

# WELCOME



## Recommended Window Installation

**2 credits**

Minnesota Department of Labor and Industry

**MARVIN**   
Windows and Doors

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# Course contents

- Overview: Hands-on Presentation

## *Installing a Window*

- Recommendations (Installation Instructions)
- Choices – Right Window for Right Application  
    Interfacing Window with Wall Condition
- Level, Plumb, Square, and True
- Clearance Provisions and Shimmiing
- Sill Pan Flash Choices
- Materials and Compatibility
- Proper Flashing and Perimeter sealing

# Course Overview

- Overview: Hands-on Presentation
- R.O. Clearance provisions
- Sill Pan Flash Types
- Weather seal alignment
- Performance and Operation
- Level, Plumb, Square, and True
- Shimming
- Sealing
- Flashing
- Final Inspection for Operation

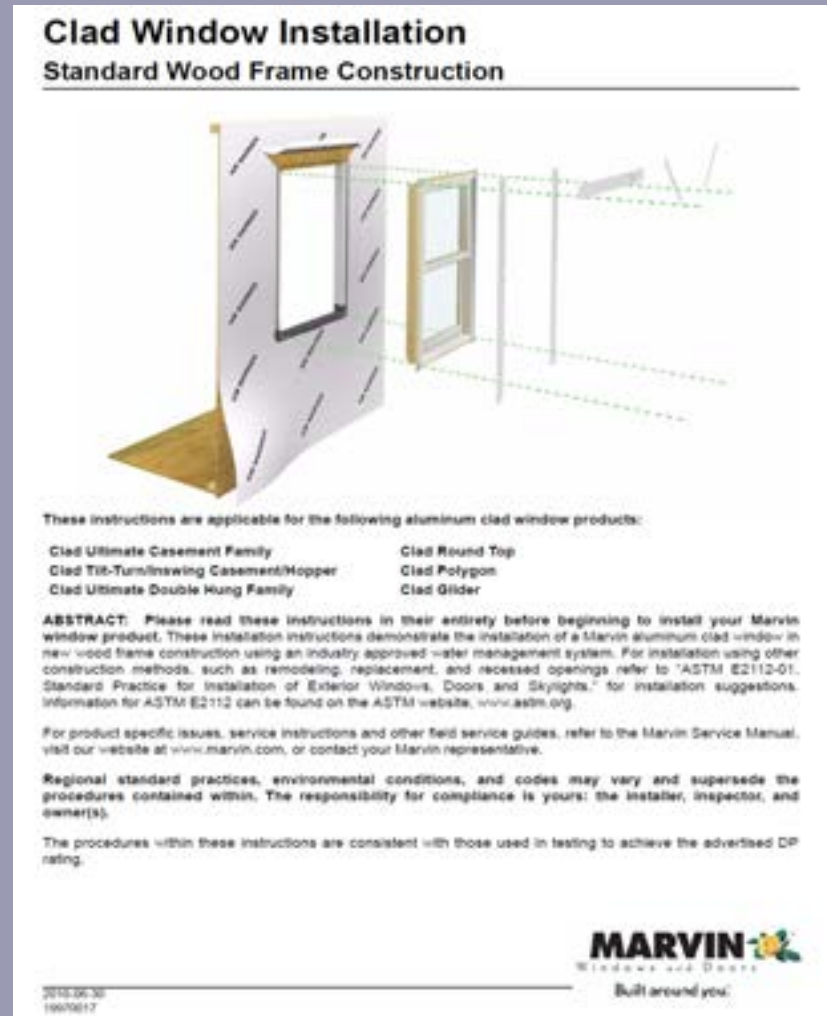
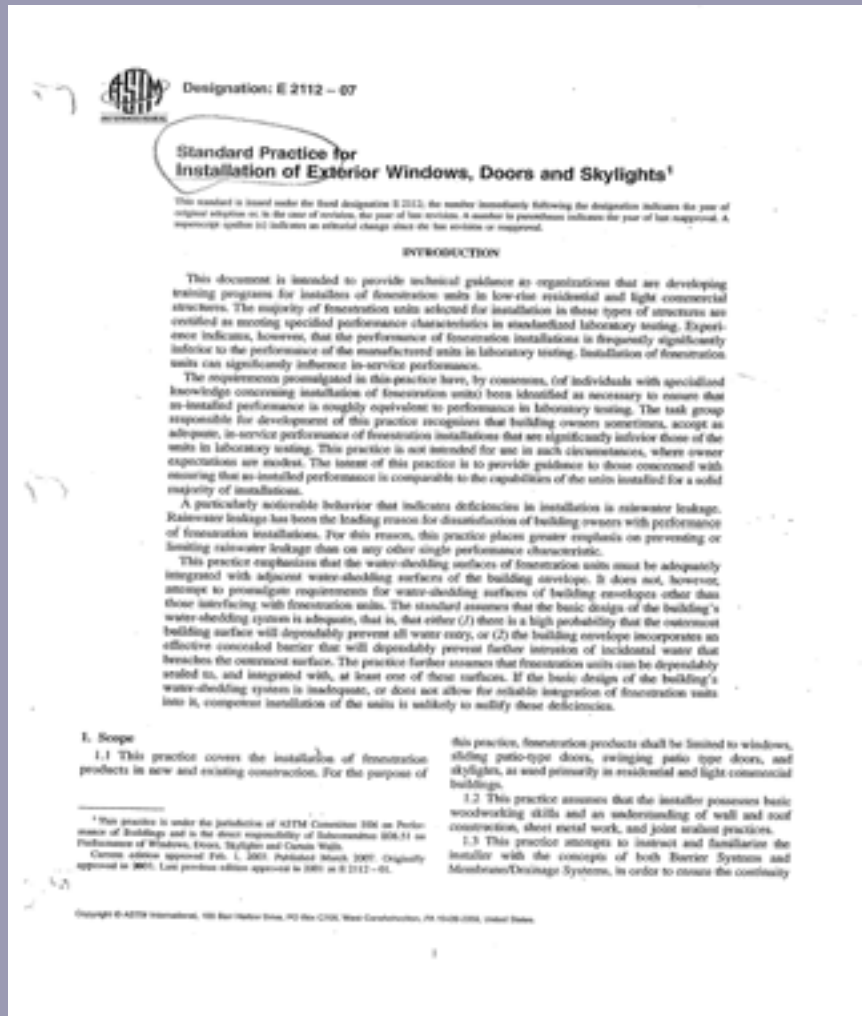
# Course goals

- General Knowledge of Windows
- Knowledge of Barrier Systems
- Window Install Methods A,B,A1,B1
- Weatherboard fashion and flashing techniques
- Making choices of materials to be used in Installation

# In Reference to and Recommended

ASTM E2112-07

Manufacturer



Installation

# Manufacturer's Recommendations

**ABSTRACT:** Please read these instructions in their entirety before beginning to install your Marvin window product. These installation instructions demonstrate the installation of a Marvin aluminum clad window in new wood frame construction using an industry approved water management system. For installation using other construction methods, such as remodeling, replacement, and recessed openings refer to "ASTM E2112-01, Standard Practice for Installation of Exterior Windows, Doors and Skylights," for installation suggestions. Information for ASTM E2112 can be found on the ASTM website, [www.astm.org](http://www.astm.org).

For product specific issues, service instructions and other field service guides, refer to the Marvin Service Manual, visit our website at [www.marvin.com](http://www.marvin.com), or contact your Marvin representative.

Regional standard practices, environmental conditions, and codes may vary and supersede the procedures contained within. The responsibility for compliance is yours: the installer, inspector, and owner(s).

The procedures within these instructions are consistent with those used in testing to achieve the advertised DP rating.

# Installation Recommendations

- ASTM E2112-07 provides basic principles to install Window, Door, and Skylight
- Reference to AAMA
- Who's code is it?
- What is the code for installation of window?
- Home Rule Doctrine (most stringent rule applies)
- Best Practices (water management vs. waterproofing)
- Non-Integral vs. Integral Flanges as well as Brick Mold



# Barrier Systems

Membrane Drainage Systems

Surface Barrier Systems

Water Management

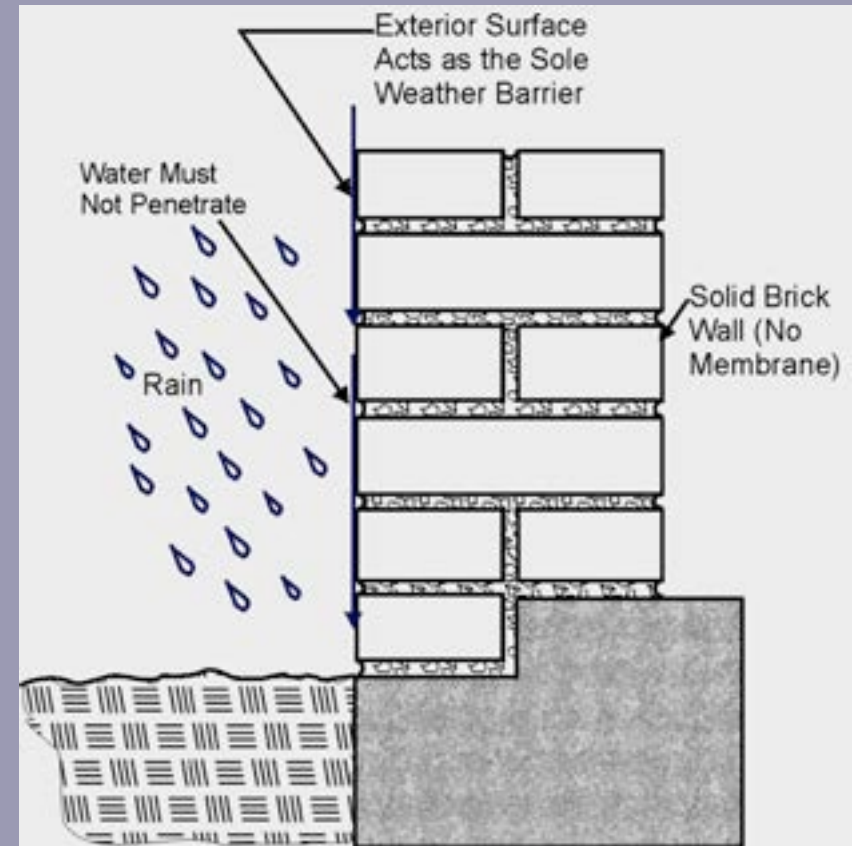
***Where do I want my  
incidentals to go?***

answer: Exterior Drainage Plane

Installation

# Identify the Weather Barrier System (Surface Barrier System)

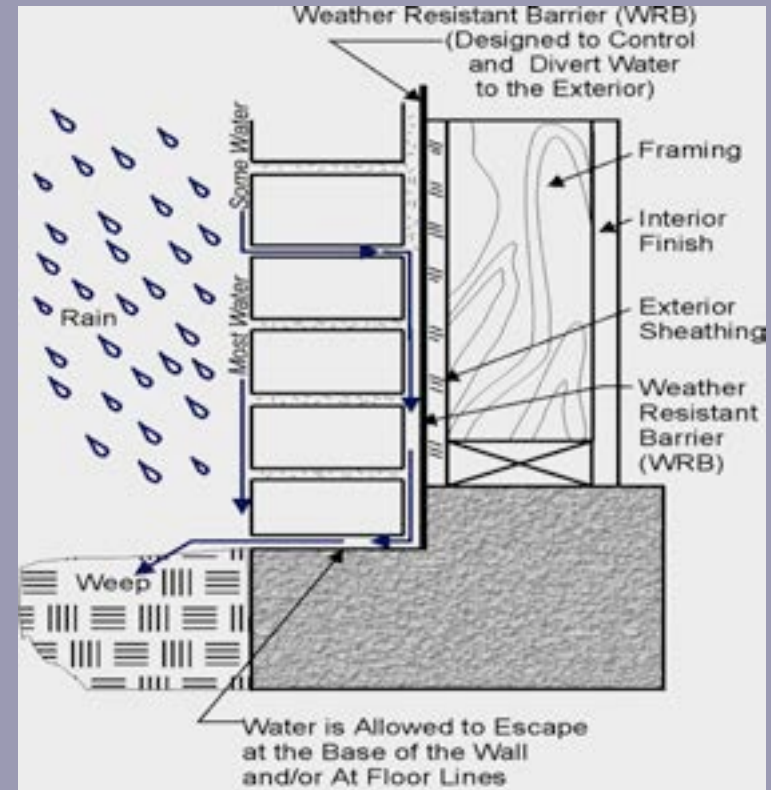
- Exterior surface is relied upon to repel the water
- Can be a solid wall or mass wall
- Does not include a secondary drainage plane
- Ties to window with a sealant joint



Installation

# Identify the Weather Barrier System (Membrane Drainage System)

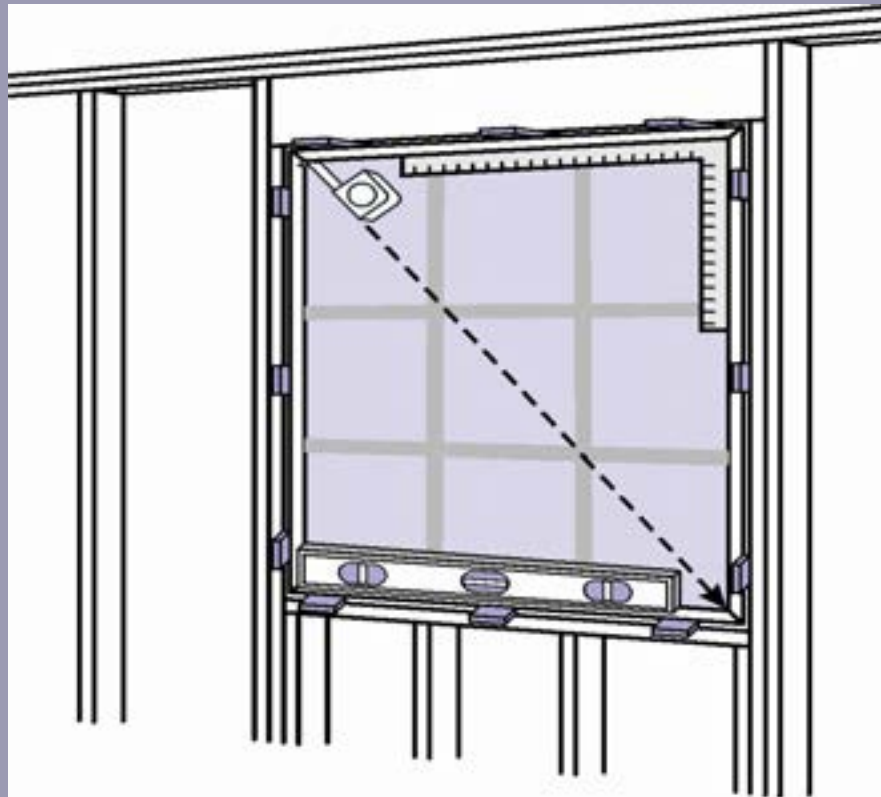
- Exterior surface repels most water, but not all
- Weather resistive barrier (WRB) is located behind the exterior surface
- Integrate windows and doors into WRB with flashing and sealant



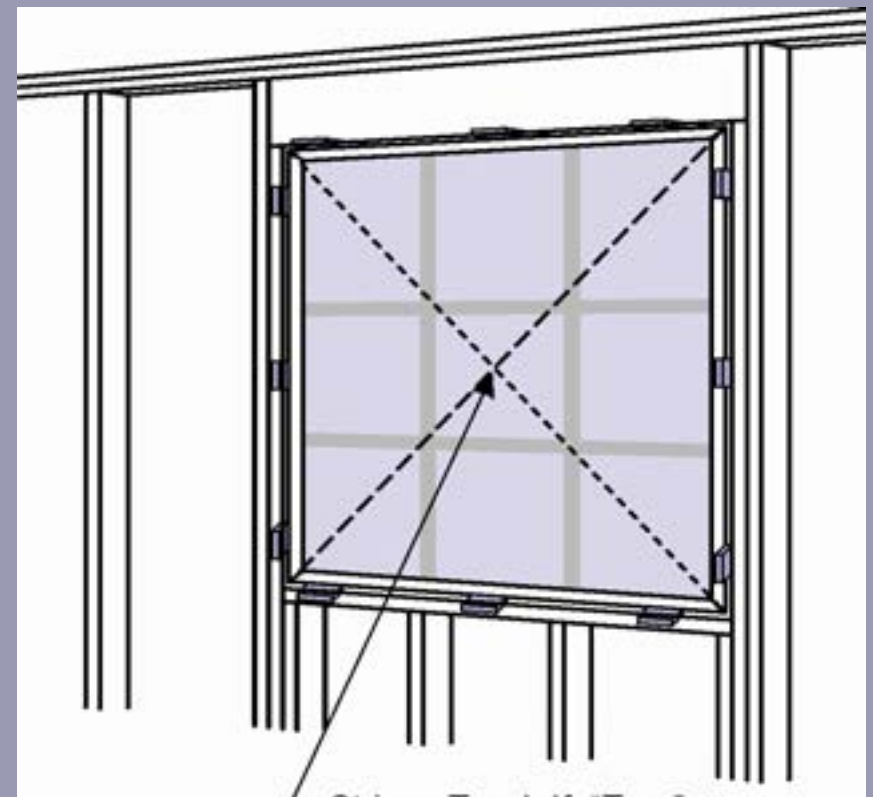
Installation

# New Construction - Level, Plumb, Square, and True

Four terms important to performance and operation



LEVEL, SQUARE, AND PLUMB



Strings Touch If "True"

TRUE

Installation

# Define - Level, Plumb, Square, and True

## Definitions:

**Level** — having no part higher than another; having a flat or even surface; being in a plane parallel to the plane of the horizon; horizontal.

**Plumb – True** (exact or precise) according to a plumb line (a cord with a lead bob attached to one end that is used to determine perpendicularity); perpendicular: vertical

**Square** - to bring to the form of a right angle or right angles; set at right angles to something else.

## How to Measure:

**Level** — sometimes called a 'spirit level'. To determine if a floor, shelf, countertop or other flat surface is level you will need a level. I recommend a 2 ft. level for most projects because it is the most versatile. If you have a very long surface you will get more accurate results with a longer level. To use a level place it onto the surface you want to measure. Be sure that surface is smooth without bumps or debris. Look at the liquid filled, glass tube in the center of the level and make adjustments up or down until the bubble is sitting between the 2 black lines.

**Plumb** — To determine if a vertical surface like a wall, fence post or pole is plumb you can use your level for this job, too. Place the level up against the surface you are check for plumb being sure the surface is smooth and free of debris. For this measurement you will use the liquid filled tube on one end of your level. Make adjustments until the bubble is in between the 2 black lines.

**Square** — To determine if the place at which 2 surfaces meet are 90° apart you will need either a speed square or a framing square. When you place either of these tools at the point at which 2 surfaces the sides of the tool should sit flat on both surfaces. If there is a gap on one side or the other you will need to make the necessary adjustments.

**Author: Judy Browne**

Installation

# Opening and Framing Requirements

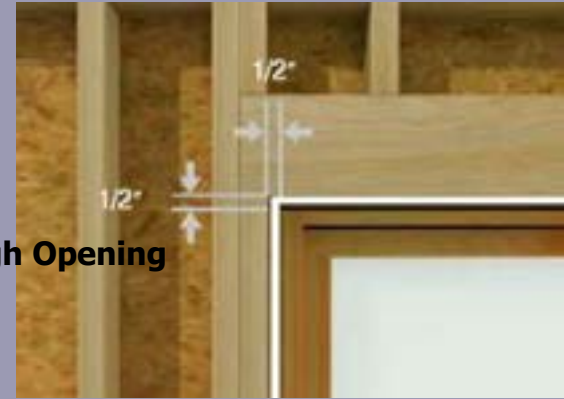
## Rough openings (RO)

1" wider and 1/2" higher than the outside measurement of frame

## Masonry openings (MO)

A minimum of 1/2" wider and 1/4" higher than the outside measurement of frame

**Rigid sill pans will decrease the RO height clearance.**



**Rough Opening**



**Masonry Opening**

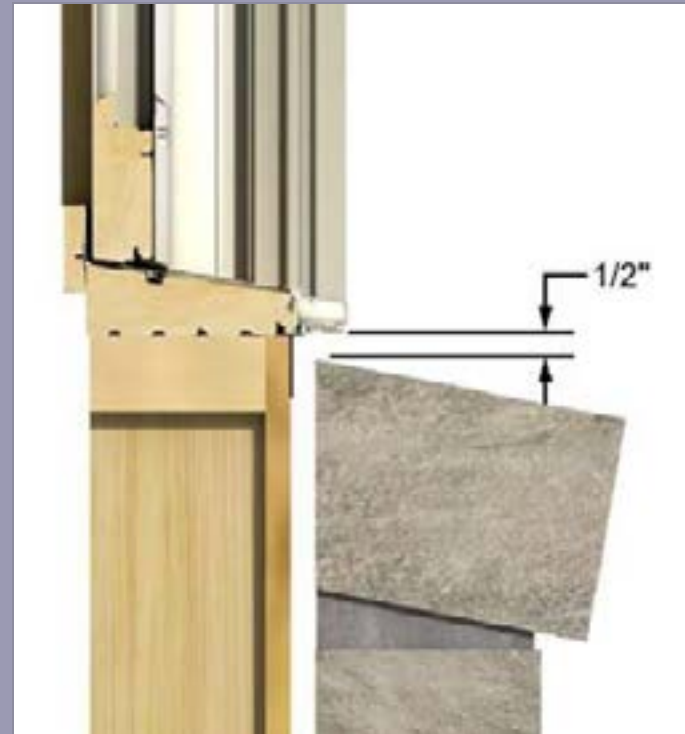
# Brick Bind

## Rough Opening Preparation

Standard wood frame

construction with brick  
veneer -  $\frac{1}{2}$ " min. between  
the bottom of the window  
sill and top row of brick to  
avoid "brick bind."

Additional clearance may be  
advisable on multiple  
story buildings.



## Clearance Provisions

- Unless otherwise specified, provide at least 1/2" at the top and 1/2" clearance on each side.
- Also note the thickness of Sill Pan.

## Clearance Provisions

- Unless otherwise specified, provide at least 1/2" at the top and 1/4" clearance on each side.
- Also note the thickness of Sill Pan.



# Proper Shimming

- Within 4” from corners and in intervals of 15” and as directed by Manufacturer.
- Contact points - Corners, checkrails, meeting stiles, lock points and hinge points.
- The purpose of shimming is to keep your window frame within 1/16” of straight.

**Positioning Window:** center it in the opening, level at the sill, and plumb the frame to desired depth. If necessary, shim under the jambs to bring to level.

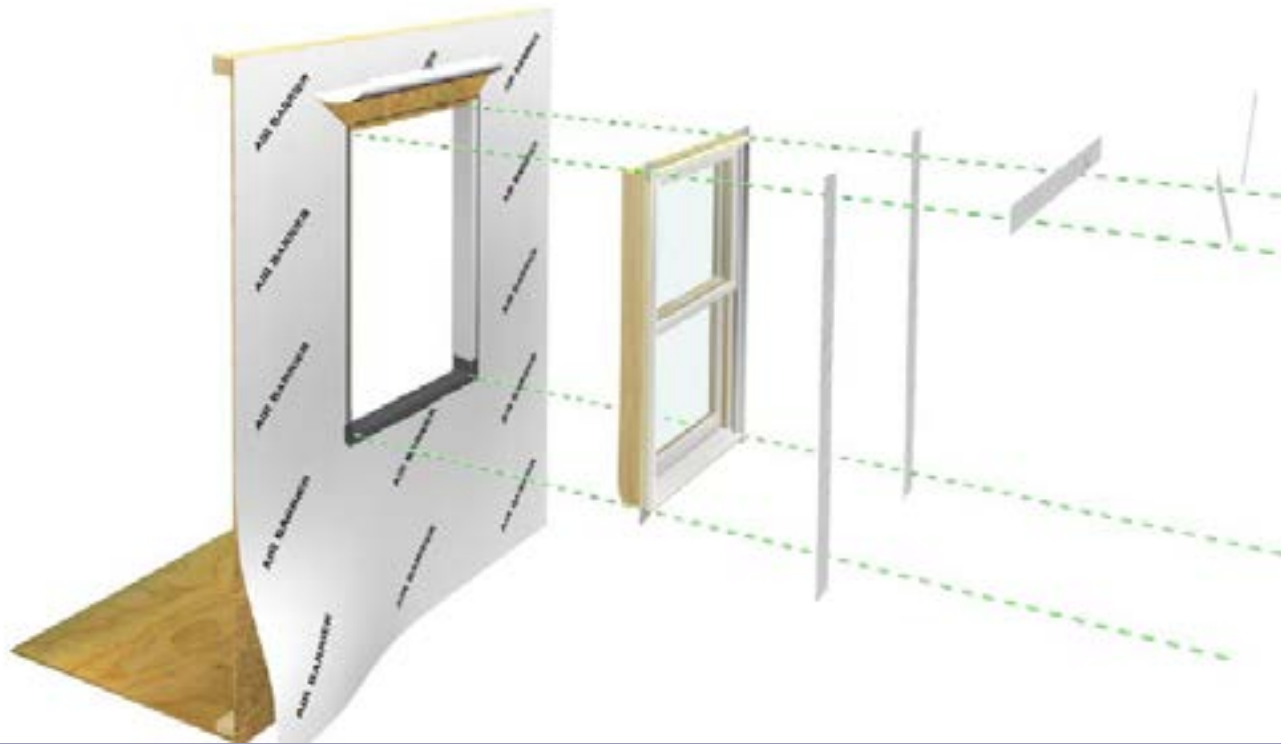
**Wedge Shims:** typically made of wood, easy to apply, used in pairs, restricted to top and side applications.

**Rectangular Shims, Horseshoe Shims and Shim Packs:** generally made of high impact plastic, can be used in most types of application

# Clad Window Installation

## Standard Wood Frame Construction

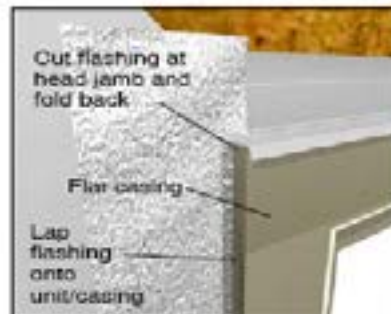
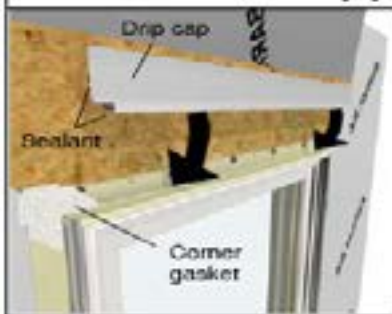
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Installation

## Step 5: Flashing the Installation

### Air Barrier Applications



Install flashing at head jamb to cover drip cap and membrane at jambs

Install flashing to cover wrap and lap onto window jamb/casing

Fold air barrier down over membrane



Installation

## Technical Installation Specifications

The following details are specified for proper installation and for the unit to meet the advertised design pressure (DP) rating.

- Rough Opening Width: 1/4" - 1" (6-25) wider than window/door frame outside measurement.
- Rough Opening Height: 1/4" - 1/2" (6-13) higher than window/door frame outside measurement.
- Masonry Opening Width: 1/4" - 1/2" (6-13) wider than window/door frame outside measurement.
- Masonry Opening Height: 1/8" - 1/4" (3-6) higher than window/door frame outside measurement.

### Architectural Detail Manual Specifications:

- Rough Opening: Width 1" (25); Height 1/2" (13).
  - Masonry Opening: Width 1/2" (13); Height 1/4" (6).
- A rigid, sloped sill pan integrated with the weather resistive barrier. The panning must drain water to the exterior of the cladding OR the exterior surface of a

- Properly flash and/or seal all windows at the exterior perimeter.
- Sealants used for installation must be Grade NS Class 25 per ASTM C920 and compatible with the building exterior, window exterior surface, and flashing/water management materials.
- The following materials were used to develop these instructions:

**Weather Resistant Barriers:** DuPont™ Tyvek® HomeWrap or Grade D building paper.

**Flashing Materials:** DuPont™ FlexWrap or DuPont™ Straight Flash, DuPont™ Tyvek® Tape.

**Sealant:** OSI® Quad Pro-Series®; solvent release butyl rubber sealant or DAP DynaFlex230™.

**Panning System:** Marvin SillGuard™.

*Other materials may be used but must be*

- Flashing materials must comply with ASTM E2112-01, section 5.13 and be compatible with all materials used in installation including panning systems, air barriers and building papers, sheathing, and the window unit.  
**Flashing material must not contain asphalt and must be compatible with flexible PVC (vinyl).**

z (51) galvanized roofing nails spaced no more than 4" (102) from each corner and spaced no more than 8" (203) on center around the entire perimeter.

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# Sill Pan Flash

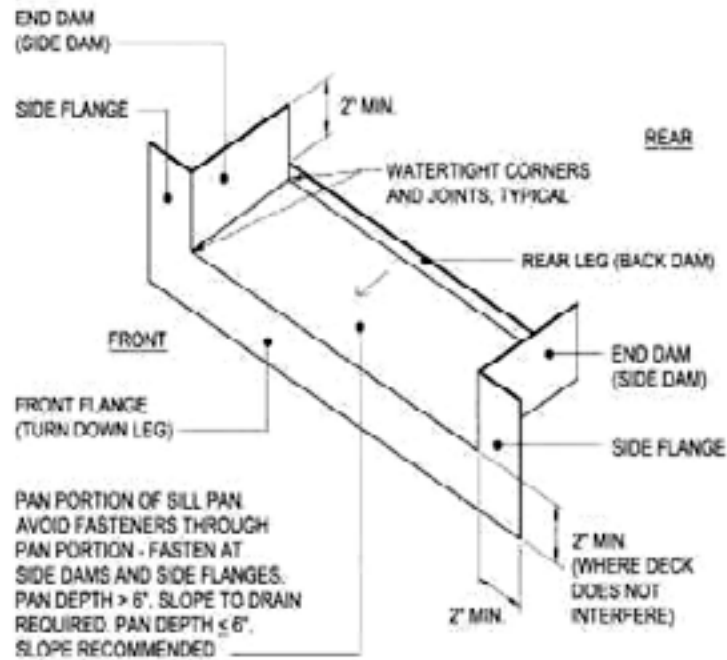


FIG. A3.4 Configurations of Typical Sill Pan Flashing—Isometric



Installation

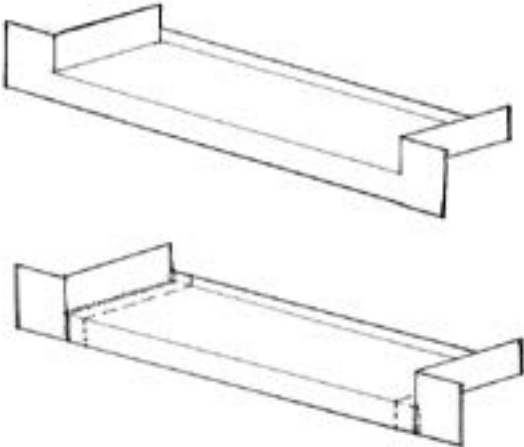
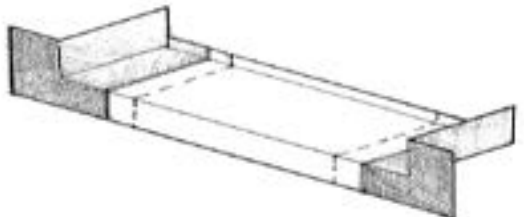
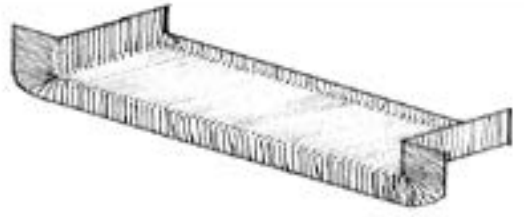
# Sill Pan Flash Types

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
<b>Liquid Membrane</b>	<b>Continuous coating</b>	<b>Type V</b>

(Based on and expanded from ASTM E2112-07, Table 5.)



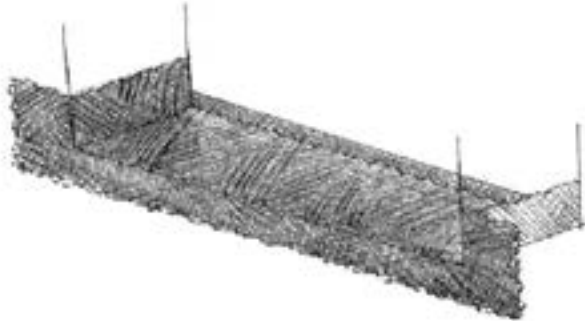
Installation

# Types of Sill Pan Flash

Type	Material	Fabrication	Diagram
Type I	Rigid sheet – metal or plastic	1-piece  Multiple pieces – soldered or welded watertight	
Type II	Rigid sheet – metal or plastic	Multiple pieces – solid preformed corners, lapped and sealed or joined to a solid center section with watertight seal	
Type III	Flexible membrane – self-adhering flashing	1-piece, formable membrane	

Installation

# Types of Sill Pan Flash

Type	Material	Fabrication	Diagram
Type III	Flexible membrane – self-adhering flashing	Multiple pieces, membrane pieces lapped watertight	
Type IV	Combination – rigid + membrane flashing	Multiple pieces – usually formed rigid comers joined with lapped self-adhering membrane sheet(s)	
Type V	Liquid – membrane coating	1-piece; spray-, brush-, or roller-applied coating applied directly to the substrate. Note: integrate with any separate flashing & WRB	

Installation



# Sealants

## ASTM C920 Sealant Schedule

- Silicone, Latex, Polyurethane, Butyl, Acrylics, Synthetics

### Grade NS

- Non-sagging product

### Class 25

- 25 % Elongation (the ability to move 15-40%)

### Seek proper choices

- Compatibility with other substrates in window interface to the wall (building materials, flashings, sealants, dissimilar materials, fasteners and Etc.)
- **KNOW YOUR S\_\_\_\_\_ (Substrates)**

# Sealants

- **Compatibility** - Watch for:
  - Hardening or softening
  - Tackiness (after normal cure time)
  - Loss of adhesion
  - Discoloration or bleeding
- **Surface Preparation**
  - Sound - free of rotted wood, loose paint, mortar or concrete, etc.
  - Clean - free of dirt, dust, oily substances, and/or old sealant
  - Dry and free of frost

# Product Compatibility or Incompatibility ??



Installation

# Sealant Adhesion and Application Matrix

ADHESION	APPLICATION													
	SEALANT ADHESION GUIDE							SEALANT APPLICATION GUIDE						
	SILICONE	POLYURETHANE	LATEX (MEETING ASTM C920)	LATEX	SOLENT RELEASED	BUTYL TAPE	SILICONE	POLYURETHANE	LATEX (MEETING ASTM C920)	LATEX	SOLENT RELEASED	BUTYL TAPE		
ALUMINUM ANODIZED	Yes	Yes	Yes	Some	Yes	Yes	BEHIND MOUNTING FLANGE <sup>1</sup>	Yes	Yes	Some	Some	Some	Yes	
ALUMINUM MILL FINISH	Yes	Yes	Yes	Some	Yes	Yes	BOX FRAME TO OPENING	Yes	Yes	Yes	NR	Some	NR	
ASPHALT BUILDING PAPER	Yes	Yes	Yes	Yes	NR	Yes	EXTERIOR CASING	Yes	Yes	Yes	Some	Some	NR	
BRICK	Yes	Yes	Yes	Some	Yes	NR	EXTERIOR/INTERIOR STOP	Yes	Yes	Yes	Yes	Yes	NR	
CONCRETE	Yes	Yes	Yes	Some	Some	No	EXTERIOR PERIMETER <sup>1</sup>	Yes	Yes	Yes	Some	Some	NR	
COPPER	Yes <sup>2</sup>	Yes	Some	Some	Yes	Yes	HEADER EXPANDER	Yes	Yes	Yes	Some	Some	NR	
EIFS	Yes	Yes	Some	NR	NR	NR	INTERIOR TRIM AND STOOL	NR	Yes	Yes	Yes	NR	NR	
FIBERGLASS	Yes	Yes	Some	Some	Some	Yes	MULL SEAL	Yes	Yes	Some	NR	NR	NR	
GALVANIZED STEEL	Yes <sup>2</sup>	Some	Some	Some	Yes	Yes	PANNING	Yes	Yes	Yes	NR	Some	NR	
GLASS	Yes	Some	Yes	Some	Yes	Yes	SILL ANGLE	Yes	Some	Yes	NR	Some	NR	
HOUSE WRAP	Some	Some	Some	Some	Some	Yes	SILL CAPPING	Yes	Some	Yes	NR	Some	NR	
PAINTED SURFACES <sup>2</sup>	Yes	Yes	Yes	Yes	Yes <sup>3</sup>	Yes	SILL EXTENDER	Yes	Yes	Yes	Some	Some	NR	
POLYETHYLENE	Some	Yes	No	No	Yes	Yes	THRESHOLD	Yes	Yes	Some	NR	Some	NR	
POLYSTYRENE FOAM BOARD	Yes	Yes	Yes	Some	NR	Yes	UNDER DOOR SILL PAN	Yes	Yes	Some	NR	Some	NR	
STUCCO	Yes	Yes	Yes	Some	Some	NR	UNDER FLASHING <sup>2</sup>	Yes	Yes	Some	Some	Some	Yes	
VINYL	Some <sup>3</sup>	Some	Some	Some	Some	Some	WALL STOOL	Yes	Yes	Yes	Some	Some	NR	
WOOD	Yes	Yes	Yes	Yes	Yes	Yes								

<sup>1</sup> = Neutral Cure Silicone Only	<sup>1</sup> = Match Sealant Movement Capability to Anticipated Joint Movement
<sup>2</sup> = Check Paint Individually	<sup>2</sup> = Check Adhesion and Compability to Mating Surfaces
<sup>3</sup> = Check for Compatibility	NR = Not Recommended
NR = Not Recommended	Some = Many Are Not Adequate
SOME = Many Are Not Adequate	Yes = Majority Are Adequate
YES = Majority Are Adequate	

Installation

# Points to know and understand about BUTT Joints

## Two Sided adhesion

C - Clean

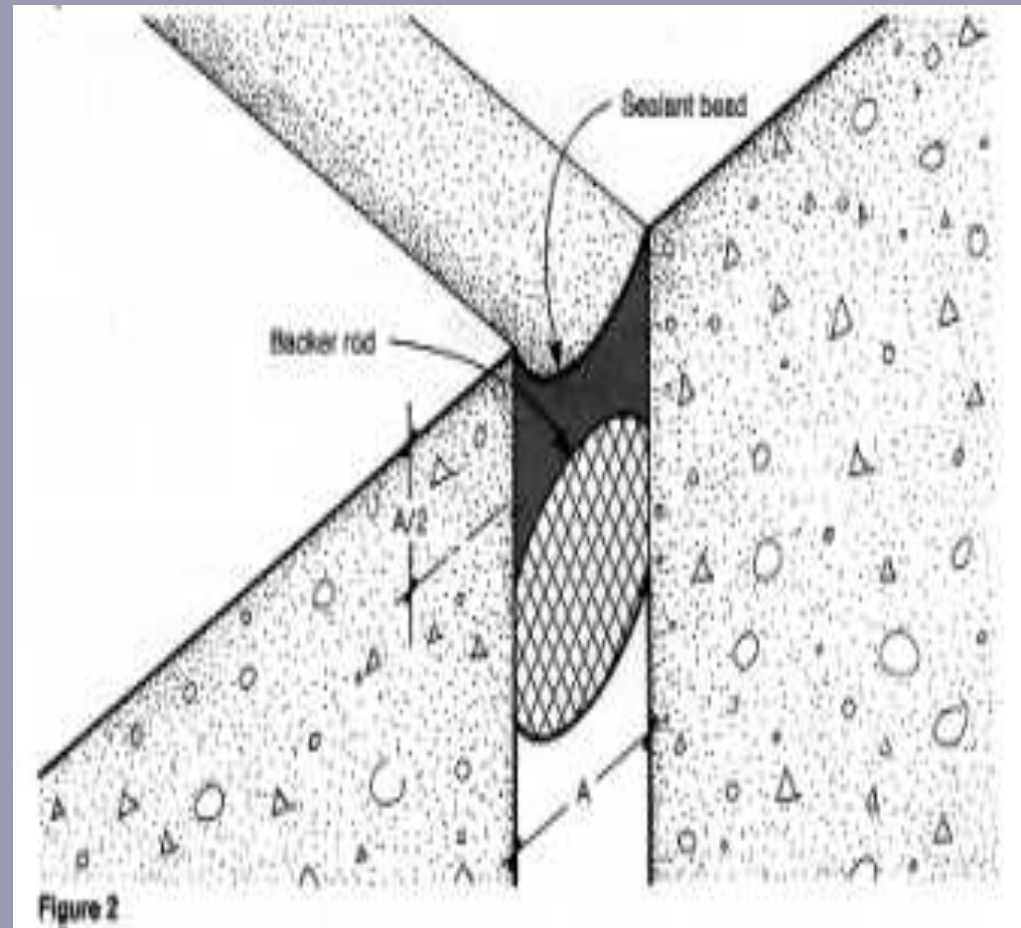
P - Prime

P - Pack

S - Shoot

T - Tool

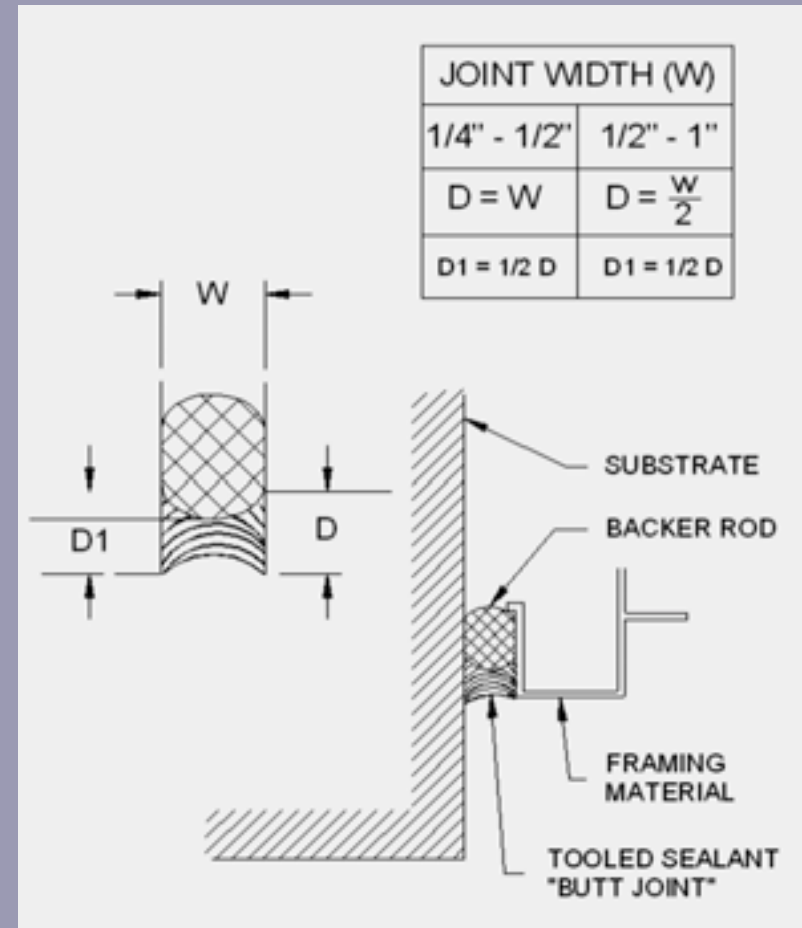
**Note !** Backer Rod controls depth of joint and helps with adhesion and movement



Installation

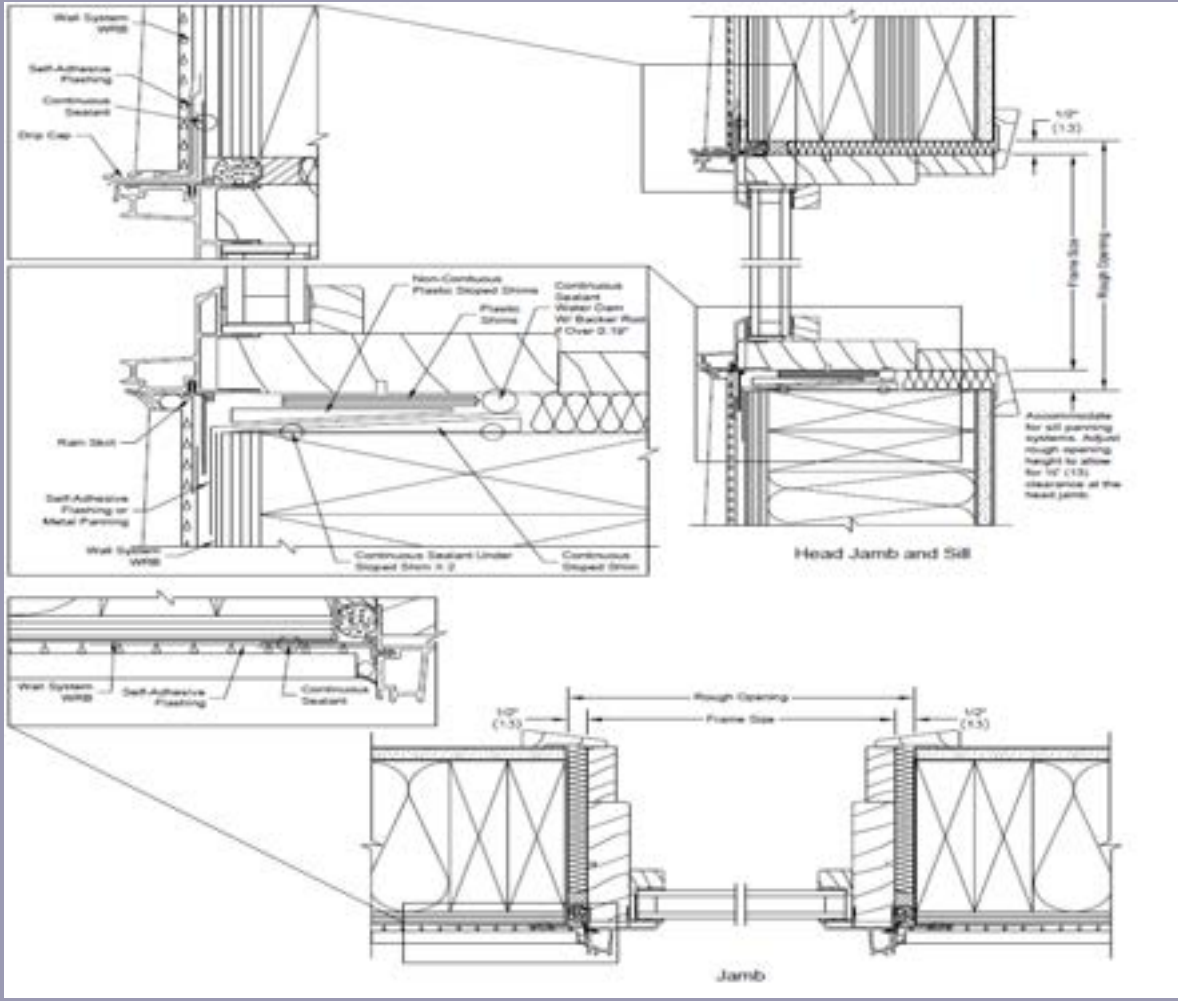
# Joint and Sealant Dimensions

- At least 1/4" sealant bond to each contact surface
- Butt joints of Porous surfaces (concrete, masonry, or brick)–  
For 1/4" to 1/2" width, the width should equal the depth



Installation

# ADM Flashing Details



Installation

# Sealant Joints

**THOUGH A SMALL PART OF A BUILDING'S EXTERIOR,  
SEALANTS PERFORM A VERY LARGE FUNCTION**

Joints sealed with an elastomeric sealant usually fail from a combination of factors that can be summed up in six words -

## **The lack of attention to detail**

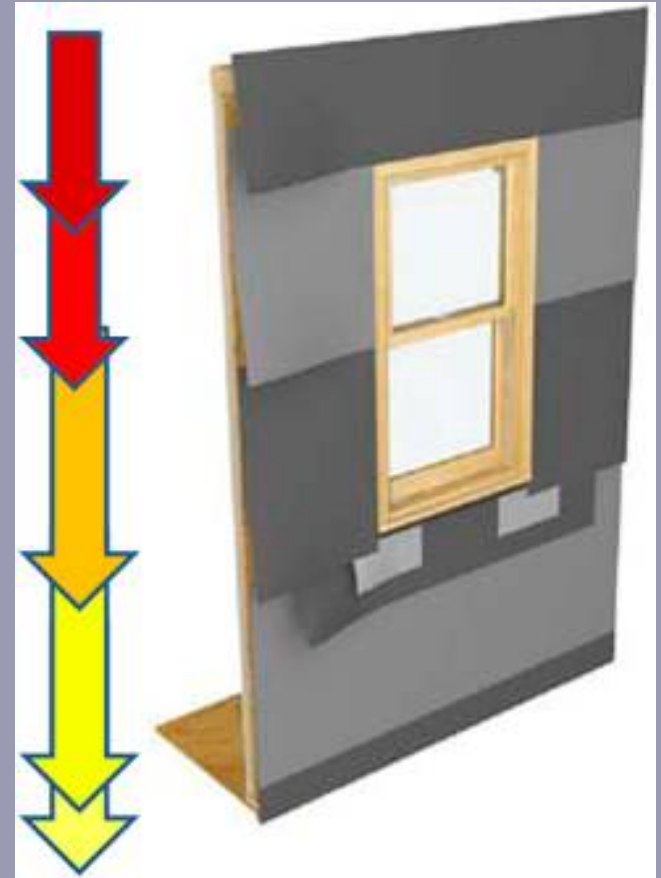
Too often, since the sealants are a small percentage of the work, they are perfunctorily specified, easily substituted, and haphazardly applied. Yet successful joints require meticulous design, precise sealant selection, and painstaking application.



# Weather Board Flashing

All wraps and flashings are installed in a weather-board fashion.

This allows the building to shed any water that may reach the building wrap.



# Mounting Flange Installation Methods

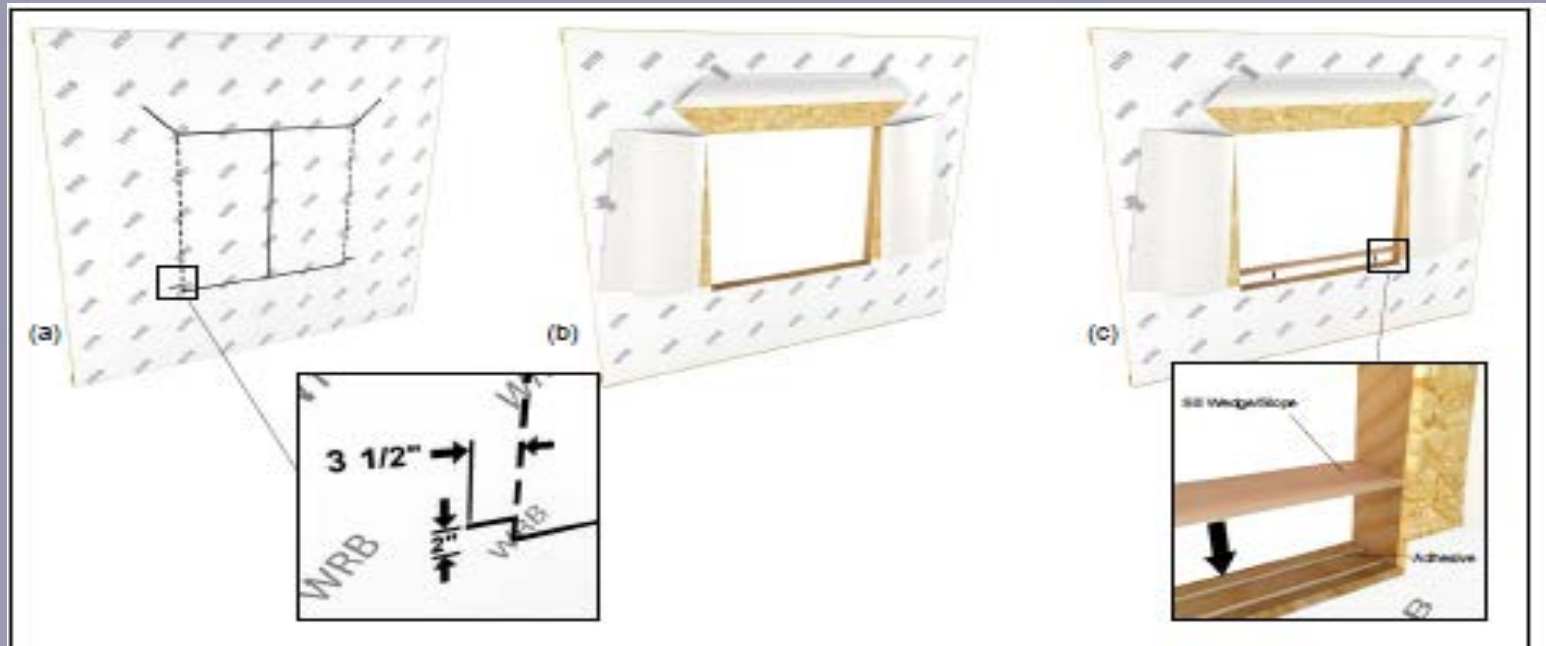
- Method A
- Method B
- Method A-1
- Method B-1

DETERMINING THE PROPER LENGTH OF FLASHING	
<b>SILL FLASHING</b>	= RO <sup>w</sup> + (2 x FLASHING WIDTH)
<b>JAMB FLASHING</b>	= RO <sup>h</sup> + (2 x FLASHING WIDTH) - 1"
<b>HEAD FLASHING</b>	= RO <sup>w</sup> + (2 x FLASHING WIDTH) + 2"
LEGEND	
RO = ROUGH OPENING	
RO <sup>h</sup> = ROUGH OPENING VERTICAL HEIGHT	
RO <sup>w</sup> = ROUGH OPENING HORIZONTAL WIDTH	

Flashing Method Selection Chart			
(Based on doors with integral fins being installed in membrane/drainage type wall systems)			
		A	B
		Jamb flashing will be applied <b>AFTER</b> the door or <b>OVER</b> the face of the mounting flange	Jamb flashing will be applied <b>BEFORE</b> the door or <b>BEHIND</b> the face of the mounting flange
	Weather resistant barrier (WRB) is to be applied <b>AFTER</b> the door installation	Use Method "A"	Use Method "B"
<b>I</b>	Weather resistant barrier (WRB) is to be applied <b>FIRST</b> or <b>BEFORE</b> the door installation	Use Method "A1"	Use Method "B1"

Installation

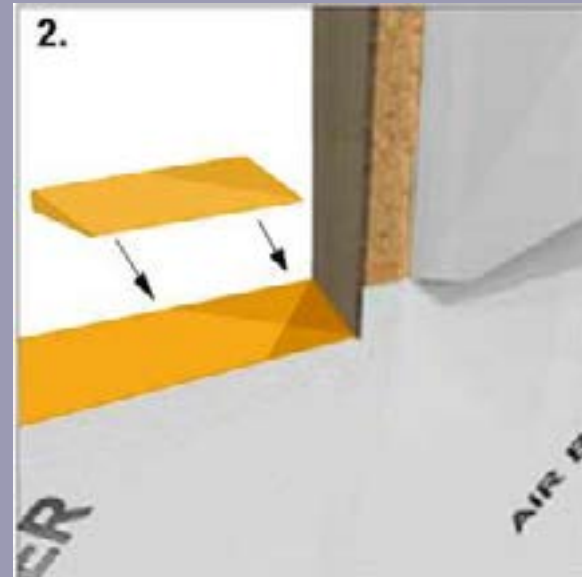
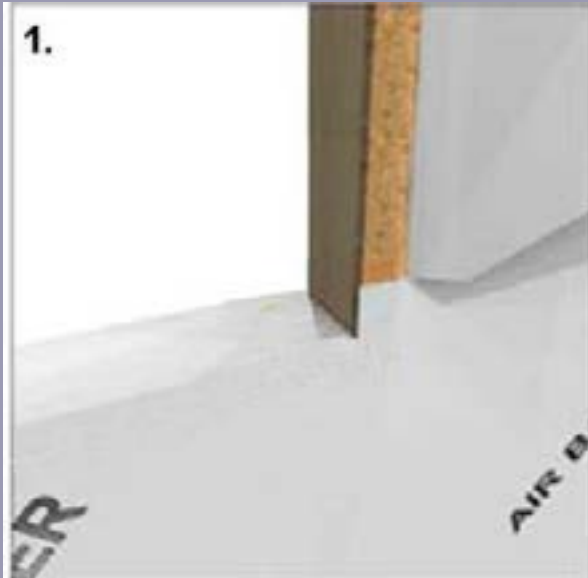
# Air Barrier Application



## Step 1:

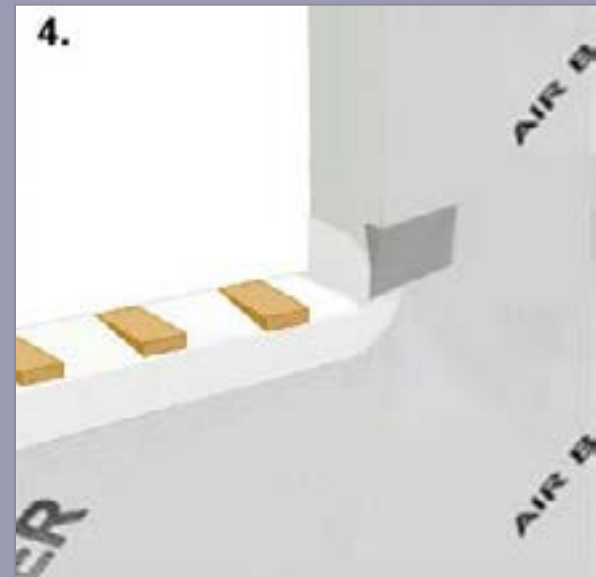
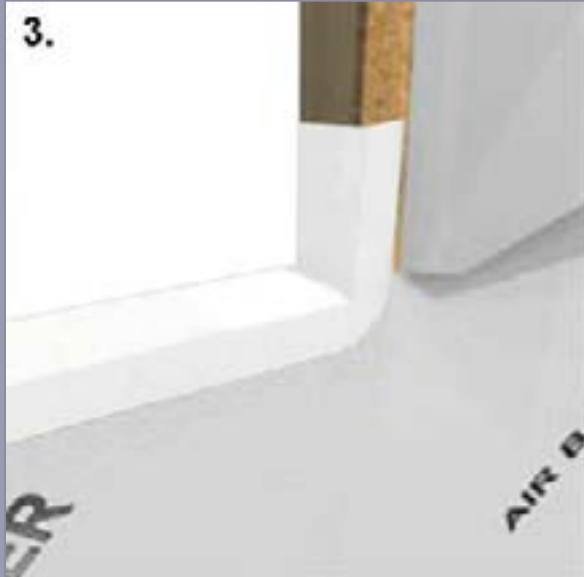
- Trim air barrier across top of head jamb.
- Trim up from the bottom corners ~ 2" then make an additional horizontal cut about 3- 1/2" wide.
- From the horizontal cut, make two 45° cuts toward the center.

# Sill Panning Systems: Beveled Cedar Sill (R.O. Prep)



Installation

# Sill Panning Systems: Beveled Cedar Sill



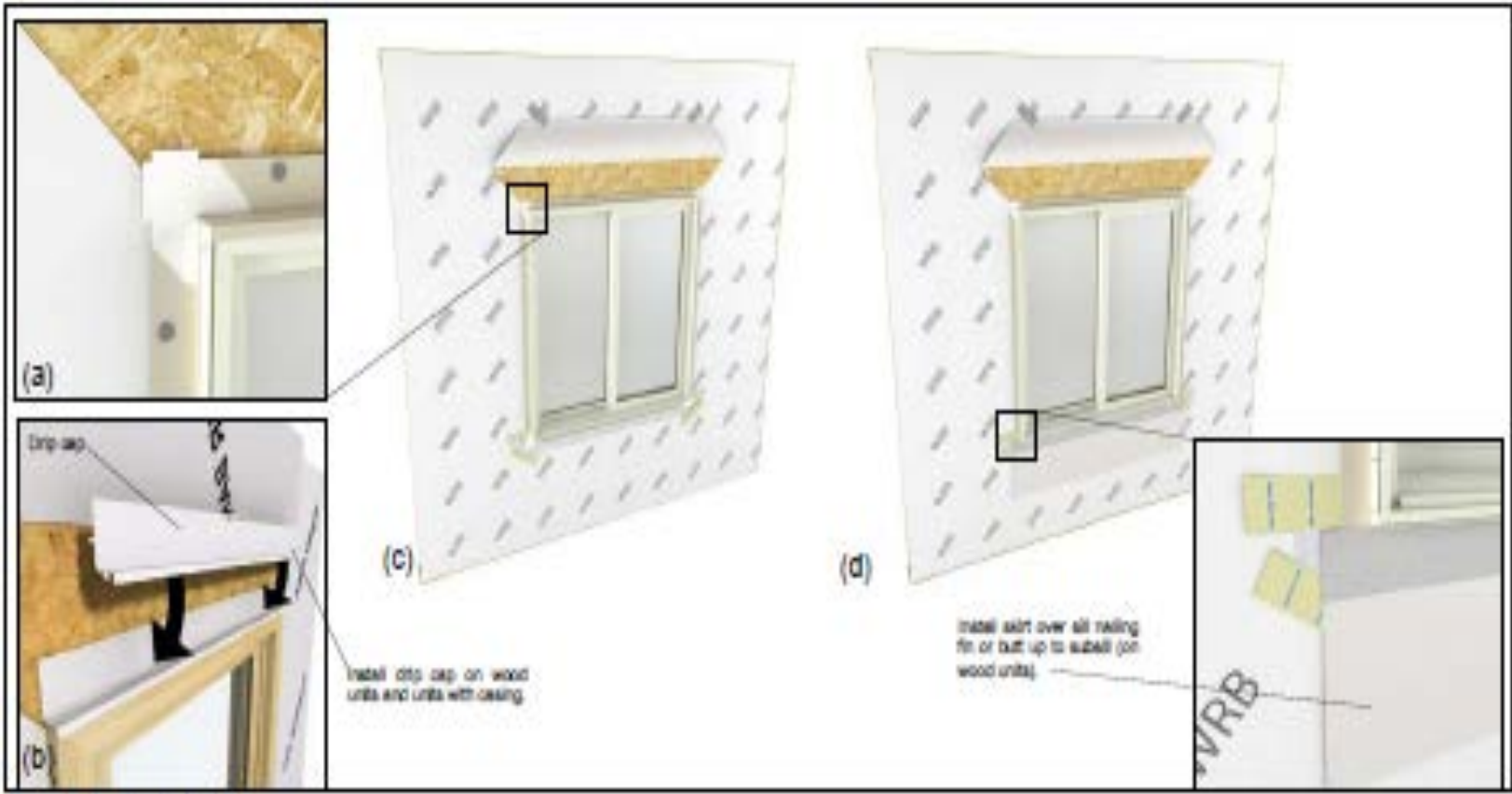
Installation

# Installing the Window

## Install the Window

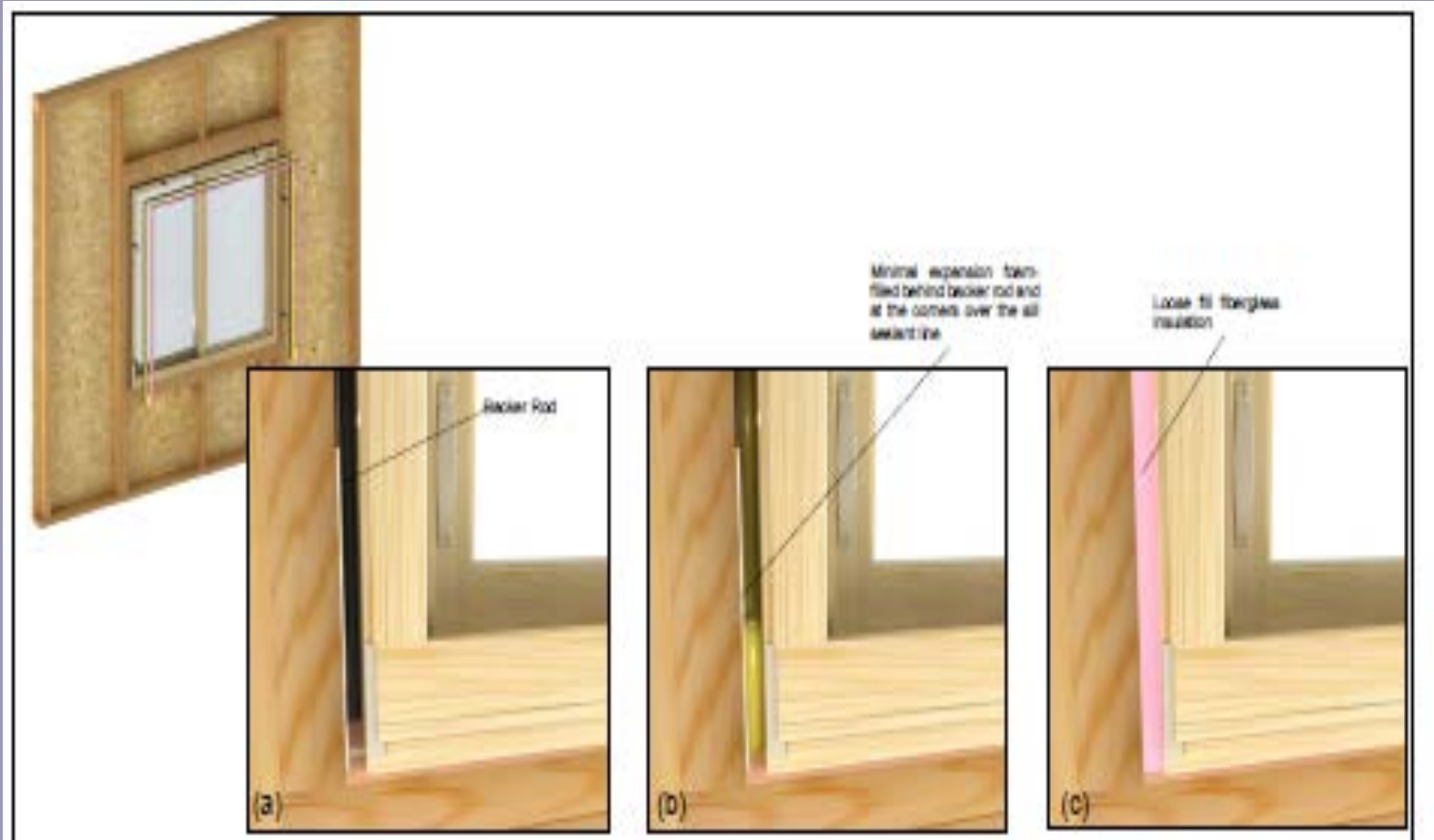


# Flashing the Installation



Installation

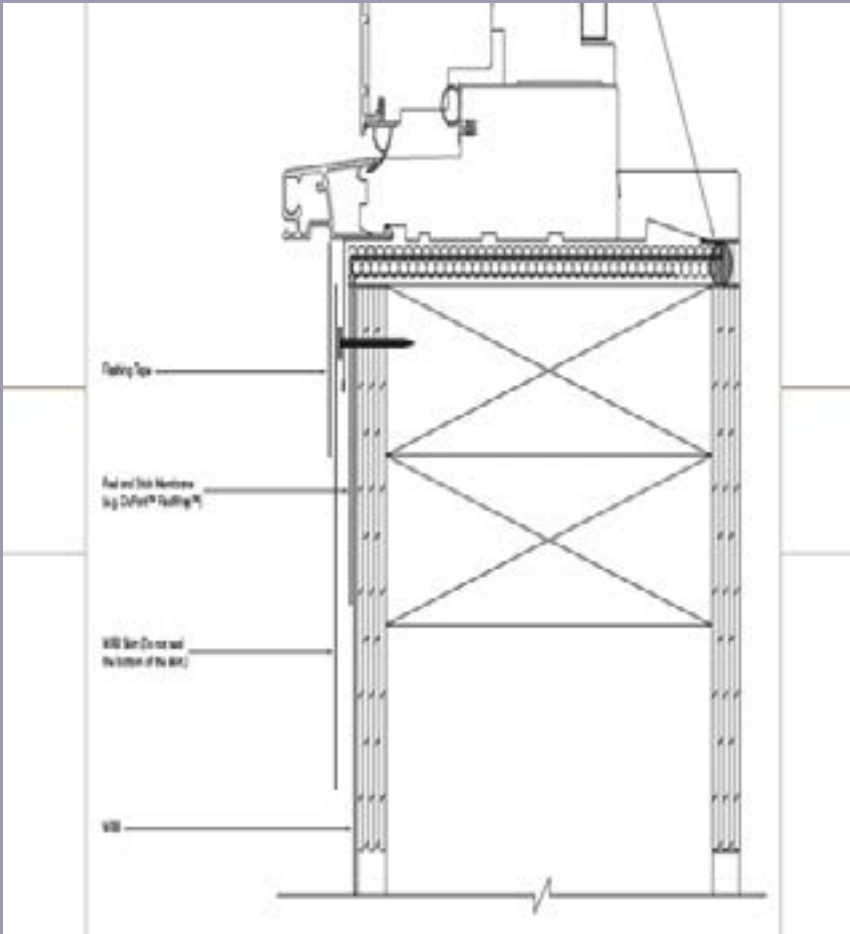
# Insulating the Window Installation



Installation



# High Pressure Skirt



Installation

# Questions

## Items mentioned & used in today's presentation

- **Utility Knife**
- **Level**
- **Hammer Tacker**
- **Laser Level**
- **Speed Square**
- **Tape Measure**
- **Flashing Tape**
- **Type III Sill Pan Flash**
- **Sealant**
- **Sheathing Tape**
- **Beveled piece of Cedar Siding**
- **Shims**
- **Corner Gaskets**
- **High Pressure Skirt**
- **Tyvek House Wrap**
- **High Pressure Skirt**

# Questions

***Thank you for your time and attention to this course.  
It has been a pleasure to work with you today.***

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Marvin Windows and Doors  
Installation and Field Service Instructor  
Warroad, MN 56763

**[erickl@marvin.com](mailto:erickl@marvin.com)**



Installation