Advancements in EIFS for Today’s Building Envelope Design Challenges

Thursday, May 24, 2018
AIA Learning Units - 1.0 CEU’s

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Learning Objectives


2. Introduce new technology and design enhancements related to impact resistance, durability and specific environmental performance needs.

3. Explore the full range of options for EIFS assemblies for commercial buildings.

4. Understand building envelope wall code complexity such as continuous insulation requirements, air/water-resistive barrier integration and fire testing performance and how a single sourced EIFS cladding can easily comply.
Goals and Objectives

• Advancements in EIFS
  • Fluid Applied Air/Water-Resistive Barrier Coatings & Flashings
  • Machine Base-Coated Components
  • High-Impact Assemblies
  • Water-Repellant Hydrophobic Chemistry
  • High Performance UV Resistant Colorants
  • Engineered Systems
  • Pre-Fabricated EIFS Panels
  • Code Compliance

• Quality Control / Assurance Program
EIFS Composition

Exterior Insulation and Finish Systems (EIFS)

- *Continuous Insulation (CI) and AWRB* are integral *components* of the ‘system’

- Single-Sourced Solution for:
  - Building and Energy Code Compliance
    - Flashing
    - Air & Water-Resistive Barrier
    - Continuous Insulation (CI)
    - Fire – *NFPA 285*
  - Integral Color / Texture Finish
  - Any Architectural Style & Aesthetic
  - Comprehensive Warranty
**EIFS Composition**

1. Fluid applied flashing
2. Fluid applied air/water-resistive barrier (AWRB)
3. Vertical notched Adhesive / Drainage Plane
4. Expanded polystyrene insulation (EPS)
5. Reinforcing Mesh embedded in Base Coat
6. Textured Finish
7. Weep / Drainage Accessories

**EIFS With Drainage**
EIFS with Drainage

Critical Components:

Flexible Flashing Material
- “Fluid” applied with reinforcing mesh scrim
- Seamless assembly
- Protects against moisture penetration into wall structure
- Flexible - accommodates all shapes, sizes, conditions

Flash Wall Penetrations / Integrate In-fill Components
Flashing Rough Openings

All penetrations – windows, doors, louvers, etc.
Flashing Wall Penetrations

- Electrical boxes / conduits / Scuppers
- PTAC / HVAC / Plumbing
- Expansion Joints – Floor line / Building
- Change of substrate

Flash all Penetrations / Joints / Transitions
Integrating Metal Flashings

Flash in the Flashings – Head & Sill Pan
EIFS with Drainage

Critical Components:

Fluid Applied Air/Water-Resistive Barrier
- Seamless air & water-resistive barrier
- Protects against moisture penetration into wall structure
- Permeable and non-permeable versions
- For use “Behind all Claddings”

Meet the intent of the code

Chemical Bond – Either layer can come first
Treating Board Joints & Fasteners
Apply Air / Water-Resistive Barrier

- Application Methods
  - Roller – 2-coats
  - Trowel
  - Spray

Air & Moisture Penetration Protection
Integrate Flashing & Barrier

Either layer can come first
Continuous Seamless Protection

Fully prepared secondary weather barrier envelope
“Backwrapping” is the most fundamental and critical installation aspect of an EIF system

- Full encapsulation of return edge of EPS insulation
  - Detail mesh installed 2.5” behind / onto face of EPS insulation
  - Fully embedded in Base Coat depth of EPS (thickness)
  - Smooth return surface for primer and sealant application
Machine Base-Coated Components

“Backwrapping”

• Provides for Fire Resistance rating / testing compliance
• Done by hand in what can be challenging access

• PVC starter tracks can be substituted for horizontal termination edges
  • **BUT ONLY IN COMBUSTIBLE CONSTRUCTION**
Machine Base-Coated Components

Specifying for Pre-Based Starter Boards

- Eliminates any question to this critical installation step
- Exceptional quality and precision
- Skilled labor shortage
- Must be made with materials by selected EIFS Manufacturer for compatibility / warranty coverage

Various Thickness and Edge Treatments
Machine Base-Coated Components

Specifying for Pre-Based Trims and Corners

• Eliminates any question to this critical installation step
• Exceptional quality and precision
• Must be made with materials by selected EIFS Manufacturer for compatibility / warranty coverage

Various Thickness
Machine Base-Coated Components

Warranty

• Integration of Pre-Base Coated Starter Boards, Trims, Corners or Shapes *ADDS 2 additional years to the standard system warranty*
  • 10-year up to 12-year

• *3X* Faster. *3X* Thicker. *3X* Better
High Durability CI EIFS

Common impact challenges:

• New High Durability Continuous Insulation (HDCI) EIFS
  • 20 year impact warranty protection
    • Normal wear-and-tear / unintentional surface impact damages
    • Repaired at no cost to building owner
  • Ultra-High Impact Resistance Mesh Assembly required throughout
High Durability CI EIFS

Ultra-High Impact Reinforcing Mesh

- Reinforcing mesh installed in 2 individual layers
- 4.3 oz. / sy reinforcing mesh installed over
- 20 oz. / sy reinforcing mesh

High Impact Mesh over Entire EIFS Wall Areas
High Impact Mesh Assembly

For high traffic areas, specify 20.5 + 4.3 oz. of mesh, achieving 352 inch pounds of impact resistance.

ASTM E 2486 – Impact Resistance of EIFS
Hydrophobic Chemistry
Water Repelling Surface

Available in both textured finish and paint coatings

- Beads and repels water
- Reduces dirt pick-up
- Lends to cleaner surface
High Performance Colorant

- Enabling high profile, brand imaging colors
- Enhanced fade resistance / dramatically reduced maintenance cost
Aesthetic Options

Weathered Steel
Lightweight Insulated Brick Veneer

A different way to design with brick

- Highly durable, lightweight, insulated Brick veneer
- Integrate with CI EIFS cladding or specify direct over solid commercial substrates
- 12-15 times lighter
- ‘Zero’ structure
- NFPA 285 compliant
- Design flexibility
  - Standard Colors & Blends
  - Textures
  - Shapes, Sizes & Effects
Engineered / Pressure Equalized

Engineered MD

Pressure Equalized

System Upgrade Options
EIFS Panelization

Panelization – Why?

• Limited access or space on site
• Fast track project schedules
• Skilled labor shortage
• Address weather challenges
• Quality control through warehouse production
• Ready, Transport, Lift, Install
EIFS Panelization

Full Composite  Lightweight  Metal Deck Backed
Mystic Lakes Casino Hotel

- 265 panels
- 45,000 sf
- 37 days
Mystic Lakes Casino Hotel

- 265 panels
- 45,000 sf
- 37 days
Code Compliance

Specific to the Building Envelope Walls

- IBC Chapter 14
  - Weather Resistive Barrier (WRB)
- IECC / ASHRAE Standard 90.1
  - Continuous Air Barrier
  - Continuous Insulation
- IBC Chapter 26
  - NFPA 285 “Assembly” Fire Testing
    - Type I-IV Commercial Construction
  - Mixed Use **Podium Design**
    - Type 3-B wood framed
    - 2-Hour Load Bearing Wall required
      - ASTM E-19
# Code Compliance

**IECC 2012 / 2015 Insulation Requirements**

- **Prescriptive R-value** - *Cavity + Exterior Continuous Insulation (CI)*

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<thead>
<tr>
<th>CLIMATE ZONE</th>
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Flash Wall Penetrations / Integrate In-fill Components
# Code Compliance

## IECC 2012 / 2015 Insulation Requirements

**Prescriptive R-value** - \( \text{Cavity} + \text{CI} = \text{Wall Components} \)

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U-0.064 = R-15.625

w/ R-13 cavity Insulation = 2.5” of EPS or 1.925” of XPS

w/ out cavity Insulation = 4.058” of EPS or 3.125” of XPS
Code Compliance

**NFPA 285 Fire Testing Compliance**

**Exterior walls in Type I - IV constructions**

- Combustible Cladding
- **Continuous Insulation (CI)**
  - Walls of any height
- **Air/Water-Resistive Barrier (AWRB)**
  - Walls greater than 40’-0”
- **Specific Assembly Test**
  - Exact materials that will be installed in the wall assembly
  - Very few tested assemblies
Fire Testing Compliance

Podium Design

- Load bearing wood framed wall assembly
- 2-hour requirement
  - ASTM – E119
- NFPA 285
  - Continuous Insulation (CI)
  - Weather-Resistive Barrier (WRB)

Note: Not all EIFS Manufacturers have passed these test
Traditional Wall Assembly

Attachment and Support

Anchors & Ties
Bearing Angles,Lintels and Flashing
Min. 1” air space
Base Wall Flashing
Concrete foundation
Integration of CI

Attachment and Support

*Everything must get bigger, longer, stronger*

- Increasing engineering / structural requirements and cost
  - Anchors & Ties
  - Bearing Angles, Lintels and Flashing
  - Base Wall Flashing
  - Concrete Foundation

Cost is substantially increased
Traditional Detailing

Typical Detailing – Jamb

Wall components are sized, designed and detailed to fit traditional wall conditions

- Windows, doors, louver frames, electrical boxes, etc.
- Solid structural attachments can be made
- Proper “seal” can be accommodated between cladding and wall component
  - Sealant and baker rod
Traditional Detailing

Typical Detailing – Jamb

Conditions Change Drastically

- Traditional wall components no longer “fit” the conditions
- Proper “seal” cannot be accommodated
  - Veneer cavity is left open
  - Sealant cannot bond to CI
Add in Continuous Insulation

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Typical Detailing – Jamb

No need for “Enhanced Detailing”

- Accommodates standardized wall components
- Provides for proper seal
- Accommodates requirements for CI at ‘all’ penetrations
Traditional Detailing

Typical Detailing – Jamb

And it all works regardless of how much insulation is specified.
Traditional Detailing

All Continuous Insulation

Can easily accommodate “NO CAVITY INSULATION” design options

- Delete interior vapor retarder
- Delete cavity insulation
- Change exterior AWRB to ‘non-permeable’
  - Rule of Thumb
  - Run Water Vapor Transmission Analysis

Huge Additional COST SAVINGS opportunities
This concludes the AIA Continuing Education System Program

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Quality Control / Assurance Program

EIFS Quality Control / Assurance Program
Quality Control / Assurance Program

Key Ingredients

• Commitment
• Identify and implement key vendor partnerships
• Integrated Design Process (IDP) approach
• Third party inspection component
• Proactive – not reactive
• Early – not late
• To the phrase, “Less is More”
  • In Bidding – Less ($$$) is typically not more
Quality Control / Assurance Program

EIFS QC Program Elements

• Design assist
  • Code compliance, detailing and specification assist
• Partner supported services
  • Plan / detail / specification review
  • Building / fire / energy code compliance review
  • Water vapor transmission analysis
• Bidding / qualified contractor support
• Pre-installation conference / construction coordination
• Interim site / field visit
• Warranty close-out
Quality Control / Assurance Program

Pre-Installation Conference

• All envelope materials and trades
• Proper EIFS and AWRB interface, installation and sequencing
• Detailing between EIFS and contiguous wall components
  • Alternate cladding / veneer types
  • Wall penetrations - Ex. windows, doors, etc.
  • Roof transitions / terminations
• Proper sealant / installation
• Interim site / field visit scheduling
Quality Control / Assurance Program

Most Comprehensive Warranty available
- Material defect
- Moisture intrusion and related damage
- Lifetime rust protection
- Fade resistance
- No proration / depreciation
- Extended terms through partnerships
  - Pre-base coated components, sealant partners
- Renewable for the life of the building
Single Source Solution

Keahou Lane - Hawaii

Specification, Manufacturer, Installer, Warranty, Performance
Thank you for your time!

Questions?

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Do and DON’Ts

• Expansion Stress / Stress Cracks
Do and DON’Ts

• EIFS tight to dissimilar material
• No sealant
  - Floating slab
  - Metal coping
Do and DON’Ts

- Tight to dissimilar material
  - Hose bib
  - Over-tighten compression
Do and DON’Ts

• Poor mesh embedment
Do and DON’Ts

• Temperature and / or moisture protection
  • Frozen finish