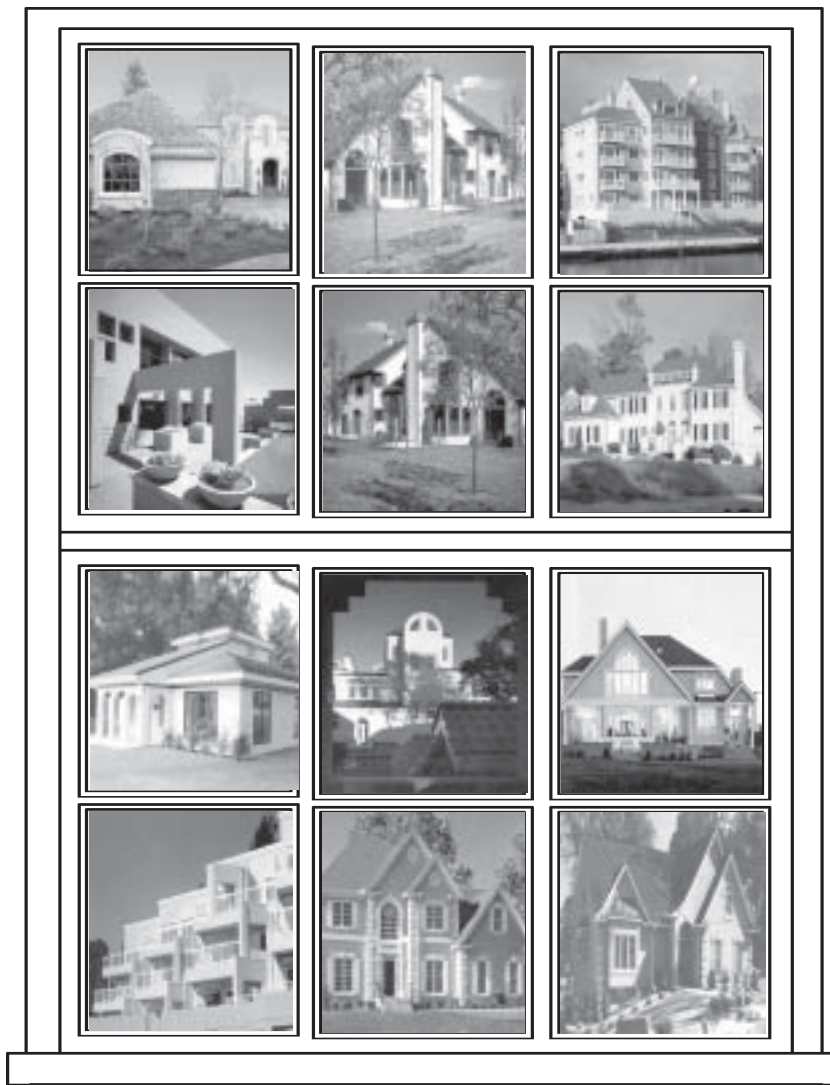


EIFS HOME OWNER'S GUIDE

A Guide to the
Design, Inspection, Maintenance and Repair
of
Wood Frame Buildings
That Use
Exterior Insulation and Finish Systems ("EIFS")
as the Exterior Wall Material



This book is
compliments of
Robert Thomas,
EIFS Consultant.
Free download from
www.eifs.com

Robert G. Thomas, Jr.



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Introduction



This book is about Exterior Insulation and Finish Systems ("EIFS"), a type of building product that is used as the exterior surface of a building's outside walls. This book is a goldmine of useful information for people involved with EIFS on wood-framed buildings such as houses, apartments, condos and light commercial buildings. Specifically, this book is for people who want to:

- O Buy, sell, maintain, repair or inspect an EIFS building
- O Decide if they want to use EIFS on a new building
- O Understand EIFS (Realtor, bank, insurer, etc.)

The Premise

This book is intended to fill a need. There has been a lot of cinterest lately about the performance of exterior building walls. A lot of information has come forth, yet much of it regarding EIFS is simply inaccurate. This has not helped resolve the concerns of those involved with EIFS walls. This book is loaded with information and hope fully will change all that..... for the better.

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Author



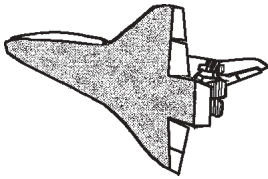
With 20+ years of *continuous* experience *exclusively* with EIFS, the author is arguably the best known and most experienced EIFS consultant in North America. An architect by education, former Manager of Technical Services at the Dryvit company, chairman of the American Society for Testing and Materials ("ASTM") committee on EIFS, and author of countless publications about EIFS, he is a sought-after consultant, teacher and speaker on EIFS issues.

Caveat

This is general book about EIFS. It is not a detailed treatise for professional use on any specific building. If working with EIFS issues on a specific building basis, enlist the help of EIFS manufacturers, distributors, contractors and construction industry professionals to develop solutions which are tailored to your specific building. See the back cover for some information sources, or go to www.eifs.com.



What is EIFS?



Like the Space Shuttle with 32,000 insulating ceramic tiles glued to its underside, EIFS insulates by placing the insulation where it does the most good.... on the outside of the wall.



Where is the EIFS headed?
Good question.
The EIFS industry continues to grow.

Exterior Insulation and Finish Systems* ("EIFS") are a type of building material that is used as the exterior facing of a building's exterior wall. EIFS is composed of a number of layers. EIFS is a type of wall surfacing system, and needs to be thought-of as such: a system.

This book is about using EIFS on wood-framed buildings, which usually means homes or other forms of residential construction, but can also include other wood-framed buildings such as apartments, condominiums and light commercial buildings. EIFS is also used on large commercial buildings, however, most large commercial buildings are not wood-framed.

EIFS are not a type of "whole wall" per se, but rather are a part of a wall, like shingles or brick or wood studs. In other words, the building's wall, as a whole, consists of many parts, including windows, doors, cable TV penetrations, vents for clothes dryers, flashings, caulking, and maybe even EIFS (or brick, or wood siding or who knows what). Thus the overall performance of the exterior wall of building is the product of the wall's various materials working together as a total wall system. EIFS is just one part of such a total wall system.

EIFS is unique in that it is the only wall material that provides insulation, a finished exterior surface and weather-proofing, in a single seamless product. This "single product does it all" at tribute accounts for its popularity: EIFS is a good value.

EIFS looks like stucco (portland cement plaster). Stucco is a "natural" product, composed of sand, portland cement and other materials. EIFS is a synthetic product. Unlike stucco, EIFS can be made in large areas without any joints, and also with a wide variety of shapes, colors and textures.

You should be aware that EIFS is sometimes combined with walls that are basically "stucco". The stucco is thus the main exterior wall material, while the "sculpted shapes" sometimes present on such walls, are made from EIFS. This type of wall is not an EIFS wall. It's a stucco wall.

The above description is what EIFS **is**. It is important to realize what EIFS **is not**. Again, EIFS is a building material, not a whole wall, and does not include windows, flashings, sealants and other adjacent wall materials. This is important, as many buildings that have problems with their walls, and which have EIFS on them, have problems that do not originate from the EIFS itself, but rather from other wall materials. An understanding of this is critical to resolving problems with building walls. Leaks are a common example.

* EIFS is often called "synthetic stucco", or "Dryvit™" (Dryvit is a manufacturer's trade name).



State of Flux



Types of EIFS



A barrier EIFS is a bit like a tent. It provides an effective water shedding skin for the building, yet does not have provisions for handling water that gets inside.

The types of EIFS used in North America have been used successfully for decades, however, there have recently been major changes in EIFS products, most notably the development of EIFS that include a provision for draining leak water. Because these changes are recent, it is important to carefully ascertain the current requirements that apply to their specific building, such as building codes and local attitudes toward EIFS that affect resale, insurance, etc.

EIFS comes in 2 basic types: barrier and drainage.

Barrier EIFS are the original kind. They rely on creating and maintaining a weather seal at the outside of a building's wall to keep water out. Thus barrier EIFS do not incorporate provisions for draining water that gets past the outermost face of the wall. This barrier concept applies to the whole wall: the EIFS and other wall components. Virtually all EIFS installed prior to the early '90's are the barrier type.

Drainage EIFS were introduced in the mid '90's, and are currently used mostly on wood-framed buildings. It is required by code in some localities. Drainage EIFS walls incorporate a means to handle water that gets past the outside face of the EIFS. This capability usually has some type of secondary water barrier outboard of the wall's framing, and a drainage cavity between the EIFS insulation and the wall framing. Some drainage systems create the cavity using vertical slots on the back of the insulation. Others use a spacer between the insulation and the water barrier, or even simply create a cavity between a trowel-on water barrier and the insulation, by using the EIFS adhesive.

Barrier EIFS are simpler and easier to install than drainage EIFS. Hence they are less expensive. The two types of EIFS look virtually identical once installed. It is not possible to convert an existing barrier EIFS to a drainage EIFS.

Composition of EIFS



Most EIFS is attached to the building's wall with either adhesives or mechanical anchors. For the truly paranoid, you can also use **both**: belt and suspenders

Any EIFS consists of at least the three following elements. A so-called "EIFS" that does not contain all three of these elements is simply not an EIFS. The three basic elements are:

An **attachment system**, which holds the EIFS onto the building. This can be either an adhesive or some form of mechanical anchor, or both.

An **insulation layer**, which consists of preformed boards for foam plastic.

An **exterior coating system**, which consists of 2 layers. The first layer consists of an adhesive and fiberglass Reinforcing Mesh, and is called the Base Coat. The second is a colored, textured coating, called the Finish.



Introduction

Jargon

"The Base Coat is too thin, and the back wrap is sloppy, but we can install a new Lamina."

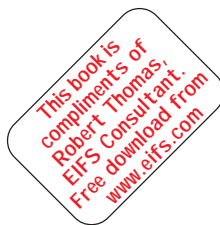


Contractor

"What? Sorry, but I don't understand EIFS-speak."



Home Owner



EIFS, like any specialty product, has its own terminology ("jargon"). Here are some words that you need to know.

Substrate: The wall surface to which the EIFS is attached. If it's bare brick, then it's brick. If it's painted brick, it's paint.

Insulation: Preformed boards of foam plastic insulation.

Attachment Adhesive: a paste-like material used to attach the EIFS Insulation to the Substrate.

Mechanical Fasteners: Plastic washers and metal screws used to attach the EIFS Insulation to the Substrate.

Base Coat Adhesive: A paste-like material that is applied to the outside face of the Insulation, and into which the Reinforcing Mesh is embedded.

Reinforcing Mesh: Plastic-coated glass mesh which is embedded in the Base Coat, and which strengthens the Base Coat.

Base Coat: The cured layer consisting of the Reinforcing Mesh and the Base Coat Adhesive.

Finish: The colored, textured, trowel-or-spray-applied coating applied to the outside of the Base Coat.

Lamina: The Base Coat and Finish together.

Weather barrier: With drainage EIFS, a film, paper or coating between the Insulation and the Substrate.

Drainage cavity: With drainage EIFS, the space between the Insulation and weather barrier, through which leaks are drained.

Drainage mat: With drainage EIFS, a nonwoven, fibrous, plastic mesh used as a spacer to create the drainage cavity.

Wrapping: Sealing and strengthening the EIFS at its perimeter by bringing the Base Coat around the edge of the Insulation.

Sealant: A liquid-applied material that cures to an elastic state, which is used to seal the edge of an EIFS; "caulking".

Sealant System: Sealant, primer (if used), backer rod (if used), and bond breaker tape (if used).

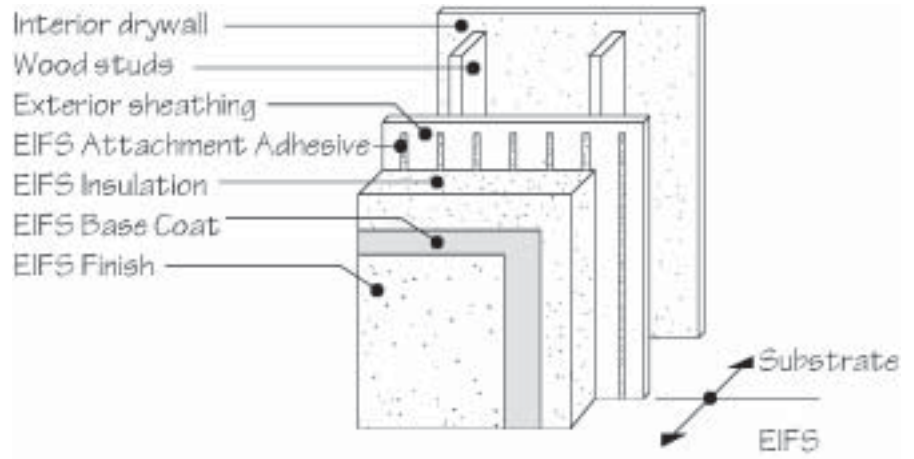
Flashing: Shaped pieces of metal or plastic, or flexible membranes, or a combination thereof, at the edge of an EIFS, used to keep water from entering the building.

Penetration: An area in an EIFS through which an object passes; windows, beams, conduits, water hose bibs, etc.

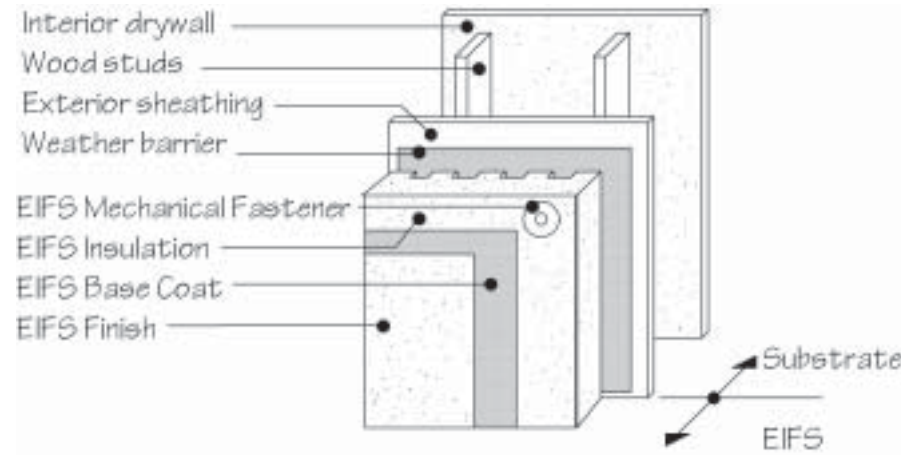
Surface-Mounted Object: An object which is in contact with the outside of the EIFS; downspouts, light fixtures, etc.



Typical Barrier EIFS, Adhesively Attached

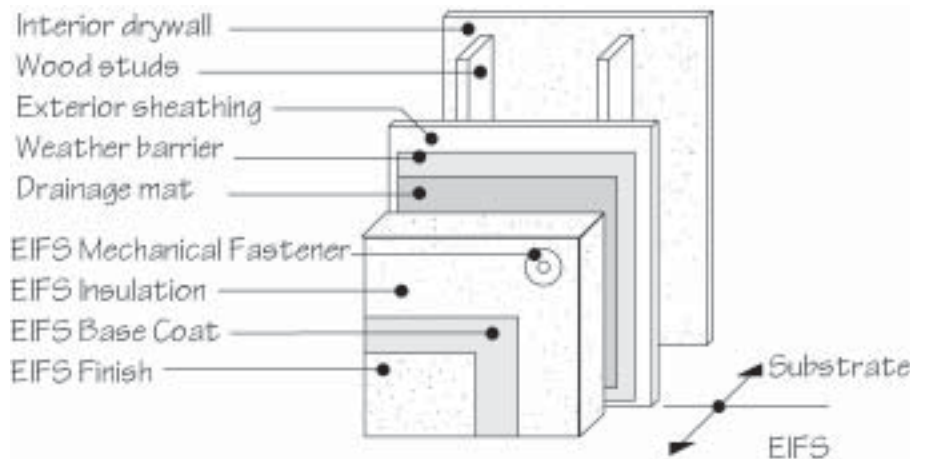


Typical Drainage EIFS, Mechanically-Attached, Using Grooved Insulation as the Drainage Cavity



This book is complimentary of Robert Thomas, EIFS Consultant. Free download from www.eifs.com

Typical Drainage EIFS, Mechanically-Attached, Using Drainage Mat as the Drainage Cavity

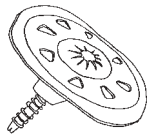




Substrates

Common EIFS Substrates include concrete, brick, block ("cinder block"), gypsum sheathing, oriented strand board ("OSB") and plywood. EIFS is not installed on interior dry-wall, metal or glass (although, with some engineering, it can be). EIFS is also not applied over open wood stud framing (but there are EIFS-like products that can do so). EIFS can also be installed over an existing wall of brick, block, concrete, clapboard siding, etc.

EIFS Insulation Materials



An EIFS Mechanical Fastener. The total fastener consists of a plastic washer, and a metal screw. The screw is removable and can be of any type, the choice being based on what material the screw is going into.

EIFS use a type of insulation called "foam plastic". This is a lightweight plastic material that contains thousands of insulating microscopic voids. EIFS insulation comes in boards (i.e., not as rolls or sprayed-on materials). Most EIFS use expanded polystyrene ("EPS") insulation. This is the white stuff used for packaging VCR's and for coffee cups. When used with EIFS, it comes in 2' x 4' sheets, in various thicknesses, and can be attached with adhesives or mechanical fasteners. EPS is white. Contrary to a common misnomer, EPS is not "Styrofoam™". Styrofoam™ is extruded polystyrene, is a trademark of the Dow corporation, is blue in color, and is used in a few EIFS systems. Extruded polystyrene insulation is also made by a number of other companies. Styrofoam™ is normally mechanically-attached. Styrofoam only comes in certain thicknesses, and is more expensive. It also has better insulating characteristics, but in EIFS it accounts only for a small fraction of EIFS projects. Some EIFS systems use polyisocyanurate (pronounced "pahl lee eye soh cy ahn yur rate") insulation. This type of insulation is especially popular on residential EIFS projects. "Poly iso" is normally mechanically attached, comes in large sheets (usually 4' x 8'), and is grey, brown, yellow or tan.

Mechanical Fasteners



When used to attach the EIFS insulation, a special type of mechanical fastener, designed for use with EIFS, is employed. They consist of a large plastic washer and a metal screw. The fastener is installed using a electric drill-like tool. The screw must go into a structural part of the Substrate, such as wood sheathing or the studs. The type of screw depends on the material being fastened-into (different types of screws for wood, masonry, concrete, etc.). Nails are not used to attach the EIFS, nor are metallic washers.

Adhesives

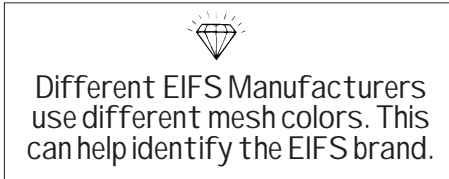


EIFS Adhesives and Finishes come in pails on pallets. Mesh comes in rolls in boxes. Insulation boards come in boxes or bags.

Adhesives are used both for attaching the EIFS and for Base Coats. All adhesives are water-based; the "wet part" is water, not some type of smelly, "chemical" solvent like mineral spirits. Adhesives are usually applied with a trowel, although some spray-applied systems exist. Some adhesives use portland cement ("cementitious") and some do not (noncementitious). Cementitious adhesives cure by the chemical reaction between the water in the adhesive and the portland cement, as does concrete. Noncementitious adhesives setup by the evaporation of the water; by "drying". Cementitious adhesives that come as a liquid in a pail have portland cement added to them just before use.



Finishes



Cementitious adhesives that come as dry powder in bags, have water added to them just before use. Certain types of adhesives must be used with certain Substrates; noncementitious adhesives for wood, etc.

EIFS Finishes are water-based, paint-like materials. They contain small mineral particles which produce the "rough" texture, as well as coloring pigments. They "dry", like house paint. The color is normally factory mixed-in, although sometimes it is added by the distributor or the contractor. Finishes are usually applied with a trowel, but some can be sprayed. The texture depends on the texture type purchased, and the tool and technique used to apply it.

Reinforcing Mesh

EIFS Reinforcing Mesh comes in rolls of various widths, is made of glass, and is plastic coated. The plastic protects the Mesh from the alkali (the alkali weakens the glass) that exists in portland-cement-based EIFS adhesives. Various weights of Mesh are available. Lighter ("standard") weights are used on most wall areas. Heavier grades are used where impact damage may occur (at walkways, balconies, etc.).

Sealants



Although not part of an EIFS per se, sealants play an important part in the overall watertightness of a wall. With EIFS, it is important to use high quality, long lasting sealants, as sealant replacement can be tedious. Sealants used should be acceptable to the EIFS manufacturer, and most manufacturers publish lists of such sealants. Sealants should be attached to the Base Coat, not the Finish.

The EIFS Industry

Comprised of manufacturers, contractors, raw material suppliers, distributors, accessory suppliers and others, the "EIFS industry" is a billion-dollar-a-year business. Most EIFS is sold to contractors via local distributors (i.e., not at retail stores to the public).

EIFS Manufacturers



EIFS Manufacturers make the EIFS adhesives and Finishes. The Reinforcing Mesh and insulation are made for them by others. Major manufacturers are listed on the back cover. Manufacturers are just that: manufacturers. They rarely get directly contractually involved with the architectural design or construction of specific buildings.

EIFS Contractors

Lawyer to Client:
"Yes, Mr. Simpson, you have an excellent case, but how much justice can you afford?"

EIFS is usually installed by plasters; sometimes by painters and drywall contractors. The term "approved", "certified" or "licensed" EIFS contractor is misleading; manufacturers do not control, approve or guarantee the work of companies that install their products. There is no mandatory national requirement for EIFS Contractor training. Many EIFS Manufacturers do offer their own forms of training, and some generic training is available; see back cover.

Warranties

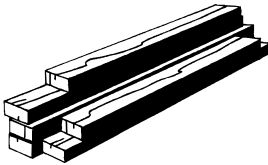
EIFS Manufacturers offer warranties for what they make: the EIFS product. Warranties that encompass the labor for installing the EIFS, and for the wall's performance, need to be negotiated on a project-specific basis.



Introduction

Like all building materials, EIFS has its own characteristics. Below is a list of EIFS characteristics that relate specifically to its use on wood-framed buildings.

Wood Structures



Like the wood frame of the house to which it is attached, EIFS contains materials (insulation and the coating resins), which can burn. The combustibility of EIFS may be an issue in fire-prone areas.

Wood is moisture sensitive. It can "rot" due to moisture; excessive amounts of moisture need to be kept away from wood. Wood also expands and contracts as its moisture level changes due to climate variations, the presence of unwanted moisture, etc. Thus a wood-framed building is in a constant state of dimensional change. This "movement" needs to be considered when designing EIFS construction details, such as the floor line joint shown on page 12.

Joints

EIFS is applied as a "wet" material in a continuous operation, and thus can be installed with few or no joints its surface. In fact, with a few exceptions, EIFS normally does not need any joints at all, but joints can be added if desired for appearance reasons or other purposes. If joints are used in an EIFS, two types are employed: expansion joints and aesthetic joints (also called aesthetic reveals).



Expansion joints occur at the perimeter of the EIFS and sometimes in the middle of large wall areas, go all the way through the EIFS, and include caulking to seal the joint. The caulking allows the joint to move as the wall flexes, while still keeping the joint watertight. Expansion joints are needed in an EIFS at the following locations: when the EIFS abuts another material; when the Substrate changes, where joints exist in the Substrate; where significant structural movement occurs; and at floor lines (to account for dimensional change in lumber as its moisture level varies).

Aesthetic joints occur in the middle of an EIFS wall area, and do not go through the whole EIFS; they are used to create appearance features in the walls surface only.

You should know that "control" joints are not used in EIFS. Control joints are a type of joint used with stucco, concrete and masonry, and are intended to "control" the location of shrinkage cracks that are expected with these types of materials. This type of shrinkage does not occur with EIFS, and hence EIFS does not need this type of joint.

Energy Usage

Because an EIFS's outside surface has no joints, very little air travels through an EIFS. This helps reduce energy usage. Also, the external location of the insulation helps keep the wall at an even temperature, further reducing energy usage.



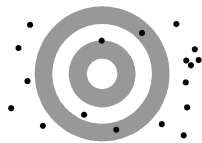


Repairs



Some type of wall materials, once installed, can be removed and reinstalled. Wood clapboard siding is an example. If an EIFS is removed, it is permanently damaged, and must be replaced with new EIFS materials. The same applies to making holes in an EIFS. Such areas must be repaired using new EIFS materials. Fortunately, with skill, repaired areas can be blended-into the adjacent old areas, and the patch eventually becomes barely visible.

A Nonstructural Material

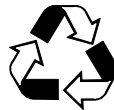


EIFS is a surfacing material, not a material that holds up the wall. The EIFS coatings are light and thin and cannot support any significant weight. Thus, objects that are attached to the outside of an EIFS wall must be connected to the building's wall framing by going through the EIFS, and not by trying to attach directly to the EIFS coatings.

Impact Resistance

EIFS is a light weight building material, and it is not as hard and robust as concrete or brick. However, EIFS is damage resistant enough for most uses. EIFS can be damaged by excessive force. The resistance to impact damage of EIFS can be boosted by using heavier EIFS Reinforcing Mesh in the damage prone areas.

Aesthetics

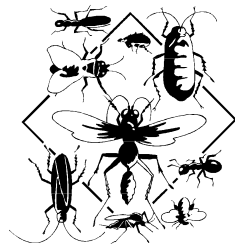


An astounding array of surface colors, textures and shapes can be achieved with EIFS. However, it is hard to make EIFS look like large areas of brick, stone masonry or metal. The dominant architectural appearance generally sought using EIFS is that of large, flat, seamless wall areas with occasional decorative trim pieces (also made of EIFS).

Recycling / Environmental

EIFS, as a whole product, does not lend itself to being recycled. However, EIFS insulation, specifically the EPS type, can sometimes be reused to make new insulation. EIFS insulations do not contain chlorofluorocarbons ("CFC's")

Cost



EIFS is a mid-priced product; in most areas vinyl and wood siding, and plywood, are cheaper, while brick and stone cost more. However, EIFS also insulates, an added benefit.

Termites

Termites do not eat EIFS, but can bore through it to get to the wood behind it. In termite prone areas, EIFS needs to be kept well above finished grade.

Crickets

Sometimes houses have EIFS on chimneys. A special type of flashing, a "cricket", is needed where a roof slope runs into a chimney, to divert water from the chimney; see drawing on page 13. A cricket is not an EIFS-specific construction method, but rather is used with many types of walls and roofs. However, the nonuse or improper use of crickets has been found to cause problems in house construction.



Building Codes



EIFS is not mentioned in many building codes by name. However, often it is regulated by technical reports issued for specific EIFS products by the "evaluation services" organization of building groups; see back cover. These reports are used as the basis for permitting a specific EIFS product on a given building project. Thus the requirements of these reports need to be adhered-to. These reports contain a wealth of information about the approved uses of specific products, and are worth reading.

Divertors

Houses sometimes have complex sloped roof shapes. When EIFS is above a roof, a special type of flashing, a "divertor" is needed at the low end of the roof; see page 13. Divertors are not an EIFS-specific construction method, but their nonuse or improper use has been found to cause problems.

Scuppers and Decks

A scupper is a water drain that penetrates through a wall. They are found on balconies, decks and roofs. They tend to be leak prone. They need to be very carefully designed and installed to preclude leaks. Decks that are attached to walls also tend to be leak prone. This includes the doors and the beams that constitute openings in the EIFS. Both these area need to be very carefully designed and installed to preclude leaks.

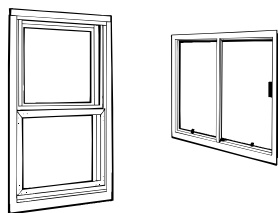
Soffits

A soffit is an exterior ceiling. Soffits can be made of EIFS. The junction between EIFS soffits and adjacent walls needs to be carefully designed and constructed to avoid leaks and unsightly stains.

Penetrations

Penetrations are wall areas through which an object passes. Examples are myriad: conduits, air conditioners, cable TV wires, louvers, hose bibs, door bell buttons, lighting fixtures, dryer vents, etc. Penetrations through an EIFS need to be sealed. Penetrations are a very common leak source.

Windows



Windows have many parts, including glass, gaskets, frame, hardware and so on, and thus have numerous potential leak points. Windows come in various grades and materials. The correct window to use of a specific building depends on the conditions to which it will be exposed; price and brand name are not absolute guarantees. The use of flashings at windows is highly desirable, and is required in many localities. The interface between the window and the EIFS wall (caulking, flashings, etc.) must be carefully done to preclude water entry. Window areas are the #1 leak source in walls.

Workmanship

EIFS is created and installed by hand at the building site. Potential thus exists for problems, from basic aspects such as not installing the system properly, to subtle matters like the texture of the Finish. To insure quality, some sort of inspection during EIFS application makes sense. This applies to the whole wall, not just the EIFS.



Wind Loads



EIFS must be able to resist being pulled off by wind forces. Adhesives are stronger than mechanical fasteners, but some EIFS (certain drainage types) can only use mechanical fasteners. It is almost always possible to engineer an EIFS wall to withstand the wind loads that houses experience.

Buying and Selling

It is prudent for sellers of EIFS buildings to disclose EIFS's presence, and for buyers to be diligent in assessing the building's condition. Aspects such as warranties and resale value should also be considered. The use of independent professionals to assist in this work is recommended.

Inspections



EIFS is a specialty product. Many home inspectors do not have the specialized knowledge needed to assess EIFS, although some do. If you need to have an EIFS inspected, use an inspector with specialized EIFS training; see back cover.

There are limits to what can be learned about the condition of an EIFS-clad wall by merely looking at it from the outside. A complete inspection involves opening up the wall and looking inside. This damages the wall, and requires patching.

Drainage EIFS

The use of drainage type EIFS is mandated by the building codes in some parts of North America; check to see what is required before selecting or building with EIFS. It is not possible to change a barrier EIFS to a drainage type.

Proper Use of EIFS as a Product

EIFS is intended for use on vertical exterior walls. The codes do not permit it to be used indoors, nor as a roofing material. Also, regular EIFS not a "below grade" insulation and waterproofing system, although EIFS types are available for this purpose.

Wrapping the Edge of EIFS

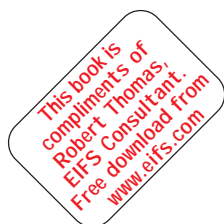


The edge of an EIFS should be sealed and strengthened by either wrapping the EIFS Base Coat around the edge, or by embedding metal or plastic trim into the edge; see examples on pages 12-13. The all-too-common method of simply butting the raw EIFS insulation and Lamina against an adjacent material (such as a window), without using any caulking, simply does not produce an effective weather seal.

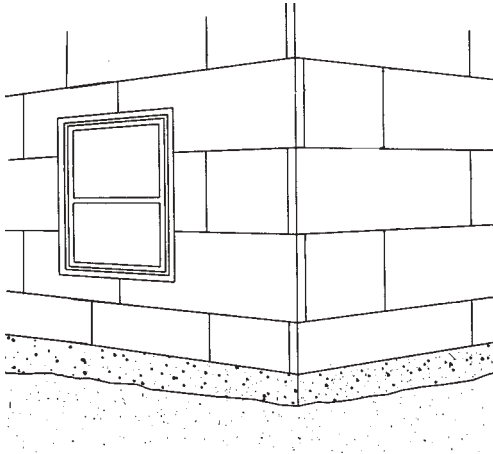
Insulation Thickness

The maximum thickness permitted for most EIFS is 4", and is often controlled by building codes. The minimum is usually 3/4". Using mechanical fasteners requires 1 1/4" or more.

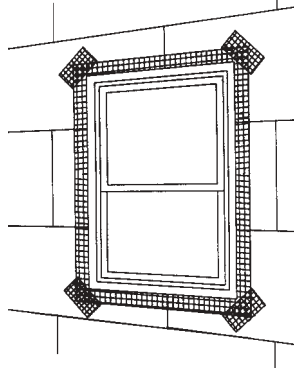
Foam Shapes



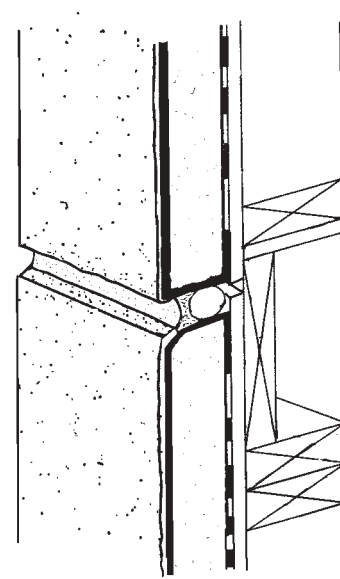
It is possible to create attractive surfaces by building up the thickness of the EIFS insulation. These "sculpted" areas are called "foam shapes". Although the codes generally do not allow thicknesses greater than 4", in practice it is often OK to do so on a limited basis; confer with local building department first. See examples on page 12. Be aware that there are also "foam shapes" that are not "the EIFS" per se, but are made by non-EIFS companies, and applied onto EIFS.



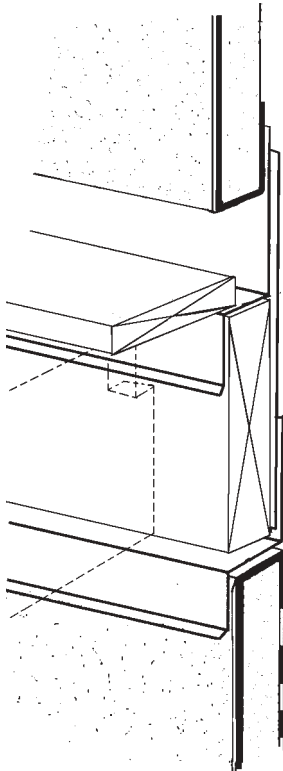
Interlocked Insulation Pieces at Corner; "L"-Shaped Insulation Pieces at Corners of Opening; EIFS Held Up Above Grade



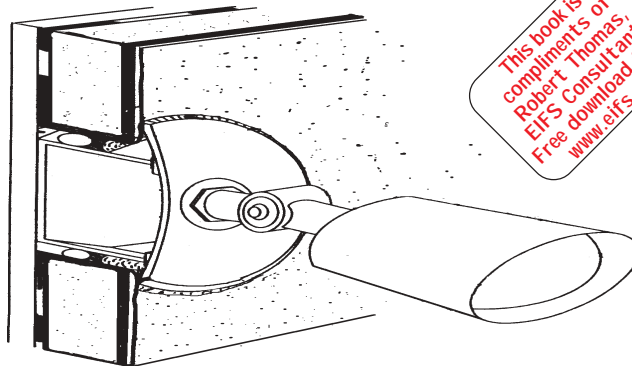
Diagonal Mesh and "L" Shaped Insulation Pieces at Corners of Openings



Expansion Joint at Floor Line



Deck Framing
Note that decks occur at floor lines, and a joint is needed there (see upper right, this page).

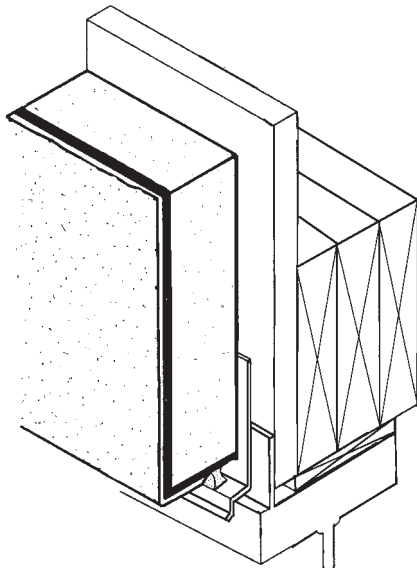


Light Fixture

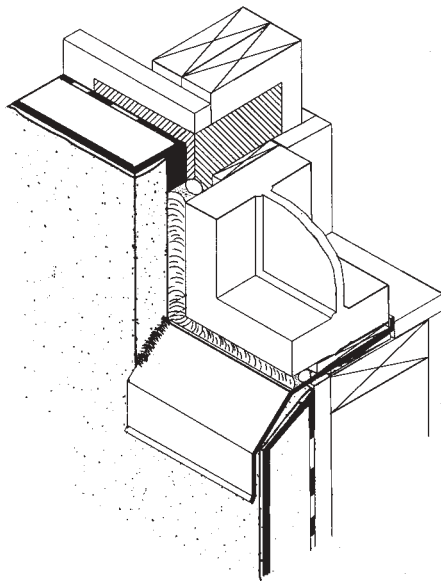
This book is compliments of Robert Thomas, EIFS Consultant. Free download from www.eifs.com



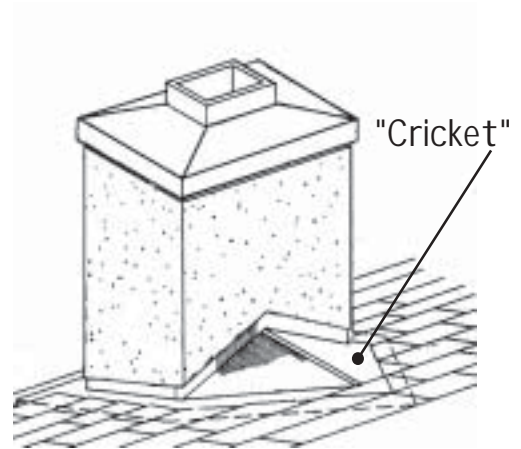
Foam Shapes



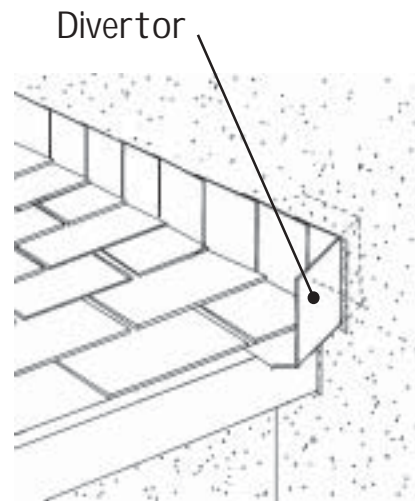
Window Head



Window Sill



A "Cricket" Flashing



A Divertor Flashing

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 Robert Thomas,
 EIFS Consultant.
 Free download from
www.eifs.com

IMPORTANT NOTE: The drawings shown on these two pages represent conceptual examples of a fraction of the ways in which EIFS can be installed. They are not complete details nor do they show all aspects of of the construction (flashings or attachments or sealants, etc.). The details above are for traditional barrier-type EIFS. Drainage-type EIFS vary considerably in their design, as each manufacturer's system is different; contact specific EIFS manufacturers for details of their systems. Almost all water leaks in walls with EIFS on them occur at the edge of the EIFS. Thus, in order to properly install a new EIFS, or to inspect an old one, it is critical to have full and complete drawings showing every condition at the edge of the EIFS. For a voluminous series of EIFS construction details for residential (wood frame) and commercial EIFS, see the *EIFS Design Handbook* (additional information about this book is available at www.eifs.com). See also the Caveat on page 1 of this book.



Introduction



Mixing the Adhesive -
A 2-Man Job

EIFS is usually installed by plastering companies, although drywall and painting contractors also sometimes install EIFS. Although it is possible for a handy home owner to install EIFS himself, professional skills are needed to do a proper job; EIFS is not a do-it-yourself product. Keep in mind that EIFS materials are normally only sold to "approved" EIFS contractors through specialty distributors, so home owners will have trouble getting their hands on EIFS materials anyway.

Most EIFS manufacturers have videos showing how their systems are installed. Some of these are very well done. See listings on outside back cover to contact them for a copy.

EIFS is almost always installed directly onto a home's walls at the construction site from scaffolding. This means that direct access to the building's wall is needed from below. Sometimes shrubbery and other objects are in the way, requiring creative solutions to get at the wall.

Installing EIFS - The Basic Steps



The following is a highly condensed description of how a typical EIFS is installed. There are many other steps, particularly at the EIFS's perimeter and at openings.

Installing EIFS involves 3 basic steps. They must be done in this sequence, and time must be allowed for each layer to cure or dry, prior to proceeding with the next step. Keep in mind that 3 days are needed to do even the smallest EIFS installation, as 1 day of curing is needed between each of the 3 steps. Please note that when mechanical fasteners only are used, as soon as the insulation is attached, the Base Coating can be applied. This eliminates 1 day of waiting. Here are the basic steps.

Step One: Attach the Insulation



Applying the Adhesive

The Substrate is inspected for defects and any that are found are corrected.

If a drainage EIFS is being installed, the water barrier is now applied over the Substrate. Some drainage EIFS also use a separate spacer material to form the drainage cavity. If the EIFS being installed uses a spacer, then the spacer is installed now, over the water barrier.

If an Adhesive is used to attach the EIFS, it is first prepared by stirring and/or mixing-in such materials as water and portland cement. If the adhesive uses portland cement, it must be used immediately as it begins to cure as soon as the cement is added. The prepared adhesive is then applied to the back side of each insulation board with a trowel, and then the insulation is pressed against the Substrate. The adhesive "grabs" the Substrate, and the newly attached



Embedding The Reinforcing Mesh

Step Two: Apply the Base Coat



Applying the Finish

Step Three: Apply the Finish



The Perimeter of an EIFS

Weather Restrictions



Insulation board is pushed snugly against the adjacent pieces. Adjacent insulation pieces are then added to the Substrate until the wall-area being worked-on is complete. The Adhesive is allowed to cure overnight.

If mechanical anchors are used, the Insulation boards are held against the Substrate, and the fastener screw (with integral washer) is driven through the Insulation and into the Substrate using an electric screw gun. The outside face of the plastic washer is "set" flush with the outside face of the Insulation.

The surface of the Insulation is inspected for defects (dents, gaps between Insulation pieces, etc.), and any defects are corrected. The surface of the insulation is sanded lightly to make it smooth.

Base Coat Adhesives are prepared in the same manner as Attachment Adhesives. The prepared adhesive is spread on the Insulation with a trowel. The Reinforcing Mesh pieces are immediately embedded into the wet adhesive, with their edges overlapped. The adhesive is trowelled to force it through the Mesh, and then smoothed to **fully embed** the mesh (mesh color not visible) and to make the surface flat.

If heavy Mesh is used to improve the EIFS's impact resistance, the heavy Mesh is added to the Insulation first, and then a layer of regular Mesh is applied over it. Heavy Mesh pieces are not lapped at their edges.

The dry Base Coat is inspected for defects and any found are corrected.

The Finish is stirred (like paint) and then applied with a trowel (or perhaps by spraying) to the Base Coat. The Finish is then textured with a trowel-type tool to produce the desired final appearance.

After the Finish has dried, the perimeter of the EIFS is finished-off, by using sealants or flashings, etc.

The perimeter of the EIFS is terminated either by wrapping the Base Coat around the edge of the Insulation, or by embedding metal or plastic trim.

With drainage EIFS, the bottom edge of EIFS wall areas is usually left open in some manner to allow water to exit.

EIFS must be installed at above-freezing temperatures. The EIFS industry standard is 40°F or above when applied, and to remain so for at least 24 hours. This means in cold weather the work area must be enclosed and heated. Similarly, until cured, EIFS can be washed-off by rain, and hence protection is also needed from precipitation.



Introduction

Inspecting an EIFS is, in many ways, no different than inspecting walls that use other types of wall materials. This section covers idiosyncracies of inspecting EIFS.

The Outside is Only Part of the Story



EIFS is a material that is used as the outside face of a wall. Obviously it completely covers whatever is behind it. Although an EIFS itself may look fine from the outside, problems with the EIFS and the wall structure may be hidden behind the outside surface of the EIFS. Since EIFS cannot be disassembled and reassembled without reinstalling new EIFS materials, a thorough inspection is rarely possible without poking holes in the wall. This scars the walls, and is expensive and time consuming. When buying or selling, this intrusive (damaging) work on the building may be an issue: the owner doesn't want the wall to be scarred and the prospective buyer doesn't want to incur the expense. Luckily there are some nondestructive inspection techniques that will give you some idea of the condition of the wall without damaging the wall in the process.

Common Problems

The most likely within-the-wall problem is water intrusion and its effect on wall materials. Also possible are mildew problems, as well as various types of structural problems. Problems on the outside of the wall include cracks, color/texture problems, impact damage, and failed sealant joints. All these issues are covered on the following pages.

Where to Start



It's possible to dig into an EIFS wall from the indoors and from the outdoors. Indoor inspections have the advantage that they can be done during bad weather, but they require disrupting (dust, noise, etc.) whatever is going on indoors. Inspections from indoors also means taking apart much of the wall to get at the backside of the EIFS insulation. Inspections from outdoors requires decent weather, and access to the wall. Both approaches involve intrusive, destructive removal of materials, and patching of the affected areas.

Moisture Meters



A common leak investigation technique is the use of moisture meters. These are electronic devices that indicate the amount of moisture in a material. Their use requires practice to produce valid information. They cost a few hundred dollars to a thousand or more. There are two basic types:

The most common type is a small, calculator-sized meter, which is connected via a cable to a wand. The wand has what looks like two parallel metal ice picks sticking out of it. The picks are inserted through holes in the EIFS (which must later be patched) and into the material to be measured, such as the studs and sheathing. This type of meter gives an actual moisture percentage reading, but only works on certain materials, like wood. Most of these meters are not designed to measure moisture in insulation or gypsum products.



A second type of meter looks like a laundry iron. It is moved across the surface of the EIFS and gives an indication of the relative moisture level beneath it; it does not give an actual percentage. It will also pick up the presence of pipes, metal and other conductive materials. This type of meter does not damage the wall at all, and is often used as a screening device for locating areas that may be too damp.

When using moisture meters, make a sketch of the area being investigated and record where the probes were made, and the meter readings. Patch the probe holes when done (a dab of matching caulking works well). Hint: usually damage is at the top or bottom of an opening, and fans out into the adjacent area below; high readings are rare in the "field" of a wall, unless there are cracks in the EIFS coatings.

Be Methodical

Properly assessing the condition of an EIFS wall requires being methodical. This means looking carefully for all problem sources, and not overlooking any. For example, just because a leak source has been identified, does not mean that it's the only one. Repairing only the one that has been found will thus not resolve your problem.

Whose EIFS Is It?

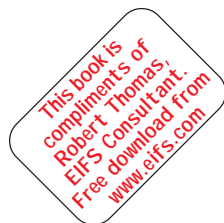


Although EIFS are proprietary products, there are many similarities, and differences, in the way they are installed. In order to know how a given EIFS should have been installed, you need to know whose product it is. Most EIFS, once installed, are indistinguishable, but you will need to know whose product it is in order for the Manufacturer to be willing to help you; Ford dealers don't fix Chevies. Local EIFS distributors and contractors can sometime help you determine whose product it is. You should be aware that while it is technically possible to take samples of an EIFS and have it analyzed in a lab to determine whose product it is, this is an expensive proposition, requiring cooperation with EIFS Manufacturers, and is sometimes inconclusive.

Keep Records

You should take photos, make notes and generally record what you did, what you saw, who was present, and when it was done. An easy way is to take photos and mark them to show the work.

EIFS Inspectors



Trained EIFS inspectors do exist; see back cover for leads to individuals by contacting the organizations that train them. Ask for reference project names and a sample of an inspection report. Also, ask about their EIFS training and how long they've done this sort of work.

"Strip It All" Fixes

Beware of recommendations to strip the entire EIFS in order to fix it. It is often not necessary. Usually damage is confined to the immediate area of water intrusion, not the whole wall.



Introduction

Cracks in EIFS are usually small splits, normally not much wider than the thickness of a credit card. Cracks in EIFS can be an inch or less in length, or can go on for many feet. Big "cracks", caused by impact forces, are covered on page 25.

Cracks are one defect that can be seen from the outside and do not require digging into the wall to determine their presence. However, sometimes you'll need to get right next to them to see them. In other words, some defects can not be seen from the ground, or they may be "hidden" in the corner of an opening, etc. Being a flexible synthetic product, EIFS is not crack prone itself, so cracks in EIFS are usually either due to a design or installation problem, or failure of the EIFS material (very rare).

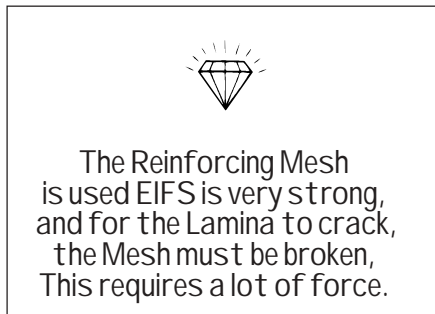


Where to Look

Cracks can occur in the field of the wall or at changes in the wall surface, such as at aesthetic reveals and at corners of openings. Changes in the thickness or shape of the wall's surface are likely crack locations as such changes in the walls geometry tend to concentrate the forces in the EIFS, aggravating the tendency to crack.

Causes

Cracks in the EIFS Lamina are due to overstressing the Lamina to the point where it splits open. There are many reasons why this can occur. Here are some common ones:



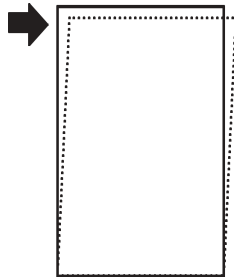
1. Reinforcing Mesh is not present at all.
2. Reinforcing Mesh is not lapped at the crack location.
3. Gaps exist between ends of Insulation boards.
4. Adhesive exists between ends of Insulation boards
5. A joint is not present where one should be.
6. The wall flexes too much.
7. The Reinforcing Mesh has failed.
8. The wrong type of Insulation was used.
9. The Insulation board has shrunk within the EIFS.
10. Racking forces are present at the corners of openings.
11. The Mesh was damaged as it was being installed.
12. The depth of an aesthetic reveal is too deep.

Which is THE Cause?

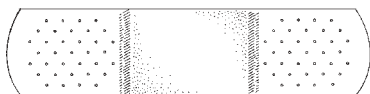
Determining which one of the above causes is the true cause of a given crack takes some detective work. Here are some guidelines on how to handle each of the above causes. The number(s) at the beginning of the following paragraphs refer to the numbered problem causes listed above.

1 and 2. Remove the Lamina and view it edge-on with a microscope to confirm the presence of Mesh. You'll be able to see the Mesh as a thin white line within the Base Coat.

3 and 4. Remove the whole EIFS (back to the Substrate) and see if there is a gap or adhesive between the ends of the Insulation pieces. There should not be any adhesive between



Racking:
The opening goes "out of square" due to forces in the plane of the wall,



Band Aid (surface-applied) fixes are only good for temporary repairs. You'll need to dig into the EIFS to do a permanent one.

The Correct Fix



the Insulation board ends, or a gap there either; the board ends should be butted tight.

5. Look at the building's drawings or check the actual construction of the wall by tearing into the wall (a contractor or architect may be needed) and see if conditions requiring a joint exist, but have been covered over by the EIFS.

6. Enlist the help of an engineer to determine if the wall moves too much or is inadequately braced. It may be possible to do this using engineering calculations, or by digging into the wall to see how it was actually built. Also, check to see if the wall was subjected to excessive wind forces, such as a hurricane.

7. Remove the Lamina and have it checked at a testing lab to see if the Mesh is still present or has gotten weak. This type of defect usually shows up as lots of small vertical and horizontal cracks all over the EIFS's surface.

8. Remove the Insulation to see if it is the right kind. It might be the wrong material type, or the wrong density.

9. Remove the Insulation and Lamina at Insulation joints and check to see if it shrunk after being installed. Shrinkage can show up as insulation that is bigger on one side of the Insulation piece than on the other (this can cause the edge of the Insulation piece to appear beveled).

10. A structural engineer can determine if racking is an issue. If the required solid insulation pieces and diagonal Mesh pieces have not been installed, this can be determined by removing a section of the Lamina at that location.

11. Remove the Lamina and have a testing lab look at the Mesh to see if it, or its coating, was damaged by zealous installation techniques or by bending it too sharply.

12. Measure the Insulation thickness at bottom of the aesthetic reveal groove to see if the minimum thickness (usually 3/4") has been maintained.

Cracks can let in water, which can result in additional problems with the wall. Once you locate them, it's smart to seal them until proper repairs can be made. Proper repairing of cracks usually requires removing the EIFS back to the Substrate, and replacing it.

The key to fixing all the above defects is to find all the true cause(s). Only by doing so can an effective repair be assured. Many defects have multiple viable repair options, see pages 27 and 28 for basic repair techniques.



Introduction

As a seamless product, it's pretty hard for an EIFS itself to leak in the middle of a blank wall area. When looking for leaks, concentrate your efforts at the EIFS's perimeter.

Where to Look

Leaks usually occur via one of the following mechanisms:

- A. Through a material itself; The EIFS? The caulking? Or???
- B. Through an assembly of materials: The windows?
- C. At interfaces between materials: EIFS-to-windows?

How to Look



And you think
you have leak problems?

In order to leak, water must be present (rain, condensation, etc.), a force must exist to make the water move (gravity, wind, air pressure, etc.), and an opening for the water to go through must exist (a gap or hole). If any one of these 3 do not exist, then a leak can not occur.

A common technique for tracking down leaks is to spray water on the wall from the outside, and see where the water shows up. Sometimes this is done in conjunction with applying a vacuum (using a fan) from the indoors to induce the water to flow. Although this type of testing would appear simple, there are numerous tricks to running such tests properly; you probably will want professional help if the leak source(s) are not obvious. If the leaks are gross, then a hose spray may work as a do-it-yourself approach.

Causes

Here is a list of the common causes of leaks in EIFS walls.

1. Sealant has come to the end of its life.
2. Sealant has become de-bonded from the EIFS.
3. The sealant itself is defective (production defect).
4. Flashings were improperly designed and/or installed.
5. EIFS-to-window not properly sealed, or not at all.
6. Windows themselves leak.
7. Window weep holes are plugged.
8. Surface mounted objects are not properly sealed.
9. Penetrations through the EIFS are not properly sealed.
10. EIFS itself is porous.



Which is THE Cause

First, for all the above situations, the water spray method described above can often be used. This may involve removing the interior drywall to see if water is getting into the stud cavity. Considerable water, applied over an extended period, is often needed, as many walls can absorb a lot before leaks actually appear. This is why some walls only leaks when it "rains hard" (i.e., the wall still is leaking during "soft" rains).

When doing water spray tests, mask off (with plastic film and tape) the area that you do not want to expose to water. This allows the water to be isolated to certain



No kidding. If you are a do-it-yourselfer, you may be able to save a lot of \$ by using your garden hose to find the leak.

But it takes a lot of water over a long time. It takes at least 2 people, too.

Sealant Problems

Flashing Problems

Unsealed Openings

Leaky Windows


Don't assume that "quality" windows don't leak --- many do

Improper Seals

Porous EIFS

areas, thereby pin pointing where the leaking is occurring. Work from the bottom up, so that the areas above stay dry until you soak them.

Often leaks come from multiple sources, so don't get overjoyed by finding just one; there may be 2 or more. Be methodical and find them all before commencing repairs. Below are some ideas on how to track down leaks from the above list of sources. The numbers at the beginning of the following paragraphs refer to the numbered problem causes listed above. See pages 27-28 for basic repair techniques.

1, 2 and 3. Removing sealant can be problematic. Often the EIFS is damaged in the process, and the ensuing repairs are fussy and quite expensive. See page 28 for basic information about removing sealants.

4. Sometimes leaky flashings can be fixed by simply sealing the leaking area. However, sometimes the flashing must be removed and modified (or replaced), which can disrupt the entire flashed area, and require removing and replacing sections of EIFS.

5. EIFS-window interfaces can often be sealed without removing the window. It's just a matter of doing so by applying a new bead of sealant where it was supposed to go in the first place.

6 and 7. Leaky windows can sometimes be repaired by plugging the leaky part of the window with a sealant. For example, unsealed mounting holes in the bottom of the window frame, or unsealed joints between frame pieces are common culprits. Clogged window weep holes can often be simply cleared; it's a DIY job.

If the window itself is in bad shape (old and rotting wood ones are a classic case), they may need to be removed and replaced. This can be difficult as it may involve cutting away the EIFS to get it out.

8 and 9. Sealing these leak sources can be as simple as caulking them shut, or as difficult as removing the sealed materials, cutting back (and rebuilding) the EIFS, and properly sealing the opening once and for all.

10. This is a very rare condition, but it can be confirmed by removing a sample and testing it at a lab, or by applying water to the surface and seeing if it goes through. Professional help is needed on this one.





Introduction



Mold is a living biological "creature" that grows when certain conditions are present (such as temperature, humidity and a "food" source). It can attack wood-based products, and other construction materials, causing deterioration. It can have adverse health affects. The presence of mold in a wall is not caused by the EIFS per se, but can occur in walls that are clad with EIFS. EIFS does not cause mold to grow (EIFS does not "attract" mold, nor does it act as a mold source, nor it grow within EIFS itself). In fact, EIFS adhesives and Finishes contain chemicals to inhibit the growth of mold.

Where to Look

Mold's presence can be detected by a number of means:

- A. Visually, seeing it in the cavity or by stains on the walls.
- B. "Nasally", by a musty odor
- C. Health-wise, by not feeling right.
- D. Structurally, by its adverse effects on the wall framing.

How to Look

If mold is in the cavity (such as in the fiberglass insulation) or in (or on) the wood wall materials, opening up the cavity and looking inside is the sure way. This can be done by cutting holes in the wall and peering inside. Some building defect investigators use a pricey mini TV camera called a borescope which can be inserted like a stiff rope into the wall cavity through a small hole, and used to snoop around inside the cavity, without having to cut large holes in the wall.

Types of Mildew



People are sensitive to mildew to various degrees; some are unaffected, while others are quite sensitive. The nastiness of mildew varies with its species, and some are said to be quite un-benign. Samples of mold can be analyzed in a lab, and their concentration and type can be determined. An industrial hygienist does this type of work, and is thus a professional type of activity.

Causes

The formation of mildew is caused by the presence of spores (which exist everywhere in small quantities) and the right conditions for their propagation (temperature, humidity, food source, etc.). Mildew can go dormant if conditions do not fit its growth parameters, but can come back to life if the conditions improve. The presence of moisture tends to increase mildew problems. Water from condensation, and leaks, can thus help to fuel the fire.

The Fix

If you suspect that you have mildew problems, especially if you are known to be sensitive to mildew or have symptoms, you should seek professional help in resolving it. This can mean disassembling the wall to remove the offending materials, eliminating the source, and rebuilding the wall. Getting rid of mildew is not a simple matter of spraying materials to remove it; it is an insidious problem.





Mechanical Fasteners



The use of metal framing is increasing in house construction. This increases the "thermal bridge" problem. EIFS helps by cloaking the framing with insulation.

Mechanical fasteners should be "seated" flush with the outside surface of the Insulation. Their presence may be visible as a different color of the Finish, due to a "thermal bridge" through the EIFS insulation layer; the fasteners are at a different temperature than the surrounding Insulation. If the fasteners are properly "seated", then his "problem" is often transient, causes no harm, and goes away as the Lamina's temperature stabilizes. However, if the fastener is not flush, it can lead to cracking at the fasteners.

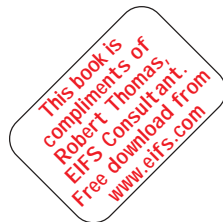
The Fix

No fix is needed, nor really practical for properly seated fasteners. For fasteners that are not flush, it can be corrected somewhat by applying a new Lamina over the old one.

Insulation Board Joints

Sometimes the outlines of the Insulation boards are visible. This is usually due to gaps or adhesive between the ends of the Insulation boards. In either case, a difference in heat and moisture flow through these areas causes the edges of the boards to be visible. This is aesthetically objectionable, but needs to be remedied because it can cause cracking at the board joints (which looks worse, and can cause leaks).

The Fix



The fix is difficult, as the problem is buried within the EIFS. Putting a heavy new EIFS Lamina over the old one may help. Cutting out isolated joint areas and replacing them is also effective. If the problem is widespread, the EIFS itself may need to be stripped, as stripping the Lamina usually ruins the surface of the EIFS Insulation.

Flatness

The thinness of the EIFS Lamina causes it to follow the contour of the Insulation. If the Insulation was not sanded prior to applying the Base Coat, or if offsets exist between the outside surface of adjacent Insulation boards, then the wall may appear wavy. This defect usually occurs when light shines parallel to the wall's surface.

The Fix

This is purely an aesthetic issue, and can be fixed by skimming-out the Lamina with a thick, flat layer of EIFS coatings (check with the EIFS Manufacturer for specific materials to use), or by removing the Lamina, sanding it flat, and reinstalling the Lamina.

Mesh

Sometimes the Reinforcing Mesh is visible through the Finish. This means that the Finish is too thin and that the mesh is not fully embedded in the Base Coat. This can cause problems, such as cracking, as the mesh is not well protected from the elements.

The Fix

Stripping and reinstalling the Lamina is one solution, but is expensive (the Insulation gets damaged, etc.). It's easier to apply a whole new Lamina over the old one.



Introduction

EIFS is a lightweight material and does not lend itself to "Rambo" cleaning techniques. Harsh solvents can leach through the Lamina and dissolve the Insulation, while aggressive physical cleaning techniques (water blasting, sand blasting, wire brushes, etc.) can tear apart the Lamina. Hence, gentle cleaning techniques are in order.

Plain Old Dirt

If the EIFS Finish is just "dirty" from everyday exposure to the environment, simply scrubbing it with warm water, a bristle brush and detergent will often do the job. It is possible to use pressure washers on EIFS, but you must be careful because they can damage the Lamina. The method that works is to use a lot of water at low pressure, and not a little water at high pressure.

Color



Large existing EIFS areas are usually painted using a roller. A brush is used for detail areas.

If the color is wrong, or if you want to change it, the solution is easy: paint it. Acrylic house paint can be used in most cases (some EIFS Finishes are not compatible; check with EIFS Manufacturer), or better yet, use the paint version of the Finishes, available from EIFS Manufacturers.

Rust

Once in a while the Finish may have bit of iron in it. This can come from minute iron particles embedded in the Finish's texturing granules, or from iron filings somehow getting into the Finish. These particle "bloom" when wetted, resulting in long vertical stains, which will eventually go away on their own. If you want them gone now, pick out the offending particle and use a commercial EIFS-type rust remover to get rid of the stain.

Texture

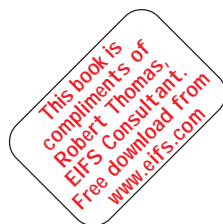


An EIFS's texture is a physical thing and can not be changed other than by removing the Lamina and replacing it (very expensive), or putting a new Lamina over it. Applying a new Lamina involves filling-in the texture of the existing Finish (making it smooth) and then applying a new Finish. It is not possible to put Finish over Finish directly. Check with EIFS Manufacturer for specific products to use.

Graffiti

The "Rhode Scholars" who do their "artwork" often use epoxy or urethanes or other tenacious paints that are nearly impossible to remove. The only really practical solution with EIFS is to paint over their wisdom.

Stains



Stains include wood stains, roof mastic and all manner of nasty materials. Most can not be removed safely from EIFS, and thus need to be painted over.

Mildew

Mildew on an EIFS's Finish can be removed using a dilute mixture of ammonia and warm water; contact EIFS Manufacturers for concentrations. Keep in mind that the mildew will come back unless the surface (usually one with a shallow slope or in a humid area) is kept clean by maintenance.



Woodpeckers



Melanerpes carolinus

Woodpeckers have a strange affinity for EIFS. They bore through the Lamina, augured out the Insulation and make a home inside the EIFS. Some species are migratory, and will come back (don't be too sure that you did get rid of them by shooting them away). Many species are endangered; killing is a no no. You can try fake owls and snakes, high tech sirens, or even foul smelling liquids. Someone even built an EIFS bird house to entice them. They didn't buy it. Good luck.

Impact



EIFS can be damaged by all manner of objects: cars, forklifts, runaway barbecues, lawn mowers, etc. It's smart on new buildings and old ones to somehow physically separate the impact source from the EIFS (shrubbery, railings or whatever). To fix impact damage, the area needs to be removed and replaced, as described on page 27.

A maintenance hint: do not stand on EIFS window sills or EIFS foam shapes (no matter how wide they are) or lean ladders against exposed EIFS edges. It will dent or crush the EIFS, or maybe even come off (if it's a foam shape). Instead, use something to spread out the forces, and pad it with carpeting.

Hidden Sealant Joints

Occasionally it will look like the interfaces between EIFS and adjacent materials (usually windows) have not been sealed because there is no caulking visible. Don't assume so. There is a special type of seal which is placed between the end of the insulation and the window, and over which the EIFS Lamina is applied. Thus the seal can't be seen. This type of seal is made of an expanded foam tape. To determine if such a seal exists beneath the Lamina, you'll need to probe behind it and see if it is there. Even if it is there, do not assume that it is leak-free. Just like traditional wet-applied caulking, this type of seal can also leak, and hence needs to be investigated to make sure it is working OK. If it is not performing properly, you can simply apply caulking over it (doesn't look as good, but it works).

Building Fire



2 Story EIFS Fire Test

When exposed to fire, an EIFS gets damaged. Not only does the Lamina get toasted, but the foam melts underneath. If the fire is severe, the supporting wall may also be affected. The solution is to remove the EIFS in the affected area and replace it. Work from the center of the affected area outward until you reach the point where the EIFS is not affected at all, and then replace it.

Heat

Just as in a building fire, high temperatures can melt the Insulation. A hot BBQ grill can do it. So can reflected light off a skylight onto a dark (heat absorbing) Finish.

Commercial Maintenance Products

All sorts of special products (chemicals, tools, paints, etc.) for cleaning, installing and maintaining EIFS are available. See outside back cover for sources.



Introduction

The word "delamination", when applied to EIFS, means that the wall is coming apart in terms of the wall's various layers no longer being properly connected to one another. Clearly this can be a safety issue, and it can take several forms. The most basic form is a hurricane simply pulling the whole wall apart. A more EIFS-specific version is the EIFS coming apart internally, such as one layer becoming detached from another. If you are experiencing delamination problems with EIFS, this section will help you.

EIFS Lamina



Finish not bonded to Base Coat

It is possible, although rare, for the EIFS Lamina to come apart. It's also possible for the Finish to not be well bonded to the Base Coat (for various reasons), as well as for the Base Coat to come off the Insulation. This is not an easy situation to remedy, as it is a chemical problem and defies simple approaches, such as some sort "magic" coating that can somehow rejuvenate the EIFS; there ain't no such thing. So talk with the EIFS Manufacturer about what works with their products; certain products and repair techniques can be effective in certain situations. This is one area where an EIFS consultant may be your only hope.

EIFS From Substrate



Failure of sheathing attachment to Substrate

It is possible for the EIFS to come detached from its Substrate. This can be due to high wind forces (or simply not enough mechanical fasteners being used), as well as from adhesive "bond" problems". Bond problems can be due to incorrect procedures (temperature, dust, etc.) occurring during application of the EIFS, as well as contamination of the Substrate surface (thereby inhibiting bonding). It is also possible for the Substrate to get damaged from water leaks, thereby losing its strength.

The solution to loss of attachment to the Substrate is to attempt to reattach it. This is not easy, as the problem is buried in the wall. Trying to pump adhesive between the EIFS and the Substrate does not work. Using mechanical fasteners (and then burying them under a new EIFS Lamina) can be effective. In the case of severely deteriorated bond or Substrates, the removal of the entire EIFS may be the only viable solution.

Supporting Wall Failure



Various conditions can occur wherein the wall to which the EIFS is attached fails. This includes rotting of the wood framing, and deterioration of the sheathing. In addition, the fasteners that hold the sheathing onto the studs may be inadequate, allowing the EIFS and the Substrate to come off in one big piece under extreme wind conditions.

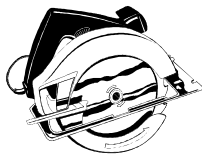
All these problems require tearing apart the wall and getting at its basic structure. This is no minor task. The damaged or ineffective areas need to be replaced, and the EIFS itself reinstalled.



Introduction

A number of basic repair techniques are used to fix a wide variety of common EIFS problems. They are listed below, and will give you a clue as to how these types of repairs can be done. For all these repairs, the use of an EIFS Contractor is recommended. They have the proper tools and can help assure a decent-looking end result.

Remove/Replace Piece of EIFS



A circular saw with a masonry cut-off blade can cut through the EIFS right to the Substrate. Just set the depth to the thickness of the Insulation, and saw away. Watch out for the dust!

When impact damage occurs, or for some reason it is prudent to remove a small section of the EIFS (i.e., not a whole EIFS wall) back to the Substrate, and to then to replace the whole EIFS, this is one way to do it:

- Cut to Substrate using circular saw (see left).
- Gently pry loose the cut out area, and remove it.
- Grind away the Finish outside of cutout area.
- Make an insulation "plug" that snugly fits into cutout.
- Install plug to Substrate using Adhesive or fasteners.
- Apply Adhesive to Insulation and ground-away area.
- Embed Mesh in wet Base Coat Adhesive.
- Apply new Finish, and blend-in.

EIFS Manufacturers have instructions for this basic technique, as well as videos. It's not as hard as it sounds.

Remove Entire EIFS From Wall

This technique works when large areas of the entire EIFS must be removed from the Substrate. Keep in mind that the Substrate will often get damaged during this process, and will need to be replaced.

- Use circular saw as a described at left
- Cut vertical slots 1' apart from top to bottom of wall
- Slip pry bar under EIFS and pry EIFS off in strips

Removing EIFS Core Samples



Sometimes you may want to take samples of the EIFS to see such things as the Base Coat thickness or the condition of the Insulation. You can also use this technique to see if there is adhesive or air gaps between insulation board edges. You'll need a hole saw with a long "barrel" in order to reach the Substrate if the EIFS Insulation is thick. Here's an easy way to do so.

- Use cordless drill with 3" hole saw with carbide teeth.
- Drill through EIFS to Substrate.
- Using the drill, pull the "plug" out of the wall.
- Slip the "plug" out of the hole saw barrel.

Sample Record Keeping

Whenever removing samples, here are some hints (especially if lawyers are lurking around):

- Keep a list of all the samples taken.
- Give each one a unique identifier, and mark each sample.
- Take a close-up photo of each sample.
- Store each sample in it's own Zip-Lock bag.



Remove/Replace Failed Sealant



A utility knife often works well for slitting sealant beads

This is a fussy, time-consuming process, but can be done.

- Slit old sealant immediately adjacent to EIFS.
- Carefully pull out old sealant. Try to not damage EIFS.
- Grind away old sealant until Base Coat is visible.
- Repair Base Coat if it is damaged during this process.
- Check for damage to sheathing and framing, and repair.
- Prepare Base Coat for sealant (primer, if needed, etc.)
- Apply new sealant (and backer rod, if needed)

Because this process is so tedious, sometimes it is easier to remove strips of the EIFS on either side of the joint, and then to rebuild the joint using new EIFS and new sealant. The technique described for removing the whole EIFS, and replacing it, described on the previous page can be used.

Apply New Finish Over Old

Various situations may point toward applying a new Lamina (or Finish) over the old one. Here is "Cliff Notes" idea of how to do it.

- Clean the existing Finish carefully.
- Fill-in Finish with noncementitious Base Coat Adhesive.
- If a reinforced Base Coat is needed, use Mesh too.
- Apply the new Finish to the new Base Coat.

EIFS Manufacturers should be contacted for advice about specific products that are suited for this repair technique. For example, sometimes a material different than a Base Coat Adhesive is used in the second step, or sometimes a primer is first applied over the old Finish.

Applying Sealant Where None Exists



This technique can be used around windows, doors, and other places where the EIFS abuts another material, but where the sealant was never installed. The term "window" will be used to represent any adjacent surface. The correct primer to use depends on the surface (EIFS or window, etc.) and the sealant. A "bond breaker" is a piece of tape or foam rod that keeps the sealant from bonding in the corner of the "V" of the joint. The technique is as follows:

- Grind the Finish on EIFS down to the Base Coat.
- Clean the Base Coat and the window.
- Apply masking tape to window and EIFS.
- Apply primer to EIFS and window.
- Install a bond breaker in the "V" between window and EIFS.
- Apply sealant and smooth bead to make even.
- Remove masking tape before sealant cures.

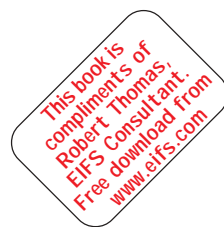
The masking tape assures a straight edge for the sealant. It is applied right at the edge of the ground off Finish area.



Use this checklist to ensure that all basic aspects of an EIFS are being installed properly (for new construction) or has been done properly (for existing EIFS buildings).

Check Here
if OK

- | | |
|---|---|
| 1. What EIFS brand and specific EIFS product is involved? | 0 |
| 2. Is the type of EIFS (barrier vs. drainage) correct for this building? | 0 |
| 3. Is the EIFS contractor acceptable to the EIFS Manufacturer? Who is it? | 0 |
| 4. Is the EIFS Substrate a type acceptable for use with this specific EIFS product? | 0 |
| 5. Have local code requirements been looked-into and complied-with? | 0 |
| 6. Are construction detail drawings available for all wall conditions? | 0 |
| 7. Do the construction details used comply with the EIFS Manufacturer's guidelines? | 0 |
| 8. Have samples of the EIFS Finish color and texture been provided, approved and retained? | 0 |
| 9. Is the sealant being used acceptable to the EIFS Manufacturer? | 0 |
| 10. Is the EIFS being used on the outside of exterior walls only, and on vertical surfaces only? | 0 |
| 11. Have joints been installed in the EIFS where required? At floor lines? | 0 |
| 12. Has the EIFS been held up above grade and other horizontal surfaces? | 0 |
| 13. Has heavy Mesh been used where impact damage can occur? | 0 |
| 14. Have diver tor flashings been installed at the low end of sloping roofs where EIFS walls are above? | 0 |
| 15. Have cricket flashings been installed where sloped roofs meet EIFS-clad chimneys? | 0 |
| 16. Have objects that are mounted on the EIFS been properly supported and sealed? | 0 |
| 17. Are sloped surfaced steeply sloped, and short in length, or have flashings been used? | 0 |
| 18. Is the perimeter of the EIFS finished by back wrapping or edge wrapping or by using trim? | 0 |
| 19. Have objects that go through the EIFS been sealed? | 0 |
| 20. Do flashings, if used, have adequate lap over the EIFS to prevent water blowing up and under? | 0 |
| 21. Is the sealant flexible? Is it well-bonded to the EIFS Base Coat (not to the Finish)? | 0 |
| 22. Are there cracks in the EIFS? In the field of the wall? At openings? At aesthetic reveals? | 0 |
| 23. Is there bulging of the EIFS? Is the EIFS well-attached to the wall? | 0 |
| 24. Are there stains or other indications of water leaks on the EIFS or indoors? | 0 |
| 25. Can the Base Coat or Reinforcing Mesh be seen below the Finish? | 0 |
| 26. Is the Base Coat thick enough? | 0 |
| 27. Are drains open at the lower edge of drainage EIFS? | 0 |
| 28. Are windows leak-free and of a type suitable for the site conditions? | 0 |
| 29. Is there a musty odor, stains or other indications of mold/mildew within the wall? | 0 |
| 30. Is the color and texture uniform? | 0 |
| 31. Is there any unrepaired damage to the wall (holes, dents, etc.)? | 0 |
| 32. Are the edges of the insulation boards visible? | 0 |
| 33. Is the perimeter of the EIFS sealed at all locations? | 0 |
| 34. Has a warranty been issued for the EIFS ? (Get copy) | 0 |
| 35. Is there correspondence regarding EIFS issues on the building? (Get copies) | 0 |
| 36. Does the EIFS have "foam shapes" that are not part of the EIFS product itself? | 0 |



SOURCES OF EIFS INFORMATION

EIFS Manufacturers

Dryvit
One Energy Way
West Warwick, RI 02893
1-800-556-7752
Fax: 401-822-4510
dryvit.com

Finestone
3550 St. John's Bluff Rd. S.
Jacksonville, FL 32224
1-866-659-3133
Fax: 904-996-6130
finestone.cc

Master Wall
4705 Milgen Road
Columbus, GA 31907
1-800-755-0825
Fax: 706-569-6704
masterwall.com

Omega Products
282 South Anita Dr.
Orange, CA 92868
714-935-0900
Fax: 714-935-0800
omega-products.com

Parex
POB 189
Redan, GA 30074
1-800-537-2739
Fax: 770-482-7872
parex.com

Pleko
915 W. Memorial Blvd.
Lakeland, FL 33815
863-683-6726
Fax: 863-683-6728
plekoeifs.com

Preswitt
3636 East 4th
Burnaby, BC V3A 4N5
Canada
604-533-3368
Fax: 604-294-8184
preswitt.com

Senergy
3550 St. John's Bluff Rd. S.
Jacksonville, FL 32224
1-800-221-9255
Fax: 904-996-6300
senergy.cc

Sto
P.O. Box 44609
Atlanta, GA 30336
1-800-221-2397
Fax: 404-346-3119
stocorp.com

Stuc-o-Flex
17639 N.E. 67th Ct.
Redmond, WA 98052
1-800-305-1045
Fax: 425-869-0107
stucoflex.com

TEC (H.B. Fuller)
315 S. Hicks Road
Palatine, IL 60067
1-800-323-7407
Fax: 1-800-952-2368
hbfuller.com

Texas EIFS
220 Burlison
San Antonio, TX 78202
1-800-358-4785
Fax: 210-472-2946
teifs.com

US EIFS
1117 Douglas Avenue.
North Providence, RI 02904
877-663-4200
Fax: 401-274-4686
useifs.com

Fasteners, Tools and Cleaners

Demand Products
4620 S. Atlanta Rd.
Smyrna, GA 30080
1-800-325-7540
demandproducts.com

Wind-Lock
1055 Leisz's Bridge Rd.
Leesport, PA 19533
1-800-521-9255
Fax: 610-385-7524
wind-lock.com

Trade Associations

Association of Wall & Ceiling Industries (AWCI)
800 W. Broad St., Ste. 600
Falls Church, VA 22046
703-534-8300
Fax: 703-534-8307
awci.org

EIFS Industry Members Association (EIMA)
3000 Corp. Ctr. Drive
Morrow, GA 30260
1-800-294-3462
Fax: 770-968-5818
eifsfacts.com

Northwest Wall & Ceiling Bureau
1032-A, N.E. 65th St.
Seattle, WA 98115
206/524-4243
Fax: 206-524-4136
nwcb.org

Texas Lath & Plaster Contractors Assoc.
1615 W. Abram, Ste. 101
Arlington, TX 76013
817-461-0676
Fax: 817-461-0686
tlpca.org

Contractor Training

Association of Wall & Ceiling Industries (AWCI)
See Trade Associations

Inspector Training

Exterior Design Institute
1531 Early St.
Norfolk, VA 23502
1-800-742-5516
Fax: 757-855-9368
eifshotline.org

Northwest Wall & Ceiling Bureau
See Trade Associations

Building Code Agencies

Building Officials & Code Administrators International (a.k.a. "BOCA"). Publishes the BOCA/National Building Code, used in Midwest and eastern USA).
4051 Flossmoor Road
Country Club Hills, IL 60478
708-799-2300
Fax: 709-799-4981
bocai.org

International Conference of Building Officials ("ICBO"). Publishes the Uniform Building Code, used throughout western USA).
5360 Workman Mill Road
Whittier, CA 90601
562-699-0541
Fax: 562-695-4694
icbo.org

Southern Building Code Congress International ("SBCCI"). Publishes the Standard Building Code, used in southern USA).
900 Montclair Road
Birmingham, AL 35213
205-591-1853
Fax: 205-591-0775
sbcci.org

Trade Journals

Walls & Ceilings magazine
755 W. Big Beaver Rd. #100
Troy, MI 48084
248-362-3700
Fax: 248-362-5103
wconline.com

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