“Beginning of the Course”

Topics we will Cover

- What is Stucco?
- What does InterNACHI require?
- How to Identify Stucco Type.
- Primary Concerns Related to Stucco.
- How to Inspect during a Home Inspection.
- What to Report.

InterNACHI: Standards of Practice state that Home Inspection:

- “Is a non-invasive visual examination of a residential dwelling, for a fee, which is designed to identify observed material defects within the specific components of said dwelling.”
- “The Inspector shall inspect the siding, flashing and trim…….And describe the exterior wall covering.”

InterNACHI: Standards of Practice state that :

- “An Inspection report shall describe and identify in written format the inspected systems, structures and components of the dwelling and shall identify material defects observed.”
- “Inspection reports may contain recommendations regarding conditions reported or recommendations for correction, monitoring or further evaluation by professionals, but this is not required.”

Exterior Components to be Inspected include but are not limited to:

- Exterior wall cladding
- Flashings
- Trims
- Doors and Windows
- Deck and Balcony Attachments & Flashings
- Eaves, Soffits and Fascias
- Grading and surface drainage.

Our Three Primary Objectives Are:

- To help you to be able to identify common stucco systems.
- To help you recognize problems and potential problems in the stucco system at locations that a Home Inspector is expected to observe per the Standards of Practice.
- To provide you with suggested reporting techniques.

Identification is Key to Inspecting Stucco Clad Homes

- To be able to identify the Stucco System you must understand system components.
- Here you will learn the basic components of the most common stucco systems.
- Some homes have multiple systems on them.
- At times it may not be possible to identify the System.
- Occasionally the cladding will not be a standard system but rather a combination of components or systems.

The Wall cladding must be attached to the wall or Substrate!

- What is a Substrate?
  - A substrate is the surface to which the wall cladding is attached.
  - Does the condition of the substrate matter?
  - Does the type of substrate matter?
- There are two general classes of substrate:
  - Moisture Sensitive
  - Non-Moisture Sensitive

Typical Substrates based upon Moisture Sensitivity

- Typical Moisture Sensitive Components
  - Plywood
  - Oriented Strand Board (OSB)
  - Exterior Gypsum
  - Wood framing
- Typical Non-Moisture Sensitive Components:
  - Masonry: Brick & Block
  - Concrete: Cast in Place & Precast Concrete
  - Cement Board: Perma-Base or Durock
  - Fiberglass faced Siliconized core gypsum sheathing: DensGlass, E2XP, GlasRoc & Aquatough
  - Metal sheathing
  - Metal framing

Common Stucco Types:

- Synthetic Stucco
  - Barrier PB **EIFS**
  - Moisture Drainage **EIFS**
  - PM **EIFS**
  - PI **EIFS**
  - DEFS or Direct Applied (Has no insulation but classified with EIFS)
- Traditional Stucco **(HCS)**
  - “Three Coat Stucco”
  - “One-Coat-Stucco”
  - Note: May have insulation under basecoat but this does not make it an EIF System.

Stucco Types Clarifications:

- ICF: Insulated Concrete Forms
  - This is not a type of stucco rather it can be a Substrate for Stucco
  - Stucco type applied to this substrate can be:
    - Synthetic Stucco
    - Traditional Stucco
- Non-Stucco “Systems”
  - Applicator’s Short Cuts often are:
    - parts of systems but do not have all components or
    - components used are not approved by manufacturers.
  - The term “Hybrids” in stucco is misleading:
    - Either a system is approved by the manufacture or
    - The stucco is not an approved system

Barrier or Face Seal PB EIFS

- This is the most common type of EIFS.
- PB = Polymer Based.
- Barrier means that the system is designed such that water should not get behind the exterior surface.
- Components
  - EPS insulation adhesively or mechanically attached to a substrate.
  - Polymer Based Base Coat with embedded fiberglass mesh.
  - Acrylic Finish Coat

Things to look for to Identify a Barrier PB EIFS Clad Home:

- EPS foam insulation (by itself EPS does not mean the cladding is EIFS).
- Fiberglass mesh.
- Thin lamina (base coat, mesh & finish coat); about 1/16 inch.
- The wall surface gives slightly to hand pressure.
- Typically no accessories although PVC starter tracks or casing beads are allowed.
- Sounds hollow when tapped.
- Typically adhesively attached to substrate (OSB, plywood, etc.)

Sample of Barrier PB EIFS

Substrate (OSB)

Adhesive (Between EPS and Substrate)
EPS

Base Coat with Embedded Fiberglass Mesh

Finish Coat

Back wrapped edge.

Base Coat for PB EIFS

- Trowel applied
- Weather resistant layer
- The fiberglass mesh provides the impact and crack resistance
- Encapsulate the mesh with base coat.
- Applied in 1/16 inch thicknesses

PB Exterior Insulation and Finish System (Face-seal EIFS)

Moisture Drainage MD-EIFS

- The basic installation appears very similar to Barrier PB EIFS with one additional component.
- A Moisture Barrier and drainage plane is first placed over the moisture sensitive substrates.
- PVC accessories are permitted but not required.
- Most systems have a weep screed (PVC starter track with weep holes) but not all.
- Historically they were mechanically fastened thus they flex more than PB EIFS; however, the most advanced systems are now adhesively attached.
- Each system is proprietary thus there are many variations.

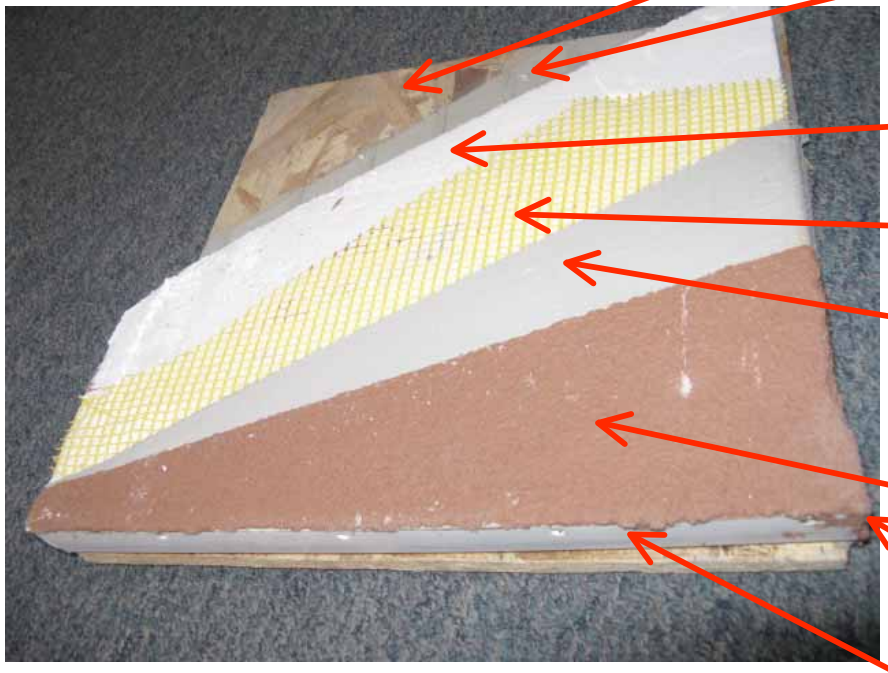
Things to look for to Identify a MD-EIFS Clad Home:

- There will be a moisture barrier over the substrate.
- EPS foam insulation (by itself EPS does not mean the cladding is EIFS).
- Fiberglass mesh.
- Thin lamina; about 1/16 inch.
- The wall surface gives slightly to hand pressure
- There may be accessories such as PVC starter tracks or other drainage provision at bottom of wall.
- Sounds hollow when tapped.
- Typically mechanically attached to substrate (OSB, plywood, etc.) although new systems adhesively attached to liquid applied membranes.

Moisture Drainage EIFS Offers Similar Performance Advantages to Barrier PB EIFS.

- Insulation on the outside of the building
  - Energy Conservation (Oak Ridge Laboratory: EIMA Study)
  - Helps control thermal movement of structure.
- Aesthetic Flexibility.
- Economical Construction
- Resilient
  - Buffered from Substrate
  - Crack Control

MD-EIFS



Substrate (OSB)

Liquid Applied Membrane & Adhesive Ribbons

EPS

Fiberglass Mesh

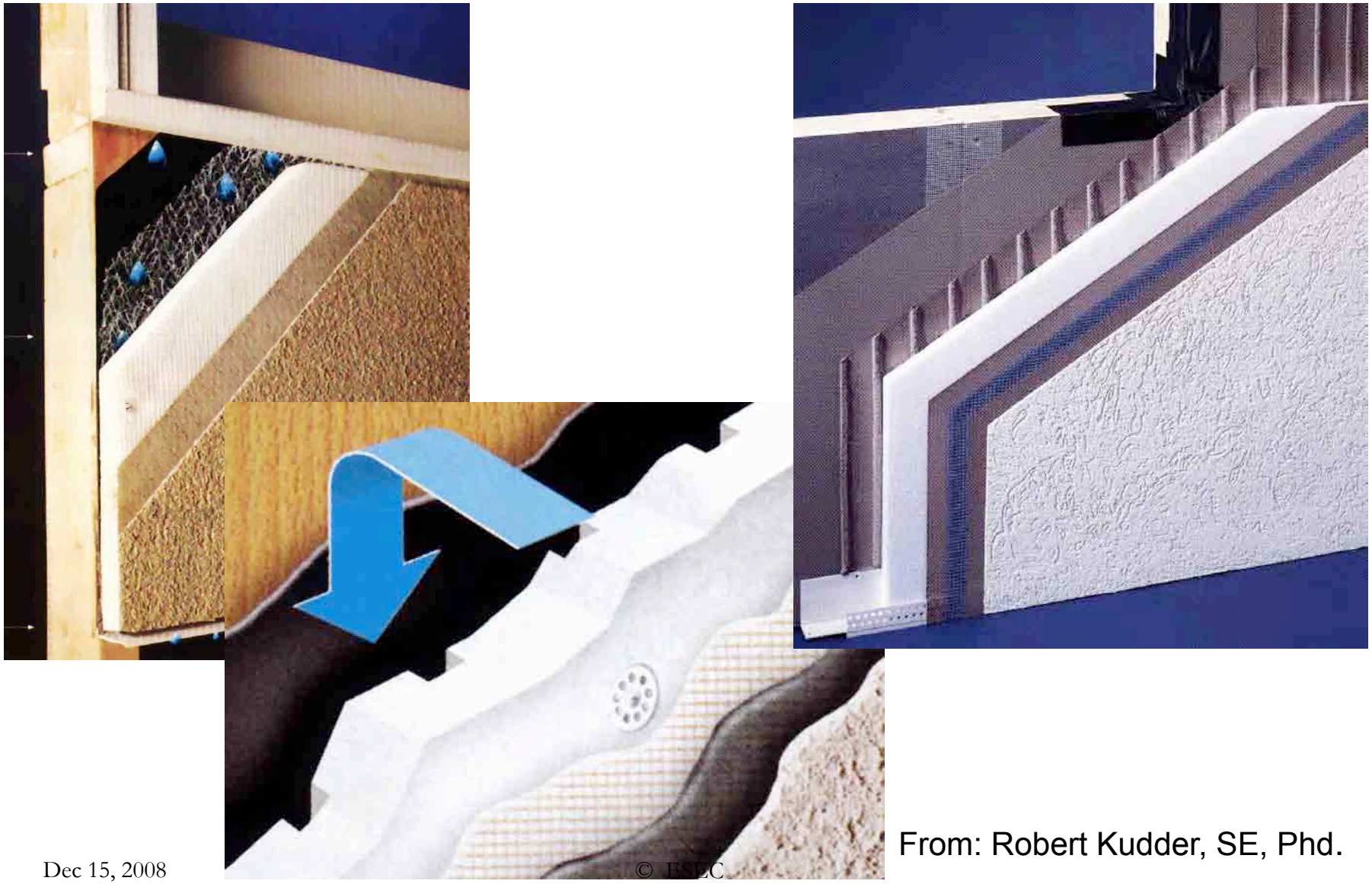
Base Coat with Embedded Fiberglass Mesh

Finish Coat

Back wrapped edge.

PVC Starter Track

Some Variations on Moisture Drainage EIFS



From: Robert Kudder, SE, Phd.

Moisture Drainage Exterior Insulation and Finish System (MD-EIFS)

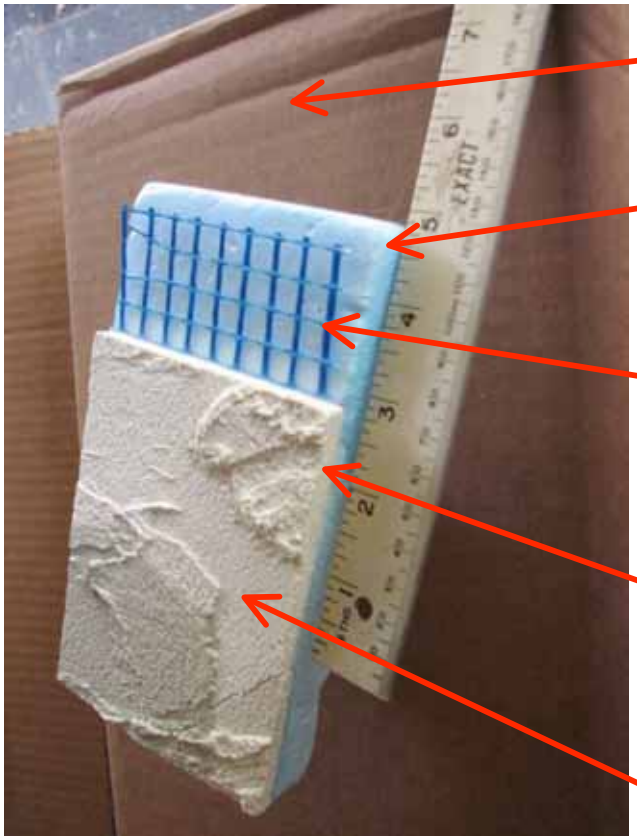
Polymer Modified, PM - EIFS

- PM systems were popular in some locations around country but not extensively used.
- PM components include:
  - Extruded Polystyrene (XPS) mechanically attached.
  - Heavy fiberglass mesh, mechanically attached.
  - Thicker basecoat ¼ to 3/8 of an inch.
  - Control and expansion joints; limit 144 sq. ft.
  - Plastic or metal trim accessories

Things to look for to Identify a PM-EIFS Clad Home:

- XPS foam insulation.
- Exposed heavy open weave fiberglass mesh.
- Thick lamina; ¼ to 3/8 of an inch.
- The wall surface is hard and firm.
- Should have PVC or metal accessories.
- Sounds solid when tapped.
- Mechanically attached to substrate (OSB, plywood, etc.).
- Typically no drainage plane or Moisture Resistive Barrier.

Polymer Modified PM – EIFS



Substrate (is not present, sample sitting on cardboard)

Extruded Polystyrene (XPS) mechanically attached to substrate.

Heavy Open Weave Fiberglass Mesh over XPS; mechanically attached to substrate.

Polymer Modified Base Coat Encapsulating the Fiberglass Mesh; ¼ to 3/8 inch thick.

Finish Coat

Polymer Modified Exterior Insulation and Finish System (PM-EIFS)

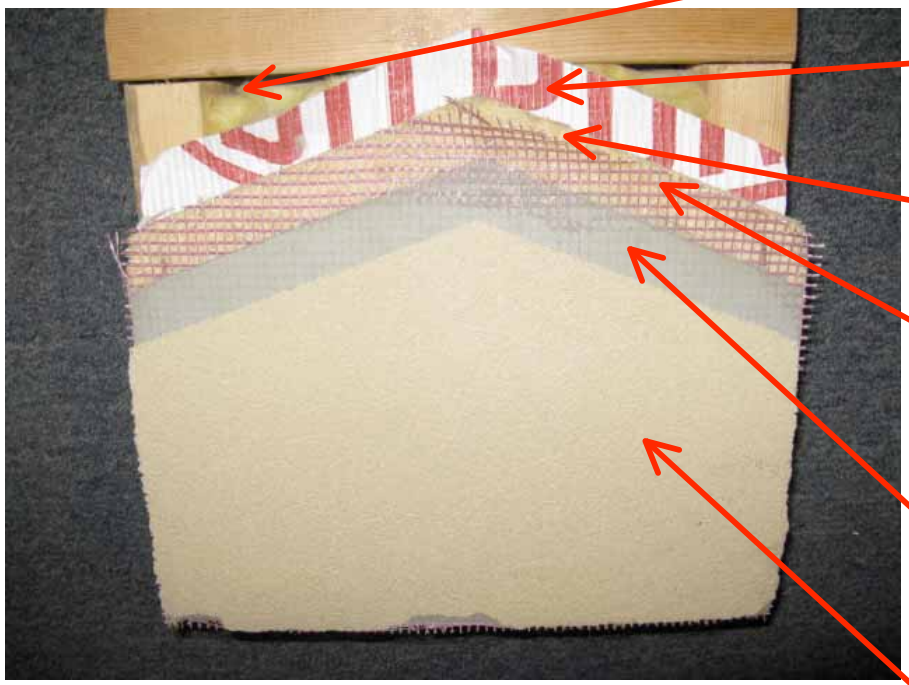
Original Polyisocyanurate (PI) EIFS

- Original PI systems were an economical EIFS installation:
  - it was permitted to be installed over open framing.
  - PI boards were 4 feet wide and 8 or 9 feet tall.
  - Only required joints to be meshed.
- Popular in some locations around country.
- Original PI systems were prone to failure due to the lack of substrate, drainage plane and limited use of mesh.

Modern Polyisocyanurate (PI) EIFS

- Most current PI systems require:
  - Substrate.
  - Moisture Resistive Barrier
  - Joints must be basecoated and meshed.
  - Then PI insulation board must be fully meshed and base coated.
- These systems perform much better but have lost the economy that they originally had.

Polyisocyanurate (PI) EIFS over Open Framing



No Substrate

Moisture Resistive Barrier (Tyvek Stucco Wrap)

Polyisocyanurate Insulation Board

Fiberglass Mesh over full PI board in addition to meshing joints in PI boards.

Base Coat with Embedded Fiberglass Mesh

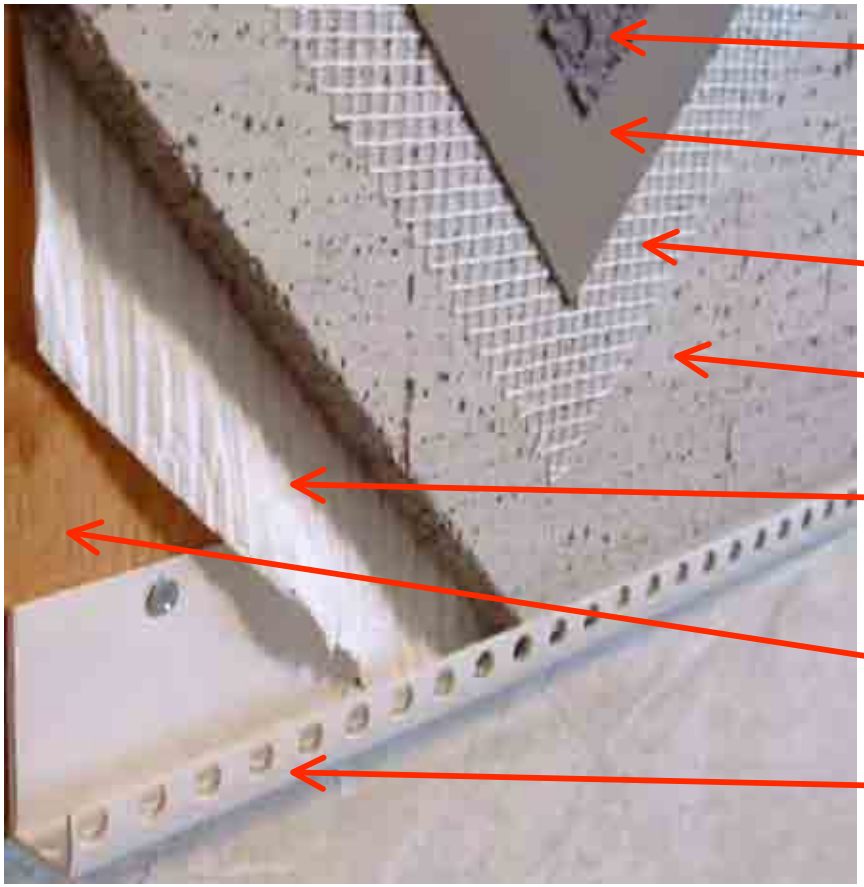
Finish Coat.

PI Exterior Insulation and Finish System (PI-EIFS)

Direct Applied Exterior Finish System (DA or DEFS)

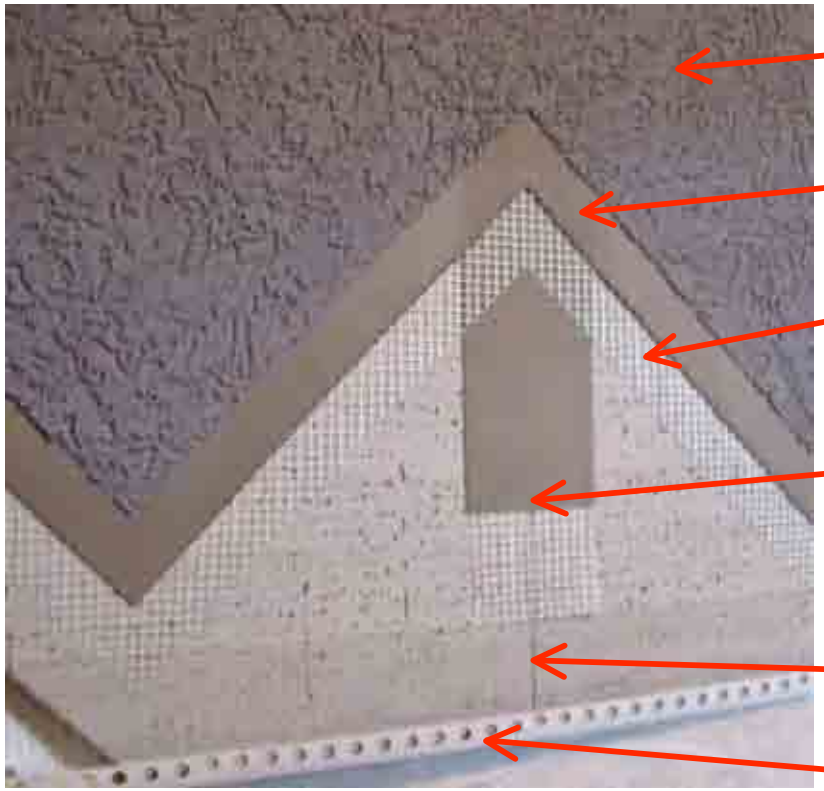
- Historically, DEFS had lamina directly applied to an approved substrate such as DensGlass or Cement Board (No insulation board). Current specs call for cement board in exposed wall areas while DensGlass or equal is approved in protected areas.
- Originally mesh was only required at joints in approved substrate. Now all manufacturers require that the mesh cover entire wall surface.
- DEFS uses system accessories.
- Each system is proprietary thus there are a number of variations.

DEFS or Direct Applied



- Finish Coat
- Base Coat
- Fiberglass Mesh
- Cement Board Substrate
- Moisture Resistive Barrier (Tyvek)
- Substrate (Plywood)
- PVC Casing at edge (accessory).

DEFS or Direct Applied Cement Board Joint Treatment



- Finish Coat
- Base Coat
- Fiberglass Mesh over entire cement board surface.
- Base Coat with Embedded Fiberglass Mesh at cement board joints.
- Cement Board Substrate
- PVC Casing at edge (accessory).

Direct Applied Exterior Finish System (DEFS)

Traditional or Three Coat Stucco: Basic components include.

- Portland Cement Stucco.
- Requires a Moisture Barrier, metal lath and accessories on Moisture Sensitive Substrates but not on concrete or masonry substrates.
- Hard & prone to cracking.
- Requires control or expansion joints every 144 sq ft over lath and 250 sq. ft. without lath.
- Metal or PVC casing bead or J-bead or weep screed.
- Scratch, brown and finish coats.

Traditional (3 Coat) Stucco Components

Substrate (OSB)

Stucco Netting (Lath)

Moisture Resistive Barrier (2 layers of D Paper)

Scratch Coat

Brown Coat

Finish Coat

Accessory (Casing)

Accessory (Control Joint)

This is Three Coat Stucco over Wood Frame

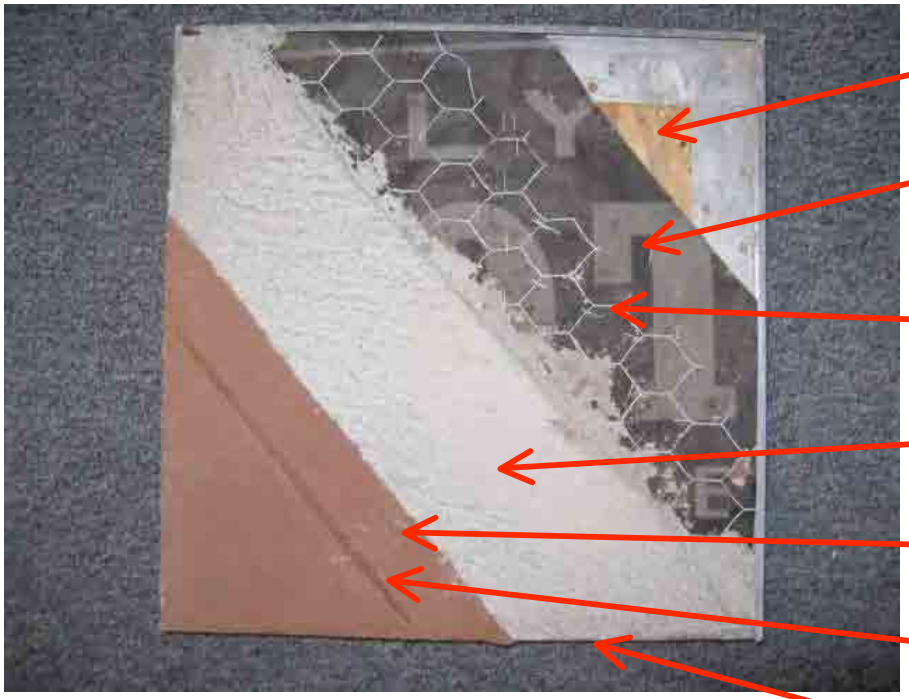
One-Coat-Stucco System: Basic Components include:

- Many are proprietary requiring ICC Evaluation Reports.
- Portland Cement Stucco with polymers and fiberglass reinforcing.
- Requires a Moisture Barrier on moisture sensitive substrates.
- Hard surface which helps resist impact damage.
- Control joint are required but spacing is to be specified by the design professional (typically to limit panels to 144 square feet).
- Metal lath (stucco netting or diamond lath)
- Metal casing bead or J-bead or weep screed.
- Minimum 3/8” basecoat plus finish coat.

One-Coat-Stucco

- The incidence of cracking is dependent on the materials used and installation techniques.
- May or may not have foam insulation behind stucco; it can have EPS or XPS insulation behind the system.
  - This does not make this an EIFS system as defined by Stucco or Insurance Industries.
- One-Coat-Stucco systems are very popular since problems with EIFS have surfaced.

One-Coat-Stucco: Components



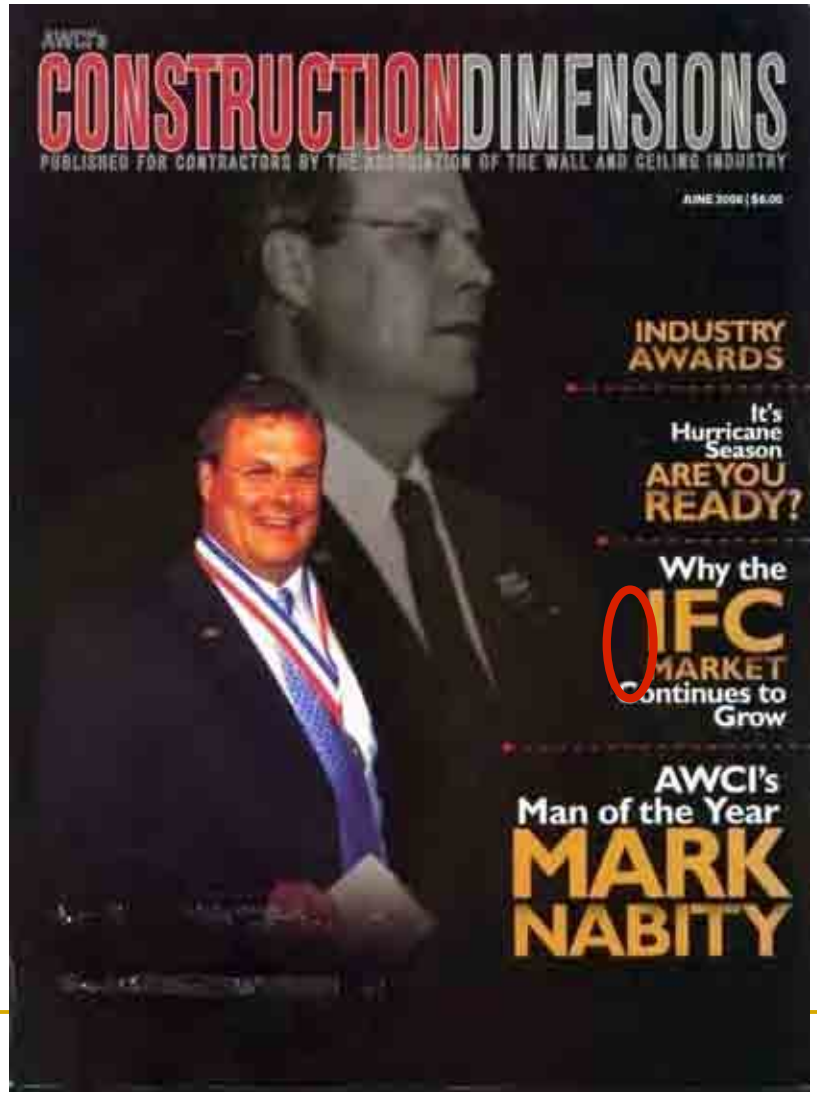
- Substrate (OSB)
- Moisture Resistive Barrier (2 layers of D Paper)
- Stucco Netting (Lath)
- Base Coat
- Finish Coat
- Accessory (Control Joint)
- Accessory (Casing)

This is One Coat Stucco over Wood

ICFs – Getting Attention

The June 2006 Cover of Construction Dimensions.

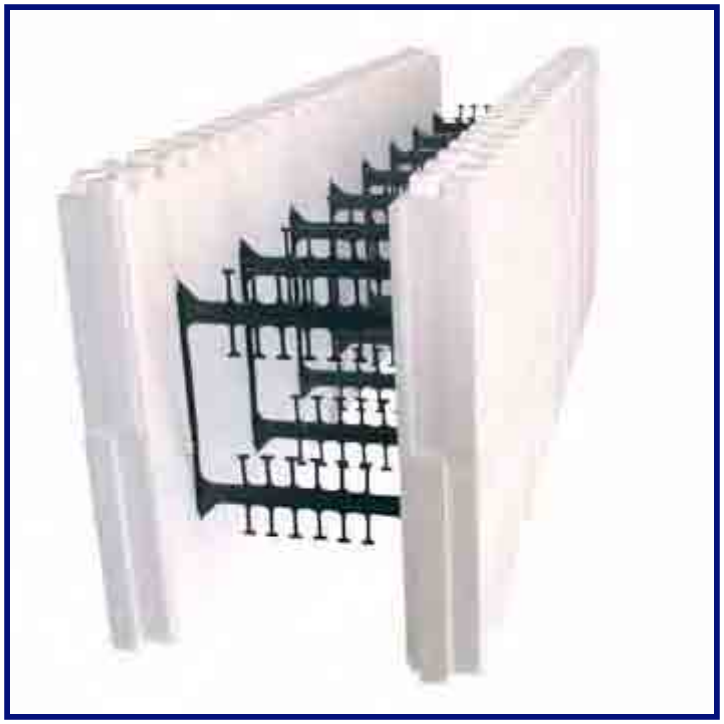
Note: a trade magazine had the letters switched on their cover; IFC instead of ICF.



Insulating Concrete Forms

- Expanded or Extruded Polystyrene forms receive poured concrete and steel reinforcement
- Replace traditional poured and CMU walls (foundation, infill, or shear, etc.)
- Used primarily for exterior, interior, load-bearing and separation walls
- Residential and commercial

The most common configuration:



- Two pieces of expanded polystyrene (EPS)
- Held together with plastic ties
- Stacked like building blocks, aligned and braced
- Strengthened with steel rebar and filled with concrete

Exterior Finishes

EIFS Lamina

Pluses

- Integrally colored
- standard mesh
- Easiest to apply
- Easiest to repair
- Most versatile

Minuses

- Low impact res.
- Insurance Issues
- Environmental Issues - rasping

Typical EIFS Cladding

Class PB EIFS Lamina (PB Base, mesh, and Finish)

- Requires separate finish and base products
- Standard 4-ounce fiberglass reinforcing mesh only
- Moderate skill level
- Low Raw Material Cost
- Low labor cost
- Least impact resistant
- Good versatility
- Low call-backs
- Insurance Issues?
- Fairly easy to repair
- Detailing important

This is PB EIFS lamina over ICF

Other Exterior Finish Systems

Hard Coat Stucco

Pluses

- Most effective at hiding deflections
- Not an EIFS?
- No rasping
- High impact res.

Minuses

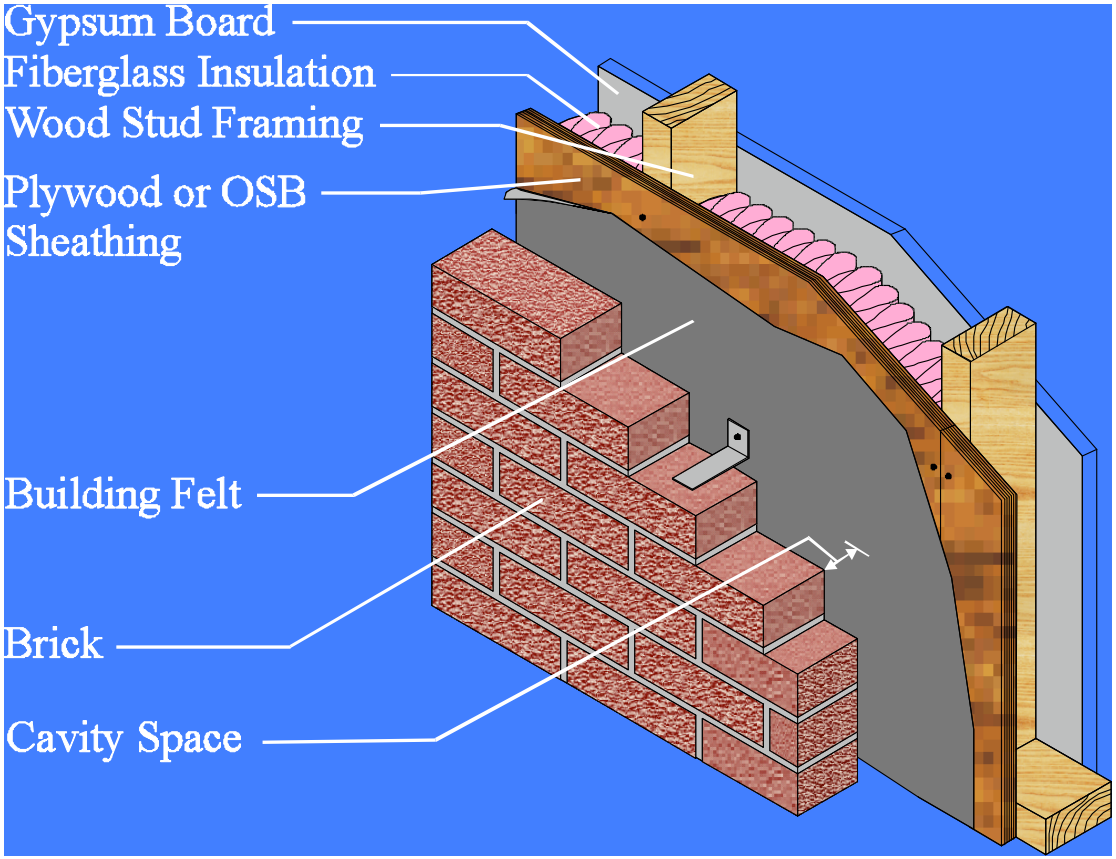
- Mechanical attachment
- Trim and Lath or netting
- Highest skill level
- High Raw Material Costs
- High labor costs
- Hard but may crack
- Harder to repair

This is Hard Coat Stucco over ICF

Additional Thoughts on "Systems"

- There are many homes with full Traditional Stucco systems with "EIFS" bands; these bands are EPS Plant-On bands. These are proper installations; *Please do not call these systems EIFS!*
- EPS bands with no basecoat or fiberglass reinforcing of lamina are improper.
- We have inspected homes with Traditional Stucco on the wall surface but Barrier EIFS attached around windows; these are typically improper.
- Some sections of a home may be EIFS and other sections may be traditional stucco; these can be proper installations.

Brick Veneer Cross Section (similar to Traditional Stucco or MD-EIFS)



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