturer's provided installation instructions.





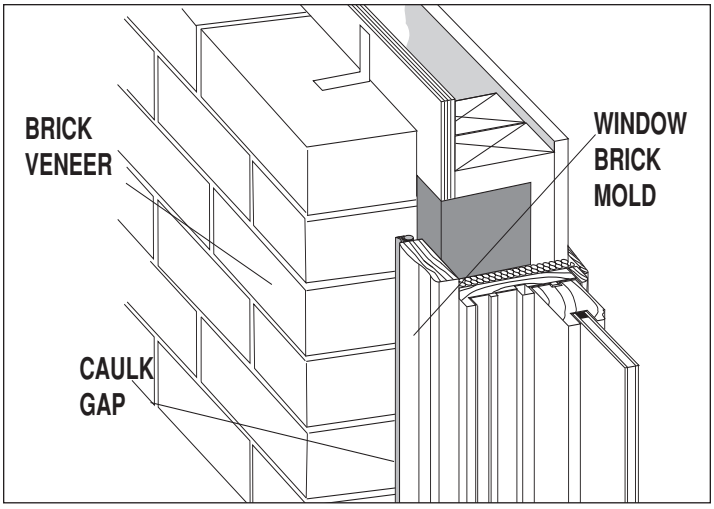
Liquid Flashing Material is Applied to Left-in-place Sill.

Adhesive-backed Flashing is applied to Jambs and Header Overlapping at Sill corners.

Apply the top horizontal section of flashing last. Cut to the same 9 inch strip, the header flashing overlaps and is sealed against the outer edge of the top nailing fin. The header flashing shall be sufficiently long to extend beyond the outer edge of the vertical jamb flashing(s).

Building paper underlayment is next applied in a horizontal fashion, starting with the lower portion of the wall, and over lapping the upper application by at least 2 inches.

Be sure that the bottom portion is slipped up and under the bottom of the jamb flashing(s), and the sill strip flashing.



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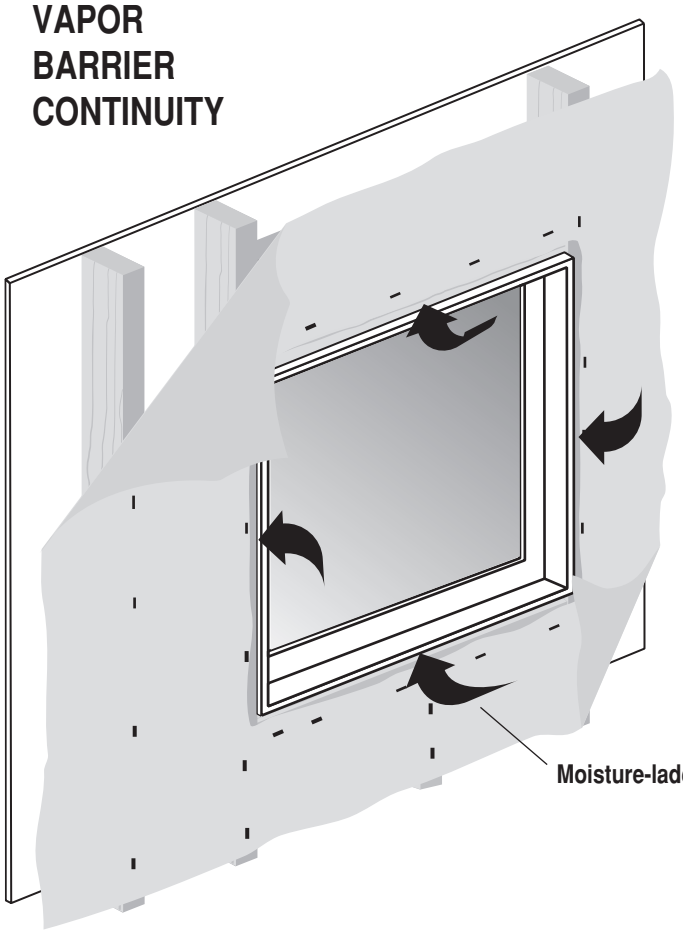
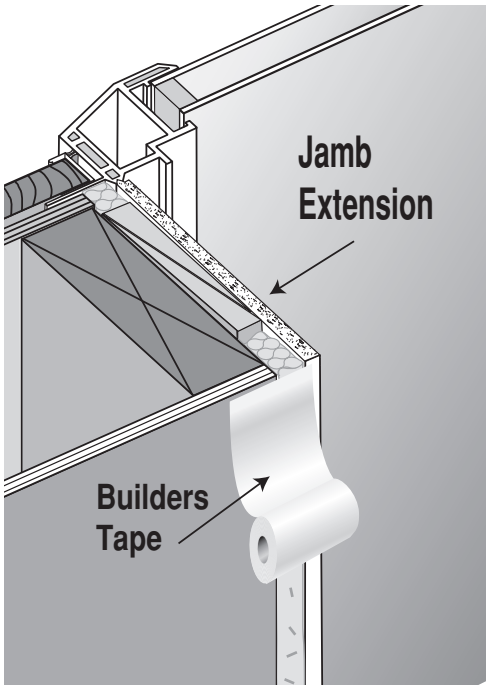
VAPOR BARRIER CONTINUITY

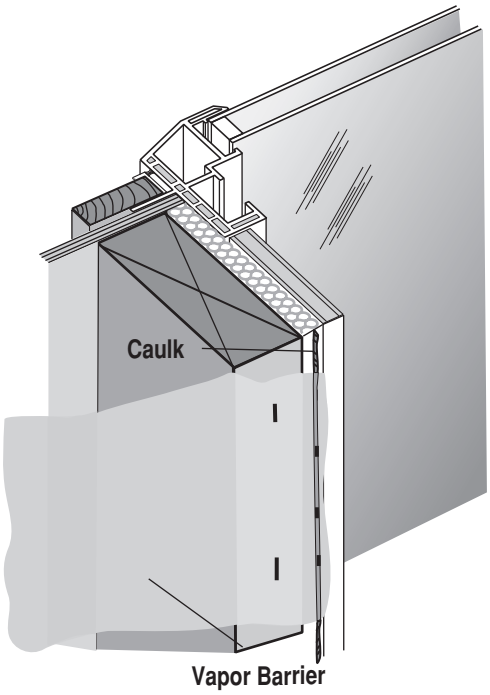


VAPOR BARRIERS ARE USUALLY VIOLATED WHEN WINDOWS ARE INSTALLED

Moisture-laden Air is allowed into the Cavity between the Rough Opening Framing and the Window Frame.

Allowing Moisture into the Cavity can cause rot or other degradation of the installation and can lower the thermal performance of the window unit.





COMPLETE THE VAPOR BARRIER TO THE WINDOW

Run a Caulk Bead Down the Window Frame to Seal the Vapor Barrier to the Rough Opening Framing

Note: *At no time shall any seal be installed in an air-tight manner so as to act as a Secondary Vapor Barrier which may trap moisture in the perimeter cavity between the window or door and the rough opening.*

For all climates other than defined as "Humid" by ASHRAE (the Coastal Regions of Louisiana, S. Carolina, Georgia, and Florida,), Vapor Barriers are recommended on the interior, or "warm side" of the building wall.

For Replacement & Renovation Applications, the weather seal should be concealed behind new capping or weather resistant exterior trim.

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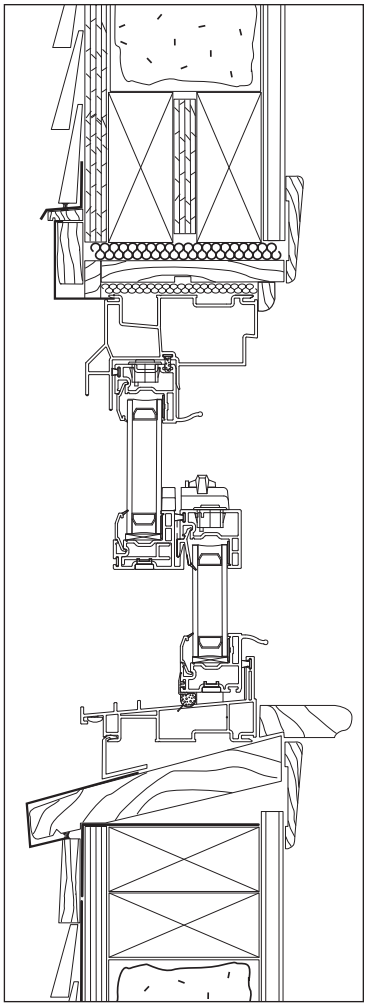
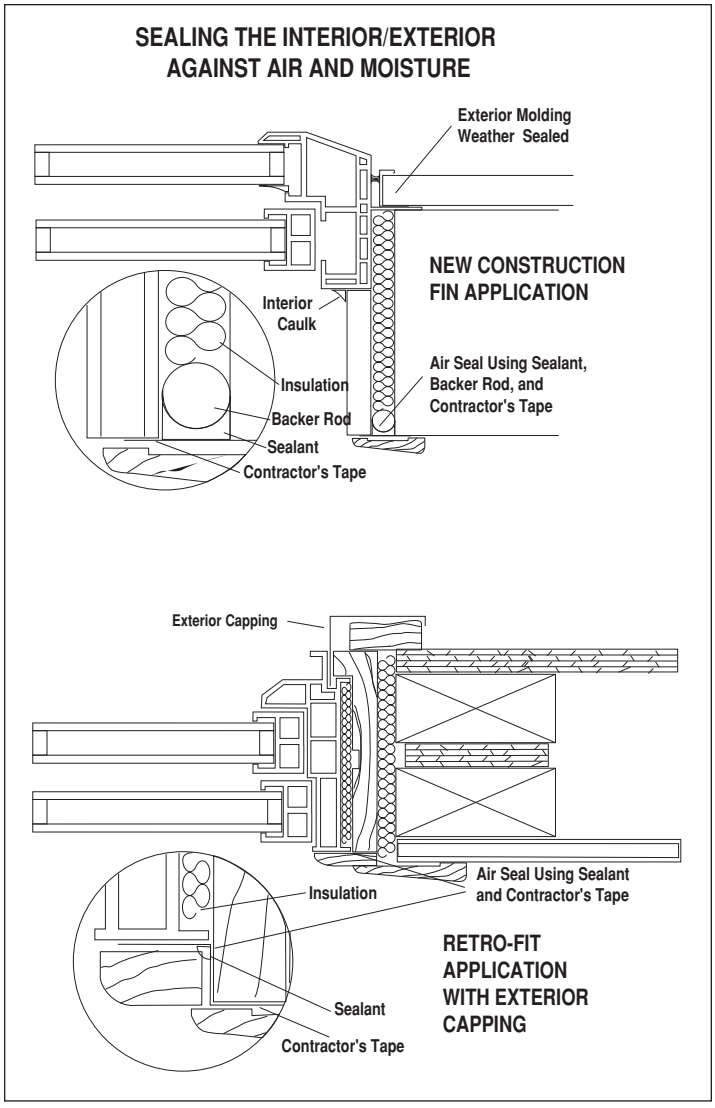
2. Capping:
Wherever possible, the existing opening frame, and/or the cavity created between the newly installed window or door and the building veneer shall be covered and sealed with properly installed capping or finishing materials.

Capped Installations shall have the capping materials integrate with or seal to the perimeter of the newly installed window or door in a water-tight manner. All capping should be installed in such a manner to allow ventilation and moisture to escape from under the capping.

Non-capped Installations shall use suitable sealing materials and procedures to create a weather-tight seal between the newly installed window or door mainframe, and the opening into which it is installed.



Suggested Capping Details for Replacement Window



3. Sealing: Sealant shall only be applied where capping profiles abut one another, but do not overlap. For non-capped installations, sealant should be applied between the exterior window or door frame and the building face rather than the window frame. It is recommended that the sealant be applied to the sheathing.

For a brick veneer and a non-capped installation, apply seal between the window frame (or brick moulding) and the brick.

It is recommended to apply the sealant using backer rod as previously covered in VI(A)(1).

NOTE: All Drawings represent typical situations, and are for reference only. Other frame materials and product assemblies will look different, however the installation integrations will be similar among them all. For actual product drawings, consult the manufacturer(s).

COMPLIANCE NOTES:

NOTE: *The intent of these specifications and guidelines is to help ensure that new, energy saving, high performance windows and doors are installed in a manner that will complement their performance. Improper installation of new window or door units may reduce their thermal effectiveness, lead to excessive air and water leakage, and condensation. These specifications and recommendations provide minimum requirements that will help ensure the installation of windows and doors in retro-fit, replacement, and remodeling applications, will be done in a safe and effective manner.*

The application of these specifications and recommendations requires a working knowledge of tools, equipment, and methods necessary for the proper and safe installation of window and door units. It further assumes familiarity with sealant and sealing, and an understanding of the fundamentals of residential construction that affect the installations of window and door units.

Actual conditions in existing buildings vary greatly. These specifications and recommendations should be used with the installation instructions provided by the manufacturer and local codes in order to effect proper product performance. In the event of a conflict, it is advisable to follow the manufacturer's recommended procedures, and local building code requirements.

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