AIA25 Conference on Architecture & Design

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AIA25 Conference on Architecture & Design

Introductions

Presenter

Chuck Monteforte, CDT, CCPR

Architectural/Builder Consultant

I offer 25 years of consulting experience, specializing in simplifying the window and door process for architects, designers and builders. As part of the Andersen Windows team, I collaborate closely with industry professionals to bring clients' dream projects to life. My extensive expertise and problem-solving approach help to streamline decisions, ensuring that custom residential and commercial projects are completed with precision. My passion for collaboration and attention to detail make me a trusted partner in architectural excellence and providing a world class customer experience.

AIA25 Conference on Architecture & Design

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Course / Learning Objectives

- . **SPECIFY** window installation methods and materials that are best suited for each project's exterior wall design
- . **DESIGN** details that will allow the installed windows to perform as intended, and as required, for the project.
- **LEAD** the project team through the installation process, providing guidance and solutions related to window issues.
- **IDENTIFY** job site best practices that will minimize impact on schedule, budget and product performance.

AIA CES Presentation

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Thank you!

Why is this Topic Relevant Today?

You decide to design fantastic, great performing wall types for one or more of the following considerations:

- Energy efficiency
- Structural concerns
- Cost concerns
- Code requirements
- Aesthetics
- Ease of construction
- Availability of materials
- Client's requirements
- Security requirements

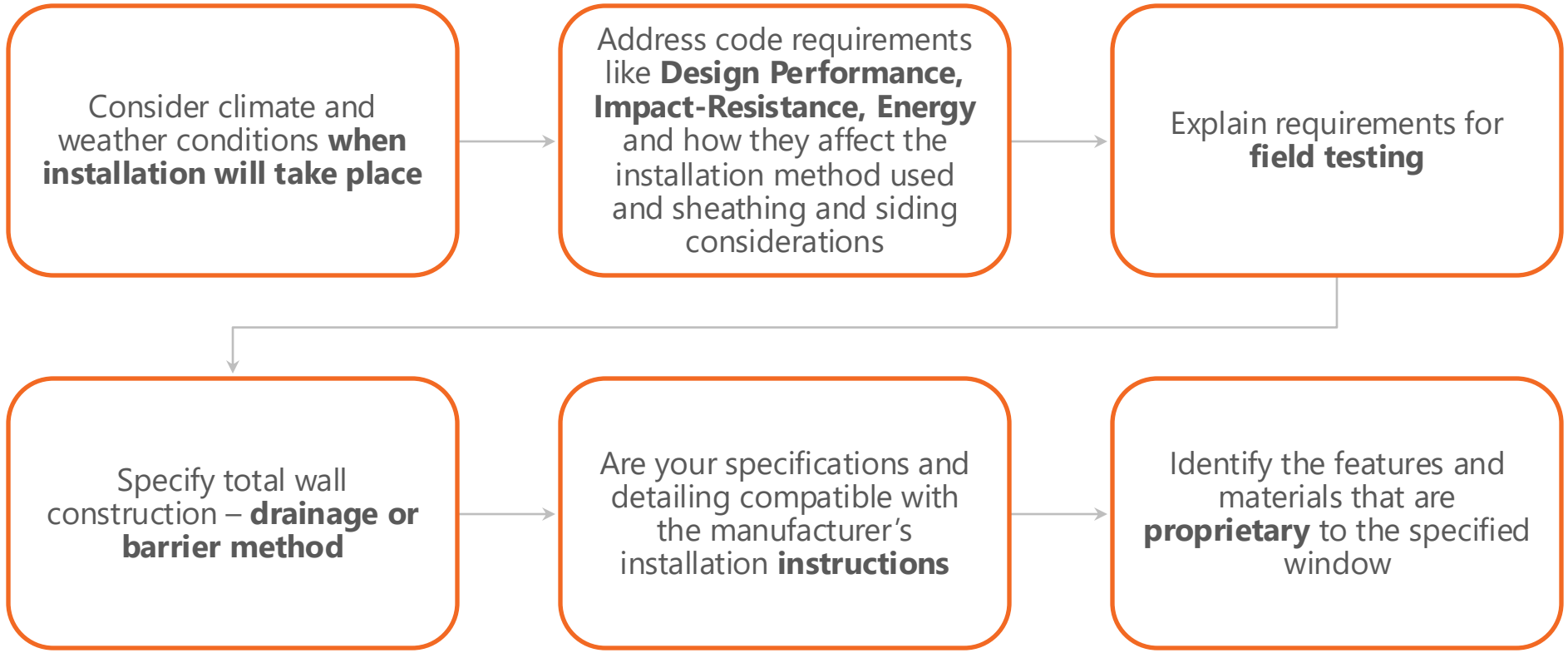
And then for the right reasons, you put huge holes in the walls!

Section 1

Best Practices in Window Specification

The Architect/Design Professional

Learning Objective #1: Specify window installation methods and materials that are best suited for each project's exterior wall design

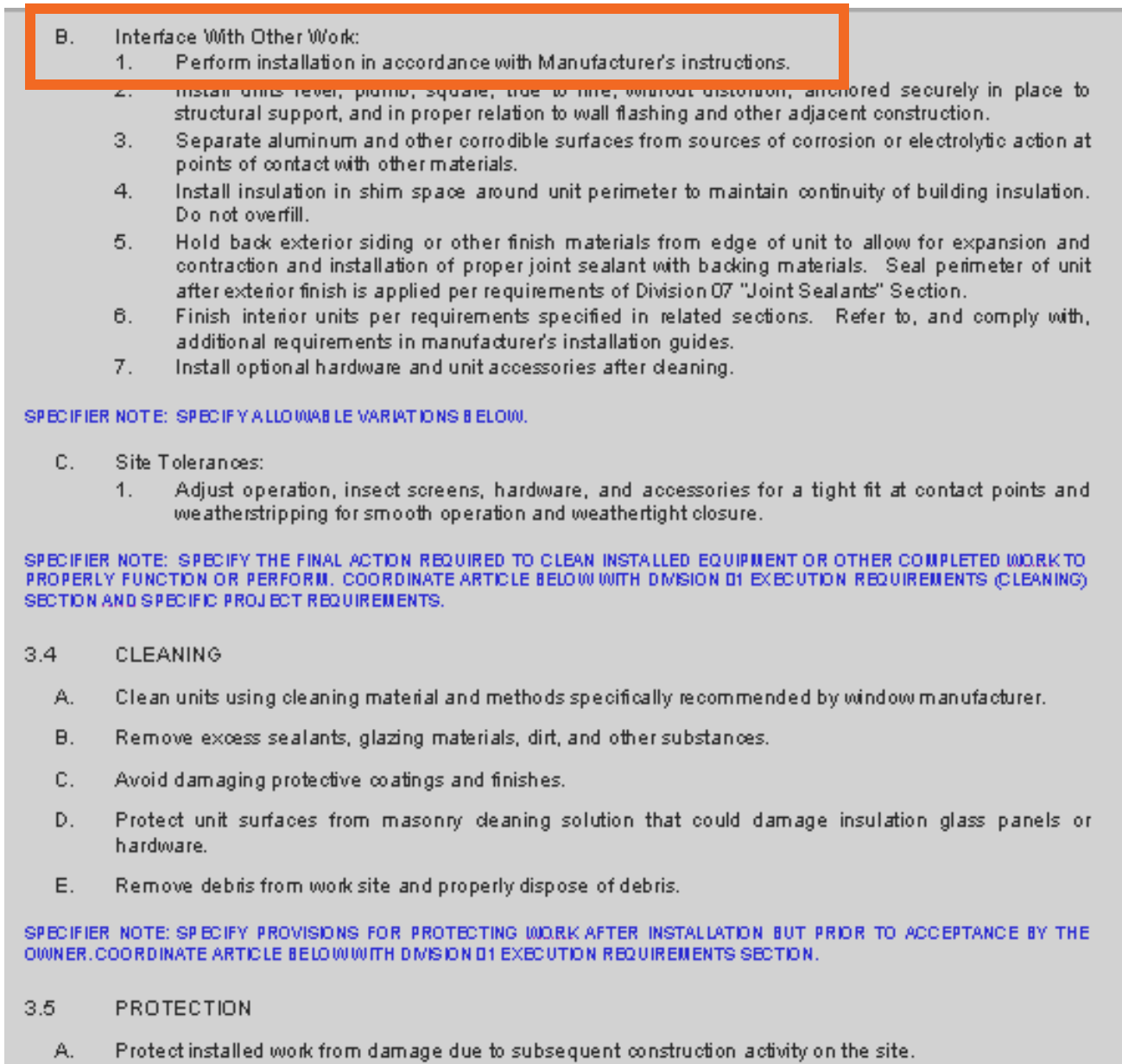


The Architect/Design Professional

Learning Objective #1: Specify window installation methods and materials that are best suited for each project's exterior wall design

Coordinate with related work:

- Include work in the correct section; **builders will not read the entire document**
- Be project specific every time; don't repeat what is "typically" specified for a "similar" window or wall design
- Window manufacturer's instructions will influence selection of flashing and installation materials



B. Interface With Other Work:
1. Perform installation in accordance with Manufacturer's instructions.
2. Install units level, plumb, square, true to line, without distortion, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
3. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.
4. Install insulation in shim space around unit perimeter to maintain continuity of building insulation. Do not overfill.
5. Hold back exterior siding or other finish materials from edge of unit to allow for expansion and contraction and installation of proper joint sealant with backing materials. Seal perimeter of unit after exterior finish is applied per requirements of Division 07 "Joint Sealants" Section.
6. Finish interior units per requirements specified in related sections. Refer to, and comply with, additional requirements in manufacturer's installation guides.
7. Install optional hardware and unit accessories after cleaning.

SPECIFIER NOTE: SPECIFY ALLOWABLE VARIATIONS BELOW.

C. Site Tolerances:
1. Adjust operation, insect screens, hardware, and accessories for a tight fit at contact points and weatherstripping for smooth operation and weathertight closure.

SPECIFIER NOTE: SPECIFY THE FINAL ACTION REQUIRED TO CLEAN INSTALLED EQUIPMENT OR OTHER COMPLETED WORK TO PROPERLY FUNCTION OR PERFORM. COORDINATE ARTICLE BELOW WITH DIVISION 01 EXECUTION REQUIREMENTS (CLEANING) SECTION AND SPECIFIC PROJECT REQUIREMENTS.

3.4 CLEANING

A. Clean units using cleaning material and methods specifically recommended by window manufacturer.

B. Remove excess sealants, glazing materials, dirt, and other substances.

C. Avoid damaging protective coatings and finishes.

D. Protect unit surfaces from masonry cleaning solution that could damage insulation glass panels or hardware.

E. Remove debris from work site and properly dispose of debris.

SPECIFIER NOTE: SPECIFY PROVISIONS FOR PROTECTING WORK AFTER INSTALLATION BUT PRIOR TO ACCEPTANCE BY THE OWNER. COORDINATE ARTICLE BELOW WITH DIVISION 01 EXECUTION REQUIREMENTS SECTION.

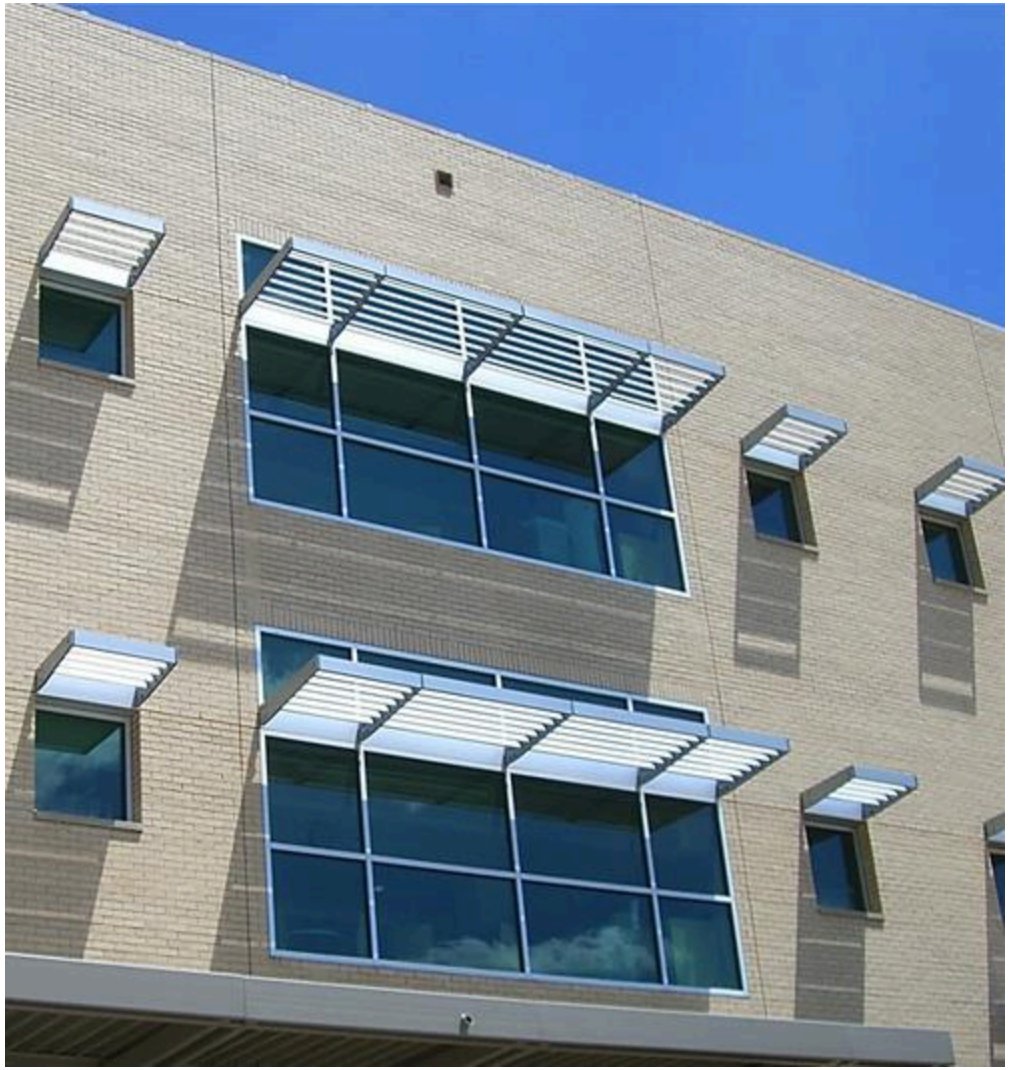
3.5 PROTECTION

A. Protect installed work from damage due to subsequent construction activity on the site.

The Architect/Design Professional

Learning Objective #1: Specify window installation methods and materials that are best suited for each project's exterior wall design

Coordinate the installation process with the work of other trades



The Architect/Design Professional

Learning Objective #1: Specify window installation methods and materials that are best suited for each project's exterior wall design

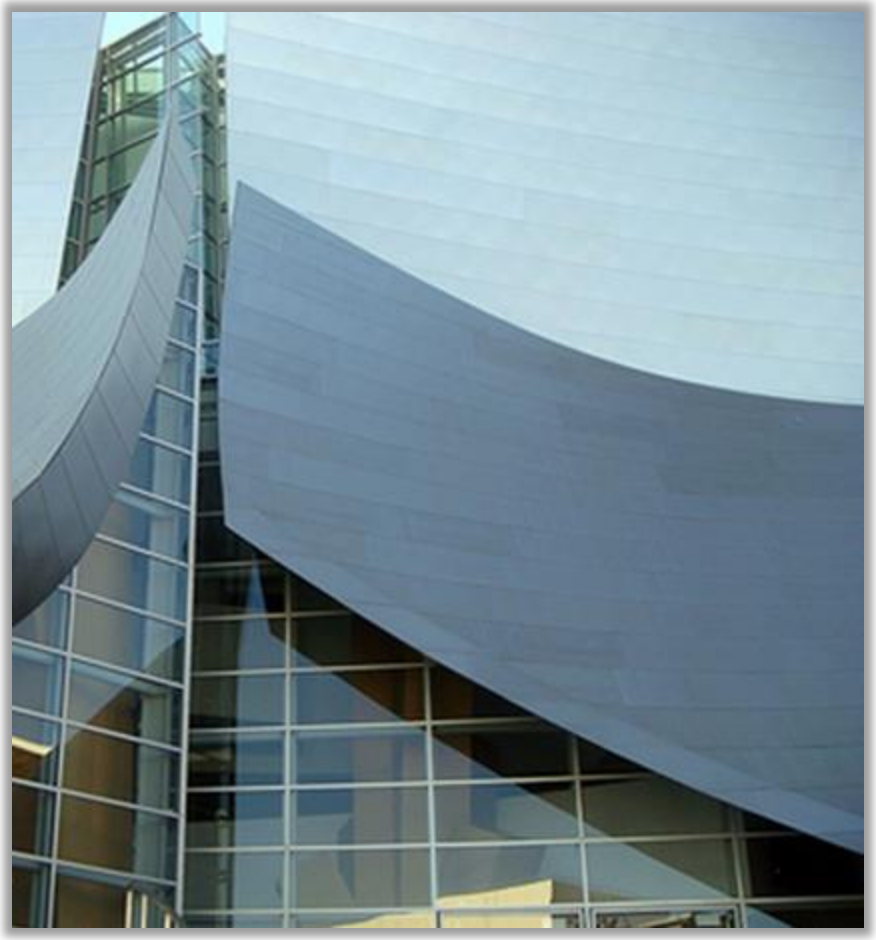
Coordinate the installation process with the work of other trades

Section 2

Best Practices in Design Details

The Architect/Design Professional

Learning Objective #2: Design details that will allow the installed windows to perform as intended, for the project



Courtesy, Flickr; Kansas Sebastian

Look beyond the present:

The building design can work with or against the window installation method, as well as allow or hinder accessibility for future maintenance, service and replacement work.

The Architect/Design Professional

Learning Objective #3: Lead the project team through the installation process, providing guidance and solutions related to window issues

Take a leadership role on the project construction team by providing valuable Design Professional Services:

Provide timely information at pre-installation meeting and all scheduled site meetings

Know specifically what you are looking for (and at) on the job site

Document deviations and deficiencies you observe on site visits during window installation - take photos

Maintain and document clear communication with owner and general contractor – from the office and on the job site

The Architect/Design Professional

Learning Objective #4: Identify job site best practices that will minimize impact on schedule, budget and product performance

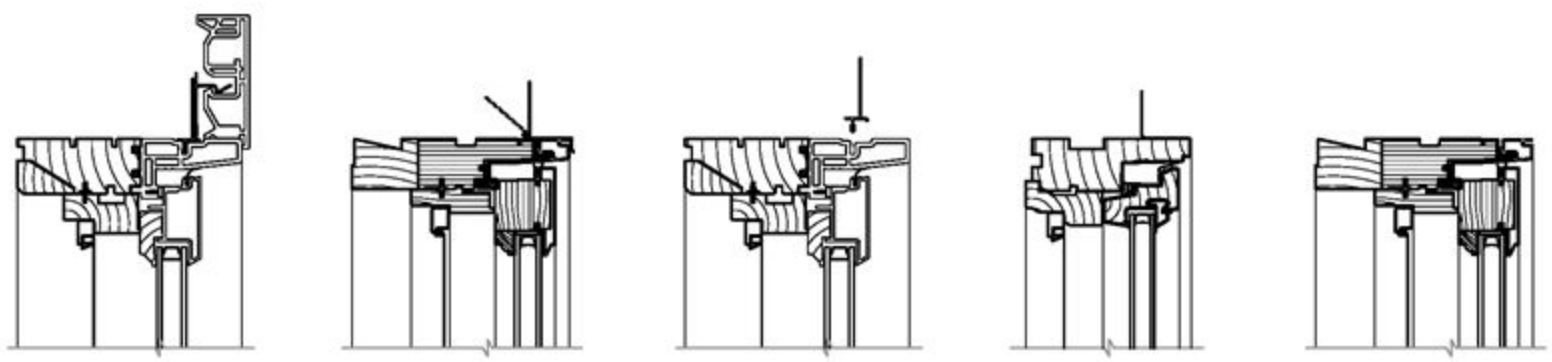
A Construction Phase Services checklist:

- Windows protected from other work activity and equipment
- Materials installed clean and dry and at the right temperature
- Properly fastened to structure
- Properly shimmed – no bowed jambs
- Weeps at head and sill are not blocked
- Backer rod is installed prior to sealant application

Window Basics

Window Types

- Vinyl
- Composite
- Glass Fiber reinforced
- Wood
- Clad wood
- Metal



A manufacturer may offer different product lines that require different installation details.

Different fastening methods may be required to achieve performance levels for specific product lines or sizes.

Outer frame types:

- No flange
- Integral flange and applied flange
- Brick mould and other options factory applied or applied in the field

Note: an installation flange is not flashing. There is no such thing as a “self-flashing” window.

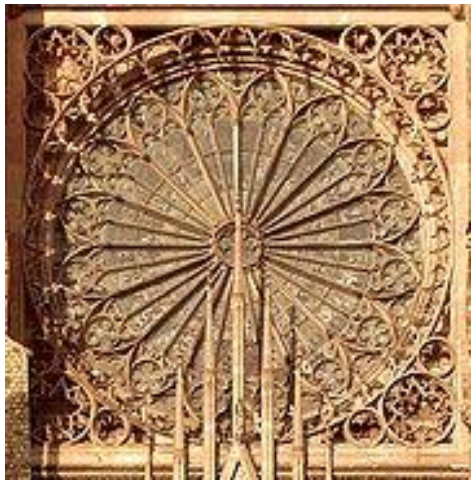
Wall Basics

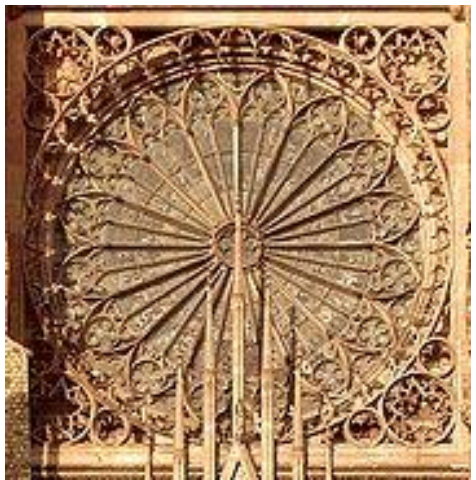
A few typical wall types:

- Wood framed
- Metal framed
- Concrete Masonry Unit (CMU)
- Poured concrete
- Precast concrete panel
- Insulated Concrete Form (ICF)
- Structural Insulated Panel (SIP)
- Truss wall

Section 3

Best Practices in the Installation Process





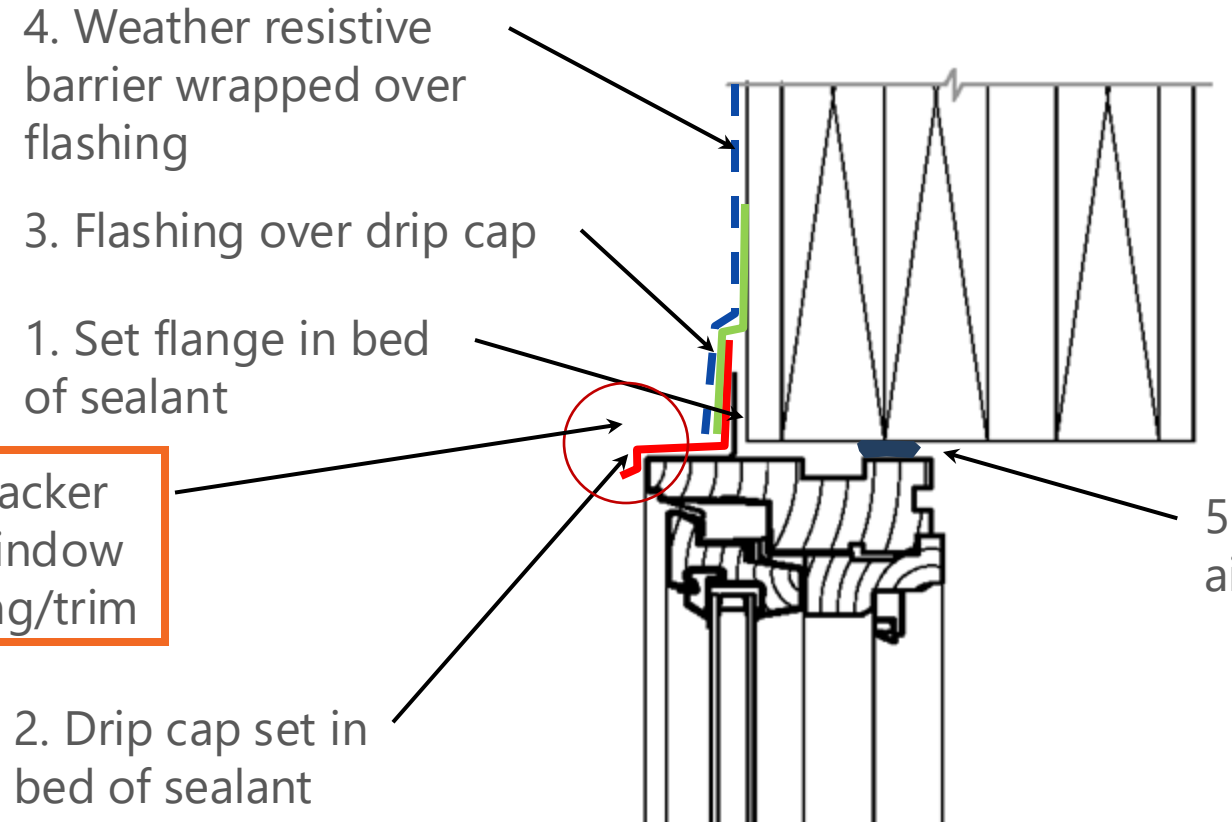
Wall/Window Integration

Not a new concept – Windows once were literally an integral part of the wall.

Today, the drainage and barrier methods of water management determine how the window and wall perform together.

- **Drainage method** assumes water will enter the wall or opening at some time and therefore, will need a way to drain to the exterior
- **Barrier method** assumes water will be prevented from entering the wall or opening because of the way the window is integrated into the wall

Wall/Window Integration - Head



Head Detail

Drainage or Barrier Method is typically the same at head location

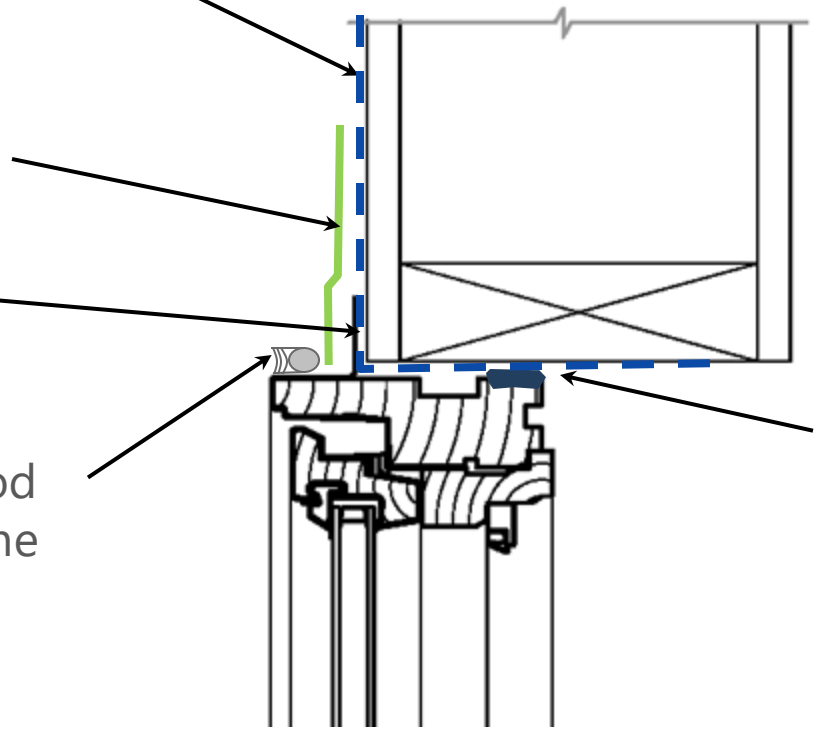
Wall/Window Integration - Jamb

1. Weather resistive barrier wrapped into opening

3. Flashing over flange

2. Set flange in bed of sealant

4. Sealant & backer rod between window frame and siding/trim

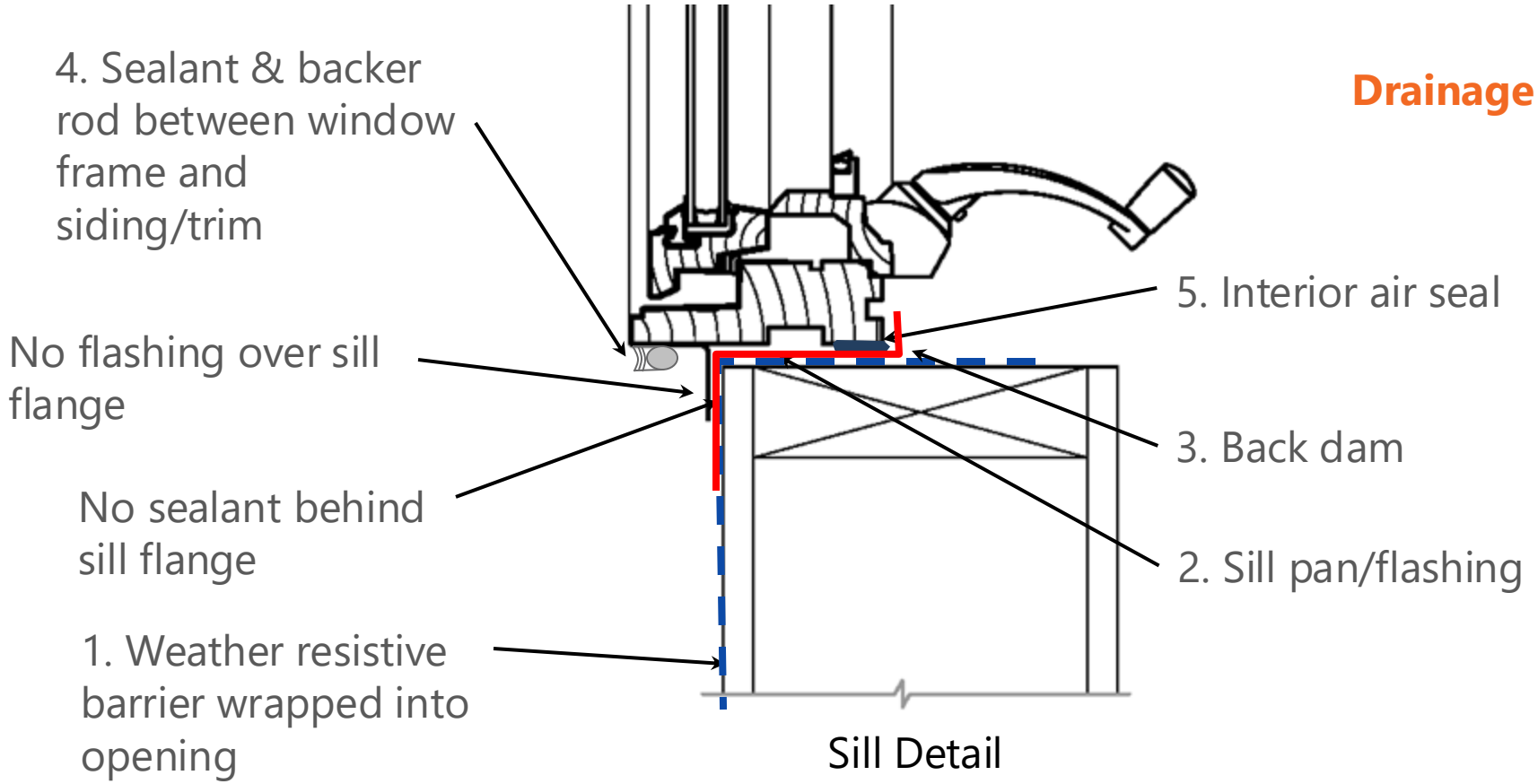


5. Interior air seal

Drainage or Barrier Method is typically the same at jamb location

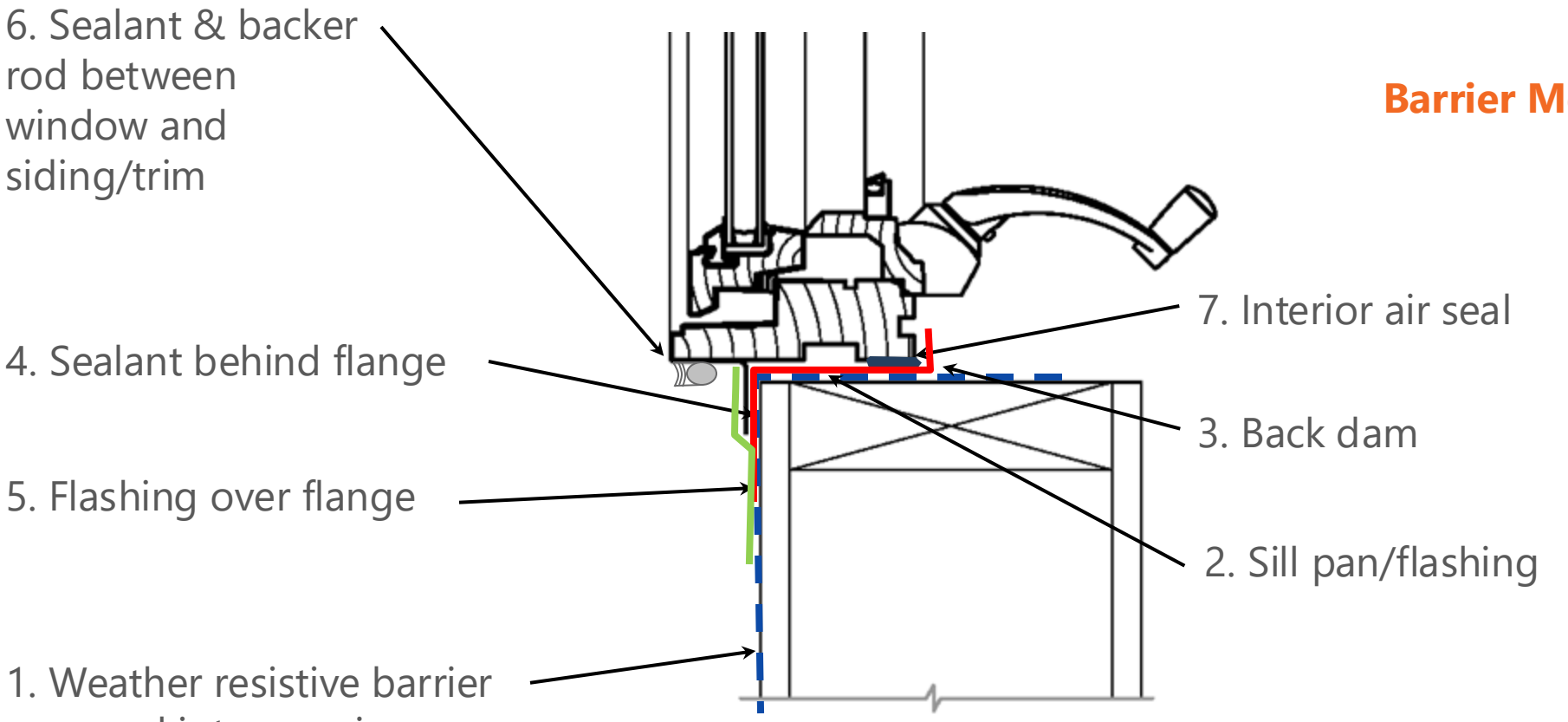
Jamb Detail

Wall/Window Integration - Sill



Drainage Method

Wall/Window Integration - Sill



Wall/Window Integration

Installation Components:

- **Shims**
  Non-absorbent – placement can affect window operation, glass stress and screen fit
- **Insulation**
  Low expanding foam – do not make operation difficult, do not block drainage at sill
- **Weather Resistant Barriers**
  Building paper, polymer house wrap. Barrier, permeable, "ventilated" polyethylene rain screen
- **Sealants** – Polyurethane, silicone, butyl. Compatible, paintable, cure time, adhesion, movement
- **Flashing**
  Self-adhering flexible (SAF), foil or plastic backed with release paper. Acrylic, polyethylene, butyl. Prime as recommended for adhesion. Always apply lapped shingle-style. **drip cap, sill pan**
- **Fasteners**
  Require solid blocking (not rigid insulation). Installation flange, screw through frame or installation clips
- **Exterior Trim / Interior Casing**
  May be applied before or after window is installed in opening

Wall/Window Integration

Installation Components

Fit

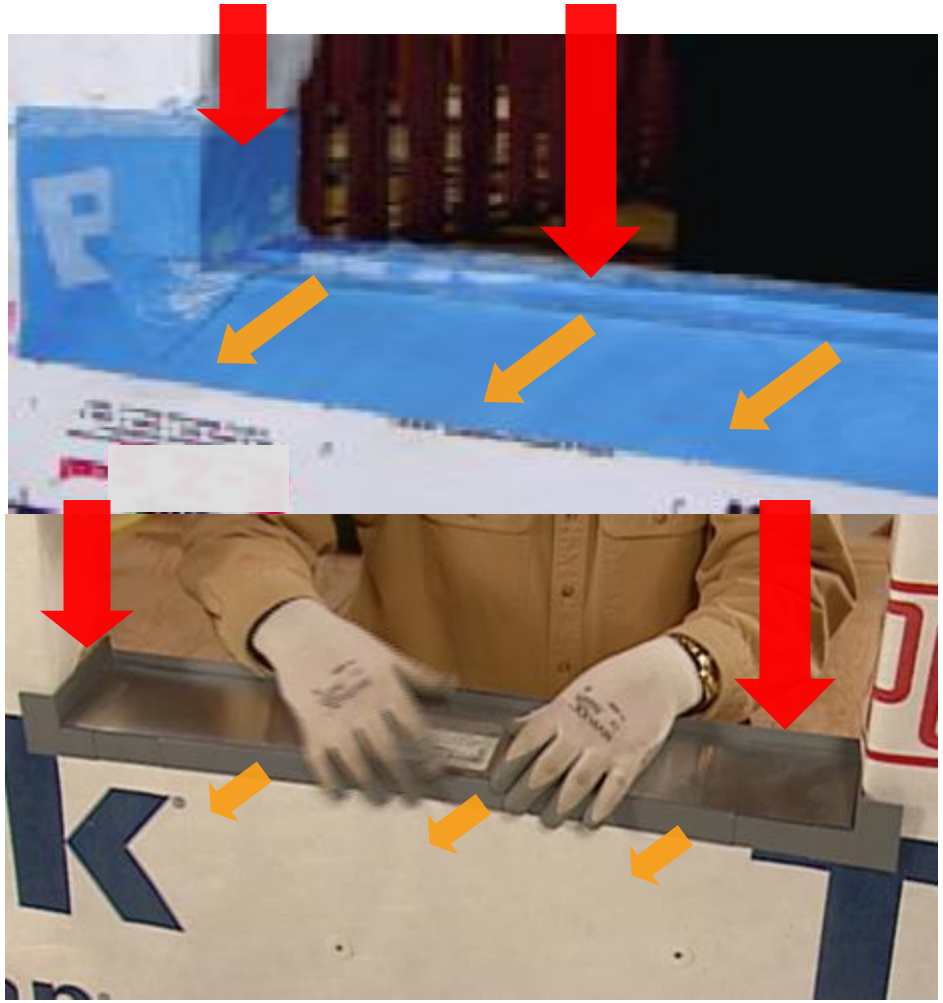
Fasten

Seal

Foam is NOT a water barrier!

Sample Window Details

Key Components of the Window Installation:



At the sill
("drainage method" of water management)

- Allow sill area to weep – leave sealant joint open at ends or leave gaps in sealant
- Slope sill pan whenever possible for positive drainage
- Different types of sill pans – site formed, pre-formed, adjustable width, sloped, flexible, metal, tape, plastic, etc.
- Create back dam and end dams
- Do not completely fill void under sill – may interfere with ability of moisture to escape

Sample Window Details

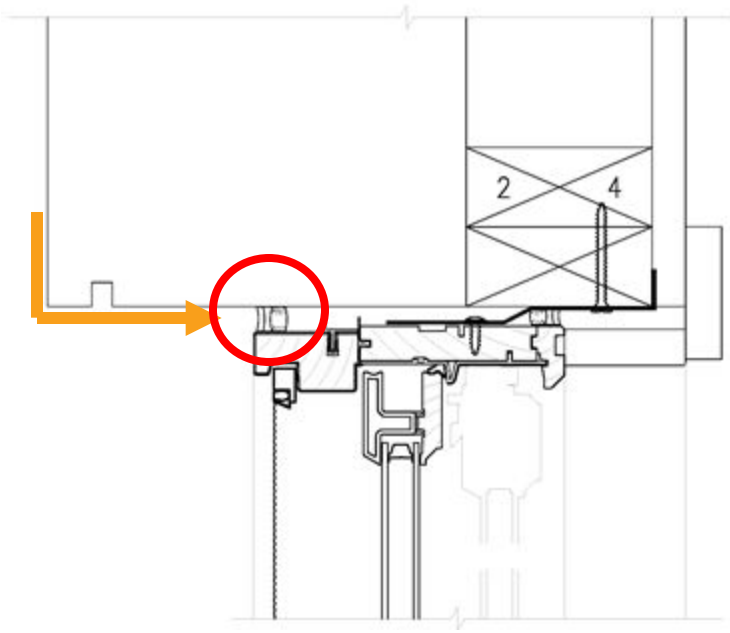
Key Components of the Window Installation:

At the head

- Recessed window details may not provide an opportunity in existing walls to use a flange or incorporate a drip cap or through-the-wall flashing.

- Quality of sealant joint is critical – the only line of defense against water. Maintenance of joint is also critical.

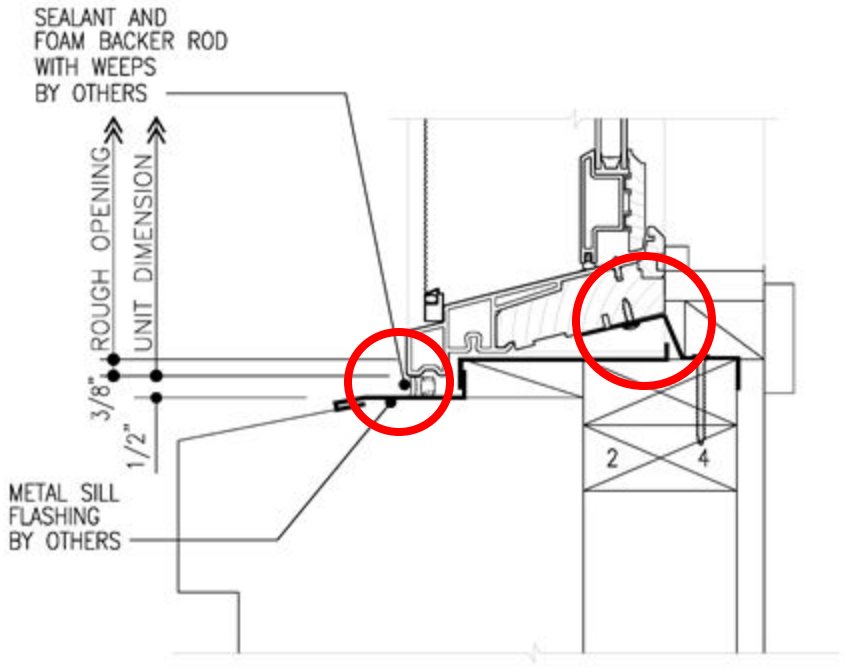
Sealant is not “forever!”



Head Detail

Sample Window Details

Key Components of the Window Installation:



Sill Detail

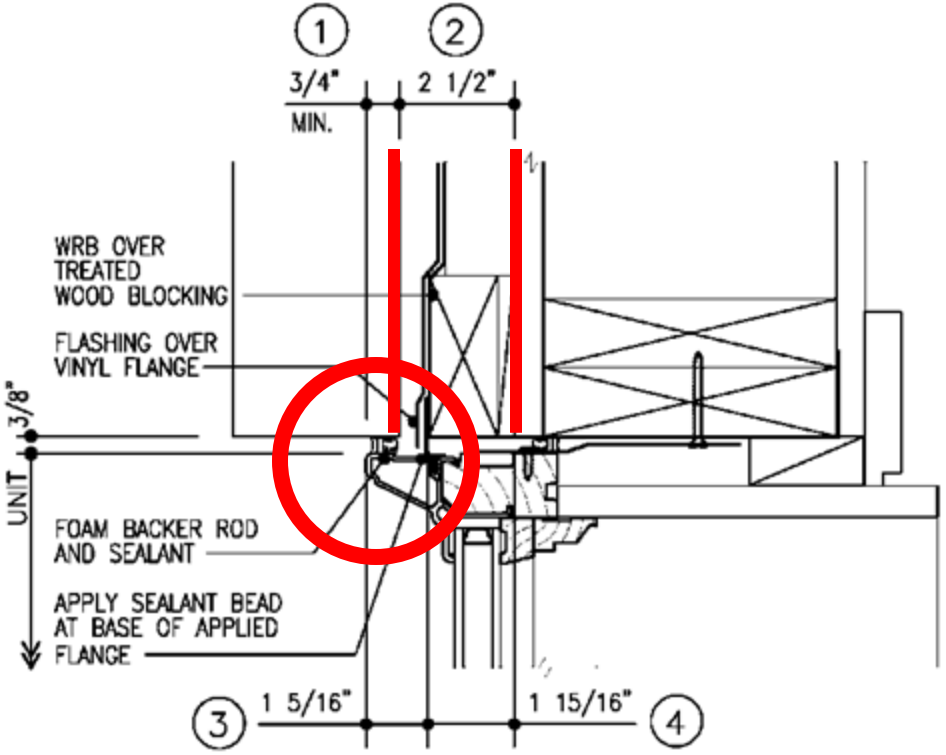
At the sill

- Note which materials are provided by the window manufacturer, and what is not.
- Window must be fastened to the structure – avoid penetrating sill pan flashing.
- Position clips to avoid compromising the back dam or air barrier.
- Note: if the window has a flange, do not apply sealant behind the sill flange. A sealed flange can trap moisture.

Sample Window Details

Coordinate Installation with Cavity Wall Air Space:

- Determine how much contact area to provide between the frame and brick for **sealant**
- Add **air space**
- Subtract dimension from face of **frame** to back of flange
- The remaining dimension is the thickness of **blocking** needed to support the flange



Jamb Detail

The Wall - Materials

Wall Types:

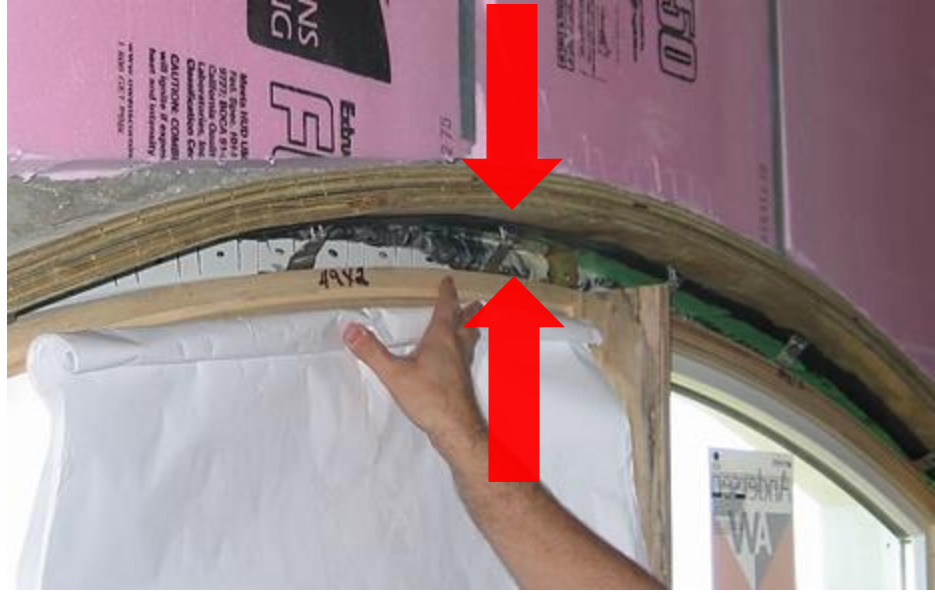
CMU w/o buck, CMU w/buck, wood or steel frame, SIP, ICF, factory-assembled, stucco, EIFS, poured concrete, sheathing without WRB, framing without sheathing

Require sill details that will contribute to water management

Wall/Window Integration

Proper Fit

- Oversize the R.O. width for a wide ribbon of windows
  - Unit dimension tolerance
  - Joining dimension tolerance
  - Construction plumb/level/square tolerance
- Consider maximum structural header deflection with longer spans in determining R.O. height
- Size the R.O. for flashing and installation materials that will be located within the opening

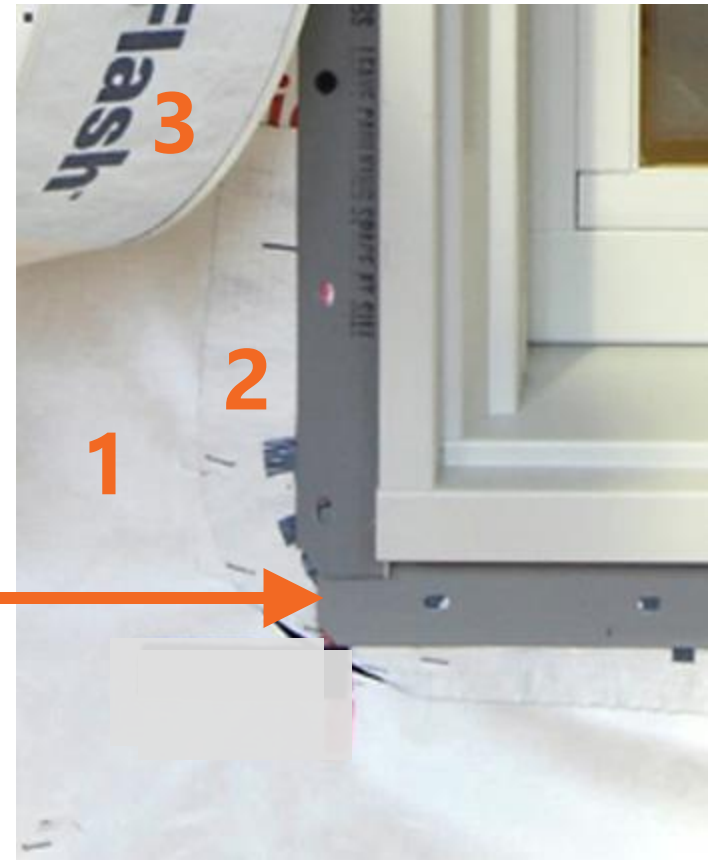


Wall/Window Integration

Installation Sequence (window with flange)

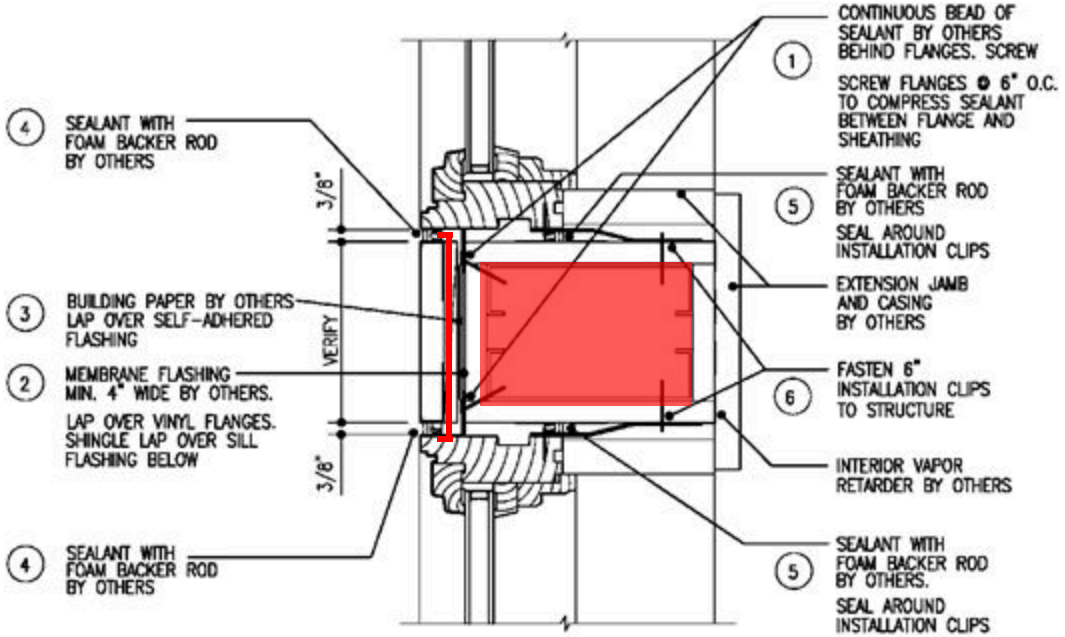
Window installed before WRB:
Flange is taped to sheathing
A temporary seal until WRB and wall finish are applied.

Window installed after WRB:
Flange is sealed to WRB and sill flashing. Flashing tape applied over flange.



Wall/Window Integration

Separate Rough Openings



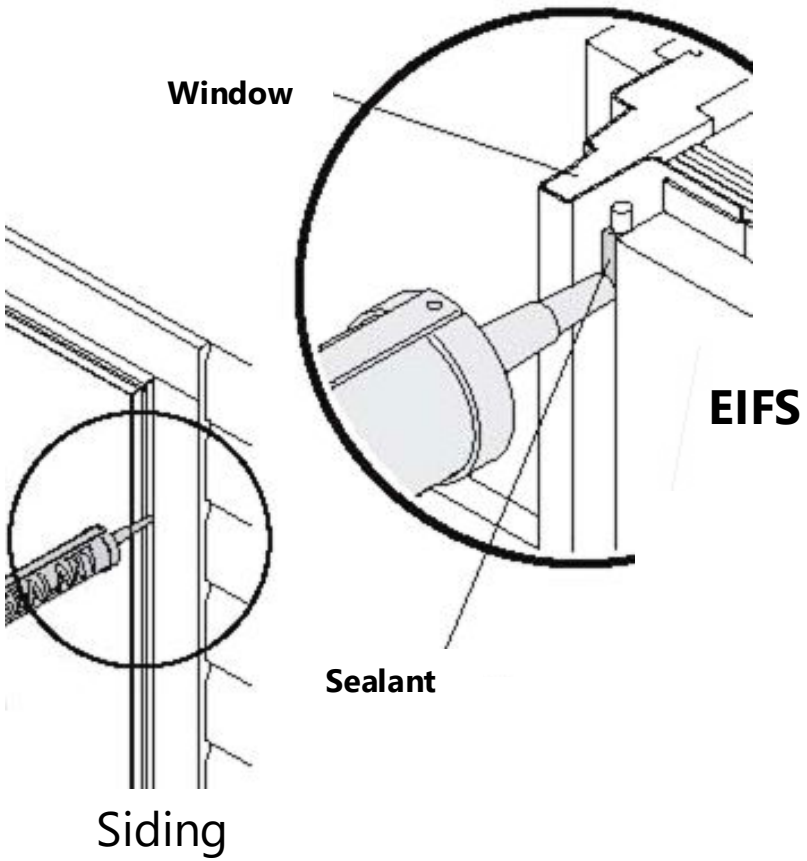
Mullion Detail

When an opening is too large to use manufacturer's joining systems, structure may need to be incorporated and is typically not provided by the manufacturer.

Wall/Window Integration

Sealant Joint at expansion-contraction locations

- Exterior & interior sealant joints mitigate air pressure differential
- Depth of sealant bead = 1/2" deep. Typical width 1/4" min. to 3/4"
- Between window and siding or trim - min. 1/4" sealant joint at perimeter
- Between window and EIFS - min. 1/4" sealant joint at perimeter
- Between window and masonry - min. 1/4" sealant joint at jambs/head, min. 1/2" sealant joint at sill



The Window Manufacturer/Supplier

Choose a Manufacturer that will provide

- A quality product – to meet code and project requirements
- Clear instructions – G.C. should follow how to install, fasten, and integrate the window into the opening

⚠ WARNING / ADVERTENCIA

Metal fasteners and components may corrode when exposed to preservative treated and/or fire-retardant treated lumber. Use approved fasteners and components to fasten unit. Failure to do so may cause a failure resulting in injury, property or product damage.

Los componentes y los sujetadores de metal pueden corroerse cuando quedan expuestos a madera tratada

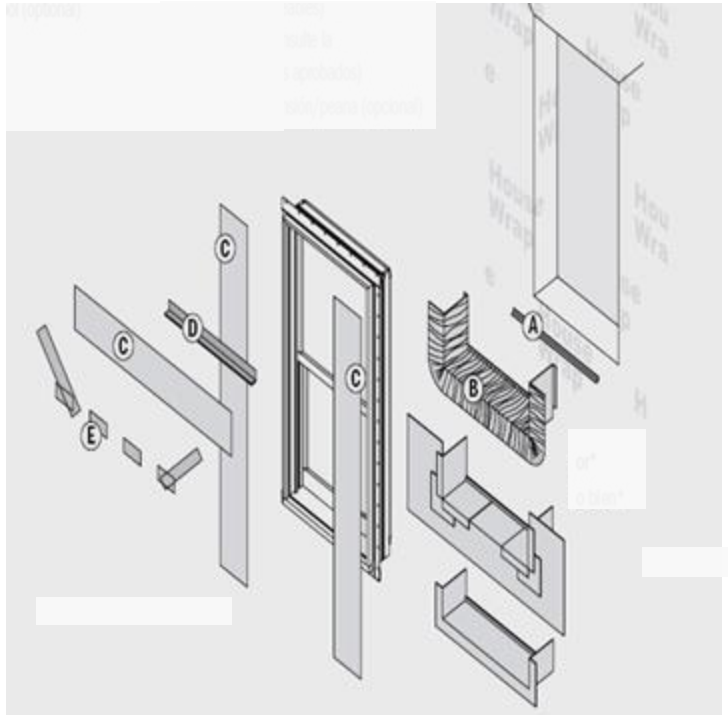
APPROVED FASTENER CHART (select one)

Fastener	Min Shank	Min Head	Min Length	Type of Steel	Spacing
Roofing Nail	11 ga.	5/16"	1-3/4"	galvanized, zinc plated, ceramic coated, stainless	6-8" or every hole
Deck Screw	#6	5/16"	1-5/8"		

▶ *For installations that require jamb clips, see these guides:*

TABLA DE SUJETADORES APROBADOS (seleccione uno)

Sujetador	Espiga mín.	Cabecera mín.	Longitud mín.	Tipo de acero	Espacio



Section 4

Best Practices in Job Site Management of Windows

The Contractor

Proactive and Preventive

- **Meeting** agenda - topics regarding scope of work and items of concern noted during site visits
- **Understanding** how the wall must be constructed to manage water
- **Protecting** products while stored on site and after installation, from construction equipment, mortar, brick wash, etc.

Codes and Standards

The Codes:
International Building Code (IBC)

Key sections on installation and flashing:

2021 IBC Chapter 14 – EXTERIOR WALLS:

- Addresses materials, vapor barriers, *water-resistive barriers* (WRB's), and flashing.
- **Section 1404.4 Flashing** Shall be installed in such a manner as to prevent moisture from entering the wall or to redirect that moisture to the surface of the exterior wall finish or to a water-resistive barrier complying with Section 1403.2 and that is part of a drainage complying with Section 1402.2
- Flashing is required at the perimeters of exterior door and window assemblies and other wall penetrations

Codes and Standards

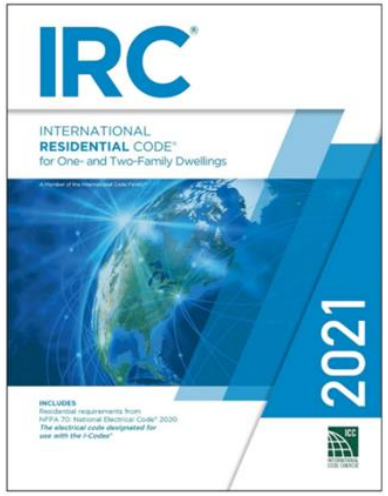
The Codes:
International Residential Code (IRC)

Key sections on installation and flashing:

2021 IRC Chapter 6 – WALL CONSTRUCTION

- **SECTION R609 EXTERIOR WINDOWS AND DOORS**
- Windows and doors shall be installed in accordance with the fenestration manufacturer's written instructions
- Window and door openings shall be flashed in accordance with Section R703.4.
- **SECTION R703.4** – Flashing *Approved* corrosion-resistant flashing shall be applied *shingle-fashion* in a manner to prevent entry of water into the wall cavity or penetration of water to the building structural framing components
- **SECTION R703.4.1** Flashing at exterior windows and door openings per the manufacturer's installation instructions. If not addressed there, then to the flashing manufacturer's instructions and if not addressed there, then pan flashing is to be installed and flashing or protection at the heads and sides.
- Flashing to exterior surface of the wall or to the WRB.
- Flashing allowed with the design or method of a registered design professional or in accordance with other *approved* methods

Codes - Flashing



2021 IRC R703.4.1 Flashing

Flashing per fenestration manufacturers instructions

or → Flashing per flashing manufacturers instructions

or → In accordance with a registered design professional

or → In accordance with other approved methods

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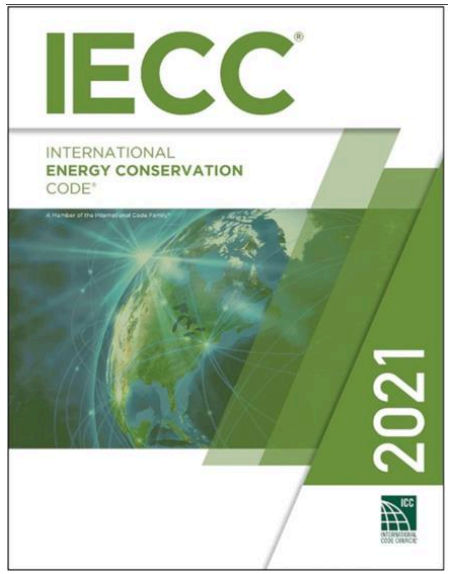
International Energy Conservation Code (IECC) Requirements

Exterior Foam Insulation

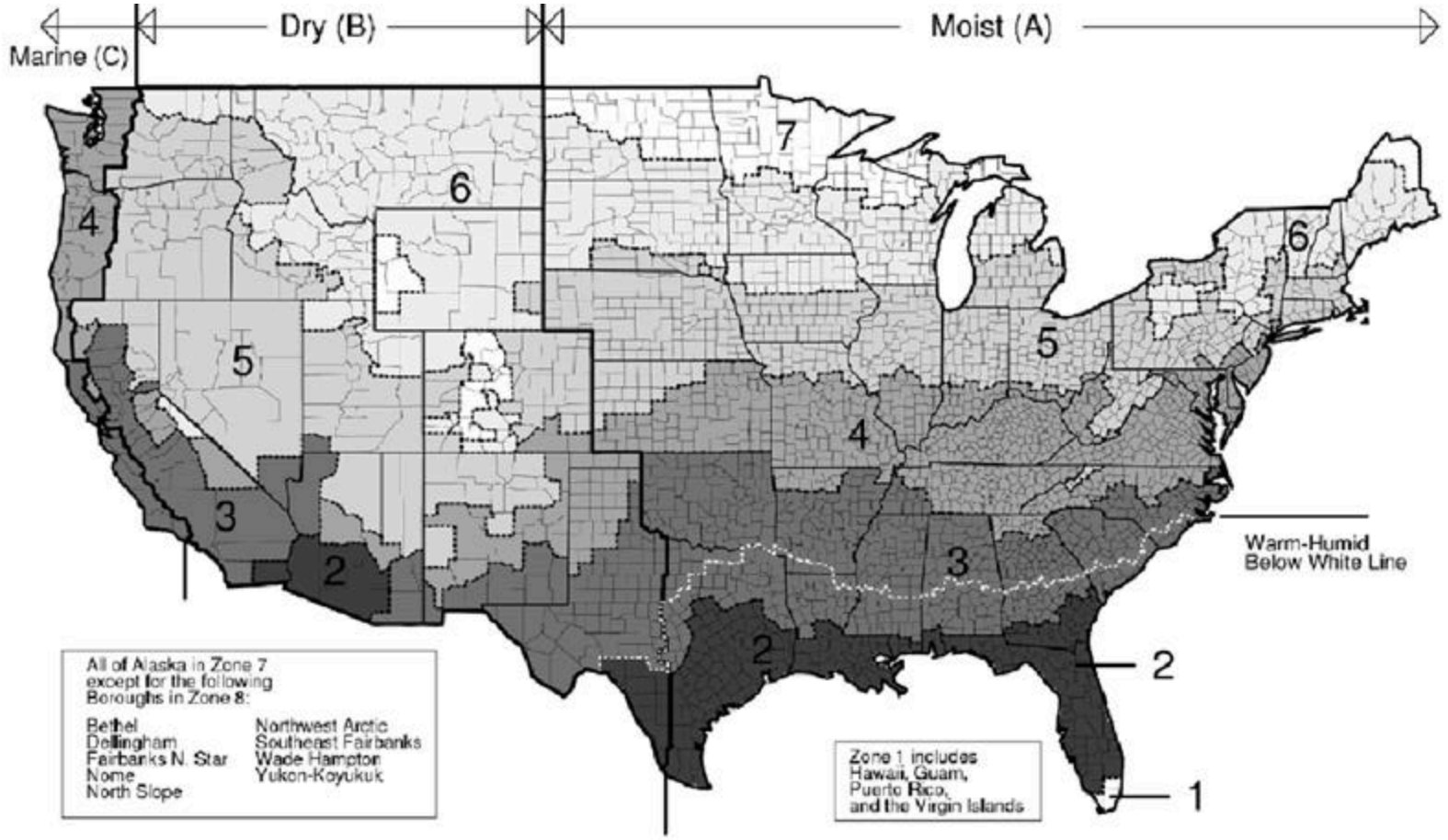


RESIDENTIAL ENERGY EFFICIENCY

2021 IECC CHAPTER 4 – TABLE R401.2.3

- In the IECC residential prescriptive table, the use of "+" indicates an exterior continuous insulation (ci) such as foam sheathing.
- There is a cavity-only insulation option and a continuous-only option in all climate zones in the US, and combination cavity/continuous in most climate zones.
- For example, in IECC Climate Zone 5 and Marine 4, the prescriptive wood frame wall insluation options are:
  - R-30 (R-30 cavity insulation), or
  - R-20 + 5 (R-20 cavity insulation plus R-5 continuous insulation), or
  - R-13 + 10ci, (R-13 cavity insulation plus R-10 continuous insulation) or
  - 0 + 20ci (R-0 cavity insulation but R-20 continuous insulation)
- Depending on the thickness of the exterior foam insulation, a structural support may be needed as part of the window rough opening preparation and installation

Climate Zones



2012 INTERNATIONAL RESIDENTIAL CODE®

FIGURE N1101.10 (R301.1)
CLIMATE ZONES

Figure N1101.10 (R301.1)
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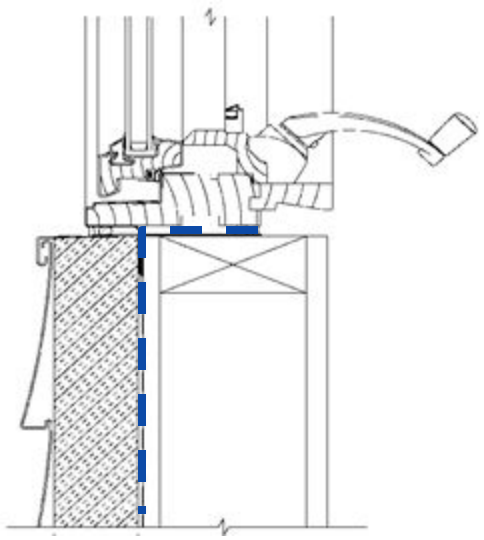
Exterior Foam Insulation

Basic Questions

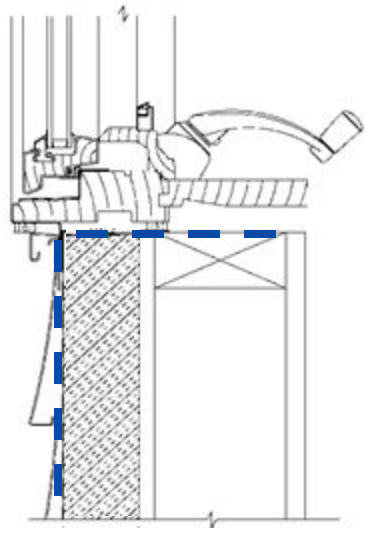
1. What is the wall construction?
2. Where is the weather resistive barrier?
3. What is the thickness of the foam?
4. How is the window supported if the drainage plane is on the surface of the foam?
5. Is the window a combination?
    a) How is the combination reinforced?
    b) How is the reinforcing attached?
6. What is the exterior cladding material?
7. How is the window fastened to the opening?

Exterior Foam Insulation

Where is the Drainage Plane?



Posterior WRB

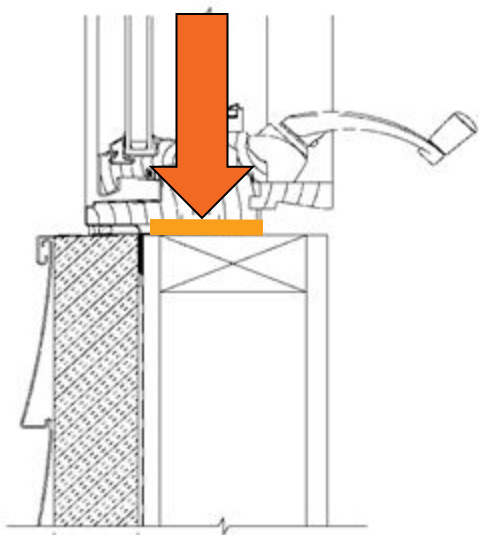


Exterior WRB

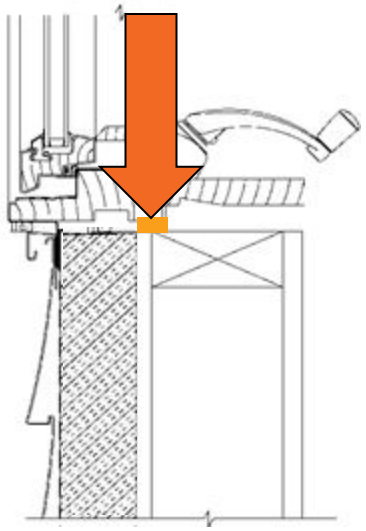
Weather Resistive Barrier (WRB) = Drainage Plane

Exterior Foam Insulation

What is the Bearing Surface?



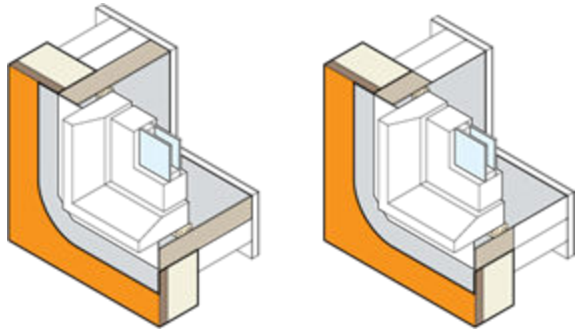
Posterior WRB



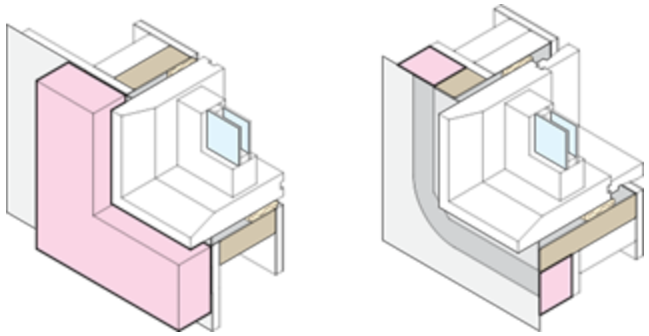
Exterior WRB

Exterior Foam Insulation

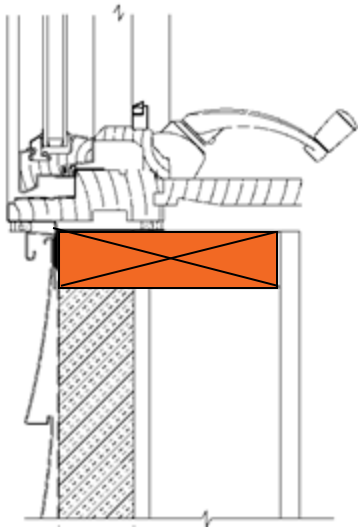
Solid Structural Element Recommended



Insulated Sheathing Application



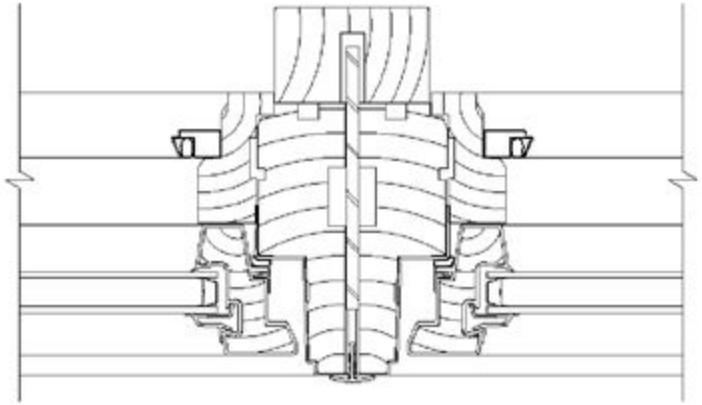
Exterior Foam Application Generic



Exterior Foam Insulation

Of Special Interest

Window Combinations



- **May be factory-joined or assembled on site**
- Rough opening – increased dimensions
- Handling – increased weight
- Exterior trim and interior mull casing
- Reinforced joining components fastened to rough opening

Section 5

Best Practices in Windows for Commercial Buildings

Of Special Interest

Large Commercial Buildings

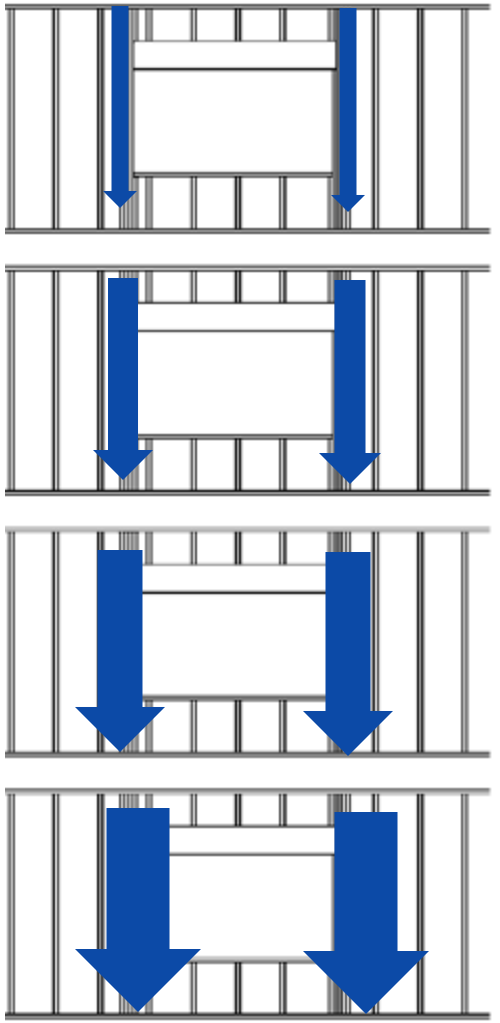
- Generally, there will be higher requirements for air and water performance. Thoughtful detailing and observing the quality of installation can be even more critical to reduce multiple risks.

- Materials will be left exposed to UV, weather for longer periods of time due to logistics of installing large numbers of windows. May affect choice of flashing and WRB materials.

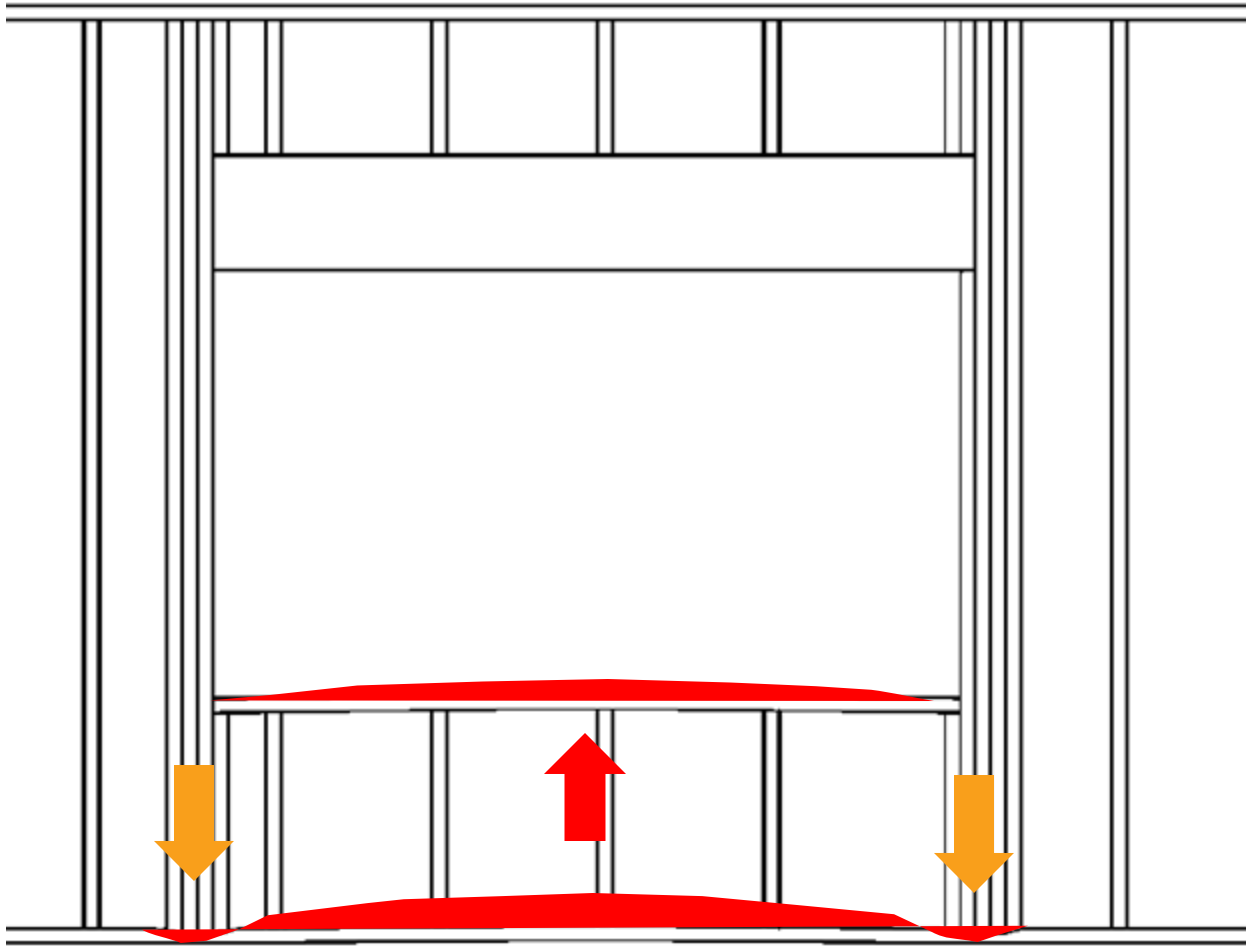
- Field testing recommended or required

Commercial Buildings

Loads Increase Each Floor



Commercial Buildings

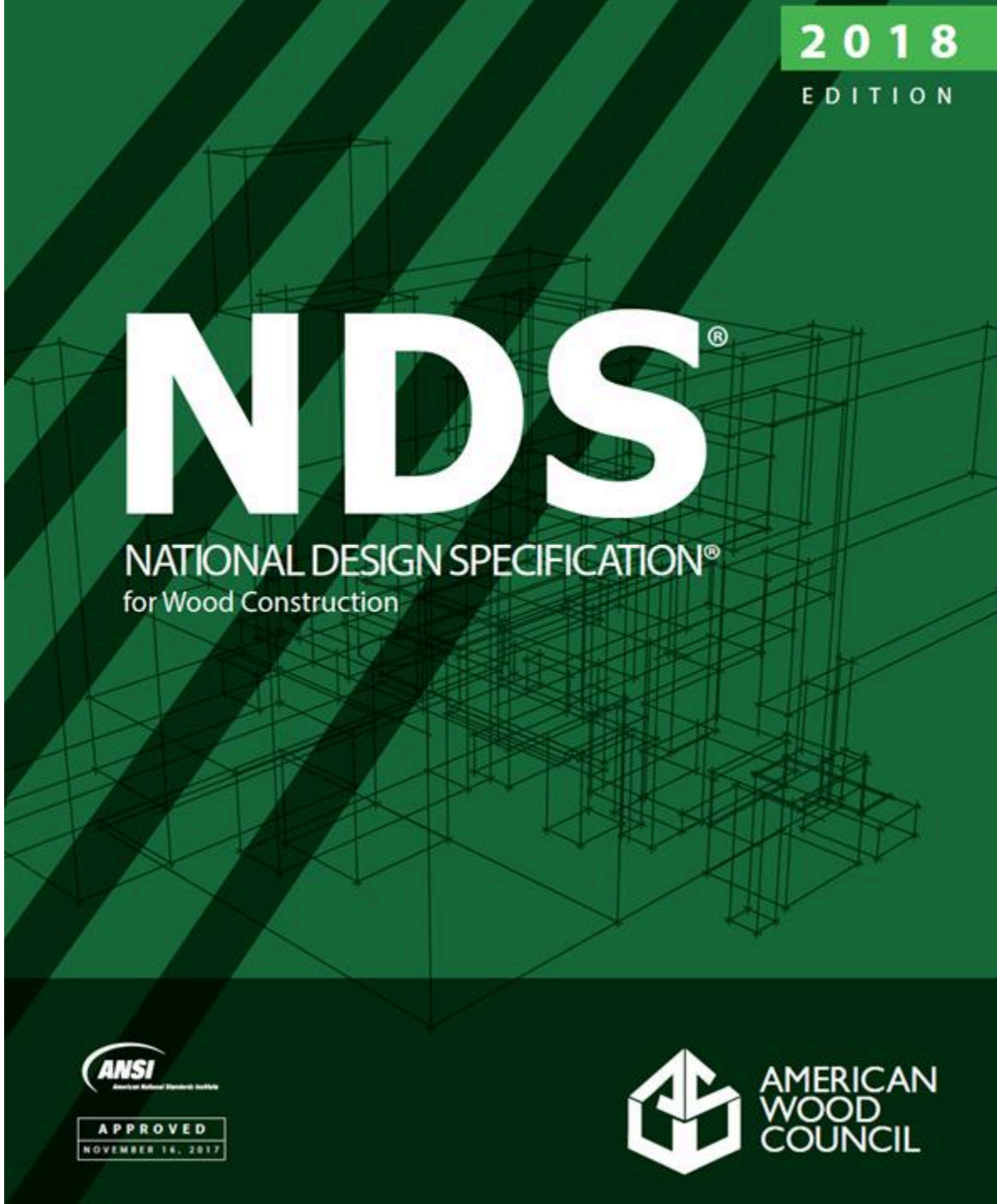


Crushed base plates & crowned sills

Commercial Buildings

National Design Standards

Courtesy, American Wood Council, Leesburg, VA



Commercial Buildings

Of Special Interest

Field Testing

- AAMA 502-21: water test pressure = 2/3 lab test pressure (can no longer specify full test lab pressure); test chamber includes space between unit and wall R.O. ASTM E1105
- Water test procedure “B” is default (4 cycles @ 5 min. each). Procedure “A” (15 min. constant) is for AW performance class windows.
- Air test @ 1.57 PSF is default; 6.24 PSF for AW performance class. ASTM E783
- Document weather conditions. Wind, barometric pressure and temperature variables at the site are why field test pressures are adjusted to 2/3 x lab test pressure

Of Special Interest

Window Replacement

- Requires special attention to existing flashing materials to maintain integrity of the water management system
- Correct sizing is critical for proper seal and operation
  - Can be a complete or partial window unit
  - Maintain code required clear opening dimensions where required for egress
- Will new unit be installed from the interior or exterior
- Will wall finishes and trim remain that require protection during the replacement process
- Health and environment - lead paint or asbestos

The Codes, Standards, and Test Methods

International Energy Conservation Code

International Building Code

International Residential Code

ASTM C1397 – EIFS application

ASTM C1193, C920 – joint sealants

ASTM E2266 – frame construction to resist water

ASTM C1063 – metal lath

ASTM E283 – air infiltration

ASTM E331, A440, E547 – water penetration

AAMA 502 - 12 – field testing

ASTM E783 (field test)– air infiltration

ASTM E1105 (field test) – water penetration

ASTM E2112 (limited to wood frame walls)

AAMA/WDMA/CSA 101/I.S.2/A440-08

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Information Resources

Journals and Magazines:

- Journal of Light Construction
- Fine Homebuilding
- Construction Specifier

On the Web:

- awc.org
  National Design Standard
- astm.org
  ASTM International
- eeba.org
  Energy Efficient Building Association
- nahb.org
  National Association of Home Builders
- aamanet.org
  American Architectural Manufacturers Association
- gobrick.com
  Brick Industry Association
- iccsafe.org
  International Code Council

Conclusion

A Successful Project

Common goals you influenced with your increased knowledge of window installation:

- the documents
- the schedule
- the budget
- the window performance
- the relationships (future work)

AIA/CES Presentation

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Thank you for your time!

We have more time if you have more questions...

For further information, please contact us:

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www.andersenwindows.com

800.299.9029

This concludes the American Institute of Architects Continuing Education Systems Program

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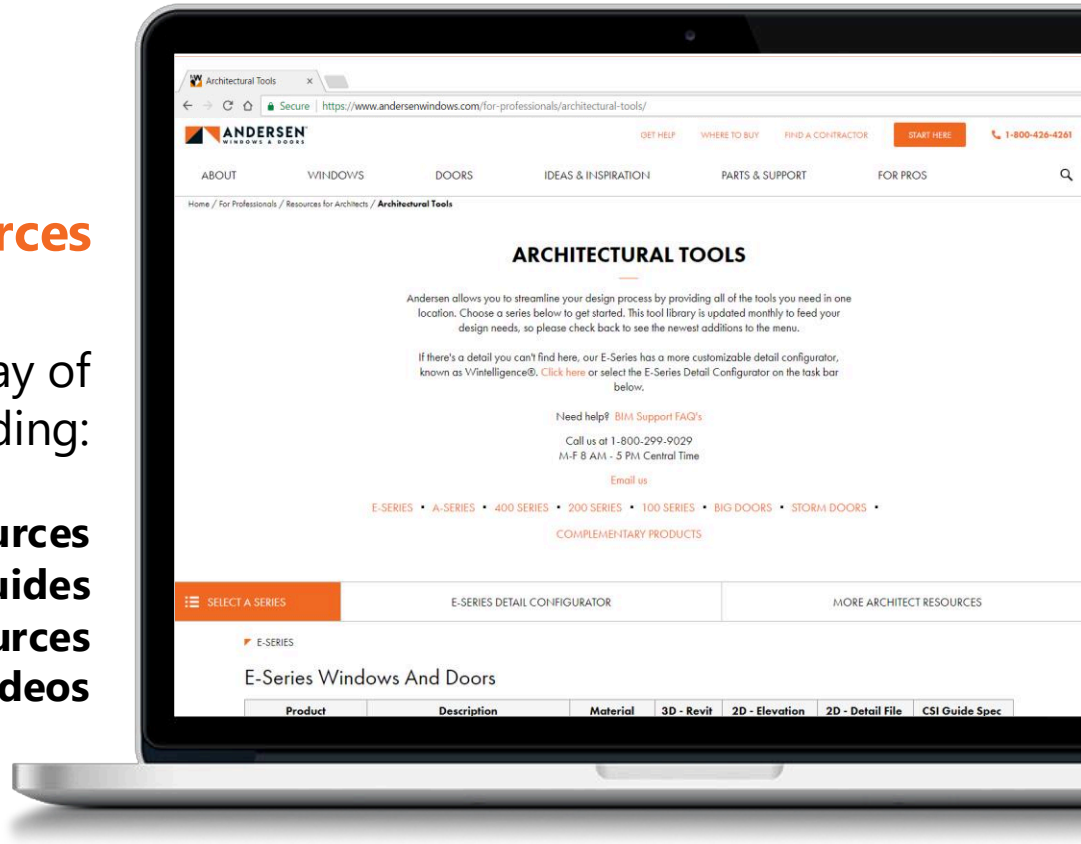
Architectural Support Tools and Resources

Check out andersenwindows.com for a full array of support tools & product details including:

Product Resources
Reference Guides
Installation Resources
Installation Videos



THANK YOU!