

EIFS (Exterior Insulation and Finish Systems) *A Simple Approach to a Complex Issue*

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Exterior insulation and finish systems (EIFS), or synthetic stucco, as it is often called, is complicated. In this short discussion, we will touch on what EIFS is, what problems it has had and what home inspectors should watch for.

Note: This article cannot do justice to this topic. Please accept my apologies for all of the omissions and simplifications. We understand that there are many variations of both materials and installation methods. We also recognize that there is a separate and much more in-depth method for evaluating this cladding system using specialized equipment and invasive testing. Our focus is restricted to the scope of a general home inspection.

What Is Synthetic Stucco?

Synthetic stucco is an exterior wall cladding system from Europe that was first used in North America in the 1960s and became very popular in housing in the 1990s. Originally used on masonry walls, it became popular on wood frame homes. It was used because of its relatively low cost, good insulating levels and architectural flexibility.

We will look at the most common variations, which include the following:

- a sheathing (substrate) such as plywood and oriented strand board (OSB)
- a water-resistant barrier (WRB) over the substrate—optional
- a drainage plane—in newer installations (This may be vertical strips of adhesive over the WRB.)
- insulation board (usually expanded polystyrene) adhered or fastened to the substrate
- a 1/16-inch to 1/4-inch thick water-resistant base coat (commonly cement mixed with acrylic polymer) troweled on, with a glass fiber reinforcing mesh embedded
- a finish acrylic coat sprayed, troweled or rolled on, which provides the color and texture

What's in a name? Synthetic stucco may be called EIFS, thincast, softcoat or PB (polymer-based) stucco. Traditional stucco may be called hardcoat, cement stucco, Portland cement stucco, lime-cement stucco or thickcoat.

How is EIFS/synthetic stucco different from conventional stucco? It's different in several ways. Here are some:

EIFS/SYNTHETIC STUCCO	CONVENTIONAL STUCCO
Insulation board over the substrate	No insulation board
No secondary weather barrier on the exterior of substrate	Building paper or housewrap on the exterior of substrate
Drainage plane on newer systems	No drainage plane
Polymer-based cement base coat	Portland cement base coat
Fiberglass fabric mesh reinforcement	Wire lath reinforcement
Thin, flexible acrylic finish coat	Thicker, brittle cement finish coat

Problems With EIFS

Problems with EIFS in homes in the United States surfaced in the 1990s and included class-action lawsuits. The initial problems were identified in the southeastern United States, but problems have been found throughout North America. The problems centered around water damage to wood framing members. In some cases, significant rot was found within the first year or two after construction.

What Happened?

EIFS over wood frame walls forms a watertight skin on the outside of the building. It's a little bit like putting a building in a plastic bag. The idea is to keep the water out of the building. These systems are referred to as "barrier" or "face seal" systems.

Why Different From Conventional Stucco?

Synthetic stucco problems develop when water gets into the wall assembly through the skin. This often occurs at joints and penetrations. Once water gets past the skin, it gets trapped in the wall and is unable to escape or dry out. The walls are said to have very low "drying potential," unlike conventional stucco, which is much more porous. Trapped water leads to mold and rot.

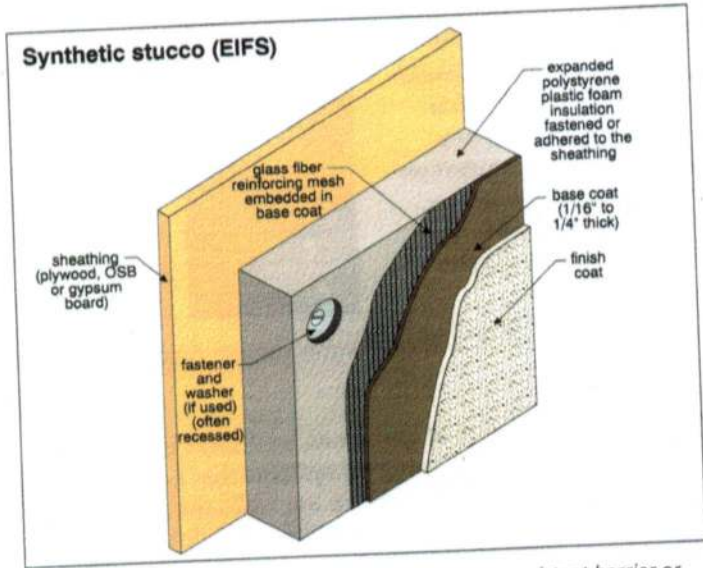
Conventional stucco is more porous, as mentioned. Water can move through both in and out. The stucco itself acts as a reservoir. Conventional stucco often has a convenient, if unintentional, drainage plane at the back of the system. A double layer of building paper, for example, forms a great drainage plane.

Common problem areas include the following:

- around and below doors and windows
- at wall penetrations for pipes, conduit, vents, electrical fixtures, railings, etc.
- at roof and deck flashings
- where EIFS goes below grade
- complex architectural details



Here's what it looked like when we opened up a wall where the detail work was not so good.



This illustration shows an older system with no water-resistant barrier or drainage plane.



The joint between the synthetic stucco and windows is a vulnerable area. This system appears to be in good condition with a well-caulked joint.



Kickout flashings prevent water from getting behind stucco at the bottom of adjacent roofs.

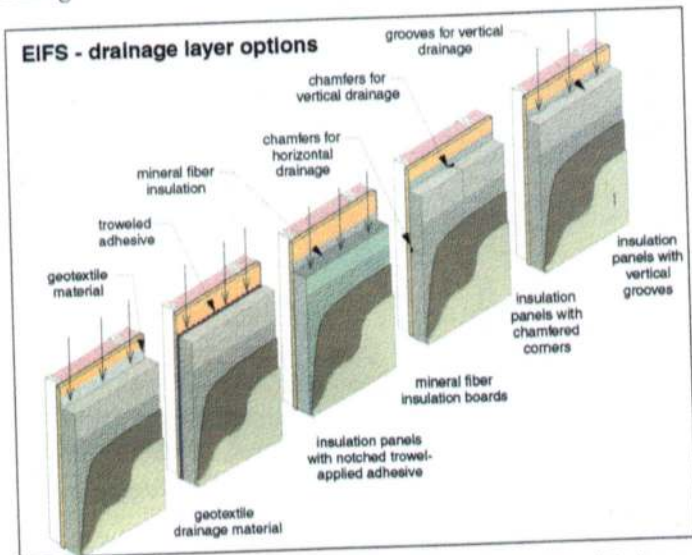


Workmanship is often an issue, as seen on this windowsill.



There is no kickout flashing on this new home. This is likely to be a problem area.

As problems were recognized, the installation approaches changed. A drainage plane was added behind the insulation to allow water to escape by draining down the wall and out through the bottom. This approach addressed the reality that water would probably get through the wall at some point and provided a way to get rid of it.



This illustration shows a more modern approach with a series of drainage strategies.

Don't bother trying to memorize these assembly details. As home inspectors, we never get to see a cross-section of the wall. We only get to see readily accessible performance issues.

These approaches, introduced around 1997, have not been universally successful and are dependent on good installation techniques and detailing. Vented rain screens using more formal drainage approaches are more successful, but not as common in residential construction.

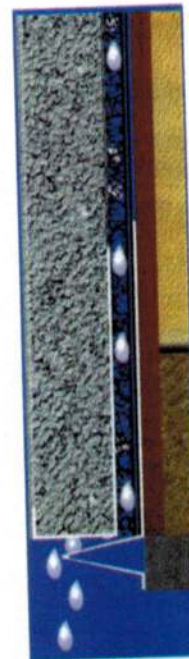
Identifying EIFS

Differentiating hardcoat stucco from synthetic stucco is largely a tactile experience. Tapping and pressing on hardcoat and synthetic stucco yields very different sounds and feels. Tapping on hardcoat stucco feels like tapping on thin concrete. It sounds solid. Tapping on softcoat stucco has more give, and typically yields a hollow sound or very little sound. Tapping on hardcoat stucco with a bare knuckle hurts more than tapping on synthetic stucco. There is no substitute for experience here.

You may be able to see the fiber mesh reinforcement at openings or surfaces, as we saw on the windowsill in the photo at the bottom right on Page 11. You may be able to see the wall detail at the bottom with a mirror, for example. You may be able to see the insulation, fiberglass mesh or the thick (approximately 2-inch) wall system projection typical of synthetic stucco. By the way, you should not be able to see the insulation or the mesh.

Intricate architectural stucco details including dentils and quoining are difficult to achieve with hardcoat stucco. These details often

Illustration courtesy of STUC-O-FLEX International. Here we can see the drainage layer behind the stucco. The drip screed/weep screed at the bottom directs water out through the bottom of the wall. In a true vented rain screen, the cavity behind the stucco becomes pressurized by the force of the wind. This reduces the pressure differential across the stucco and reduces the amount of water driving through the siding. We don't get to see walls and cross-sections, so you won't often know how the stucco assembly was put together.



indicate synthetic stucco. These complex exterior details are also often problematic.

Note: There are lots of variations, and there are always exceptions. There are hybrid systems that have acrylic finish over a hardcoat base. There are walls that are hardcoat stucco walls with the architectural details at the perimeters done in synthetic stucco. If you are not sure, do not guess!

What to Watch For

Inspecting synthetic stucco walls is tricky, and the home inspection scope wherein we are visually inspecting readily accessible items presents some significant limitations. Damage to wall systems typically is concealed behind the synthetic stucco skin. We look for evidence of distress and clues that may suggest concealed problems. Here is a list of the most important things to watch for:

- Stucco bulges or cracks (often at or near openings due to stress concentration)
- Dark streaks below the corners of windows and any dark areas consistent with moisture
- Loose stucco
- Mechanical damage
- Unfinished edges and exposed fiber mesh reinforcement
- Stucco extending down to or below grade (It should stop at least 6 inches above grade.)
- Missing kickout flashings
- Poorly installed flashings above door and window openings and at roofs, decks, etc.
- Poorly sealed openings around doors, windows, pipes, conduits, railing connections, electrical fixtures, etc.
- Evidence of patching, caulking and other temporary repairs
- Flat roofs with no overhang (Large overhangs help protect walls.)

Problems around windows are more common than any other. Pay close attention around and below windows, inside and out.

Continues on Page 22



It's rarely this dramatic, but watch below windows!

Continued from Page 12

Further Investigation

Some home inspectors offer stucco evaluation services. This can include inspection with penetrating moisture meters (probe testing), scanning moisture detection devices, infrared thermography, borescopes and so on. There are training programs and protocols that should be considered before offering these. Many inspectors simply recommend further investigation by a specialist for homes with synthetic stucco.

Thanks to Roger Hankey and Kevin O'Hornett for their many valuable contributions to this article. 📷

ASHI Chapter Education

Fourth Annual Hampton Roads ASHI Holiday Season Tech-Talk

When: December 5, 2015
Where: Chesapeake, Virginia
 Mike Casey Presenting
 ASHI National President
 Alden Gibson and more.
Contact: Kenny Hart at theplumbingandhvacguy@gmail.com or
 Go to www.facebook.com/plumbingandhvacguy
 and click on Upcoming Events

OAHI/CAHPI-ON 2016 Educational Conference

When: March 4-6, 2016
Where: Holiday Inn Burlington Hotel and Conference Center, Burlington, ON
 Corporate Head Office / Training Centre 1515 Matheson Blvd. East, Suite 205 Mississauga, ON L4W 2P5
CEUs: 18 ASHI CEUs
Contact: 416-256-0960 info@oahi.com

Ohio and North Central Chapters Ohio Home Inspectors Expo

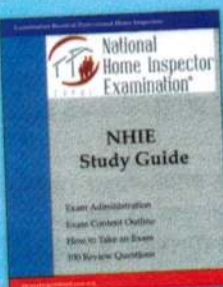
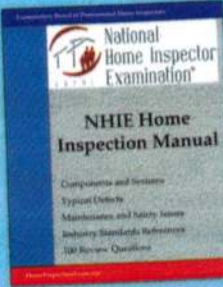
When: March 4-6, 2016
 DoubleTree Hilton Columbus/Worthington
 175 Hutchinson Avenue
 Columbus, OH 43235
Speakers: Bruce Barker and Alan Carson
Contact: George Basista
georgebasista@yahoo.com

NC ASHI Education Event

When: January 8-9, 2016
Where: Winston Salem, NC
CEUs: 12 North Carolina CEUs, 8 ASHI CEUs
Subjects: Deck inspections, inspection legal issues, fuel gas appliance inspections
Speaker: Bruce Barker
Contact: bruce@dreamhomeconsultants.com

ASHI Central PA Chapter Education Conference

When: March 5, 2016.
Where: Park Inn by Radisson (Harrisburg West), 5401 Carlisle Pike Mechanicsburg, PA 17050
Subject: Heat pumps/HVAC systems, foundation issues and repairs
CEUs: TBA
Speakers: Cecil Johnson, Andrew Gray

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