

# Integrated Air & Water Barrier Systems

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AIA Course: GP-FF-WRBAB    Credit Designation: LU | HSW



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# Course Description

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This course provides guidance for architects, specifiers, waterproofing contractors, and other professionals considering use and advantages in the selection or specification of air and water barriers for the design and installation of integrated structural panel and air and water barrier systems. Topics covered include an introduction to air and water barriers, structural panels, code requirements when designing for energy code compliance, and common design and installation practices and techniques.

# Learning Objectives

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1. Understand the purpose of air and water barriers, as well as their makeup in building enclosures.
2. Become familiar with the various types of air and water barrier systems and assemblies, and their comparative advantages.
3. Highlight the codes and standards that govern air and water barriers.
4. Differentiate between traditional and integrated air and water barrier systems.

# Section 1

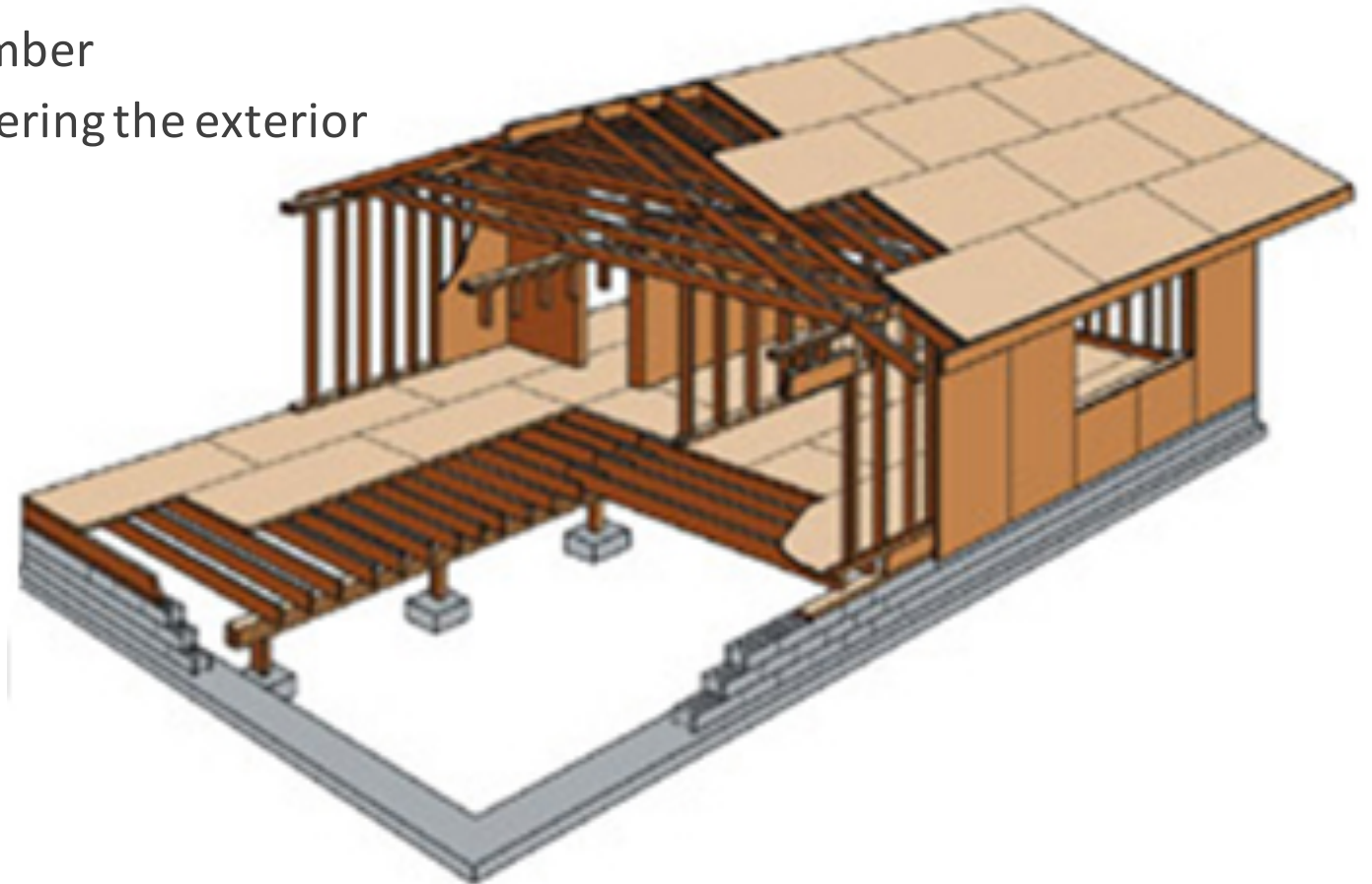
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## Introduction to Building Envelope and Barriers

# Traditional Wood Framing

- Wood Platform Frame Construction
  - Dimensional or engineered lumber
  - Plywood or OSB sheathing covering the exterior



# The Enclosure

- Structure
- Control Layers
- Cladding





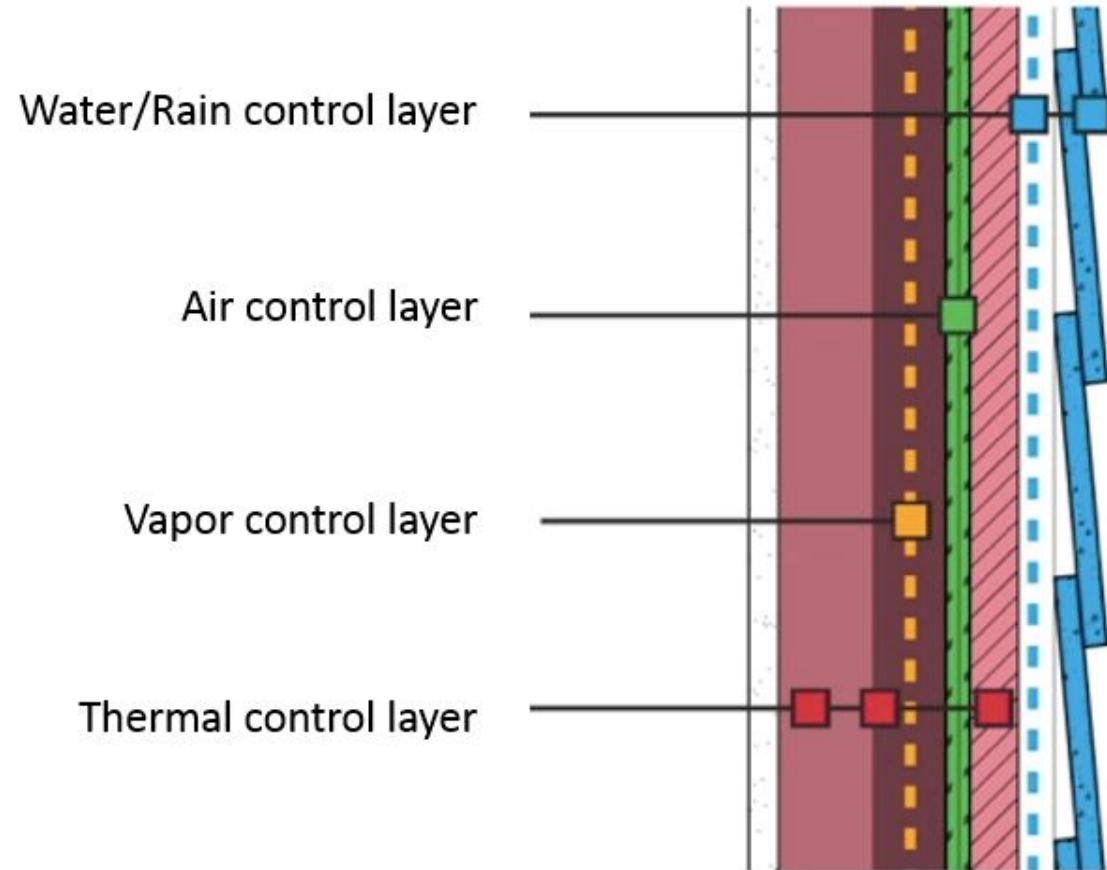
# The Enclosure – Wood Frame

- **Structure**
  - Dimensional or engineered lumber
  - Sheathing – plywood or OSB
- **Control Layers**
  - Insulation
  - House Wrap/AWB
- **Cladding**
  - Vinyl, fiber cement or wood siding
  - Wood shingles
  - Brick veneer, etc.



# Elements of Control Layers

- Air Barrier
- Water Barrier
- Vapor Barrier
- Insulation
- Radiant Barrier



# Air Barrier

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- Air barrier materials
- Air barrier accessory
- Air barrier components
- Air barrier assemblies
- Air barrier systems



# Water Barrier

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- Prevent water from entering the structure
- Mitigate moisture damage
- Keep out bulk liquid water
  - Falling rain
  - Windborne rain
  - Snow
  - Ice



# Vapor Barrier

- Class I vapor retarder (impermeable) = 0.1 perms or less
- Class II vapor retarder (semi-impermeable) = 0.1 perm to 1.0 perm
- Class III vapor retarder (semi-impermeable) = 1.0 perm to 10 perm



# Insulation

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## Definition:

A material with low thermal conductivity that reduces building energy consumption by preventing heat gain and loss through the building envelope

## Examples

- Polyurethane
- Polyisocyanurate
- Fiberglass
- Wool
- Vermiculite
- Straw bale
- Cardboard
- ...and more



# Radiant Barriers

Materials that reflect, rather than absorb, radiant heat



# Challenges When Sealing the Building Envelope

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## **PENETRATIONS**

- Windows
- Doors
- Vents
- Plumbing
- Architectural features

## **INTERFACES**

- Building corners
- Material types
- Foundation to wall
- Wall to roof
- Roof drains, hatches & skylights



# Common Weather Barriers

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- Asphalt-impregnated paper or fiberglass (asphalt felt paper)
- Micro perforated, cross-lapped films
- Films laminated to spunbond nonwovens
- Films laminated or coated to polypropylene wovens
- Supercalendered, wetlaid polyethylene fibril nonwoven
- Drainable house wraps

***House wrap accounts for approximately 80% of weather barriers in the wood frame market***

# Alternative: Integrated Air & Water Barrier Systems

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Pre-fabricated assemblies comprised of sheathing with the air and water barrier affixed to the surface of the material.

Benefits:

- Ease of installation
- Reduced losses in air barrier



## Section 2

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## Introduction to Integrated Air & Water Barrier Systems

# Integrated Air & Water Barrier Systems

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## Advantages:

- Eliminate the need for house wrap
- Save time and labor costs during construction
- Window and corner details are less complex
- Blow outs less frequently

***Integrated air and water barrier systems install approximately 37% faster than house wrap***



# Accessories: Seam Tape

Applied to the seams and joints of the panels after installation to seal against air and moisture infiltration.



# Accessories: Flashing Tape

Flashing tape is for use in window and door flashing applications



# Accessories: Flexible Flashing Tape

Flexible flashing tape that is peel and stick should be used around windows and other openings without cuts. The tape works on curved details and wall penetrations as well.



# Accessories: Corner Seal

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- Corner seal is an innovative new solution for finishing exterior corners
- 4" wide
- Semi-rigid polypropylene
- "Living hinge" that works equally well for inside and outside corners
- Provides additional protection against air and moisture intrusion in some of the most difficult areas of the home to seal



# Section 3

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## Air & Water Barrier Codes and Compliance

# Air and Water Barrier Codes and Compliance

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## IBC, IRC & IECC

Codes governing air and water barriers for wood frame construction of one- and two-story residential and light commercial

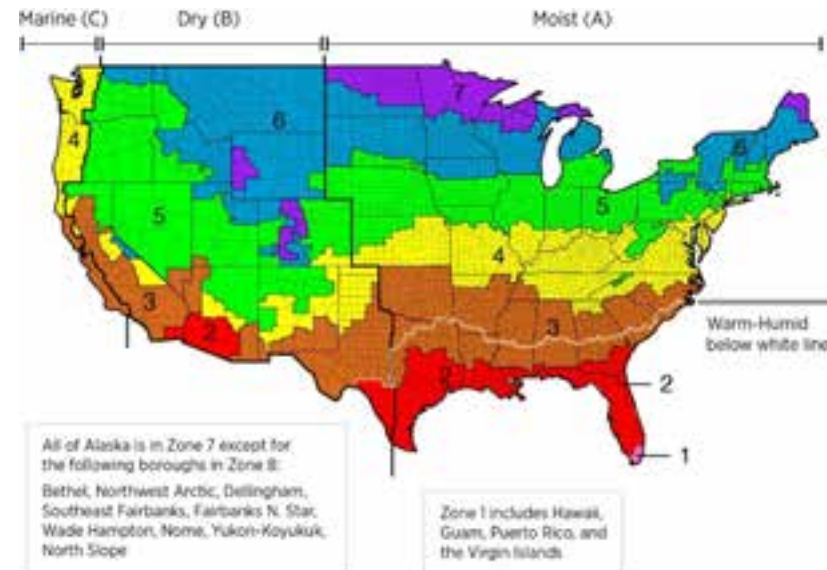


# Air Barrier Codes

The 2015 IECC code requirement for buildings:

Climate zones 1 and 2 test at or below 5 air changes per hour (ACH)

Climate zones 3 thru 8 test out at less than 3 ACH



# Air Barrier Testing vs. Codes

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## Issues for Contractors and Designers:

- International Residential Code doesn't provide prescriptive air barrier design requirements.
- Contractors are to perform specific actions and then perform a blower door test to see whether the building meets the code requirements.
- At the same time, performance requirements becoming more stringent for every new code released.

***So how is a contractor to ensure she/he is keeping up with the latest requirements?***

# Air Barrier Material Testing (IECC C402.5.1.2.1)

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## Commercial Codes

The commercial codes provide prescriptive requirements for common materials or allow for alternative materials that have an air permeability no greater than 0.004 cfm/ft<sup>2</sup> at 1.57 psf when tested in accordance with ASTM E 2178.

# Air Barrier Assembly Testing (IECC C402.5.1.2.1)



# Air Barrier Whole Building Testing (IECC C402.5)

- Testing of the building envelope in accordance with ASTM E 779
- Blower door test
- Passes if total leakage is less than 0.4 cfm/ft<sup>2</sup> at 1.57 psf





# Integrated Air & Water Barriers

Integrated air and water barrier systems must be tested as assemblies according to ASTM E2357, Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.





# Water Barrier Codes

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- IBC 1404.2 and IRC R703.2 define water resistive barriers as one layer of No. 15 asphalt felt complying with ASTM D 226.
- IBC section 104.11 and IRC section R104.11 detail the requirements for applying for alternative materials, requirements typically come in the form of a research report and testing.

## Section 4

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## Integrated Air & Water Barrier System Applications

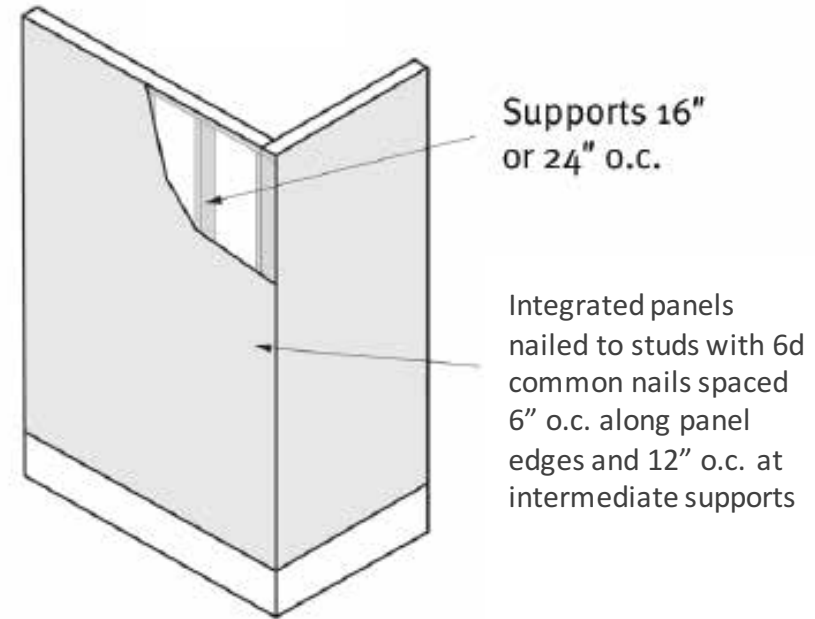
# Application & Installation

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- Nailing the panels
- Cutting the Panels
- Taping the Panel Seams
- Overlay Repair
- Flashing and sealing windows, doors, penetrations and transitions

# Nailing the Panels

Nails should be at a minimum 6d common nails, spaced 6" on center along panel edges and 12" on center at intermediate supports



***Space panels 1/8" at ends and edges***

# Cutting the Panels

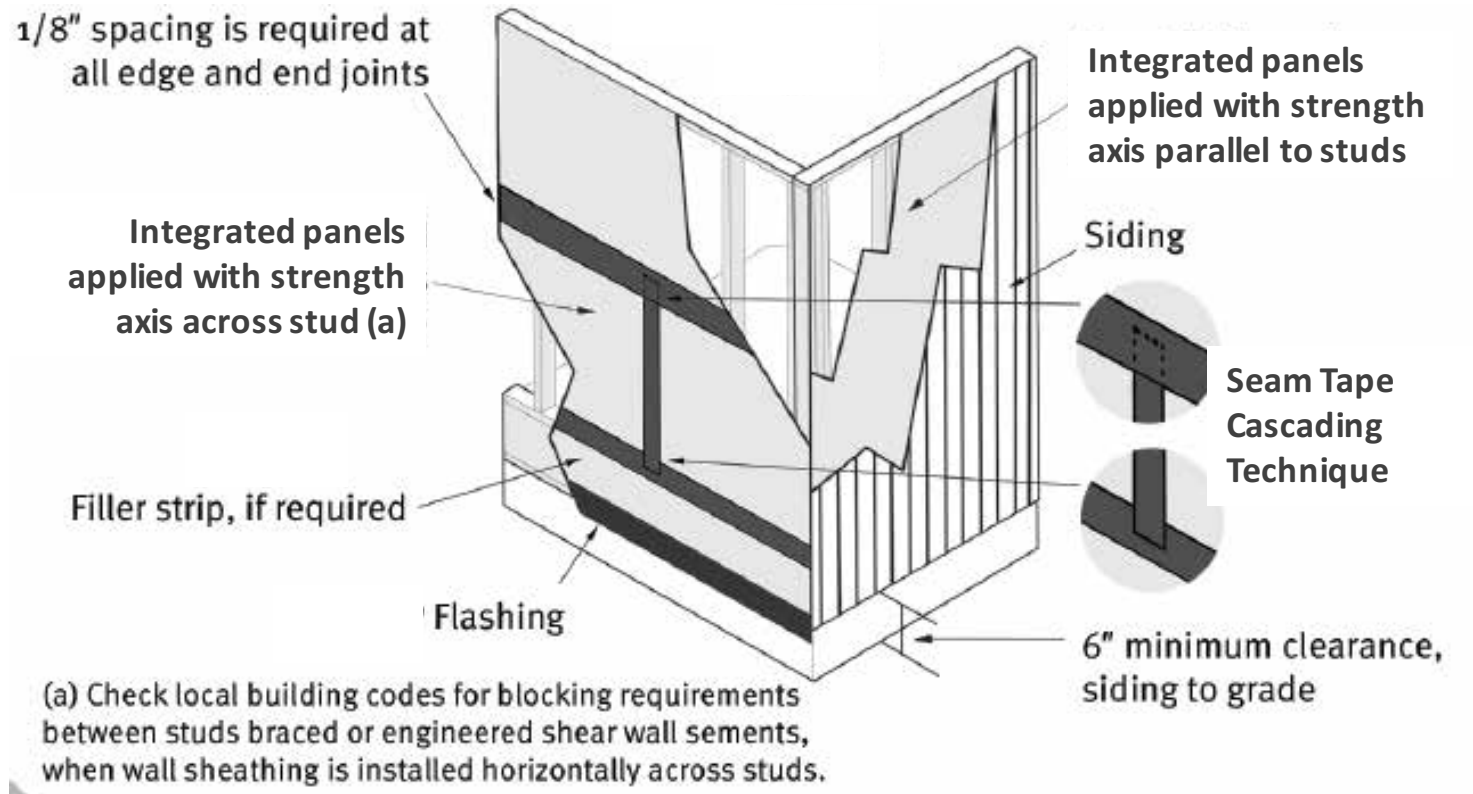
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- Cut panels with a circular saw with the air and water barrier side facing down.
- Install the cut edge of the panel toward the ground.
- If the panel's cut edge is vertical or facing away from the ground, tape that edge immediately after installation with seam tape.

# Taping the Panel Seams

## Apply Seam Tape

- Between sheathing panels
- Around openings
- Penetrations
- Material Transitions



# Overlay Repair

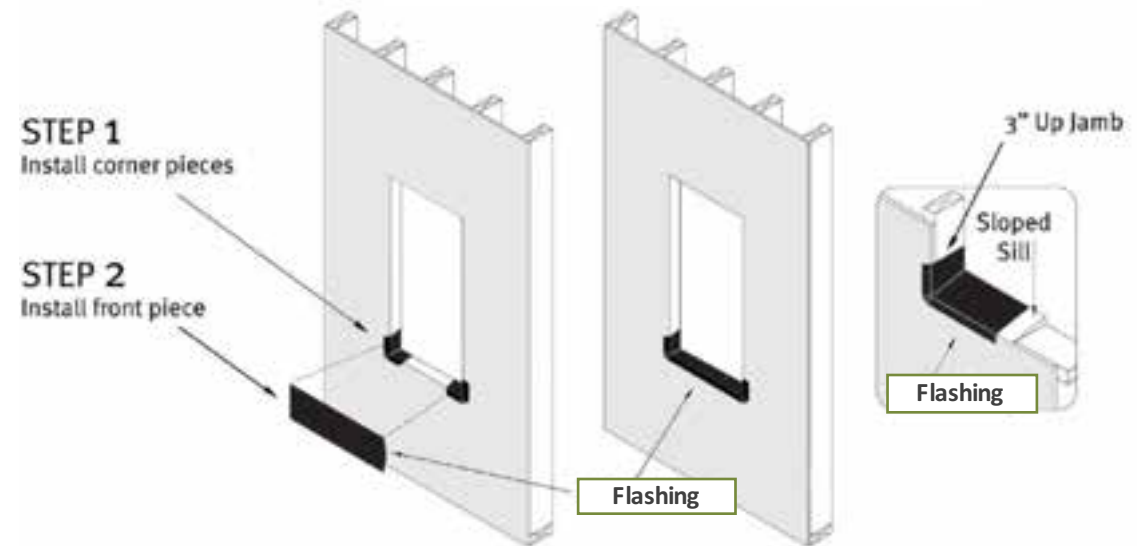
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- Damaged areas in the overlay can be repaired using seam tape.
- Center the tape over the damaged area and apply modest pressure on the tape surface with your hand or a J-roller.
- Ensure a constant bonding occurs between the tape and the panel and avoid wrinkles and air bubbles to achieve a proper seal.

# Flashing and Sealing Penetrations

Flashing tape for penetrations and intersections of exterior wall, including:

- Roofs intersections
- Chimneys
- Porches
- Decks & Balconies





# Section 5

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**Conclusion and  
References**

# Thank You

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## Questions?

[www.gpforcefield.com](http://www.gpforcefield.com)

### **Thank You for Attending!**

This concludes the American Institute of Architects  
Continuing Education System Program

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