WEB BASED CORE APPLICATION SPECIFIC INSTALLATION INFORMATION AND METHODS

Sealing, Caulk and Vapor Barrier

Application, Shimming, Fastening, and Sealing

Application: The new window must be installed plumb, level, and square. Make sure loads from the wall above are not transferred to the window.

Shimming: All shimming should be done with the proper pressure to the mainframe of the newly installed window to guarantee the proper operation of the window sashes.

The shims should be made of a material that is hard enough to support the window, provide good thermal insulation, resist decay, and allow for fastening to run through.

Fastening: To fasten the window properly to the opening, use corrosion resistant fasteners of sufficient size and length to permanently anchor the new window. In most cases, these anchors are supplied with the window unit.

1. Fastening for Replacement or Renovation: Fasten to the jambs, and/or head sections of the left-in-place frame using corrosion resistant screws, or nails when conditions permit. Use non-tapered shims as needed, and install at all fastening points.

2. Fastening for New Construction: Fasten the "new construction" vinyl window into the opening structure by fastening the integral fin. Take care to allow for natural expansion and contraction of the window or door fin. Use cap-nails along header as shown elsewhere. Shim any gap present between the new window and the opening, as needed. Use corrosion resistant fasteners.

Caulking:

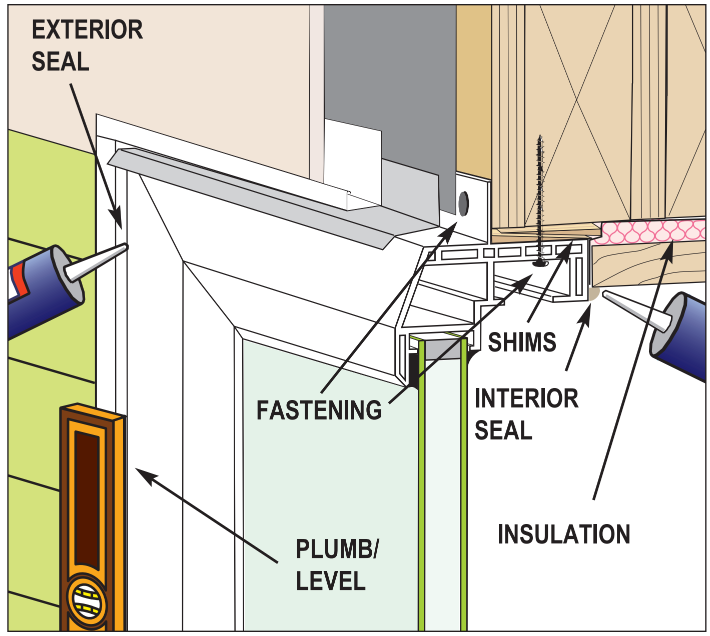
1. Replacement: Use caulking during mounting of replacement vinyl windows as follows:

Inside/Out Application- Apply caulk to the back of the exterior stop, and under the sill when the newly installed window is mounted against the exterior stop leaving weep gaps.

Outside/In Application- Apply caulk to the back of the interior stop, and under the sill when the newly installed window is mounted against the interior stop.

2. Renovation & New Construction: Caulking alone is not recommended for use during renovation or remodeling installation. Instead, use proper flashing methods described in detail elsewhere.

Insulation: After new vinyl window is mounted in the opening, inject PU foam between the window and the rough opening (RO) to insulate any perimeter voids between the mainframe of the new window, and the opening.

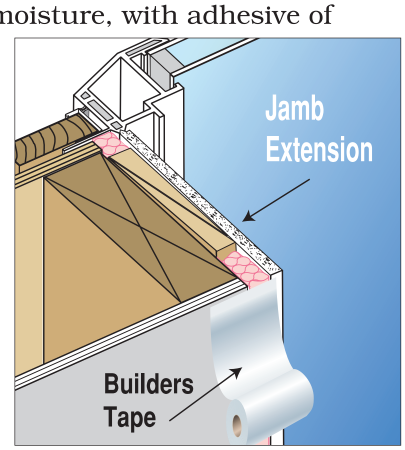


Do not compress the insulation to avoid pressure on the frame of the new window that will distort the frame, which could impede smooth operation of the new window. It is also recommended that a proper air seal on the warm side of the insulation be provided.

Interior Air/Moisture Seal: It is recommended that an air and moisture seal be provided on the interior side of the rough opening gap using sealant, or Barrier Tape. To prevent drafts, heat loss, and further reduce the potential for the formation of condensation between the wall and the new window, it is essential that the rough opening gap doesn't allow air and moisture to pass between the new window and the existing wall into the opening cavity.

1. Sealant Method: Apply Caulk/Sealant 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 and the rough opening. Where needed, foam or rubber backer rod can be used as a "bond breaker" ensuring that the sealant only bonds to the window frame and the rough opening.

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 adhering to the dry wall on one side of the gap, and the interior surface of the window frame on the other, or between the new window frame and the left-in-place frame.



Application Criteria for Caulks and Sealants

What is the difference between caulks and sealants? They are in essence interchangeable terms. Literally, caulking is a soft, putty-like material for sealing joints where leakage or movement may occur, and sealants are compounds used to fill and seal a joint where movement or leakage is expected.

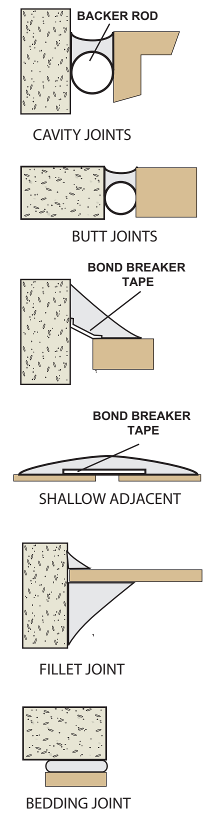
There are 5 Basic types of applications where sealant is used for window replacement and retrofit applications:

1. **Cavity spaces - Control joints** are used between the old frame and the window, with backer rod and 1/4" minimum spaces
2. **Cavity Spaces - bonding joint** with minimum 1/4" depth
3. **Shallow Adjacent components -** Bond breaker tape and a rounded bead
4. **Fillet joint** - Typical at siding/trim and coil to window frame intersections and does not require bond breaker tape or backer rod. Apply ¼" to 3/8" bead.
5. **Adhesive -** Bedding joint between flat surfaces

And there are 2 Sealant Responsibilities -

- **Primary -** Principle barrier to air and water migration into or between space between components
- **Secondary -** Control of moisture and air in and out cavities

Sealants are never meant to join two materials in any structural way. Sealants need to support the elements of proper water and moisture management: Divert; Drain; and Dry.



COMPARISON CHART

TYPE OF CAULK/ SEALANT	TYPICAL SERVICE LIFE (Years)	MAX. JOINT WIDTH (Inch)	EASE OF APPLY	APPROXIMATE DRYING TIME		FLEXIBILITY (Max. Joint Movement)	SHRINKAGE	APPLY TEMP RANGE (°F)	SERVICE TEMP RANGE (°F)	ADHESION TO SUBSTRATES*	RESISTANCE TO				PAINTABLE
				TACK FREE	TOTAL CURE						U/V	OXIDATION	WATER	ABRASION	
LATEX (Polyvinyl Acetate or Vinyl)	3-5+	3/8	Very Easy	15-30 Minutes	5 Days	Very Low ±2%	5% - 10%	>40	-20 to 150	Fair to Good	F	F	P	F	Yes
ACRYLIC LATEX	3-10	3/8	Very Easy	15-30 Minutes	5 Days	Very Low ±2%	5% - 10%	>40	-20 to 180	Fair to Good	G	G	P	F	Yes
SMP- (Silyl Modified Polymer)	20-30	5/8	Easy	20-30 Minutes	1-3 Days	Very High ± 50%	Nil	0 to 140	-14.8 to 158	Excellent	E	E	E	G	Yes
SILICONIZED ACRYLIC LATEX	20-30	1/2	Easy	2 Hours	5 Days	Medium ±25%	5% - 10%	>40	-20 to 180	Good	E	E	F	F	Yes
ELASTOMERIC/ POLYMERIC	10-20	1	Easy	2 Hours	14 Days	High ±25%	N/A	>40	-20 to 200	Excellent	G	G-F	E	G	Yes
URETHANE -BASED ACRYLIC	20	3/4	Very Difficult	1-7 Days	14-21 Days	Low to Medium ±10%	Up to 5%	>40	-40 to 300	Excellent	G	G	F	F	Yes
POLYURETHANE	20-30	3/4	Difficult	Remains slightly tacky until weathered	14-30 Days	High ±25%	Nil	>40	-40 to 250	Good to Excellent	F-G	G	E	E	No
SILICONE	20-30	1	Easy	20-45 Minutes	1/2 to 1 Day	Very Low ±1%	Nil	>0	-40 to 250	Good	E	E	G	P	No

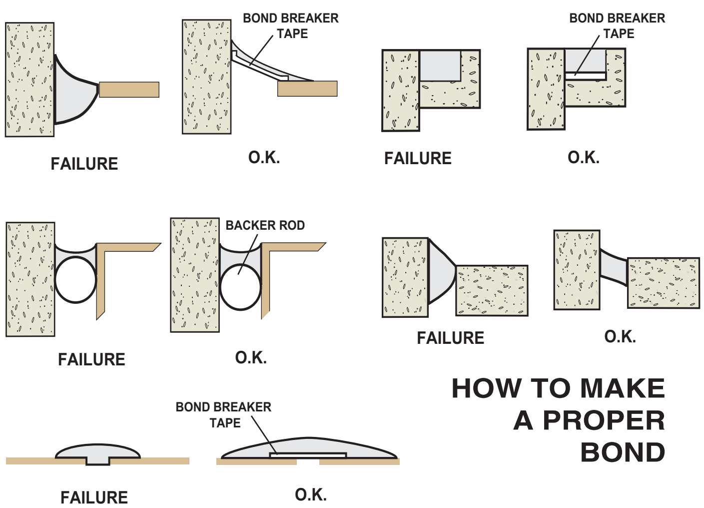
P=Poor **F**=Fair **G**=Good **E**=Excellent

* ASTM C794

Application is probably the most important part. The single most frequent cause of joint failure is in the application. Joints that are mis-matched as to width of substrates, joints that are narrow or thin, joints that are deep or at an angle, or joints that are three-sided need extra care. The illustrations show how basic some of the problems are and how to correct them. It is important to remember that the purpose of caulks and sealants is not to substitute for structural joining. No caulk or sealant will "tie" two materials together. They will only "seal" the joint against air or moisture penetration.

These guidelines are how to determine the joint size, but consideration must be given to surface preparation, adhesion, weather and UV resistance, and caulk shelf-life. To better explain, look at the diagrams. The three main causes of seal failure, regardless of proper width or flexibility are Adhesive Failure, Cohesive Failure, and Substrate Failure.

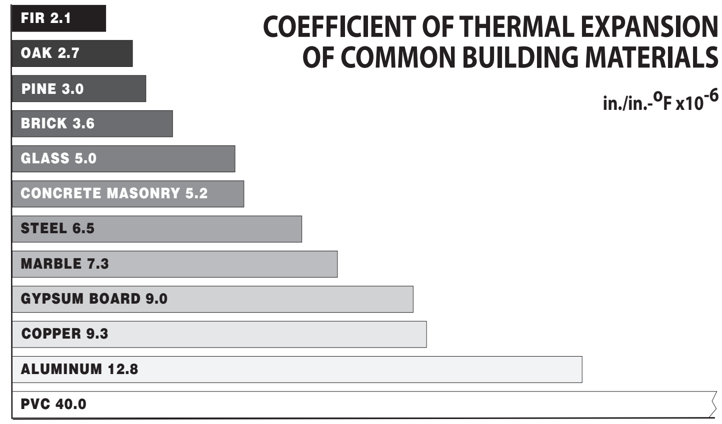
1. Adhesive Failure is the result of the caulk or sealant not sticking adequately to one of the substrates. This will happen if the movement exceeds the sealant's capability, if the surface isn't prepared properly, or if the bead isn't carefully placed.



2. Cohesive Failure is the result of the sealant itself failing to hold together. Splits, tears, or other ruptures can occur if the sealant dries out, is over-stretched, deteriorates due to time and weather, or is improperly mixed or has entrapped air.

3. Substrate Failure occurs most often when there is inadequate surface preparation. The surface that fails probably needed to be sealed, scraped, or otherwise prepared to accept the sealant selected. Caulks and sealants fail because they don't stick, won't move, or they dry out, crack, or shrink.

The major considerations are Material Movement and Joint Design. The two materials being joined are subject to expansion and contraction due to temperature and moisture changes, and there may be movement due to use. It is necessary to design a joint that allows the movement without overtaxing the elasticity of the caulk.



As the chart shows, this difference in expansion rate must be considered when joining a Vinyl Window to brick, or pine, or even aluminum, for example.

Some basic guidelines to follow:

1. Latex, Acrylic Latex and Urethane Acrylic have limited application range and about 25% shrinkage and should not be used during inclement weather or as a back bedding sealant. Excellent for interior applications.

2. Polyurethanes have excellent joint movement capability but are prone to UV degradation and become less aesthetic over time.

3. Low and medium Modulus Silicones have excellent joint movement and UV stability. Tendency to collect dirt and dust.

4. Silyl Modified polymers (MS Polymers) -best choice as a back-bedding sealant. Compatible with Flashing tape and weather resistive barriers (WRB). Excellent adhesion to common building materials.

5. Elastomeric Polymer have wide temperature range application and exhibits approximately 25% shrinkage. Best used as exterior primary sealant where aesthetics are important.

Which is Best?

Best is a relative term. With all the different types of materials that need to be caulked or sealed, it's difficult to choose among the variety of brands and types of sealants. To decide which type of caulk or sealant will work best, it is better to look first at what caulks are supposed to do, and why most sealant failures occur.

In simple terms, caulks are supposed to seal a joint between two materials so that air and moisture cannot penetrate the joint and this joint must stay sealed under variable weather conditions and even if the two materials move. Therefore, caulks must stick to the two surfaces, have elasticity to withstand movement, and must not deteriorate due to the environment.

To determine which is best for your application, consider the following:

1. Used inside or outside
2. Application and Service Temperatures
3. Materials to be joined

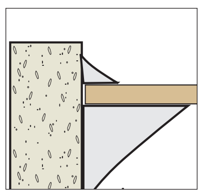
Picking the Proper Sealant

AWDI understands that the application of a sealant is as crucial as the choice of sealant. When a bead of sealant is applied to a joint there are severable factors to consider:

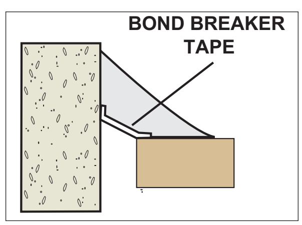
- Adhesion
- Flexibility
- Durability
- Compatibility
- Temp, Weather, Exposure)
- Aesthetics

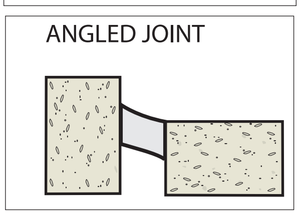
Within these three performance aspects there are countless combinations of applications, substrates and conditions a sealant is exposed to.

Bedding Joints:
For bedding joints, it is especially important that the sealant meet AAMA 800-802, and is of the right consistency and made up of 100% solids so it will not shrink after cure, unlike solvent and latex based sealants that shrink and create gaps after curing.

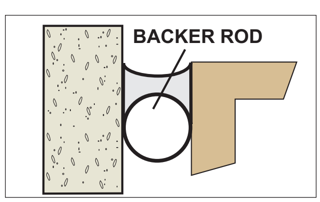


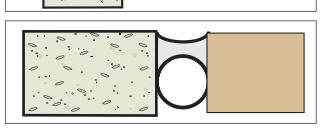
Fillet Joints:
A fillet joint is formed when two surfaces come together to form a right angle. The sealant used to join these two surfaces is triangular in shape. The sealant must adhere to the variety of substrates you're faced with. Without strong adhesion there is a high chance that the sealant will pull away from the substrate allowing for air and water infiltration.





Control Joints:
A control joint is formed when two similar or dissimilar materials meet or when substrates do not form a right angle. This joint will require both a backer rod and sealant for proper application. This joint can be as wide as 5/8 inch and be prone to extreme movement, a highly flexible sealant is necessary for a reliable seal with this application. In order to successfully install a window or door and effect a lasting weathertight seal, AWDI recommends an ASTM C920, Class 50 sealant such as premium DYNAFLEX® from DAP as a good representative to seal the exterior joints of windows and exterior finish materials. The best choice is a sealant that meets AAMA 800-802 to assure proper adhesion to the most common building materials and that is compatible with WRB and flashing tapes; and can be ued in a wide temperature range and wet surfaces.





Desired Properties

- No Shrinkage
- Locks out air and water infiltration to protect integrity of the seal
- Proven Wet Surface Application
- Ability to use the same sealant in warm and cold temperature situations to produce consistent results. 0F – 140F cold and warm weather application
- Strong Adhesion / All Surfaces Will stick to even the most difficult to bond building materials
- 5X stretch, 50% joint movement Long term durability assurance even with expansion and contraction of building materials
- 24 hour fast cure, paintable 1 HR. Fast cure to protect the building structure from outside forces and quick paintability saves time
- Achieves bubbling resistance faster to ensure optimal aesthetics
- 4,600 + Color Matches ensures perfect color match to all primary building materials
- Dirt & Dust Resistance ensures optimal visual appeal long after an installation
- UV Resistance
- Long term durability to compliment the durability of the building structure

__Note:__ Be careful, shims can present a problem as they extend through the cavity and can allow water and air infiltration. Foam Tape used outside like backer rod can seal the opening and conform to the contours while allowing drainage.

Spray Foam Insulation

While the term “Spray Foam” is often widely used in construction, there are two different types and each has its advantages and disadvantage.

Spray foam has been shunned by window installers and manufacturers over the years because foams, in the past, have either continued to expand after trim has been applied deforming the more pliable vinyl window frames, or because they have been over used to fill the gaps left when old windows are removed and the underlying rough opening has been exposed.

Make sure the foam you use has been tested to industry standards and is labeled conforming to standards as a low expansion, low pressure foam.

Most standards applying to window installation do not delineate between open cell foam and closed cell foam, the more popular “minimal expansion” foams are most frequently used and they are mostly closed cell. More confusing yet, is when foams are recommended, the compressed foam tape alternatives are called out to be open cell.

When it comes to Spray Foams, it helps to understand the differences.Open-cell spray foam (ocSPF) has a cell structure where the cells are filled with air. The open-cell structure renders soft, flexible foam, with a density of about 0.5-0.8 pounds per cubic foot (pcf).

The R-value per inch of open-cell foam typically ranges from R3.6 to R4.5 per inch. Unlike fiberglass and cellulose, the fine cell structure of ocSPF makes it air-impermeable at certain thicknesses. The air-impermeability of ocSPF qualifies it as an air-barrier material, dramatically reducing air leakage through the building envelope, significantly lowering the building’s heating and cooling costs. However, ocSPF, like fiberglass and cellulose insulations, is moisture-permeable, and may require the installation of a vapor retarder in colder climates.

Closed-cell spray foam (ccSPF) has a closed cell structure which yields rigid hard foam, with a density of 1.8-2.3 pound per cubic foot (pcf), and can provide structural enhancement in certain framed buildings. The smaller cells trap insulating

gas from the curing, which has a lower thermal conductivity than still air, and increases the R-value to anywhere from R5.8 to R6.9 per inch.

Like ocSPF, ccSPF is also air impermeable at certain thicknesses and can qualify as an air-barrier material. The bigger benefit is that the closed-cell structure of ccSPF also makes it water-resistant, and is the only spray foam that can be used where contact with water is likely.

At a thickness of 1.5 inches, no additional vapor retarder is required for most applications.

Desired Properties

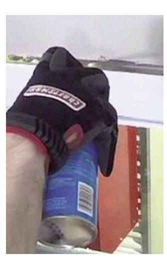
- Industry tested and labeled as a Low Pressure/Low Expansion; i.e., will not warp or deform windows & doors
- Quick Setting Formulation: can be cut or trimmed in less than 1 hour
- Cold Temperature Application: can be applied in temperatures as low as 14F
- Insulation Value of R5: makes it an efficient method for stopping air and moisture infiltration
- Remains Flexible Once Cured: will not crack or dry out

Using Spray Foam
For the best installation, it is necessary for the gap around the window or door to be sealed to block out air, water and vapor penetration. ccSPF can do that well if selected and used properly. Improper use can create water traps, impede drainage and exert excessive pressure to the window frame during expansion.

Remember: Vapor barriers need to applied on the warm side of the opening. Double vapor barriers (one on the warm side and another on the cool side) encourage condensation between and will trap the resulting condensation. Also, window installation cavities (the space between the window frame and the rough opening, or left-in-place old window frame) need to “breathe” to the outside, and allow drainage of collected water to the outside.

AWDI recommends ccSPF’Foam which is a polyurethane closed cell, low pressure/low expansion sealant to fill the gaps as protection against moisture and air. OSI's closed cell foam also achieves a thermal performance of R5 per inch.

Application
Foam can be applied using a Foam Applicator Gun, or a small can with “straw type” nozzle tip.. The flexible tip from gun or can equally allows for more precise application. This gun offers a rear valve used to control the size of bead applied into the openings. The valve also allows the life of the foam to be extended by closing the opening of the barrel for future use.



For even smaller openings, a detachable screw on top is included with the gun to be able to fill gaps as small as 1/8” wide.

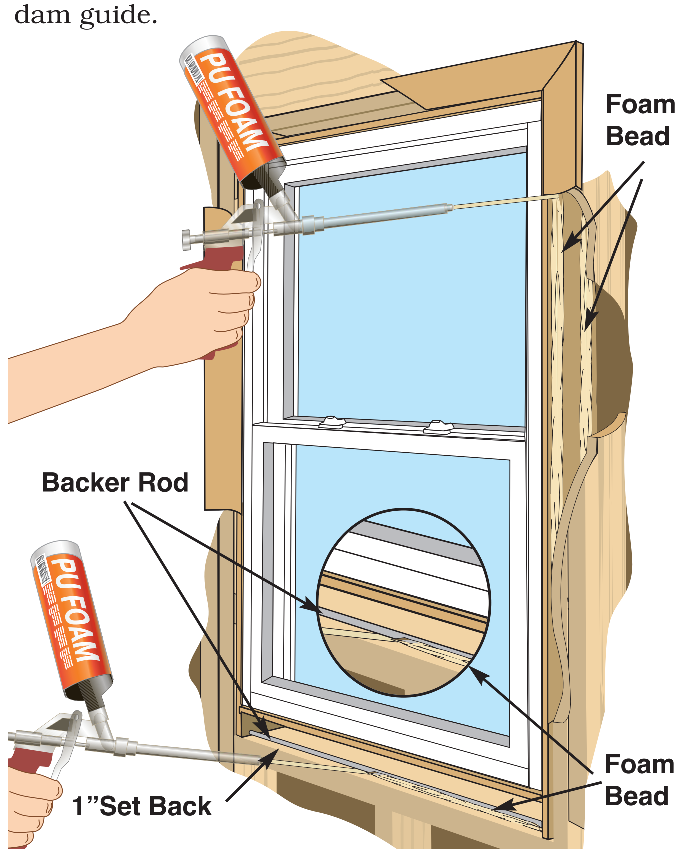
Important tips:
• Similar to the sealant gun, it is critical that you balance the movement of the foam gun or straw barrel and how you dispense the foam so that the foam makes contact with both the rough or existing window frame and replacement window frame.

• If the dispensed foam does not make contact with both the rough frame and the window frame, there won’t be an adequate bond to seal out water and air.

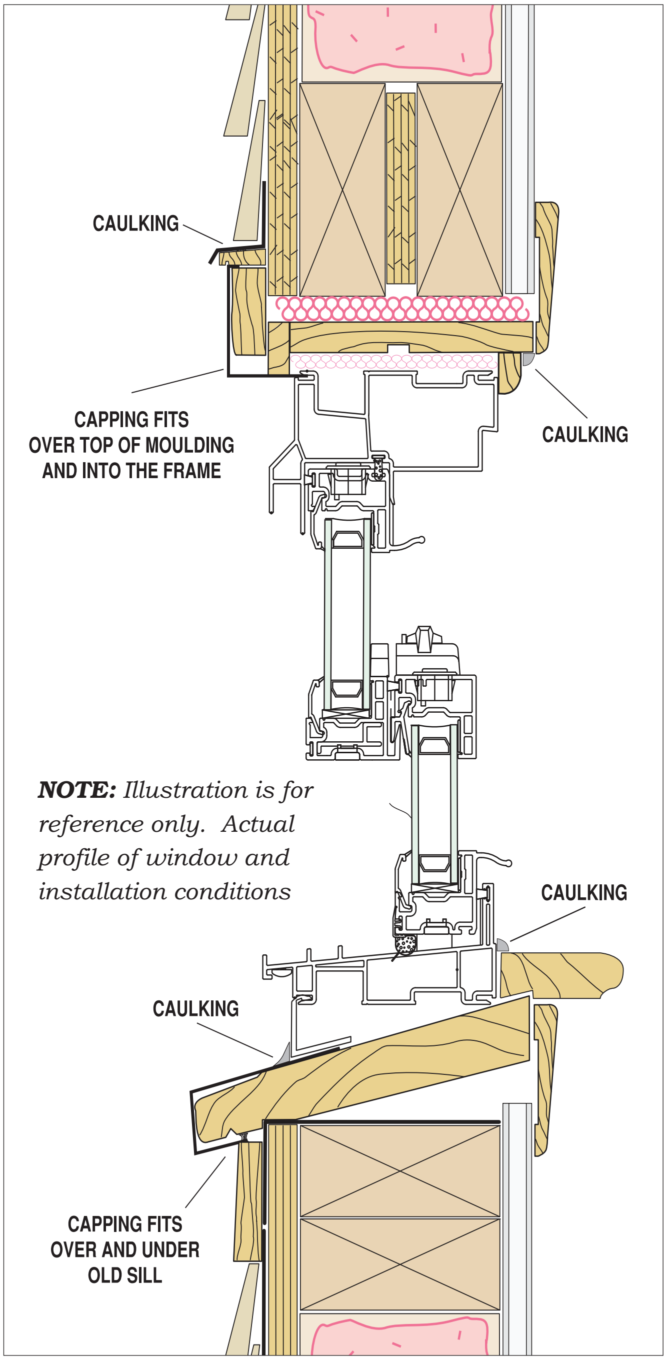
• Industry Standards suggest application of 1 inch beads, separated by an equal space. Be careful not to create two vapor barriers - one at the exterior and one at the interior. Make sure there is the ability for the opening to breathe to the cold side for drying and drainage. Use backer rod about one inch in the sill as a stop to make a workable back dam

• When applying foam around the perimeter of the window or door, you must maintain a minimum depth of 1 inch. This depth is required to provide the correct thermal performance, to help improve energy savings, and to protect against condensation problems.

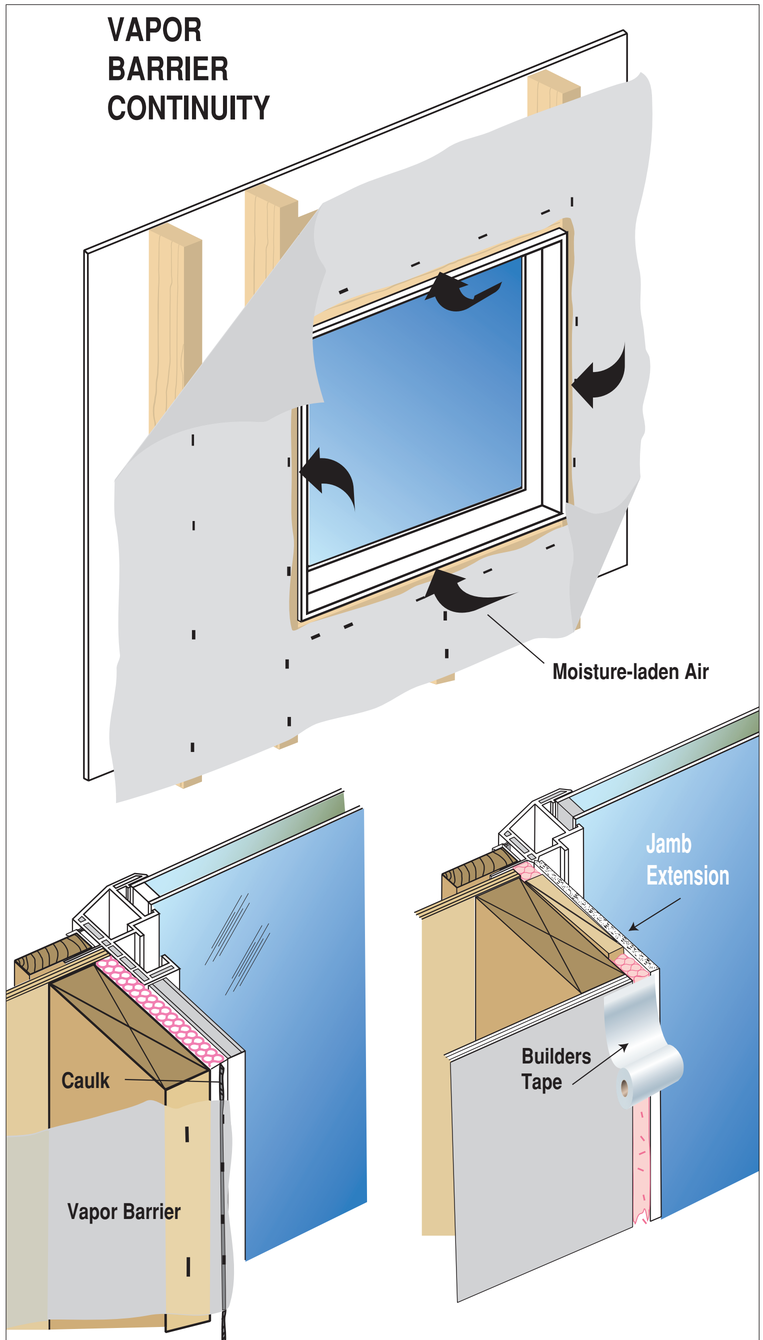
• When applying foam as a back dam to the gap between the window frame and the rough sill, do not allow the foam to extend to the exterior edge of the opening. Maintain a minimum of a 1 inch gap between the foam and the exterior edge of the rough sill. If foam fills this gap at the sill, any water from leakage will not be able to drain to the drainage plane or exterior cladding surface. Place backer rod the length of the sill, 1” from edge and use it as a back dam guide.



Capping and Vapor Barrier Continuity



NOTE: *Illustration is for reference only. Actual profile of window and installation conditions*



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. Or use Builders Tape to create Vapor Barrier between Wallboard and Window Frame - covering insulated gap.

Vapor Barriers are usually violated when new windows are installed.

Moisture laden air is allowed into the cavity between the rough opening framing and the new window frame. Allowing moisture into the cavity can cause rot, mold or other degradation of the installation and lower the thermal performance of the new window unit.

NOTE: *Vapor Barriers 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.*