

Understanding EIFS Basics Standards



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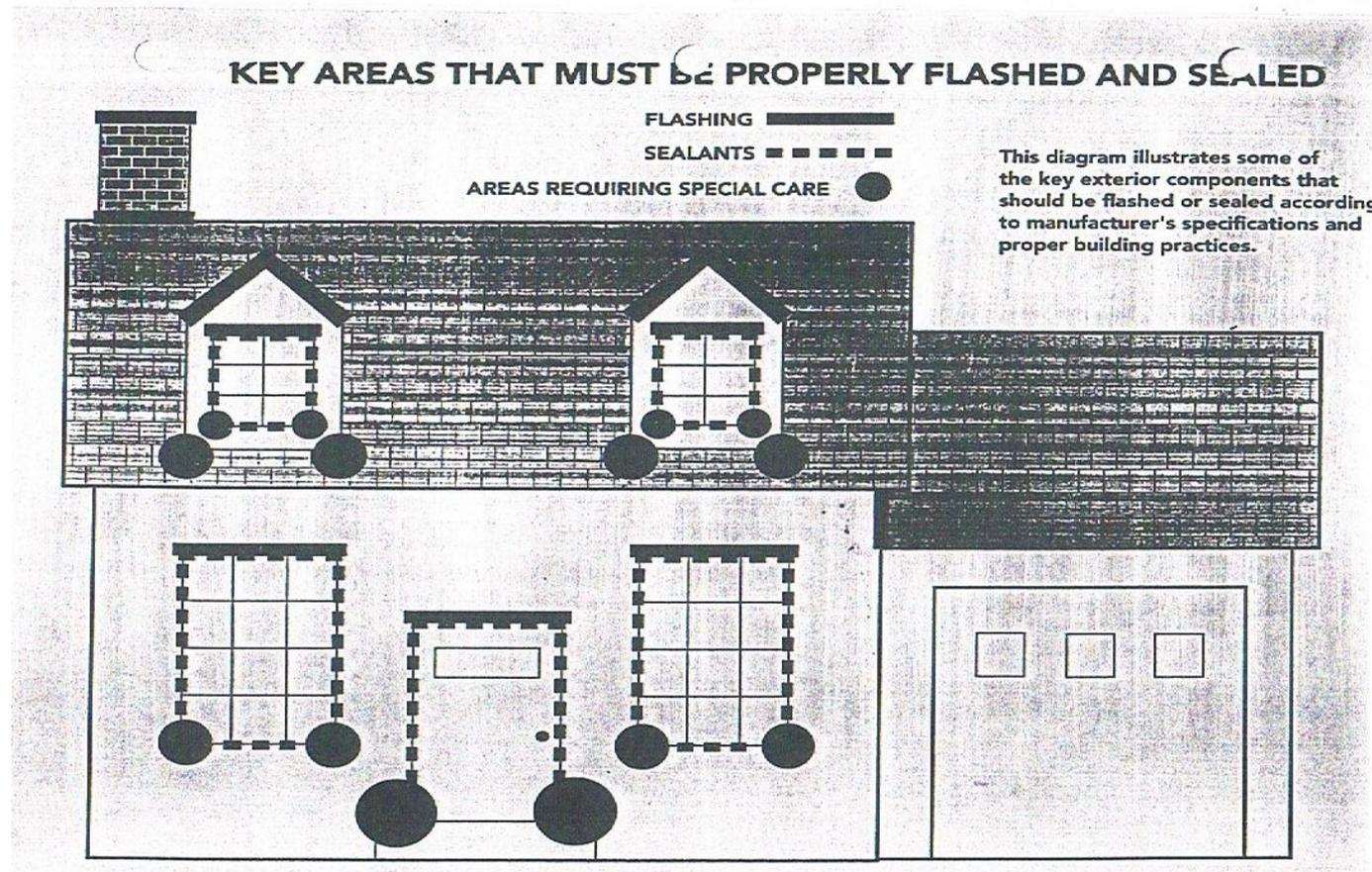


**Presented by
Larry Fowler
Guardian Home Inspection Specialist**

Understanding EIFS Basics



Key areas that water can enter



The EIFS Process

- History of EIFS
 - Where is was used
 - Types of EIFS
 - Manufacturers
-
- Purpose for knowing about EIFS



HISTORY OF EIFS

- **History of EIFS**
- EIFS was developed in Europe after World War II and was initially used to retrofit solid masonry walls. EIFS started to be used in North America in the 1960s, and became very popular in the mid- 1970's due to the oil embargo and the resultant surge in interest in high energy efficiency wall systems (such as EIFS provides). The use of EIFS over stud-and-sheathing framing (instead of over solid walls) is a North American technique. EIFS is now used all over North America, and also in many other areas around the world, especially in Europe and the Pacific Rim.



Where is was used

- In North America, EIFS was initially used almost exclusively on commercial buildings. As the market grew, prices dropped to the point where its use became widespread on normal single family homes.



EIFS Details

FLASHING

- Window openings
 - Sills
 - Head
 - Flange type windows
- Roof / Wall intersections
 - Flashing must end in daylight
 - Kick-out or mechanism to divert water from behind the wall

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EIFS Details

FOUNDATION & GRADE LEVEL

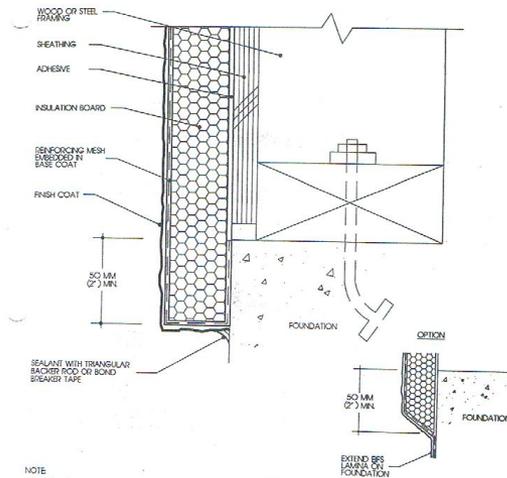
- EIFS must terminate 6” above grade
- Expansion joint at floor line
- Bottom of insulation board must be cover with the lamina
- Condition may require sealant between EIFS and foundation

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EIFS Grade Detail

EIFS Class PB Details



- NOTE
1. EIFS MUST TERMINATE A MINIMUM OF 200 MM (8") ABOVE FINISHED GRADE.
 2. APPLICATION OF EIFS TO MASONRY SUBSTRATES IS SIMILAR.

 <p>EIFS Industry Members Association 8000 Corporate Center Dr., Suite 270 Morrow, GA 30260-4118</p>	<p>Typical Termination At Foundation</p>	
	<p>Revision No. 2</p>	<p>Issue Date 12/22/96</p>

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EIFS Details

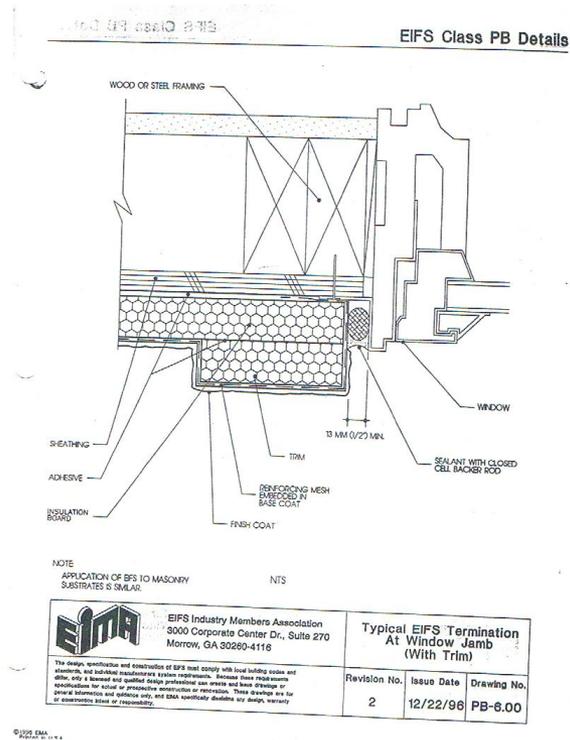
WINDOW & DOOR DETAILS

- 3/8" to 1/2" expansion joints with backer rod and sealant are required at all window and door interfaces.
 - Prevent water infiltration
 - Prevent air infiltration
 - Prevent dirt infiltration
 - Compensate for differential movement between EIFS and window
 - Have been required for over 20 years.

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EIFS Window Detail



EIFS Details

FLASHING

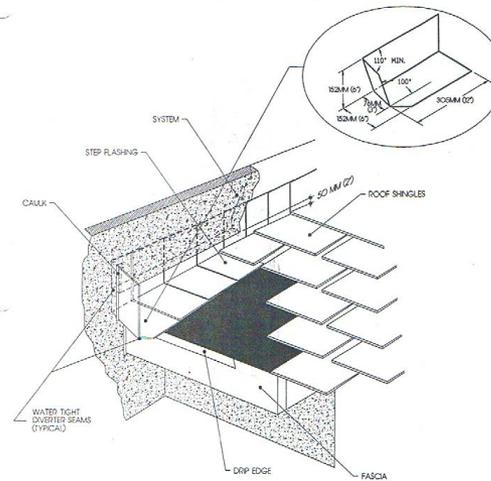
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EIFS Kick-Out Detail

EIFS Class PB Details



NTS

	EIFS Industry Members Association 3000 Corporate Center Dr., Suite 270 Morrow, GA 30260-4116	Typical Roof Flashing With Diverter	
	<small>The design, specification and construction of EIFS must comply with local building codes and standards, and individual manufacturers system requirements. Because these conditions differ, only a licensed and qualified design professional can create and issue drawings or specifications for a given or project's conditions or revisions. These drawings are for general information and guidance only, and EMA specifically disclaims any design warranty or construction intent or responsibility.</small>	Revision No. 2	Issue Date 12/22/96

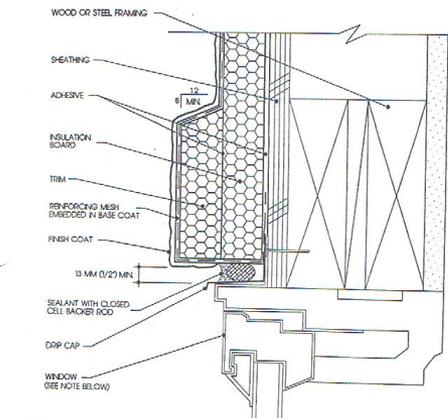
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EIFS Window Sill Detail

EIFS Class PB Details



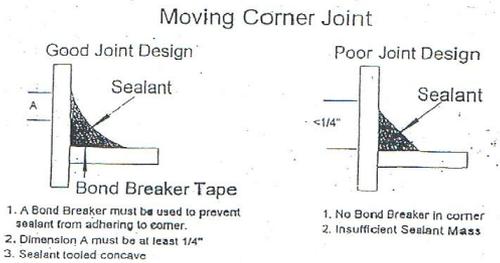
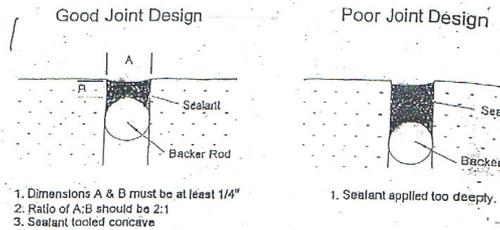
NOTE
 1. APPLICATION OF EIFS TO MASONRY
 SUBSTRATES IS SIMILAR.
 2. FLASH IN ACCORDANCE
 WITH WINDOW MANUFACTURERS'
 RECOMMENDATIONS

 EMA EIFS Industry Members Association 3000 Corporate Center Dr., Suite 270 Morrow, GA 30260-4116	Typical EIFS Termination At Window Head (With Trim)		
	<small>The design, specification and distribution of EIFS must comply with local building codes and standards, and individual installation on specific substrates. Detailed finish requirements and substrate preparation for masonry or precast concrete applications can create and base drawings or general information and details only. The user is responsible for the design, verification or construction limit or responsibility.</small>	Revision No. 2	Issue Date 12/22/96

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EIFS Retro Fit Sealant Detail



EIFS Details

FLOOR LINES

- Wood framed construction requires an expansion joint at the floor lines to compensate for cross grain shrinkage of dimensional lumber

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EIFS Details

DECK DETAIL

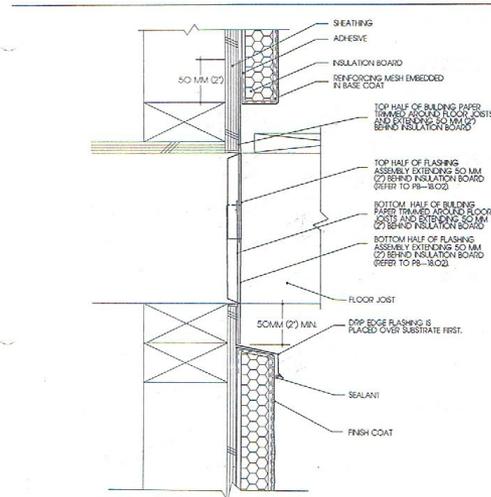
- Rim or band joist should not be attached over the EIFS
- Flashing is a must
- Seal rim or band joist fastener penetrations
- EIFS should terminate 2" above decking

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EIFS Deck Details

EIFS Class PB Details



NOTE:
1. APPLICATION OF EIFS TO MASONRY SUBSTRATES IS UNALLOWED.
2. REFER TO PB-18-02 FOR DECK CUTAWAY DETAIL.

NTS

 <p>EIFS Industry Members Association 3000 Corporate Center Dr., Suite 270 Morrow, GA 30260-4116</p>	<p>Typical Termination At Gantilever Deck</p>	
	<p>Revision No. 2</p>	<p>Issue Date 12/22/96</p>

The design, specification and construction of EIFS must comply with local building codes and standards, and include manufacturer's specific requirements. Because these requirements vary, only a licensed and qualified design professional can create and issue drawings or specifications for actual or prospective construction or renovation. These drawings are for general information and reference only, and EMA specifically disclaims any design, warranty or construction input or responsibility.



EIFS Insulation

PRECAUTIONS

- Freezing for EIFS wet material is 40 degrees F
- Some materials require temperatures above 50 degrees F
- Do not apply wet materials unless proper temperature exists or can be maintained through temporary heat

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When some of EIFS problem started

- In the late 1980s problems started developing due to water leakage in EIFS-clad homes. This created a national controversy and numerous lawsuits. ¹



EIFS Industry response

The EIFS industry has consistently maintained that the EIFS itself was not leaking, but rather poor craftsmanship and bad architectural detailing at the perimeter of the EIFS was what was causing the problems. The building codes reacted by mandating EIFS with Drainage on wood frame building and additional on-site inspection. Most homeowner insurance policies do not cover damage to EIFS and EIFS-like systems.



Manufactures Solutions

- Critics argue that, while not inherently more prone to water penetration than other exterior finishes, barrier-type EIFS systems (non-water-managed systems) do not allow water that may penetrate the building envelope to escape.↓



Insurance problems

- Insurance companies may not provide fire insurance coverage to clients who install EIFS exterior building systems, due to the lack of adequate fire-resistance inherent in the materials. Also, some facility owners have found that EIFS systems that are installed at lower building levels are subject to vandalism as the material is soft and can be chipped or carved resulting in significant damage.



Questions?



The basic underlying problem behind EIFS litigation was that EIFS was marketed as a cost-effective replacement for stucco. Stucco is expensive to install because it cracks over time. Stucco must be carefully applied by skilled craftsmen so that the cracks which will inevitably develop are subtle and not obvious. General contractors switched to EIFS because it was supposed to be easy to install with unskilled or semi-skilled labor and would not crack like traditional stucco. Although EIFS *if properly installed* according to the manufacturer's directions should not have water intrusion problems, many GCs cut corners by using unqualified labor. In turn, thousands of EIFS installations were noncompliant and suffered severe water intrusion and mold as a result. While the EIFS industry has consistently tried to shift the blame to GCs, the construction industry has retorted that using professional unionized journeymen carpenters in turn eliminates the cost advantage of EIFS over stucco, and that the EIFS industry should have anticipated this issue and engineered its products from the beginning to be installed by unskilled labor or semi-skilled labor (that is, it should have been a fault-tolerant design).



Marketing of EIFS and the EIFS industry

EIFS accounts for about 10% of the US commercial wall cladding market.

There are several dozen EIFS producers in North America. Some sell nationwide, and some are regional in their area of business operations.

The EIFS producers sell the various system components (adhesives, coatings, etc.) through specialty building product distributors who in turn resell the components to local EIFS installers. The top 5 EIFS producers account for about 90% of the US market. These producers include Dryvit Systems, STO Corp., Senergy, Master Wall, and Parex.



EIFS architectural details

- Another benefit of EIFS is the option to add architectural details that are composed of the same materials. EIFS mouldings or as they are commonly referred to, stucco mouldings, come in a large variety of shapes and sizes. They are widely used on residential/commercial projects in North America and are gaining popularity worldwide. Production methods have come a long way since their inception which allow manufacturers to create with great efficiency in a cost effective manner. The production of architectural foam mouldings was recently showcased on How It's Made airing on The Discovery Channel Network.



Terminology

- Although often called "synthetic stucco", EIFS is not stucco. Traditional stucco is a centuries-old non-insulating material which consists of aggregate, a binder, and water, and is a hard, dense, thick, non-insulating material. EIFS is a lightweight synthetic wall cladding that includes foam plastic insulation and thin synthetic coatings. There are also *specialty stuccos* that use synthetic materials but no insulation, and these are also not *EIFS*. A common example is what is called *one-coat stucco*, which is a thick, synthetic stucco applied in a single layer (traditional stucco is applied in 3 layers). There is also an EIFS-like product called a *direct-applied finish system* (or *DAFS*), which is essentially an EIFS but without the insulation, and has quite different characteristics.†



Terminology cont.

- EIFS are proprietary systems of a particular EIFS producer and consist of specific components. EIFS are not *generic* products made from common separate materials. To function properly, EIFS needs to be architecturally designed and installed as a system.
- There are a number of **versions of EIFS**. The most basic and common EIFS is called a **barrier EIFS** (also known as a *traditional* or *conventional* EIFS). Another type is called an **EIFS with drainage**, which is a barrier EIFS to which a water drainage capability has been added.†



EIFS Types

- There are a number of **versions of EIFS**. The most basic and common EIFS is called a **barrier EIFS** (also known as a *traditional* or *conventional* EIFS). Another type is called an **EIFS with drainage**, which is a barrier EIFS to which a water drainage capability has been added. Although often called "synthetic stucco", EIFS is not stucco. Traditional stucco is a centuries-old non-insulating material which consists of aggregate, a binder, and water, and is a hard, dense, thick, non-insulating material. EIFS is a lightweight synthetic wall cladding that includes foam plastic insulation and thin synthetic coatings. There are also *specialty stuccos* that use synthetic materials but no insulation, and these are also not *EIFS*. A common example is what is called *one-coat stucco*, which is a thick, synthetic stucco applied in a single layer (traditional stucco is applied in 3 layers). There is also an EIFS-like product called a *direct-applied finish system* (or *DAFS*), which is essentially an EIFS but without the insulation, and has quite different characteristics.†



Architects Specifications

- . However, as of recently, architects have begun specifying flashings, sealants, and wiring fasteners (such as Viperstrap or Windloc) as being a part of the EIFS scope of work, essentially requiring EIFS contractors to carry out that work as well. The technical national consensus standard for the definition of an EIFS, as published by ASTM International organization, does not include flashing or sealants as part of the EIFS.



EIFS Industry Members Assoc.

- Having said this, still the best way to assure a high quality job is to rely on members of the EIFS Industry Members Association (EIMA). EIMA members must meet all applicable building code testing requirements and industry performance standards.
- You can contact EIMA at 1-800-294-3462, or write EIMA, 3000 Corporate Center Drive, Suite 270, Morrow, GA 30260.



How EIFS is Installed

- EIFS is typically attached to the outside face of exterior walls with an adhesive (cementitious or acrylic based) or mechanical fasteners. Adhesives are commonly used to attach EIFS to gypsum board, cement board, or concrete substrates. EIFS is attached with mechanical fasteners (specially designed for this application) when installed over sheet-good weather barriers such as are commonly used over wood sheathings. The supporting wall surface should be continuous (not "open framing") and flat.



What is Quick-R

- There is Polyisocyanurate insulation that is typically used with a Quick R system.
- This system was designed to be installed direct to the framing studs without the use of a substrate.
- The way to inspect this system is to probe where the framing and studs are located.
- Some inspector who are not familiar with this system report that the substrate is rotted.



Because EIFS (Exterior Insulated Finish Systems) rely on a perfect seal at the exterior surfaces, they are susceptible to entrapment of moisture inside the system. Water can enter the system where seams and seals fail, where moisture migrates from inside the building and where punched openings (windows, doors, etc.) are present. Because of the low vapor permeability of the finish, water trapped behind the EIFS cannot dry out quickly toward the outside of the wall (see *figure 1*). Depending on the rest of the wall system design and installation, there may also be limited drying potential to the inside. Limited drying potential in combination with high leakage potential can lead to moisture buildup inside the wall, and eventually to mold growth and structural decay.

Sectional View Of A Typical EIFS Application

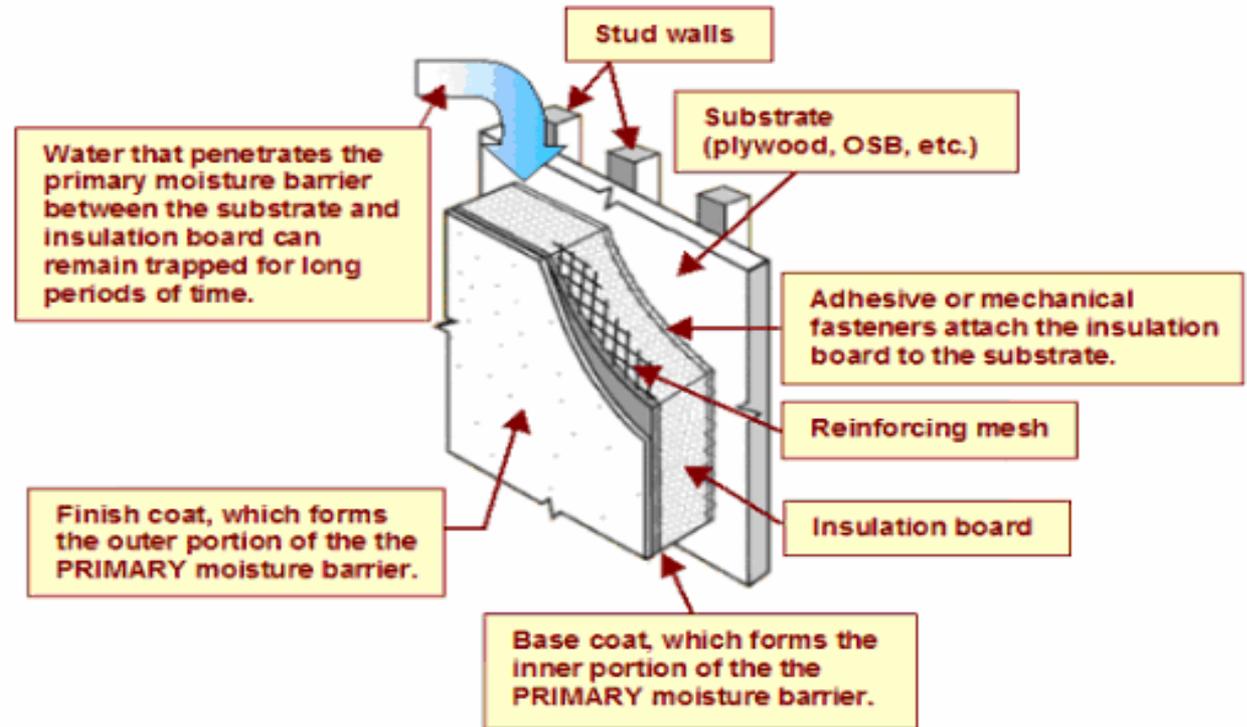


Figure 1



Definitions

- **Accessory:** Any component installed in conjunction with an EIF System manufactured by that other than the systems manufacturer other than specific system components such as Portland cement and fiberglass reinforcing mesh. (i.e. starter track, control joints, mechanical fasteners)



Definitions

- Many of the EIFS manufacturers have their own standard details showing typical building conditions for window and door flashings, control joints, inside/outside corners, penetrations, and joints at dissimilar materials which should be followed for that manufacturer's warranty.



Definitions

- **Aesthetic Joint/Reveal:** An aesthetic joint/reveal is a shaped groove cut into the insulation board prior to the installation of base coat and mesh. It serves as a design feature as well as providing a natural stopping point during the installation of the finish material. At no time can any portion of an aesthetic joint/ reveal be a flat horizontal surface.



Definitions

- **Adhesive:** Cementitious and Non-cementitious adhesives. Cementitious, either premixed dry base or polymer based adhesive that is to be mixed with cement. Typically used for the attachment of EPS to gypsum, cement board or unpainted masonry substrates. Non-cementitious adhesive is a one part incombustible adhesive typically used for the attachment of EPS to wood substrates.



Definitions

- **Backer Rod:** A closed cell foam rod installed in a joint that is to receive sealant. Its purpose is to control joint depth and configuration as well as prevent three-sided adhesion.
- **Base Coat Adhesive:** Cementitious and Non-cementitious base coats applied to the face of the insulation board and which the reinforcing mesh is imbedded.



Definitions

- **Brown Coat:** The second coat of Portland cement plaster installed in a conventional hard coat stucco system. This coat is for leveling the wall surface in preparation for the installation of the finish material.
- **Casing Bead:** Used as a stucco stop and exposed to eliminate the need for wood trim around window and door openings; also recommended at junction or intersection of plaster and other wall or ceiling finishes, and as a screed.



Definitions

Cladding System: All components of the exterior of a building including but not limited to cladding material, windows, roof, flashings and sealants.



Definitions

- **Class PB EIFS:** a polymer based system applied over expanded polystyrene (EPS) board attached to the substrate with adhesive and/ or mechanical fasteners. Base coat thickness will vary depending on weight of fiberglass reinforcing mesh and number of mesh layers covering the entire surface. Primer may be installed over cured base coat, but is optional or by system specification. Textured or non-textured finish coat is applied to primed or non-primed base coat.



Definitions

- **Class PI EIFS:** a polymer based system applied over polyisocyanurate (PI) board attached over open (steel stud) framing or a solid substrate. Base coat thickness will vary depending on weight of fiberglass reinforcing mesh and number of mesh layers covering the entire surface. Primer may be installed over cured base coat, but is optional or by system specification. Textured or non-textured finish coat is applied to primed or non-primed base coat.



Definitions

Class PM EIFS: a polymer modified, mechanically fastened EIFS. Insulation board and fiberglass reinforcing mesh are both mechanically attached to the framing and/ or substrate. Typically PM systems call for vinyl or zinc coated trim accessories. Base coat material ranges in thickness from $\frac{1}{4}$ to $\frac{3}{8}$ inches. The base coat can be coated with a primer, depending on specifications. Finish material is applied over the primed or unprimed base coat.



Definitions

- **Cold Joint:** occur when a wet edge is not maintained. This can typically be avoided with proper scaffold, sufficient manpower and aesthetic reveal/ joints.



Definitions

Corner Bead – Expanded: A general-purpose corner bead is economical and most generally used. Has wide expanded flanges that are easily flexed. Preferred for irregular corners. Provides increased reinforcement close to nose of bead.



Definitions

- **Cornerite:** This product is a strip of painted or galvanized Diamond Mesh Lath used as reinforcement. Cornerite, bent lengthwise in the center to form a 100-degree angle, should be used in all internal stucco angles where metal lath is not lapped or carried around; over substrate, anchored to the substrate, and over internal angles of masonry construction.



Definitions

- **Control Joint:** Designed to relieve stresses of both expansion and contraction in large stuccoed areas. Made from roll-formed zinc alloy, it is resistant to corrosion in both interior and exterior with gypsum or Portland cement plaster. An open slot, ¼” wide and ½” deep, is protected by a plastic tape that is removed after plastering is completed. The short flanges are perforated for keying and attachment by wire-tying to metal lath or by stapling to gypsum lath. Thus the plaster is key-locked to the control joint, which not only provides plastering grounds but can also be used to create decorative panel designs.



Definitions

Curing: This is one of the most critical aspects of good stuccowork. Cement plaster requires water for hydration and to develop its full strength. If inadequate water is present, cement hydration is incomplete, producing weaker stucco. Curing during the early days of each coat is essential since shrinkage stresses tend to be high while the plaster has not yet gained full strength. Curing does not reduce overall shrinkage but it does delay it so that the plaster can gain strength and is thus better able to resist shrinkage stresses when the plaster dries later.



Definitions

- **Direct-Applied Exterior Finish System (DEFS):** An exterior finish system without insulation board. Base coat, regular or fiber reinforced, fiberglass-reinforcing mesh, if required by system manufacturer and finish coat applied directly to an un-insulated substrate.



Definitions

Drainage Mat: One type is a three dimensional core consisting of fused, entangled filaments and a second is a non-woven fibrous, plastic mesh. Both are used as a spacer to create a drainage plane.

Drainage Plane/Cavity: The space between the EPS insulation board and the weather/moisture barrier through which incidental moisture can be intercepted, conveyed and drained to the face of the cladding system. Two types are drainage mat and fluted EPS.



Definitions

Efflorescence: A crystalline deposit, usually white, that may develop on the face of a cementitious base coat, possibly from exposure to rain or damp conditions. Efflorescence deposited on the face coat is a bond breaker, and will prevent adhesion of the finish or coating.

EIFS: Exterior Insulation and Finish System. A non-load bearing exterior wall cladding system consisting of a thermal insulation board, adhesively and/ or mechanically attached to the substrate, base coat with reinforced fiberglass mesh and a textured finish coat.



Definitions

- **EIFS-MD:** EIFS with a drainage plane. A non-load bearing exterior wall cladding system consisting of a thermal insulation board, adhesively and/ or mechanically attached to the substrate, base coat with reinforced fiberglass mesh and a textured finish coat with a drainage plane allowing incidental moisture to drain to the face of the cladding system.
- **Embed:** a method implemented to encapsulate the fiberglass reinforcing mesh in the base coat
- **Expansion Joint:** a complete structural separation of building elements that allows for independent movement of abutting elements without damage to the assembly. Typically this is a separation through the EIFS as well as the substrate and framing or masonry.



Definitions

- **Factory Mixed:** a material that is delivered from the manufacturer ready to use from the container. (i.e. finish coatings and non-cementitious base coat)
- **Field Mixing:** the mixing of a manufacturer supplied material with additional materials not manufactured by the system manufacturer. (i.e. EIFS base coat and Portland cement)



Definitions

- **Fasteners:** Plastic washers used in conjunction with non-corrosive screws to attach both Class PB and PM insulation to substrate and/ or framing. There is a great difference in the plastic washer used in the two different systems. Fasteners are considered an EIF System accessory.
- **Flashing:** A non-corrosive material of metal or plastic at a systems termination or interface with an opposing cladding component used to drain moisture to the face of the wall assembly.



Definitions

- **Finish:** A textured and colored material, trowel or spray applied over the reinforced base coat with graded aggregate of either silica or marble.
- **Insulation Board:** Aged, molded, expanded or extruded polystyrene (EPS) foam. One pound expanded polystyrene is used with a Class PB or MD EIF System. Extruded polystyrene is used with a Class PM EIF System. Also, there is Polyisocyanurate insulation that is typically used with a Quick R system.



Definitions

Metal Lath: Metal lath embedded within the stucco provides reinforcement. It is readily shaped to ornamental contours to a degree not possible with other stucco bases. Metal lath is a mesh material formed from sheet steel that has been slit and expanded to form a multitude of small openings. It is made in Diamond Mesh and Rib lath types and in two different weights for most types. Manufactured from steel protected by a coating of black asphaltum paint. Diamond Mesh and 3/8” Rib lath are also available in galvanized steel.



Definitions

One Coat Stucco (OCS): A factory blended, fiber-reinforced, Portland cement stucco base coat formulated for assured strength and durability.

Penetration: Any location in an EIF System where an object passes through all components of the system such as a window, door, light box, etc.)



Definitions

Primer: A paint-like coating (tinted or untinted) installed over the base coat to enhance adhesion, equalize suction and improve workability of the finish material.

Reinforcing Mesh: Standard reinforcing mesh is a nominal 4.5 oz./sq. yd., symmetrical, interfaced open-weave glass fiber fabric made with minimum 20 percent by weight alkaline resistant coating for compatibility with base coats.



Definitions

- **Primer:** A paint-like coating (tinted or untinted) installed over the base coat to enhance adhesion, equalize suction and improve workability of the finish material.
- **Reinforcing Mesh:** Standard reinforcing mesh is a nominal 4.5 oz./sq. yd., symmetrical, interfaced open-weave glass fiber fabric made with minimum 20 percent by weight alkaline resistant coating for compatibility with base coats.



Definitions

Reinforcing Mesh - High Impact Mesh:

Minimum 15 oz./ sq. yd., high impact, double strand, interwoven, open-weave glass fiber fabric with alkaline resistant coating for compatibility with base coats. High impact mesh is also available in 20 oz./ sq. yd. from most EIFS manufacturers



Definitions

- **Sealant:** Installed with or without a backer rod for the purpose to allow thermal expansion and contraction of dissimilar cladding components to prevent moisture intrusion at system penetration and terminations.
- **Sealant System:** The use of primer, backer rod or bond breaker in conjunction with the installation of sealant.



Definitions

- **Scratch Coat:** The first coat of Portland cement stucco installed over metal wire or lath. This first coat should be a minimum of ¼” thick, measured from the backing to adequately cover the metal wire or lath and still leave enough stucco to permit deep scratching (horizontally) to give a good mechanical key for the next coat which is the brown coat.
- **Stucco – Conventional Hard Coat:** A solid cement plaster cladding of Portland cement and sand often containing lime, plasticisers or other admixtures, applied over rigid or non-rigid backing fixed to wood or steel stud framing and reinforced with metal wire mesh or lath.



Definitions

- **Substrate:** The wall surface to which the EIFS is attached. Acceptable substrates include exterior grade plywood, oriented strand board, exterior grade gypsum sheathing, glass faced gypsum board, cement board, clean unpainted masonry, concrete free of paint sealers and oils or contaminants, structurally sound unpainted clean Portland cement stucco.



Definitions

- n **Surface Mounted Objects:** Anything attached to the face of the EIFS that penetrates the lamina. (i.e. light fixtures, downspouts) Each EIFS manufacturer has specific details for the attachment of surface mounted objects.
- n **Strip lath:** (see **Cornerite**)
- n **Weather/Moisture Barrier:** A sheet good or wet applied coating installed at the face of the substrate as a moisture barrier or drainage plane.



Definitions

Wrapping: The process of totally encapsulating all EPS to seal and strengthen the system by bringing reinforcing mesh around the system terminations, embedded in base coat. Wrapping is also referred to as back wrap or edge wrap.

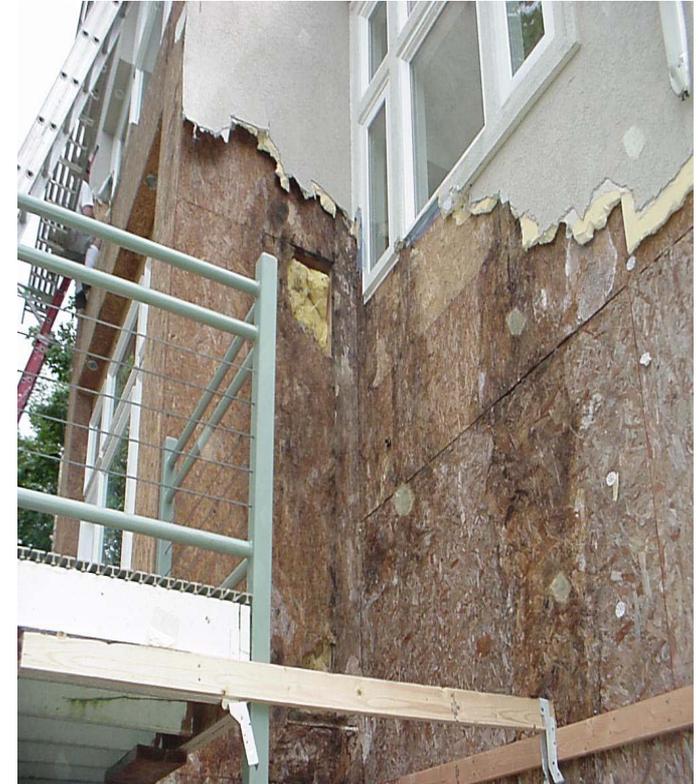
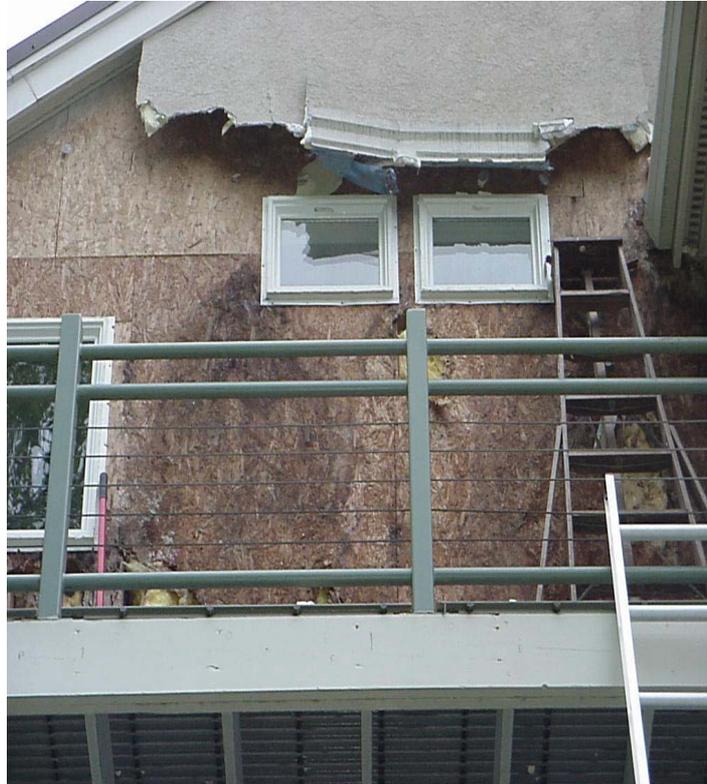


Since EIFS clearly provides many advantages, what's the big deal? The basic problem begins with the erroneous belief that homes can be made to be "water proof". The simple truth is, they cannot. For example, even when applied by professional caulking applicators, All caulk joints will eventually fail. . . .even those caulk joints made under laboratory conditions. No residential windows are fully waterproof. . . .they are designed and manufactured to a water-resistant standard. Some water will always find a way in. When it can't get out, you have a problem



EIFS Substrate Damage

The most common areas for moisture problems.



Improper Sealant Joints



Could Lead to This



8. Exterior Allows Water in Around Windows/Doors

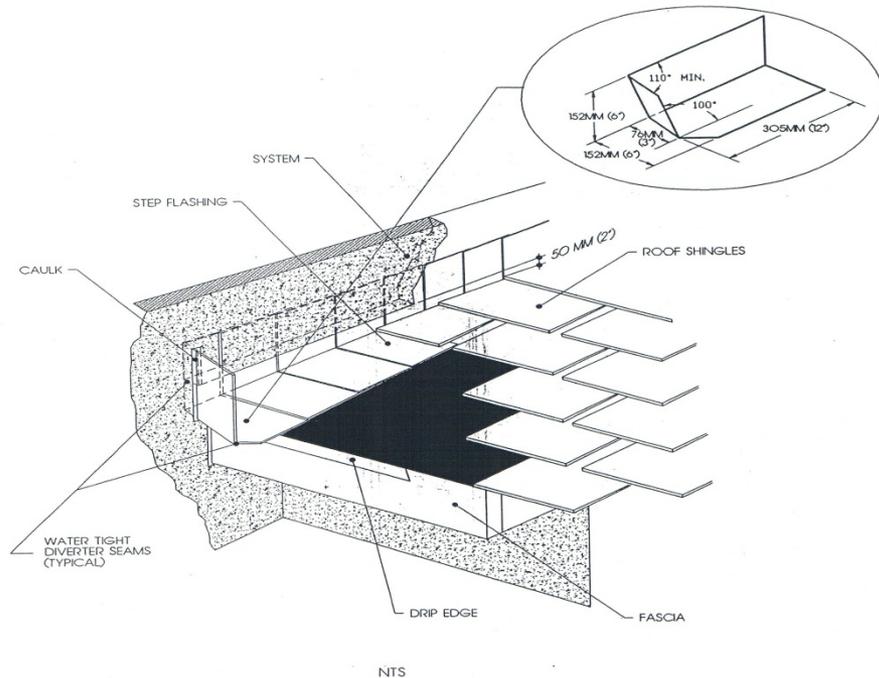
Proper sealant joints and repairing rotted sills and trim that require relatively simple and inexpensive repairs around windows and doors can eliminate expensive substrate repairs.



The Roof Kick-out is installed

When the kick-out flashing is not properly installed extensive and expensive water damage will occur. This can be #1 area for water damage.

EIFS Class PB Details



NTS

 <p>EIFS Industry Members Association 3000 Corporate Center Dr., Suite 270 Morrow, GA 30260-4116</p>	<p>Typical Roof Flashing With Diverter</p>		
	<p>The design, specification and construction of EIFS must comply with local building codes and standards, and individual manufacturer's system requirements. Because these requirements differ, only a licensed and qualified design professional can create and issue drawings or specifications for actual or prospective construction or renovation. These drawings are for general information and guidance only, and EIMA specifically disclaims any design, warranty or construction intent or responsibility.</p>	<p>Revision No. 2</p>	<p>Issue Date 12/22/96</p>



Damage caused by missing kick-out flashing



House Has an Environmental Problem

Environmental problems are a growing area of home defects. They can be caused by improperly maintained EIFS. You usually need to arrange a special inspection to determine the extent of environmental problems, and they're usually expensive to fix.



Questions to Consider

Are the windows & doors properly sealed with an approved ASTM sealant?

Is there wood rot at the windowsill, trim or doorframes?

Is the kick-out flashing installed?

Are there cracks in the EIFS?

Are all dissimilar materials properly sealed (light fixtures, water faucets, dryer vents, gutter downspout fasteners etc.)?

Has the house been properly maintained. ?

When was the last EIFS inspection performed?

Did the applicator follow manufacturers specifications?

Has the EIFS been painted. Manufacturer recommends painting every 10 years?



Questions?



The Inspection Report



EIFS Testing

unfilled as this will provide entry sites for water. Neutral cure silicone sealants, acrylic latex sealants or a sealant specified by the EIFS manufacturer should be used. Do not use sealant materials which contain solvents that are detrimental to the foam insulation board or the lamina.

4. Water Intrusion Report (see appendix of this document)

An example of a water intrusion report is provided in the Appendix of this document. The report should include all moisture measurements, photographs and drawings of the building exterior. Worksheets in the Appendix list areas where moisture readings should be taken. A step by step guide for testing is also in the Appendix. Finally, before testing, make certain that the structure to be tested is clad with *non-drainable* EIFS. Using this protocol on drainable EIFS could damage the weather resistant membrane underlying the drainable system by probing holes through it.

TEST PROCEDURE AND LOCATIONS

Techniques

Scanning - After calibrating the scanner, move it over the wall in a motion that traverses all of the area in question. Re-calibration of the scanner must be performed frequently (see Appendix). The field of the wall away from flashing or windows need not be 100 percent scanned. It is recommended that those areas be scanned if unusual conditions are present, such as cracks in the lamina. The scanner must remain in contact with the exterior finish while in operation. The scanner has two thickness settings, one for 1-inch foam board insulation and one for 2-inch foam board insulation. Follow up all "high moisture" indications by a scanner with a probe type moisture meter for accuracy and substrate condition.

Probing - Probing is done in limited areas as described in this document, under components like windows and doors, flashing details and penetrations. Where possible, insert the probes upward on a forty-five degree angle making firm contact with the substrate. Fill all probe holes with an approved sealant material. Probing also gives a good indication as to the structural condition of the substrate. If it is in good condition the substrate will be firm, preventing complete penetration with the probes or awl. Decaying or severely damaged substrates will be soft and allow almost complete penetration with the probes provided firm framing materials are not directly behind the substrate at this point.

The procedure for testing the structure includes:

1. Using, for example, a Polaroid 660 camera, photograph the front, rear, right and left building elevations of the structure as well as all other building elevations beyond a simple rectangle as used here. (see appendix for example)



EIFS Testing

2. Label each building elevation and affix the photograph on a page under the acetate containing the grid locations. The grid on the acetate should be the same size as the Polaroid 660 photograph. Be sure you have photographed every area you are going to test.
3. Begin testing each building elevation by first measuring the acclimated ("normal") moisture content of the substrate using a probe type moisture meter. The acclimated reading should be taken in an area of the wall where there are no penetrations, flashing or components like windows or doors in the immediate area. You are trying to test an assumed dry area of the building elevation to establish the "normal" moisture content for this particular wall. Acclimated moisture measurements in wood frame construction typically range from 8 to 15 percent.
4. Calibrate the scanner for each elevation. It is important to re-calibrate the scanner frequently. Scan and probe every penetration, component (window, door, gable vent, etc.), flashing (rake, deck, cap flashing, etc.), seam, expansion joint or crack in the lamina, as directed later in this document, writing down every measurement on the form. Correlate each measurement with the appropriate grid location (see appendix for example).
5. Probe elevated moisture areas identified by the scanning moisture meter to determine the exact moisture content and to discover whether the substrate is soft or firm. This is done by feeling the resistance of the material when inserting the probe into it. If scanning does not indicate any elevated moisture levels below a window, penetration or flashing detail, use an awl to probe a single hole in the areas depicted in Figures 5-7. This is to check the substrate for firmness. Be sure to indicate whether the substrate was soft or firm for every probe reading taken. Probe beneath every penetration, component and flashing as directed later in this document. Be sure to indicate whether the substrate was soft or firm with every probe reading.
6. Complete all fields of information on your reporting form. Make sure you have tested every area described in this document in such a way that anyone will be able to understand the information that you are compiling. It is important to be able to easily locate each moisture reading on the acetate grid and the photograph. Using these techniques will make it easy to visually locate any single moisture reading or problem area on the structure.
7. Where possible, provide detailed information on the report about window or door type, size and manufacturer in all areas where excessive moisture or damage is discovered. This is extremely important in areas of rot or decay. Use additional photographs or drawings if necessary. Provide detailed information about the type and construction of flashing, expansion joints and other penetrations where excessive moisture and or rot is discovered. Use additional photographs or drawings if necessary.



Determining the Manufactures Mesh

Manufacturer

- Master Wall
- Sto
- USGI Agircreek
- Dryvit
- Parex
- Finestone
- Senergy
- Fullermite
-

Mesh color

Gray

Yellow, White

Green

Blue

Red Trim White Body

Red

White

White



Standard NHBA Protocol:

Guardian Home Inspections

321 McFee Road

Knoxville, TN. 37934

PH# 671-1602 Fax 675-6010

BODY

- It is our experience that the moisture problems involving EIFS (Exterior Insulation Finish System) siding is directly related to improper installation details of the product.
- Although some of the installation may differ slightly from one manufacturer to another, the basic details are the same. These improper details typically include the following:
 - termination below grade, improper flashing details (doors and windows), no backer rod or sealant (door and windows), improperly sloped horizontal EIFS surfaces, and
 - improper termination (product not back wrapped at terminations) and no kick-out flashing. Therefore we recommend that you obtain the installation specifications for the particular product used on your house.



■ **Standard NHBA Protocol:**

- *Test readings of 30% or high & **no substrate to probe** = remove siding and inspect the framing for indications of rot or decay. Repair or replace any damaged areas as necessary.
- * Test readings between 20% - 29% = the source of water/moisture intrusion should be identified, if possible. Appropriate corrective action should be taken to stop the entrance of water/moisture. In many cases, a particular detail may be corrected, or additional sealant installed as a satisfactory corrective measure.
- * Test readings of up to 19% = additional sealant may be necessary at the door, window, cracks, trim, etc. locations should be sufficient.
-
- Serious decay occurs when the moisture content of wood is above the fiber saturation point, or approximately 30%. This fiber saturation point will only be reached when the wood is in contact with a source of water/moisture (leak). The lumber that is used in new construction has a moisture content that ranges from, approximately, 5-19%. At these levels there is a reasonable margin of safety against fungal damage.
-
- Due to the insidious nature of the problem, our findings should be used as a general guide for any repair or replacement work that you have done. Most of the damage that occurs in EIFS clad homes typically is not visible, until the latter stages (in many cases), when damage is usually severe. The decay or indication of presence of moisture is typically not visible from either sides of the wall. An early indicator, usually, is damage to a window or doorframes and trim work



- **There are two ways to approach the main problems involved with the moisture intrusion.**

The **first** and most expensive is to return all the incorrect details to the manufactures specifications. The **second** is to seal all the openings (cracks around windows and doors) that allow moisture into the system and correct the areas that can be easily corrected (roof siding contact, kick out flashing, siding below grade). **Both approaches to the main problems** appear to have similar results. Both repair methods require regular scheduled maintenance of the sealant used and both will need to be re-inspected in 6 to 18 months. The majority of the test readings appear to be in the dry range. **The dry readings, in some locations, may be misleading. It is possible to get a “dry” reading, but have damaged wood in the area. (Because of this, our test readings should be used as a general guide for any repairs that might be done.) The areas at which the test readings indicated unacceptable high moisture content are listed in the following paragraphs.**



- **After the proper repairs have been performed; A yearly scheduled maintenance program is recommended to insure that no future moisture intrusion occurs.**



How to report the moisture findings



What are some of the equipment needed to perform the EIFS inspection



**Delmhorst BD-2100 Digital
Moisture Meter Inspection Kit**



What are some of the equipment needed to perform the EIFS inspection

n Tramex Wet Wall Scanner

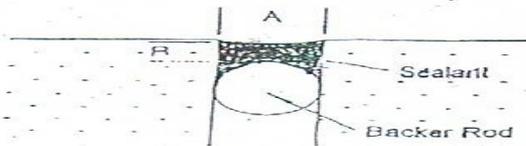


How are these tools used



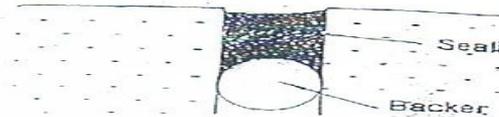
Sealant joints

Good Joint Design



1. Dimensions A & B must be at least 1/4"
2. Ratio of A:B should be 2:1
3. Sealant tooled concave

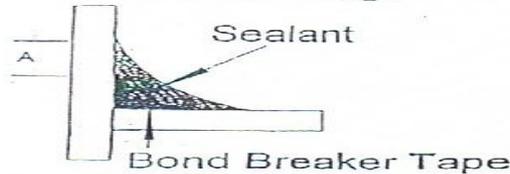
Poor Joint Design



1. Sealant applied too deeply.

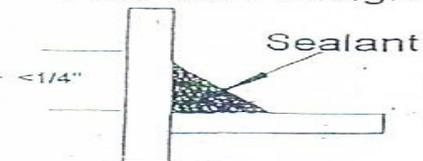
Moving Corner Joint

Good Joint Design



1. A Bond Breaker must be used to prevent sealant from adhering to corner.
2. Dimension A must be at least 1/4"
3. Sealant tooled concave

Poor Joint Design



1. No Bond Breaker in corner
2. Insufficient Sealant Mass

Questions?



Do you have to have a
State licensed to
perform EIFS
inspections?



An EIFS inspector does not have to have a State Inspection License

- The EIFS inspector should be certified by a recognized EIFS organization.
- Opinions expressed shall be based only on their experience, education and honest convictions
- The inspector shall not disclose any inspection information without the clients approval
- Inspector shall not accept compensation from more than one interested party without all consenting
- Inspector shall not offer or accept commissions or other consideration from any other parties dealing with the client
- Inspector shall not engage in any false or misleading advertising.
- The EIFS inspector should not perform repairs on any of the homes he or she has inspected. This is a conflict of interest.
- The inspector should only use equipment that follow EIFS inspection protocol.



Food For Thought

- Is it ethical to offer to repair items you find during your inspection?
- Is it ethical to get paid by a company who you refer to a client for repairs
- Is it ethical to refer your clients to the affiliate members listing on the HITA website ?



Questions?



Working With Real Estate Professionals



Does the Agent have to be there?

Buyer's Agent

- While it is not necessary for the agent to be present, they are welcome to join their client at the inspection. It is always recommended that the client make time to join the inspector.
- This allows for observation of the inspector, the ability to ask questions and gain assurances that they are professional.
- The agent and client will be able to learn together about the condition of the home, how its systems work, and how to maintain them.
- Accompanying the inspector makes the written report easier to understand.



Does the Agent have to be there?

Listing Agent

- It is not required for them to be present for the inspection. However, if the buyer's agent is unable to be present, it is important that someone who can authorize entry be present. Some inspectors will not perform an inspection alone to avoid potential liabilities.
- Their presence can allow them to observe the inspector and insure the service being provided is impartial and enables the opportunity to provide information about any issues that come up that can be satisfied on the spot.
- Asking clarifying questions during a prelisting inspection can help assist the listing agent on how to better prepare the home for selling with little obstacles to over come in the event the buyers have a home inspection as well.



Potential Limitations

- Weather conditions can limit both visual inspection and the ability to operate the equipment.
- You should have 48 hours of dry weather to perform EIFS inspection



Pitfalls and Problems

What can go wrong with the Inspector?

- The Inspector can be unprofessional and an alarmist
- Inspection is far from thorough.
- The report is confusing, difficult to read and understand.
- Issues are over emphasized or misquoted.
- Inspector functions outside his scope
- Give the customer several contractors to choose from.



Pitfalls and Problems

What can go wrong with the Inspection?

- Seller does not prepare for the inspection (allows sprinkler system to run the day of the inspection).
- Agent does not inform client properly about EIFS Inspection scope and procedure.
- Agent becomes an Inspector during the Inspection.



Preparing the EIFS for Inspection

- All areas are accessible.
- Shrubs and vegetation should be cut away from house.
- All sprinkler systems should be turned off for 48 hours before the inspection.
- Autos and other vehicles need to be moved away from areas to be inspected.
- Have animals caged or boarded.
- All fence gates unlocked.
- If the decks do not have stairs make the area accessible from the interior.
- The client should read & sign the contract before the inspection is to be performed.



Questions?



EIFS Cleaning

REPAIR – CLEANING

- Cleaning
 - EIFS are reasonably easy to clean using the proper methods and cleaners
- Light Cleaning
 - Atmospheric dirt and light soiling can many times be removed by using a liquid household soap and warm water
 - Apply the solution over the area to be cleaned
 - Lightly agitate with a soft bristle brush
 - CAUTION: DO NOT USE HARD SCRUBBING ACTION OR A HARD BRISTLE BRUSH AS THIS WILL DAMAGE THE FINISH
 - Rinse the area thoroughly with clean water

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EIFS Cleaning

REPAIR – CLEANING

- **ALGAE, MILDEW, MODERATE TO HEAVY CLEANING**

- Cleaning of this magnitude is better left to a professional contractor who is knowledgeable and skilled in the technical aspects and methods of this type cleaning

- **Prepare the following solution:**

- 1 gallon warm water
- 1 quart of household bleach
- 1 cup of trisodium phosphate (TSP)

NOTE: TSP is normally available in the paint section of most hardware stores.

- Apply the solution to the entire area to be cleaned

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EIFS Cleaning

REPAIR – CLEANING

- Lightly agitate with a soft bristle brush
- **CAUTION: DO NOT USE HARD SCRUBBING ACTION OR A HARD BRISTLE BRUSH AS THIS WILL DAMAGE THE FINISH**
- Rinse the area thoroughly with clean water
- Copper stains
 - Removal of copper stain is better left to a professional contractor who is knowledgeable and skilled in the technical aspects and methods of rust stain removal

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EIFS Cleaning

REPAIR – CLEANING

- Rust Spots and Stains
 - Removal of rust stains is better left to a professional contractor who is knowledgeable and skilled in the technical aspects and methods of rust stain removal
- A common material used to remove rust stains is “Sure Klean Ferrous Stain Remover” or consider “Extend Rust Treatment”
- The first step is to remove the particle that is causing the stain. This is accomplished by using a small tool to pick out the particle, taking care not to puncture the base coat or damage the surrounding finish. The work area should not be larger than the particle.
- Pre-wet the stain area with clean water

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EIFS Cleaning

REPAIR – CLEANING

- Combine the following ingredients into a smooth paste
 - 1 part Ammonium Chloride or Aluminium Chloride
 - 4 parts fine powdered filler such as Talc or Calcium Carbonate
 - Household Ammonia
- Add enough household Ammonia to achieve a smooth consistency
- Apply the paste over stain and leave until dry
- Rinse the area thoroughly with clean water
- Repeat the process until stains are gone

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Summary



What is a EIFS inspection?

- A thorough **visual** examination of the **readily accessible** areas of a home.
- Includes probing the EIFS where moisture is detected or suspected.
- Consists of an objective evaluation of the condition of EIFS and inspection of all details.
- Provides a pictorial or written report covering all findings and identifying potential concerns.



A EIFS Inspection is Not...

- A EIFS inspection does **not** detect every conceivable flaw and concealed defect.
- A EIFS inspection does **not** include cosmetic items.
- A EIFS inspection is **not** Home Inspection. And vice versa.
- A EIFS inspection is **not** a warranty. Warranties are available with Moisture Warranty Corp.
- A EIFS inspection is **not** technically exhaustive
- A EIFS inspection is **not** a code compliance review



Purpose of a EIFS Inspection

- A home inspection summarizes the condition of a EIFS at the time of the inspection
- Points out the need for major repairs
- Identifies areas that may need attention to avoid future failures.
- Buyers and sellers depend on an accurate EIFS inspection to maximize their knowledge of the property in order to make intelligent decisions before completing their sale or purchase.



Purpose of a EIFS Inspection

More than Just for Real Estate Transactions

- If you are planning to sell the home, an inspection prior to placing the home on the market provides a better understanding of conditions which may be discovered by the buyer's inspector. A EIFS inspection can provide an opportunity to make repairs that will make the home more desirable to potential buyers.
- For homeowners, an EIFS inspection may be used to identify problems in the making and to learn about preventive measures, which might avoid costly future repairs.



What if the EIFS Inspection Reveals Problems?

- No house is perfect and all damage can be repaired.
- When the inspector identifies problems, it does not indicate that the transaction should not occur.
- The findings serve to educate the client, usually in advance of the purchase, about the condition of the property.
- Any repair recommendations should not be performed by the Inspector. Repairs should be reviewed and conducted by a certified EIFS applicator.
- Estimates should be considered budgetary and the repairs performed as soon as possible to avoid further damage. True costs for corrections should come from the contractor/technician performing the work.



If the house proves to be in good condition or new, did the client really need an EIFS inspection?

- Yes. The Inspection should be more than just simply a “Witch Hunt”. EIFS Inspections should be an educational experience.
- They can now complete the home purchase with confidence about the condition of the property and know what needs to be done to maintain the EIFS.
- Client has “Peace of Mind”



Why a Professional EIFS Inspector?

- Even the most experienced homeowner lacks the knowledge and expertise of a Professional EIFS Inspector.
- A Professional EIFS Inspector has the experience, depth of knowledge and training to make an unbiased and informed report of the condition of a property.
“Jack of all trades”
- An Inspector is familiar with the many elements of EIFS construction, and the proper installation and maintenance of systems. Inspectors are like a General Practitioner in the medical field.



EIFS Inspector Requirements

There are no Requirements for EIFS Inspectors in the State of Tennessee

- EIFS Inspectors should have:
 - General Liability Insurance at least \$500,000
 - Errors and Omissions Insurance

- EIFS Inspectors should have:
 - Hands on experience
 - Strong interpersonal and communication skills

- EIFS Inspectors obtain approved continuing education classes



Questions?



References

- References
- 1. ^ "AnimasInsurers Slapping EIFS Exclusions on Insurance Policies". Associated Construction Publications. <http://www.acppubs.com/article/CA447443.html>

