Detailing Continuity in Building Enclosure Systems

Huber Engineered Woods
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Building Envelope Solutions
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Course Description

This course emphasizes the importance of detailing continuity in maintaining the integrity of the four control layers of the building enclosure. We will explore methods for identifying areas where continuity can be disrupted and solutions for maintaining control layer continuity in these areas.
Course Objectives

• Explain the four primary, code-based control layers that make up a building enclosure system.

• Define the primary issues related to continuity of building enclosure control layers in wood-framed wall and roof assemblies.

• Review the common choices for products and materials for building enclosure control layers, including critical transitional areas.

• Compare different drawing details and solutions for their use in wood-framed wall and roof assemblies.
Course Outline

Part 1: The Four Control Layers

Part 2: Continuity of Control Layers

Part 3: Choices in Systems

Part 4: Detailing Solutions

Part 5: Conclusion
Introduction

Building Enclosures

• Provide proper separation between the building interior and the exterior to control:
  – Water penetration
  – Airflow
  – Vapor transfer
  – Thermal transmission
Part 1: The Four Control Layers
Weather-Resistant Control Layer

2015 International Building Code (IBC) and International Residential Code (IRC) require:

• Weather Protection
  – Exterior walls shall provide the building with a weather-resistant exterior wall envelope.

• Flashing
  – Shall be installed at the perimeters of exterior door and window assemblies, penetrations, and terminations of exterior wall assemblies, exterior wall intersections with roofs, chimneys, porches, decks, balconies, and similar projections...and similar locations where moisture could enter the wall.
Air Control Layer

Air-Barrier Material Testing
- ASTM E2178: Air Permeance of Building Materials
- 1 m x 1 m specimen with no seams or transitions
- Must achieve less than 0.02 L/(s*m²) @ 75 Pa
Air Control Layer

Air-BARRIER Assembly Testing

• ASTM E2357: Air Leakage of Air Barrier Assemblies
• 8 ft x 8 ft wall with penetrations/transitions
• Includes wind cycling
• Measures infiltration and exfiltration
• Must achieve less than 0.2 L/(s*m²) @ 75 Pa
Vapor Control Layer

Thermal Control Layer

- IECC requires opaque building enclosures to be insulated based on climate zone.
- Insulation between studs not enough due to thermal bridging.
- Continuous insulation (ci) is required to minimize thermal bridging.
Thermal Control Layer

Typical Cavity Insulation Assembly

- Interior Gypsum Board
- R-13 Cavity Insulation
- Exterior Sheathing
- 2x4 Framing
Thermal Control Layer

Cavity Insulation Plus Continuous Insulation

The amount of CI to use will be based on energy-performance goals. It can be a separate product or integrated with sheathing.
Part 2: Continuity of Control Layers
Continuity of Control Layers

Assuring Integrity

• Look at complete building.
• Understand that compromising one barrier may compromise others.
• Control layers can be single function/multiple product solutions or multifunction/single-product solution.
Continuity of Control Layers

Non-continuous Conditions Create Performance Risk
• Transition from one material to another
• Change in plane
• Penetrations/interruptions in the control layer
Identifying the Building Envelope

- Start at one corner of the building.
- Draw a continuous line around the building enclosure.
- Circle the changes in plane or potential discontinuity.
Construction Detailing

• Writing “continuous” on a design detail or specification is not quite enough.
• Buildings need to be designed and **detailed** to create continuity.
• Details are critical.
Part 3: Choices in Control Layer Systems: Impact on Continuity
Choices in Control Layer Systems

Multiple Products/Multiple layers

- Each of four control layers may be specified and installed separately.
- Each needs to be compatible with each other and the building structure.
- Each is tested separately.
- Each needs to be assured to be continuous across all conditions.
- Each needs to be durable.
Choices in Control Layer Systems

Single Product, Multifunction

• Structural sheathing panels with integrated:
  – WRB
  – Air barrier
  – Vapor permeability
  – Optional continuous insulation barrier

• Membrane fused to the structural panel during manufacturing

• Installation can be simpler and quicker

• Reduced labor time and skill required
**Choices in Control Layer Systems**

**Assuring Continuity of Assembly**

- Seams of integrated panels are sealed with self-adhering tape.
- Openings and penetrations can be addressed with sealants or liquid flashing.
- Flexibility of tapes and sealants allows for full conformity and continuity of control layers.
- Accommodates structural gaps while assuring control layers are intact.
Choices in Control Layer Systems

Assuring Continuity of Assembly

- Windows and door openings require special attention for continuity of control layers.

Fluid-applied flashing material

Flexible flashing tape
Part 4: Detailing Solutions
Detailing Solutions

Sample Details

• Based on integrated product solution
• Focus on continuity of control layers
• Will look at seven typical conditions, generally following sequence of constructions
Transitions: Foundation to Framed Wall

Sealing tape across seal: Not durable

Conventional flashing and sealing tape: May not achieve air/vapor seal beneath metal

Liquid flashing across sill joint
Control Layer Compatibility: Foundation to Framed Wall

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*Only when integrated with the WRB using approved self-adhered flashing.
Transitions: Framed Wall to Concrete/CMU Wall

Plan view

Perspective view into corner
Control Layer Compatibility: 
Framed Wall to Concrete/CMU

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*Only when integrated with the WRB using approved liquid flashing against CMU/concrete
Transitions: Wall to Roof Detail

Sealing tape over and under metal flashing
## Control Layer Compatibility: Wall to Roof

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*Only when integrated with the WRB using approved self-adhered flashing*
Penetrations: Window-Opening Detail

Typical Flashing
Penetrations: Window-Opening Detail

Types:
- Flanged window
- Flangeless/storefront aluminum
- Recessed
Penetrations: Window-Opening Detail – Flanged

1. Pan First
2. Window Next
3. Sealing Tape Last
Penetrations: Window-Opening Detail – Storefront

1. Pan First
2. Side Jambs Next
3. Head Jamb Last
Penetrations: Window-Opening Detail - Recessed

Exposed Framing

Sill Pan at Window
Penetrations: Window-Opening Detail

Interior Sealing for Continuity
# Control Layer Compatibility: Windows

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Penetrations: Masonry Veneer Detail

Two Continuity Concerns
## Control Layer Compatibility: Masonry Veneer

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Interruption: Parapet Walls
## Control Layer Compatibility: Parapet Wall

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Interruption: Deck and Balcony Detail
Control Layer Compatibility: Deck and Balcony Ledger

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Part 5: Conclusions
Conclusions

The Key to Continuity Is Detailing

• All building conditions where there is a change of any type need to be addressed.

• All control layers must be detailed and constructed to be continuous.
Conclusions

Integrated Products can Simplify Continuity

• Single sheathing products can provide water-resistive, air, and thermal control layers.
• Coordinated tape, sealant, and liquid flashing assure a complete assembly solution.
Conclusions

Integrated Products can Mitigate risk

• Single source for field support
• Single manufacturer warranty
Thank you for participating.

For more information, contact:

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techquestions@huber.com