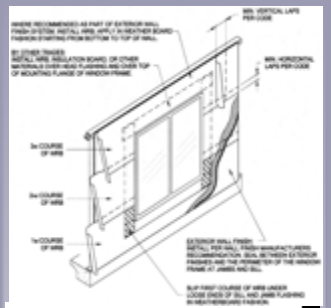
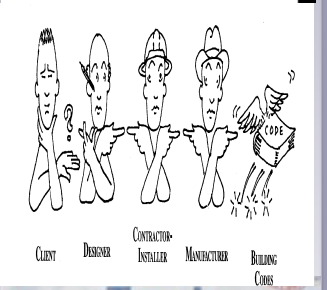
accordance with the Department of Labor and Industry's statute 326.0981, Subd. 11,

"This educational offering is recognized by the Minnesota Department of Labor and Industry as satisfying **1 hour** of credit toward **Building Officials and Residential Contractors** continuing education requirements."

For additional continuing education approvals, please see your credit tracking card.





WELCOME

Marvin Windows and Doors
presents:

Manufacturer's Recommended Window Installation Training

Welcome to Today's Training Session

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 Shimming
- 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

90 Minutess of class time for a total of :

1 CEU credit for Minnesota Contractors

In Reference to and Recommended

ASTM E2112-07

Designation: E 2112 – 07

Standard Practice for Installation of Exterior Windows, Doors and Skylights[1]

This standard is issued under the fixed designation E 2112; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

INTRODUCTION

This document is intended to provide technical guidance to organizations that are developing training programs for installers of fenestration units in low-rise residential and light commercial structures. The majority of fenestration units selected for installation in these types of structures are certified as meeting specified performance characteristics in standardized laboratory testing. Experience indicates, however, that the performance of fenestration installations is frequently significantly inferior to the performance of the manufactured units in laboratory testing. Installation of fenestration units can significantly influence in-service performance.

The requirements promulgated in this practice have, by consensus, (of individuals with specialized knowledge concerning installation of fenestration units) been identified as necessary to ensure that as-installed performance is roughly equivalent to performance in laboratory testing. The task group responsible for development of this practice recognizes that building owners sometimes, accept as adequate, in-service performance of fenestration installations that are significantly inferior those of the units in laboratory testing. This practice is not intended for use in such circumstances, where owner expectations are modest. The intent of this practice is to provide guidance to those concerned with ensuring that as-installed performance is comparable to the capabilities of the units installed for a solid majority of installations.

A particularly noticeable behavior that indicates deficiencies in installation is rainwater leakage. Rainwater leakage has been the leading reason for dissatisfaction of building owners with performance of fenestration installations. For this reason, this practice places greater emphasis on preventing or limiting rainwater leakage than on any other single performance characteristic.

This practice emphasizes that the water-shedding surfaces of fenestration units must be adequately integrated with adjacent water-shedding surfaces of the building envelope. It does not, however, attempt to promulgate requirements for water-shedding surfaces of building envelopes other than those interfacing with fenestration units. The standard assumes that the basic design of the building's water-shedding system is adequate, that is, that either (*1*) there is a high probability that the outermost building surface will dependably prevent all water entry, or (*2*) the building envelope incorporates an effective concealed barrier that will dependably prevent further intrusion of incidental water that breaches the outermost surface. The practice further assumes that fenestration units can be dependably sealed to, and integrated with, at least one of these surfaces. If the basic design of the building's water-shedding system is inadequate, or does not allow for reliable integration of fenestration units into it, competent installation of the units is unlikely to nullify these deficiencies.

1. Scope

1.1 This practice 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.

1.2 This practice assumes that the installer possesses basic woodworking skills and an understanding of wall and roof construction, sheet metal work, and joint sealant practices.

1.3 This practice attempts to instruct and familiarize the installer with the concepts of both Barrier Systems and Membrane/Drainage Systems, in order to ensure the continuity

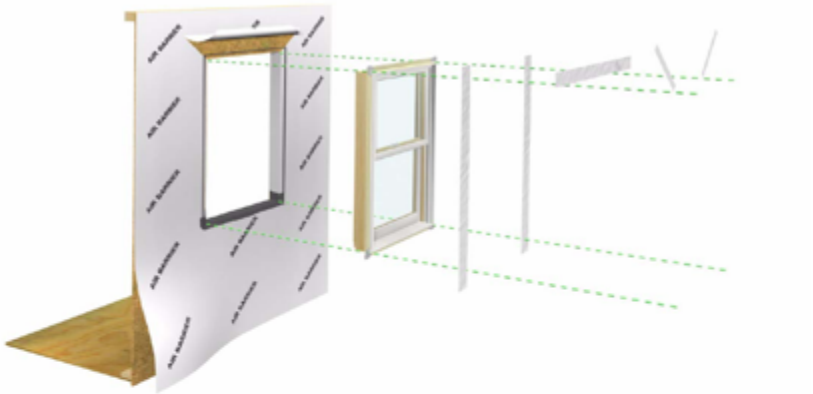
[1] This practice is under the jurisdiction of ASTM Committee E06 on Performance of Buildings and is the direct responsibility of Subcommittee E06.51 on Performance of Windows, Doors, Skylights and Curtain Walls.

Current edition approved Feb. 1, 2007. Published March 2007. Originally approved in 2001. Last previous edition approved in 2001 as E 2112 – 01.

Manufacturer

Clad Window Installation

Standard Wood Frame Construction



These instructions are applicable for the following aluminum clad window products:

- **Clad Ultimate Casement Family**
- **Clad Tilt-Turn/Inswing Casement/Hopper**
- **Clad Ultimate Double Hung Family**
- **Clad Round Top**
- **Clad Polygon**
- **Clad Glider**

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.

For product specific issues, service instructions and other field service guides, refer to the Marvin Service Manual, visit our website at 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.

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2010-06-30
19970017

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.

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

Manufacturer's Recommendations

- ASTM E2112 basic principles to installation of a 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

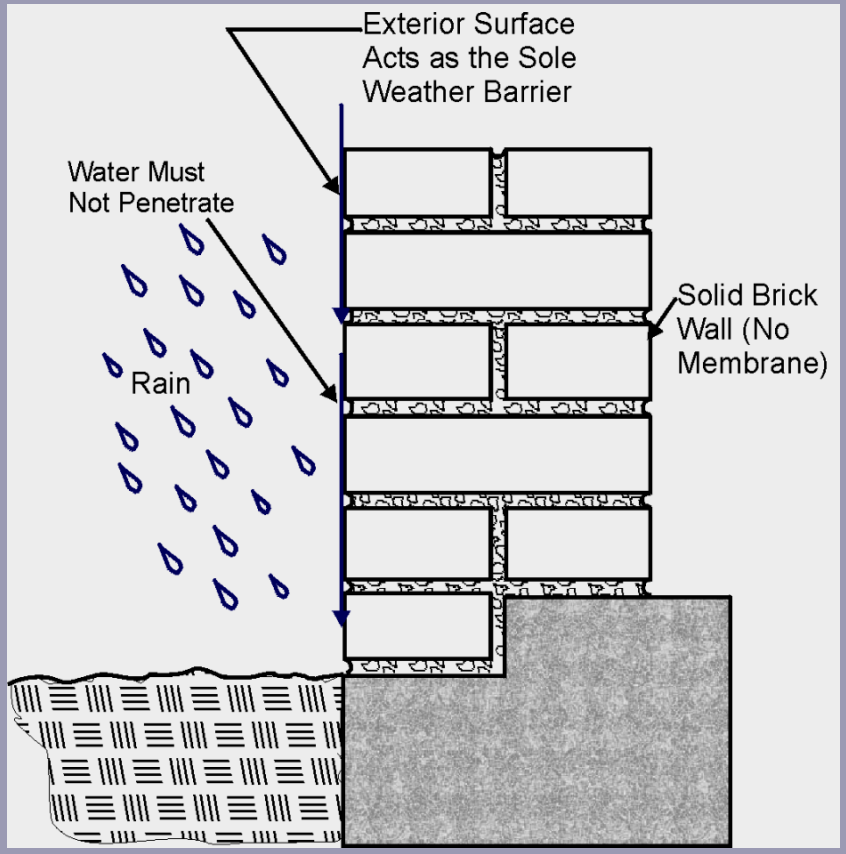
Membrane Drainage Systems
Surface Barrier Systems
Water Management

Where do I want my incidentals to go?
What do I flash or seal my window to?

answer: Exterior Drainage Plane

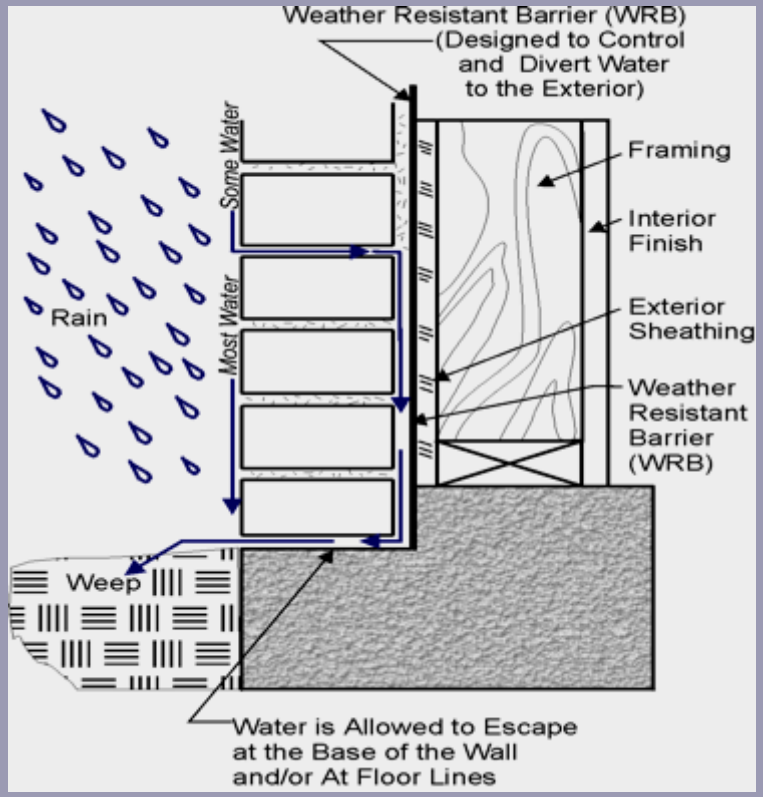
Identify the Weather Barrier System (Surface Barrier System)

- **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**



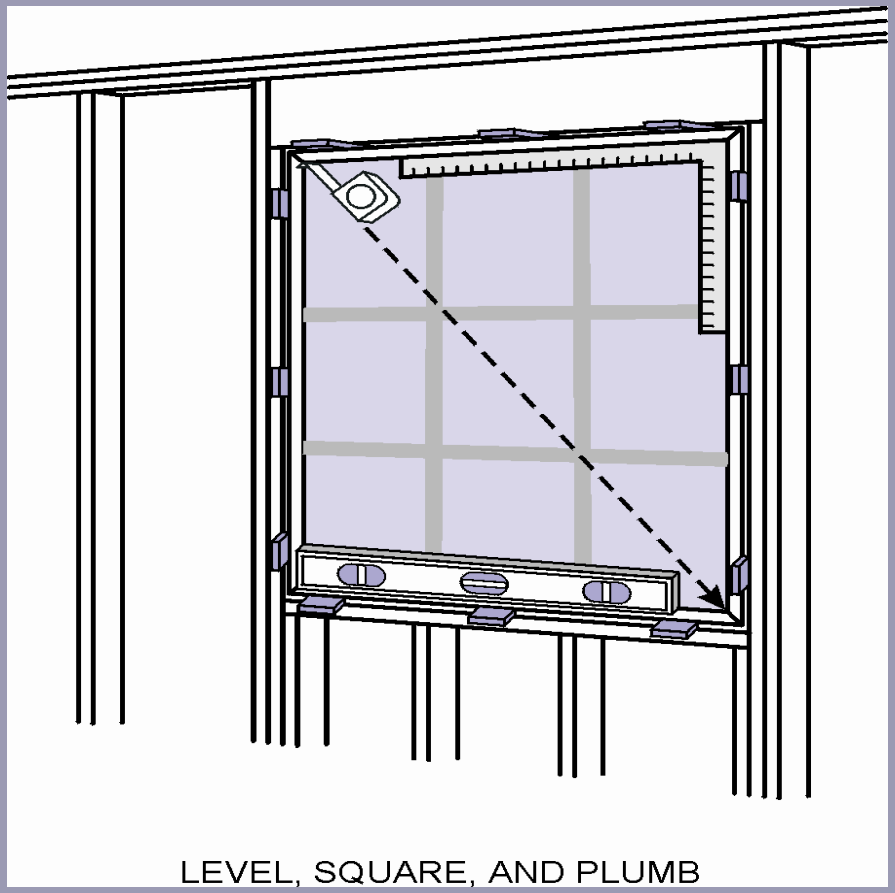
Identify the Weather Barrier System (Membrane Drainage System)

- **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**

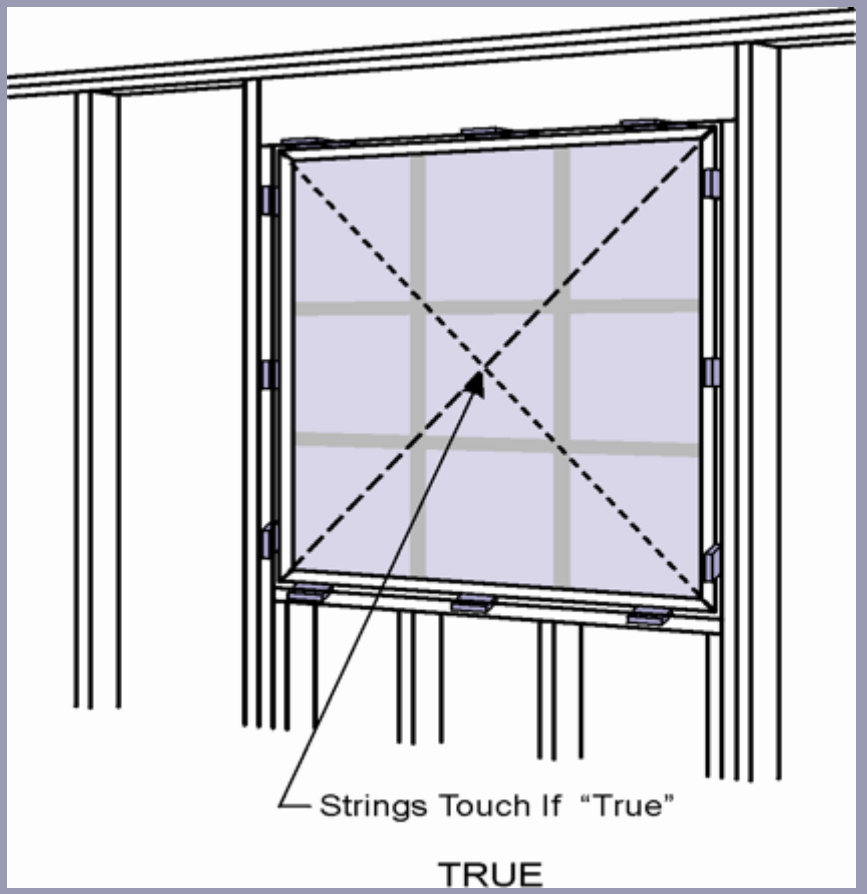


New Construction - Level, Plumb, Square, and True

Four terms important to performance and operation



LEVEL, SQUARE, AND PLUMB



TRUE

Opening and Framing Requirements

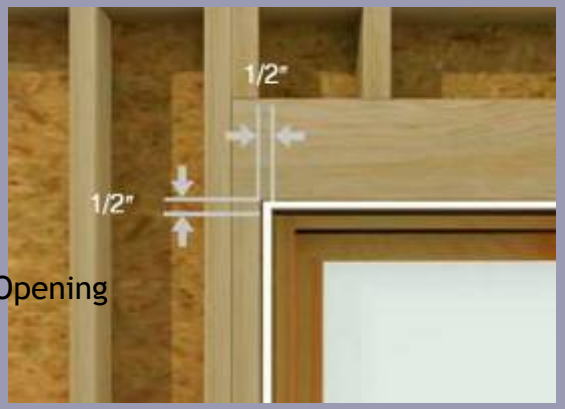
Rough openings (RO)

1" wider and ½" higher than the outside measurement of frame

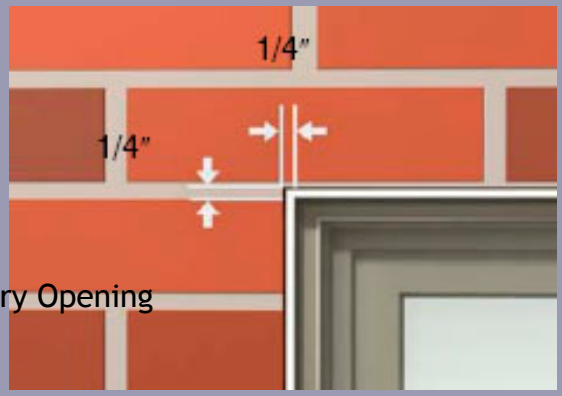
Masonry openings (MO)

A minimum of ½" wider and ¼" higher than the outside measurement of frame

Rigid sill pans will decrease the RO height clearance.



Rough Opening



Masonry Opening

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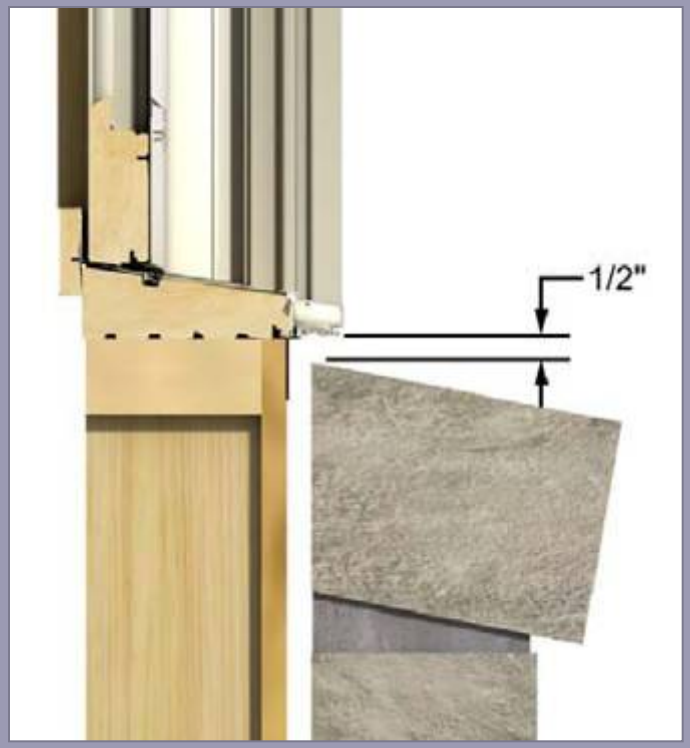
Brick Bind

Rough Opening Preparation
Standard wood frame construction with brick veneer - ½" 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.



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Proper Shimming

- **With-in 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.**

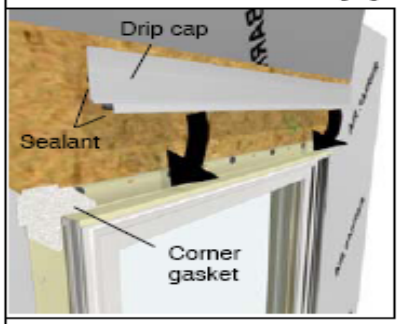
Positioning Window: center it in the opening, level at the sill, and plumb the frame to desired depth. If necessary, shim under the jambs to bring to level.

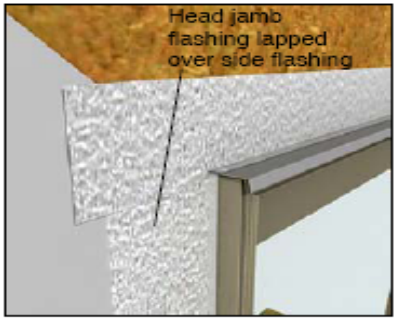
Wedge Shims: typically made of wood, easy to apply, used in pairs, restricted to top and side applications.

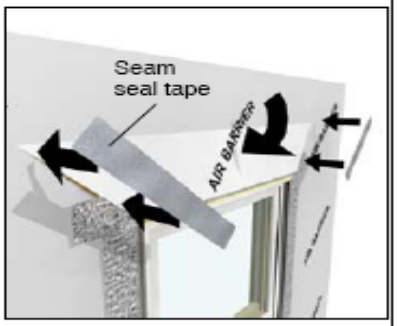
Rectangular Shims, Horseshoe Shims and Shim Packs: generally made of high impact plastic, can be used in most types of application

Step 5: Flashing the Installation

Air Barrier Applications







Installation

Material Selection

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).**

2″ (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.

Installation

Sill Pan Flash

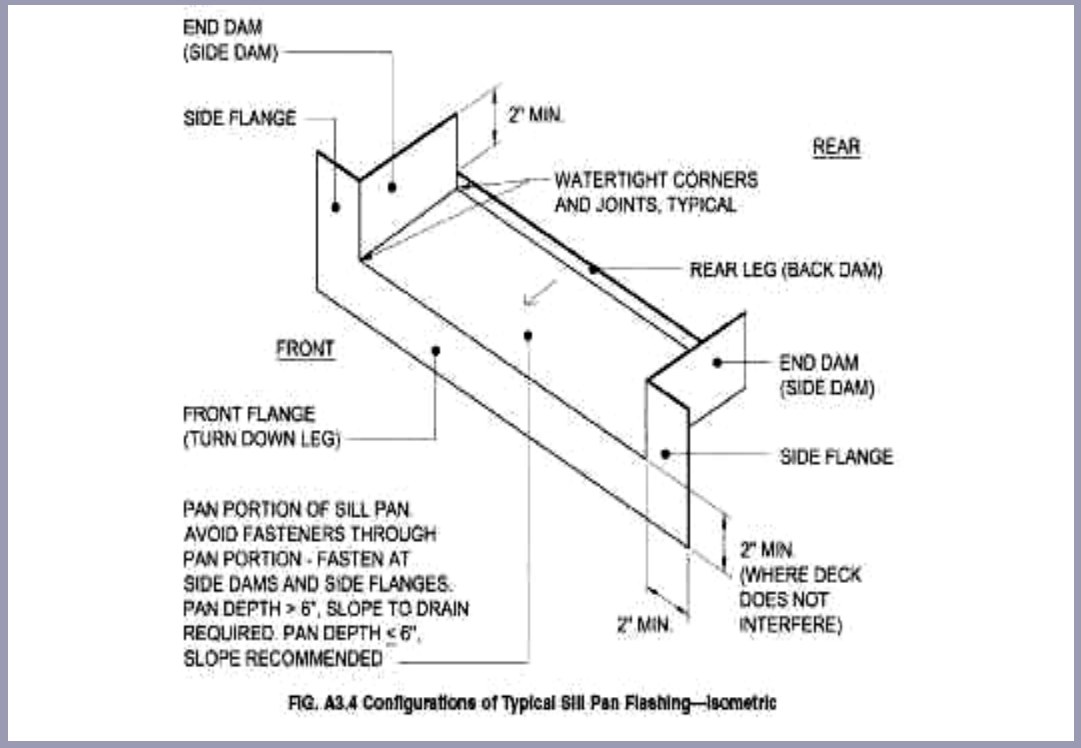
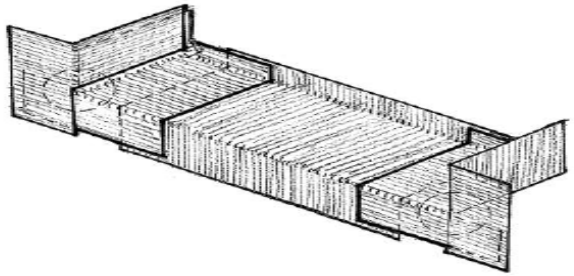
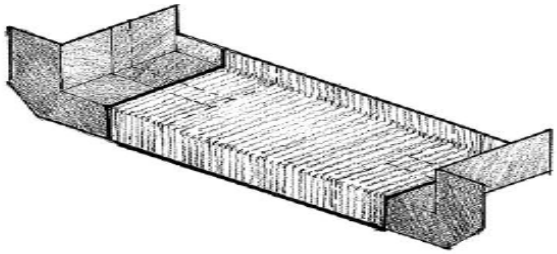
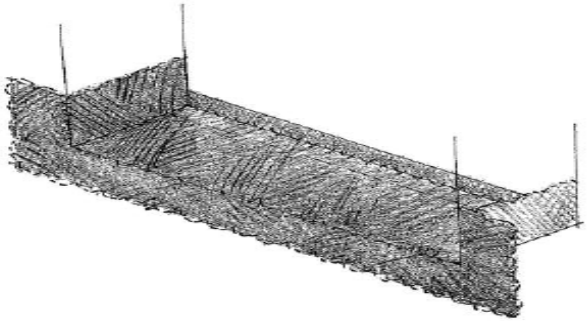


FIG. A3.4 Configurations of Typical Sill Pan Flashing—Isometric

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 corners 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	

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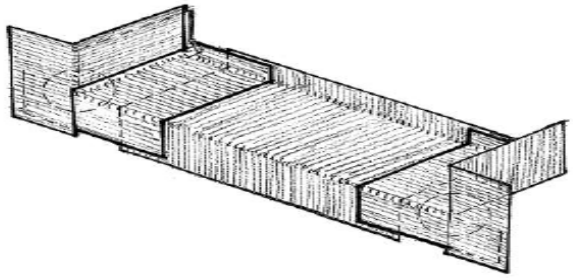
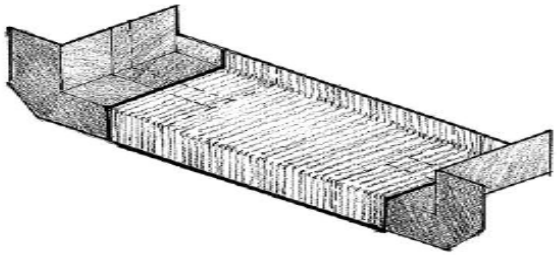
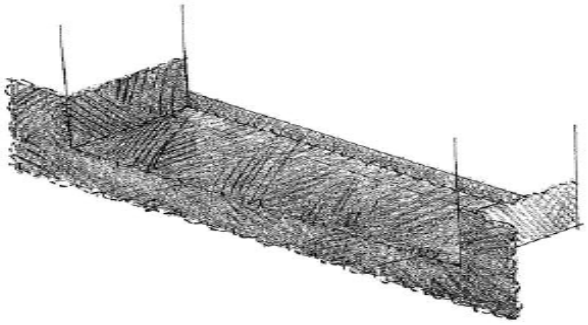
Type III	Flexible membrane – self-adhering flashing	Multiple pieces, membrane pieces lapped watertight	
Type IV	Combination – rigid + membrane flashing	Multiple pieces – usually formed rigid corners joined with lapped self-adhering membrane sheet(s)	
Type V	Liquid – membrane coating	1-piece: spray-,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

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)**

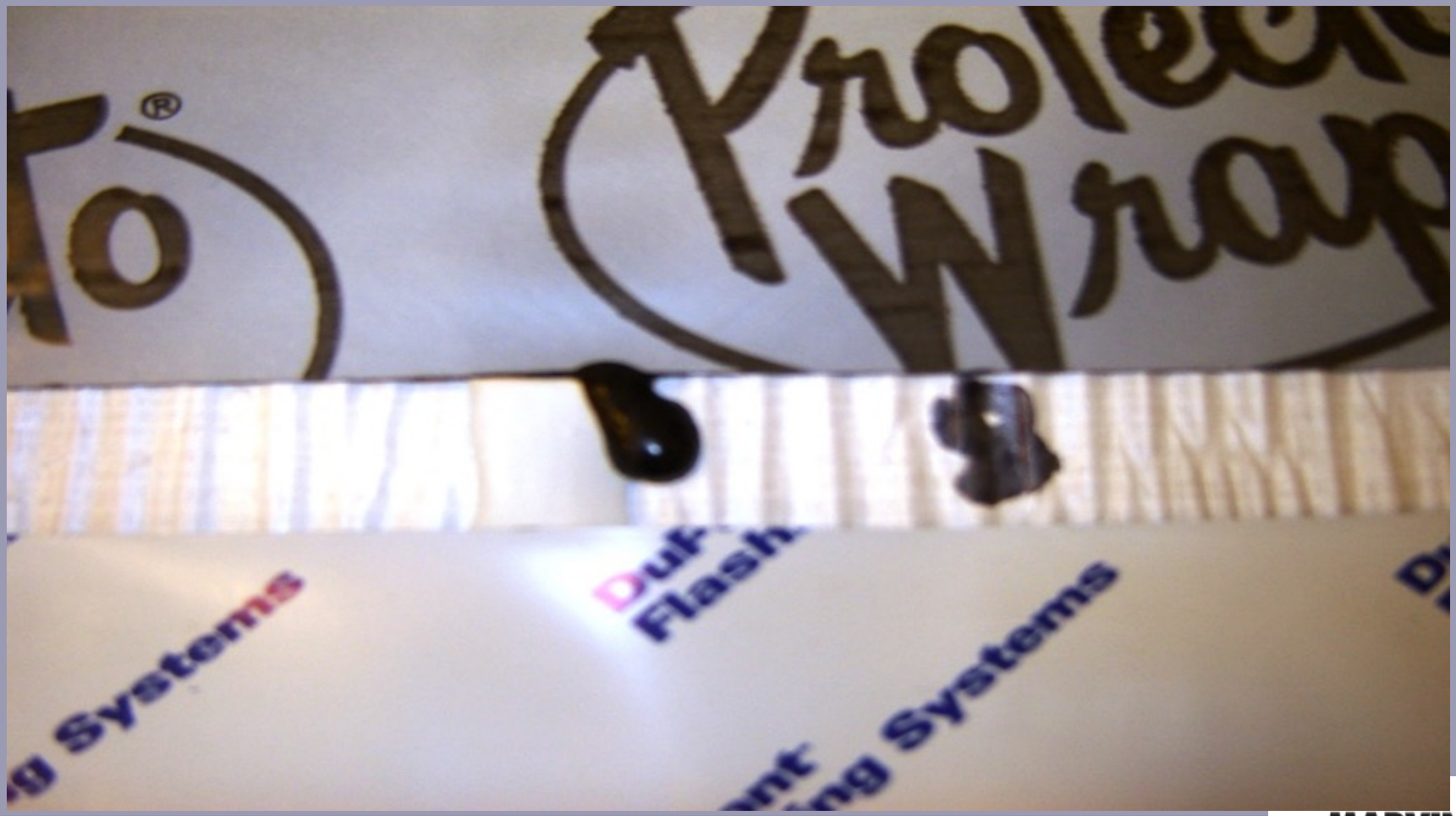
Sealants

Lesson #6

- **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

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Sealant Adhesion and Application Matrix

ADHESION

SEALANT ADHESION GUIDE	SILICONE	POLYURETHANE	LATEX (MEETING ASTM C920)	LATEX	SOLVENT RELEASED	BUTYL TAPE
ALUMINUM ANODIZED	Yes	Yes	Yes	Some	Yes	Yes
ALUMINUM MILL FINISH	Yes	Yes	Yes	Some	Yes	Yes
ASPHALT BUILDING PAPER	Yes	Yes	Yes	Yes	NR	Yes
BRICK	Yes	Yes	Yes	Some	Yes	NR
CONCRETE	Yes	Yes	Yes	Some	Some	No
COPPER	Yes[1]	Yes	Some	Some	Yes	Yes
EIFS	Yes	Yes	Some	NR	NR	NR
FIBERGLASS	Yes	Yes	Some	Some	Some	Yes
GALVANIZED STEEL	Yes[1]	Some	Some	Some	Yes	Yes
GLASS	Yes	Some	Yes	Some	Yes	Yes
HOUSE WRAP	Some	Some	Some	Some	Some	Yes
PAINTED SURFACES [2]	Yes	Yes	Yes	Yes	Yes[3]	Yes
POLYETHYLENE	Some	Yes	No	No	Yes	Yes
POLYSTYRENE FOAM BOARD	Yes	Yes	Yes	Some	NR	Yes
STUCCO	Yes	Yes	Yes	Some	Some	NR
VINYL	Some[1]	Some	Some	Some	Some	Some
WOOD	Yes	Yes	Yes	Yes	Yes	Yes

[1] = Neutral Cure Silicone Only
[2] = Check Paint Individually
[3] = Check for Compatibility
NR = Not Recommended
SOME = Many Are Not Adequate
YES = Majority Are Adequate

APPLICATION

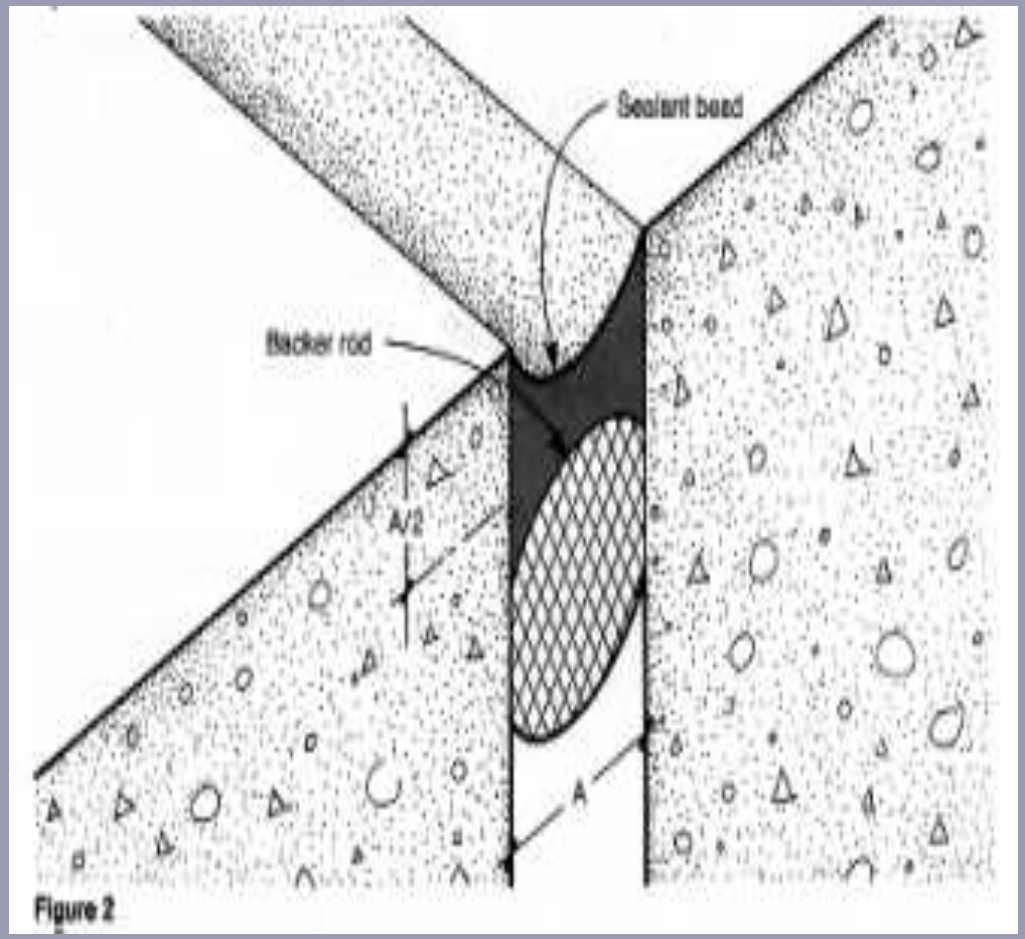
SEALANT APPLICATION GUIDE	SILICONE	POLYURETHANE	LATEX (MEETING ASTM C920)	LATEX	SOLVENT RELEASED	BUTYL TAPE
BEHIND MOUNTING FLANGE[2]	Yes	Yes	Some	Some	Some	Yes
BOX FRAME TO OPENING	Yes	Yes	Yes	NR	Some	NR
EXTERIOR CASING	Yes	Yes	Yes	Some	Some	NR
EXTERIOR/INTERIOR STOP	Yes	Yes	Yes	Yes	Yes	NR
EXTERIOR PERIMETER[1]	Yes	Yes	Yes	Some	Some	NR
HEADER EXPANDER	Yes	Yes	Yes	Some	Some	NR
INTERIOR TRIM AND STOOL	NR	Yes	Yes	Yes	NR	NR
MULL SEAL	Yes	Yes	Some	NR	NR	NR
PANNING	Yes	Yes	Yes	NR	Some	NR
SILL ANGLE	Yes	Some	Yes	NR	Some	NR
SILL CAPPING	Yes	Some	Yes	NR	Some	NR
SILL EXTENDER	Yes	Yes	Yes	Some	Some	NR
THRESHOLD	Yes	Yes	Some	NR	Some	NR
UNDER DOOR SILL PAN	Yes	Yes	Some	NR	Some	NR
UNDER FLASHING[2]	Yes	Yes	Some	Some	Some	Yes
WALL STOOL	Yes	Yes	Yes	Some	Some	NR

[1] = Match Sealant Movement Capability to Anticipated Joint Movement
[2] = Check Adhesion and Compability to Mating Surfaces
NR = Not Recommended
Some = Many Are Not Adequate
Yes = Majority Are Adequate

Points to know and understand about BUTT Joints

Two Sided adhesion
C - Clean
P - Prime
P - Pack
S - Shoot
T – Tool

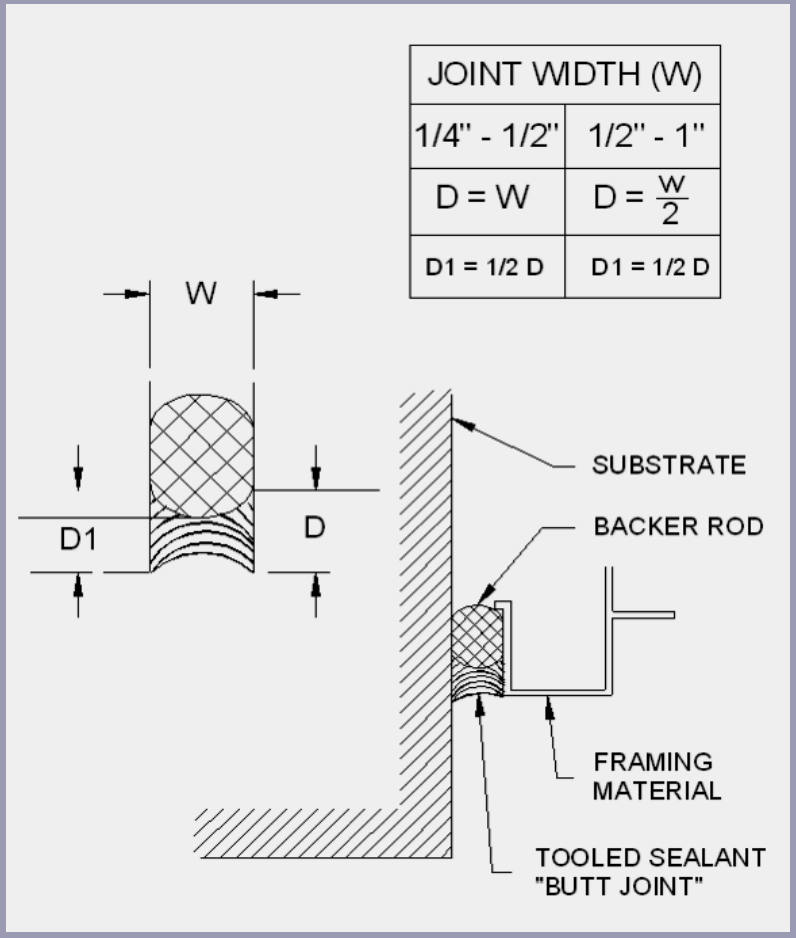
Note ! Backer Rod controls depth of joint and helps with adhesion and movement



Joint and Sealant Dimensions

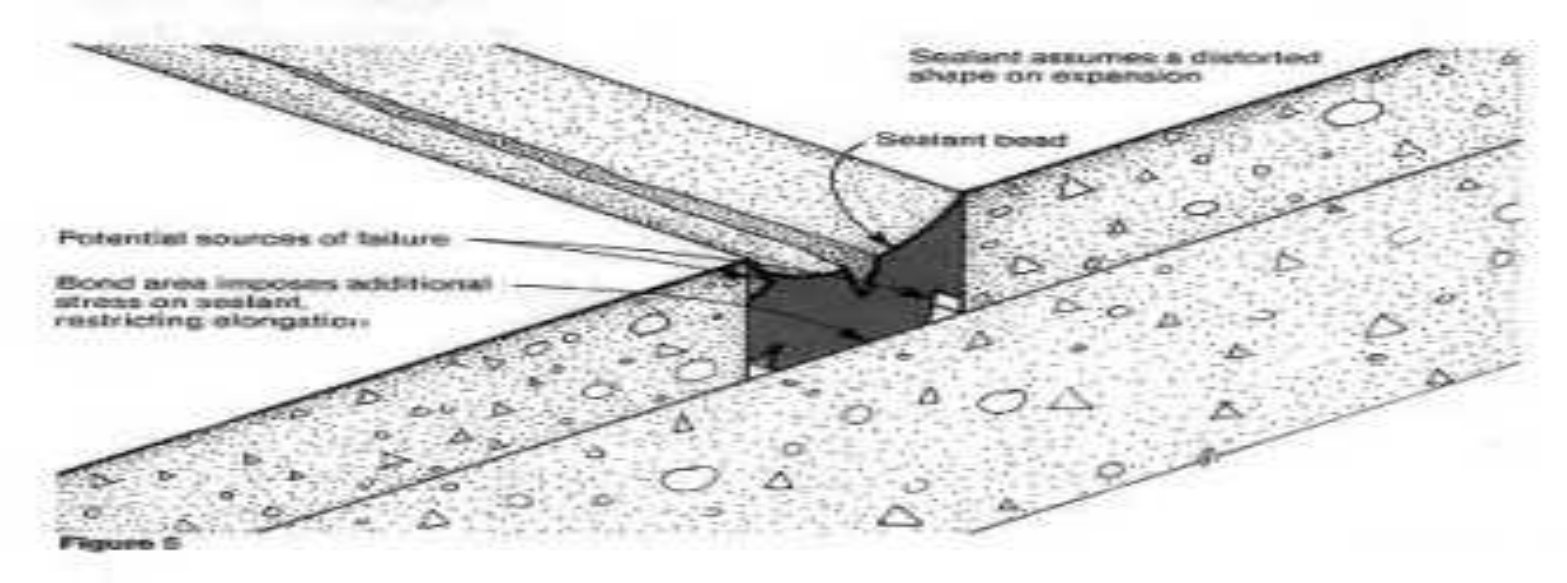
Lesson #6

- **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**



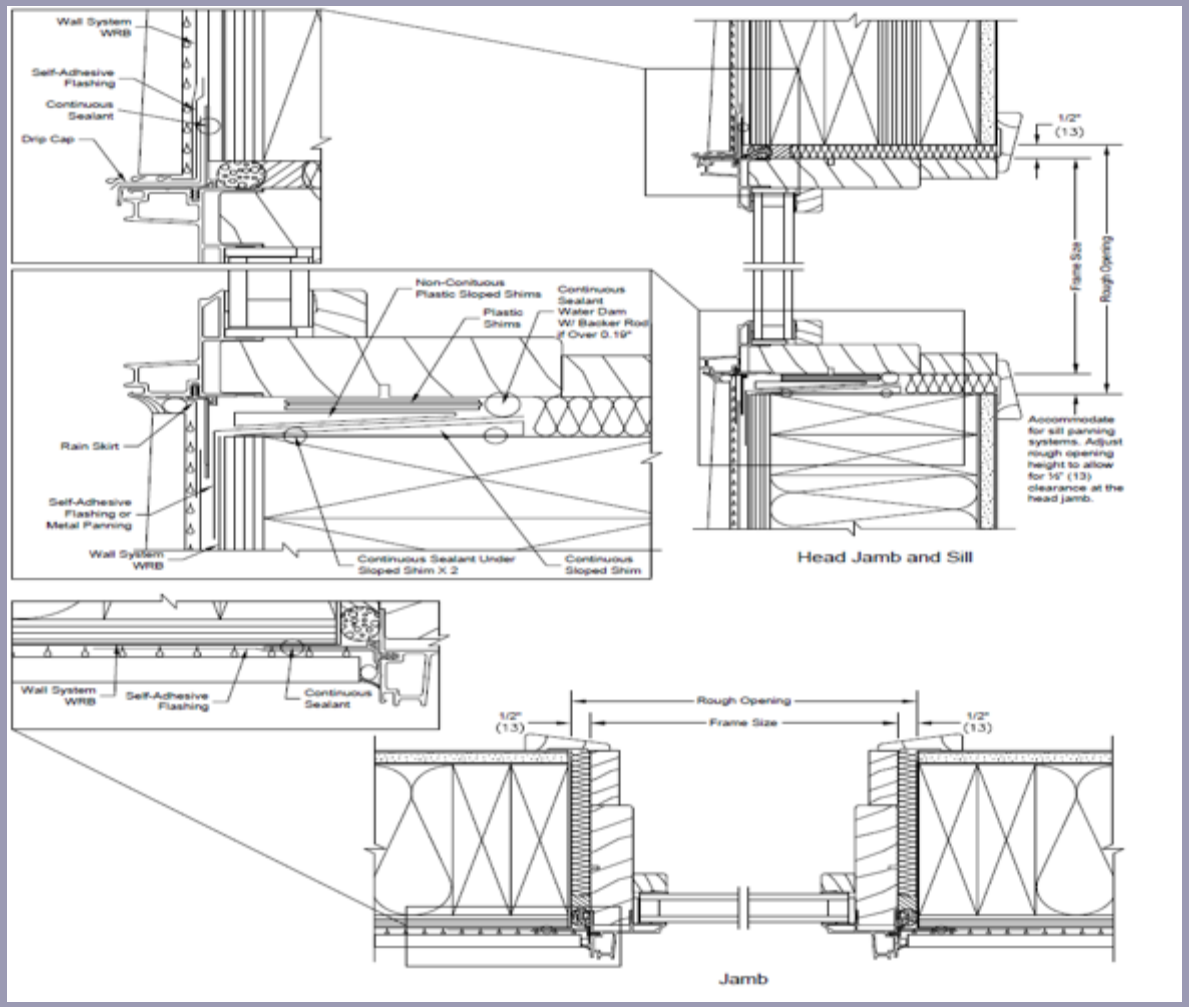
Lesson #6

- **Three sided adhesion of the sealant may result in both adhesive and cohesive failures.**



ADM Flashing Details

Lesson #6



Installation

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 –

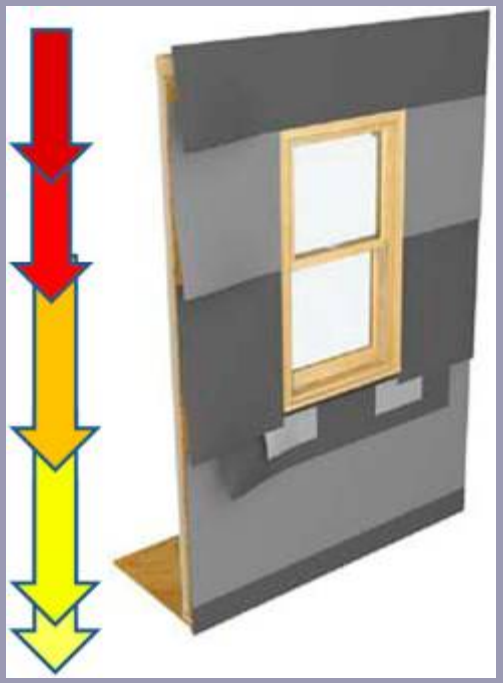
The lack of attention to detail

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**

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 **AFTER** the door or **OVER** the face of the mounting flange	Jamb flashing will be applied **BEFORE** the door or **BEHIND** the face of the mounting flange
	Weather resistant barrier (WRB) is to be applied **AFTER** the door installation	Use Method "A"	Use Method "B"
I	Weather resistant barrier (WRB) is to be applied **FIRST** or **BEFORE** the door installation	Use Method "A1"	Use Method "B1"

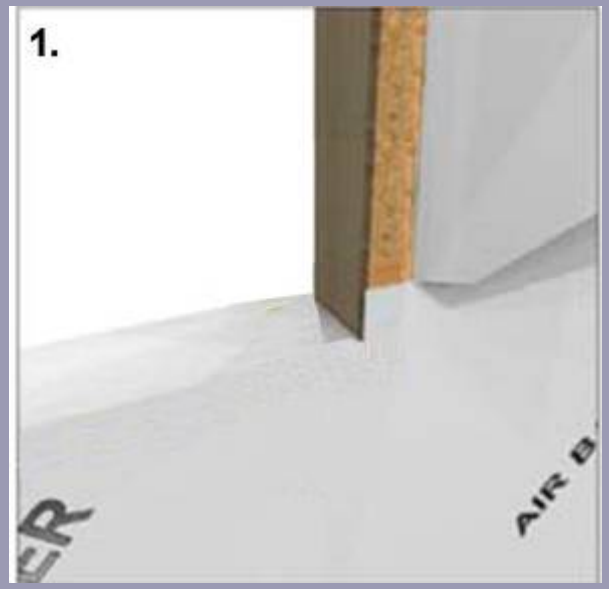
Determining the Proper Length of Flashing	
Sill Flashing	= RO^W + (2 x Flashing Width)
Jamb Flashing	= RO^H + (2 x Flashing Width) -1"
Head Flashing	= RO^W + (2 x Flashing Width) + 2"

Legend

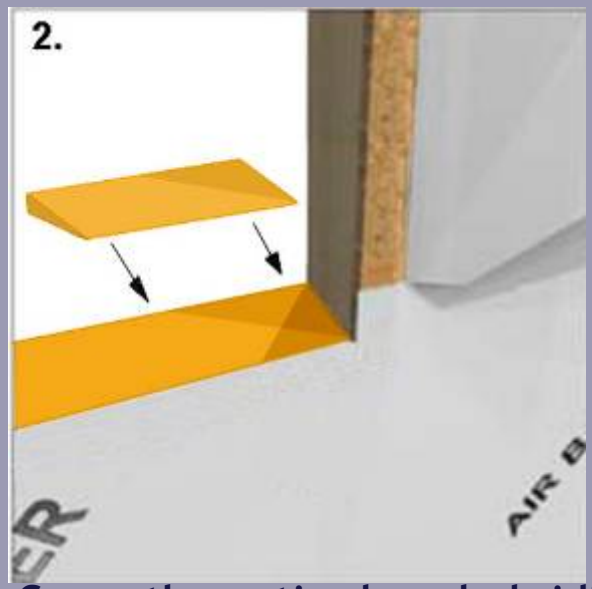
RO = Rough Opening
RO^H = Rough Opening Vertical Height
RO^W = Rough Opening Horizontal Width

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

Type III sill pan (Flexible membrane)

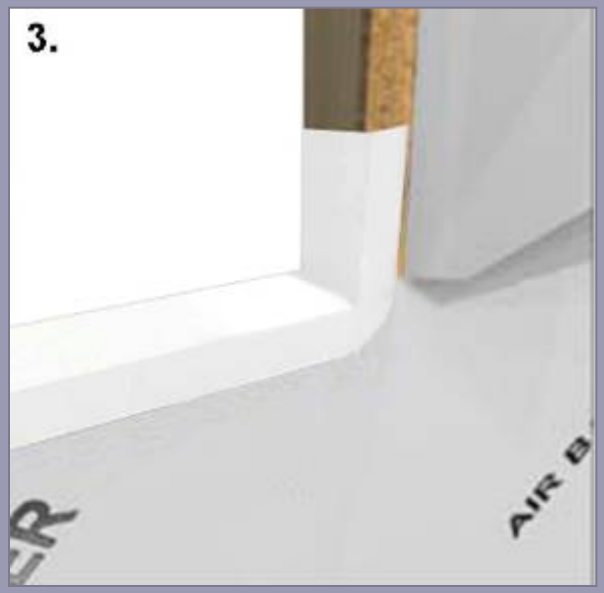


Once the building wrap is applied over the sill of the window opening, install a length of beveled cedar siding at the sill on the top of the building wrap.

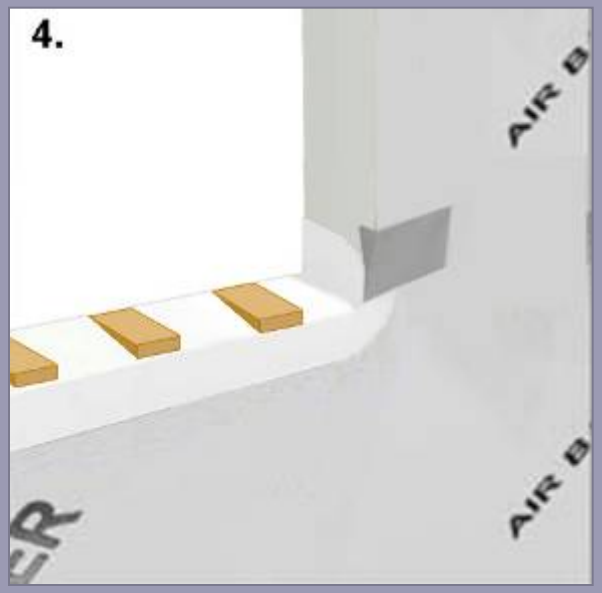


Cover the entire beveled siding with flexible flashing material. Ensure the wrap extends 6" - 8" up the opening sides and 3" onto the outside sheathing or wrapped sheathing.

Sill Panning Systems: Beveled Cedar Sill

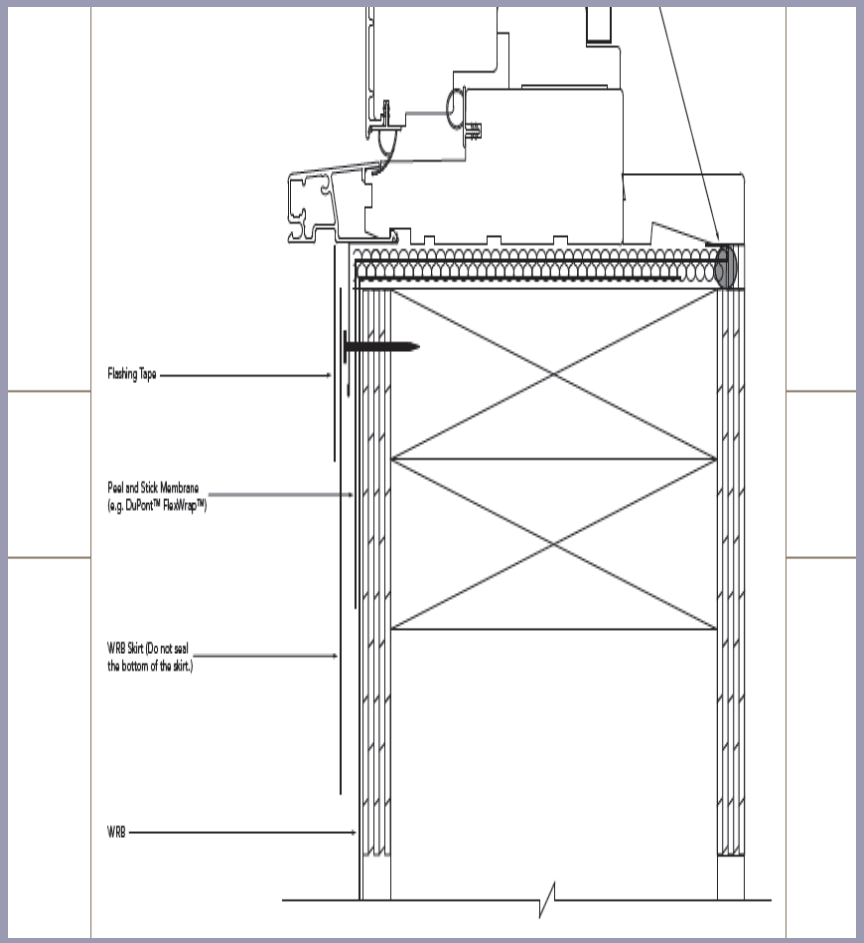


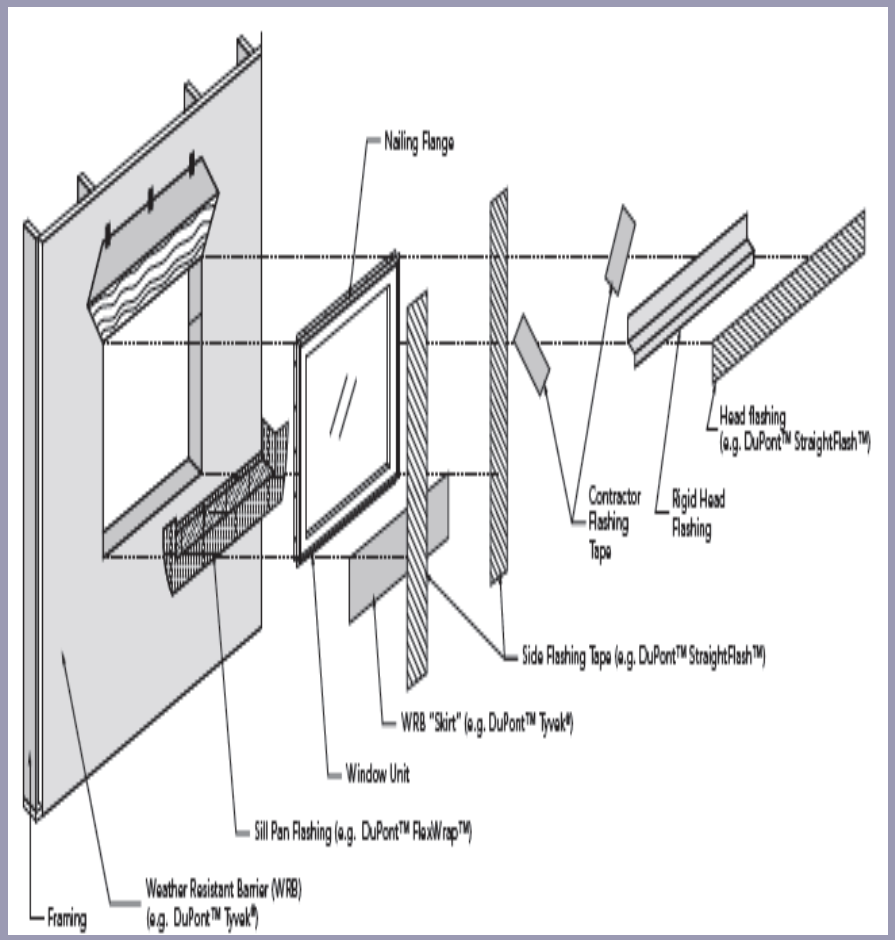
Fold the building wrap over the window opening on each side and use seal tape over any cuts in the building wrap.



Composite beveled shims are used under the window or door at intervals to contradict the bevel of the siding.

High Pressure Skirt



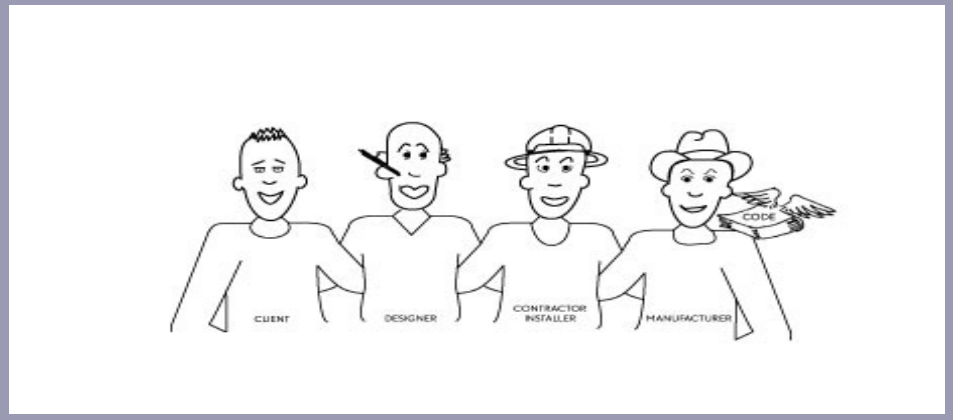


Installation

Any Questions ?????????????

Items spoke of and 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**



Any 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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