



Consulting, Resource, Education, Training, and Support Services for Home Inspectors
"A candle loses no light when it lights another candle."

EIFS

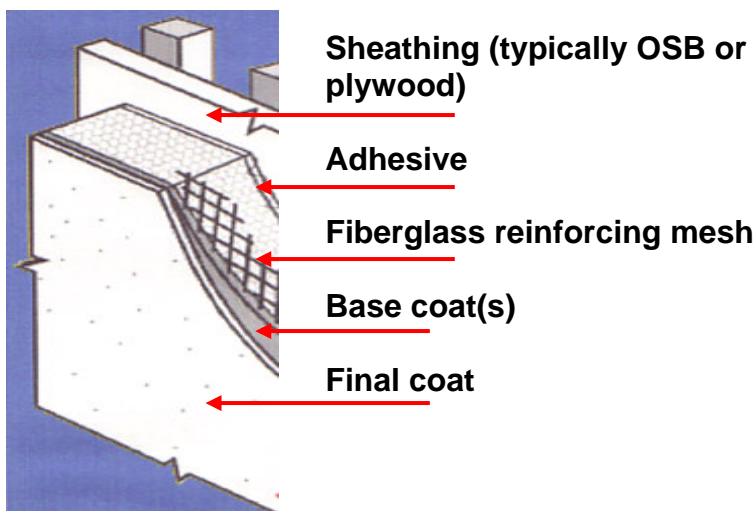
(Exterior Insulation and Finish System)

Pronounced "eefs" or "eefiss"

EIFS refers to several types of multiple layer exterior wall cladding systems that are used on both commercial and residential buildings. Originally developed in Europe in after WW II to resurface/repair damaged masonry, EIFSs began to appear in the United States in the 1960s and began to see widespread use here in the 1990's.

The benefits of EIFSs have always been their durability, improved energy efficiency over conventional cement stucco systems, and design flexibility. EIFSs that have traditionally been installed on residential structures in this country have consisted of the following:

- First, an insulation board (typically polystyrene or polyisocyanurate foam) is secured to the exterior wall sheathing/substrate (usually OSB or plywood) with specially formulated adhesive and/or mechanical fasteners.
- Next, a water-resistant co-polymer base coating is applied on top of the insulation board and reinforced with a fiberglass mesh.
- Then, a colorfast and crack-resistant acrylic co-polymer textured or non-textured stucco is applied as the finish coat.



So far, this material sounds like a major improvement over conventional cement stucco. But, as they say, “the devil is in the details.” Because an EIFS utilizes plasticized stucco, it does not breathe and many of these systems also don’t drain. This means that moisture that infiltrates behind an EIFS can become trapped. Trapped moisture has potentially significant adverse effects including creating conditions that foster the propagation of mold and rot, that cause damage to interior wall and ceiling materials, blistering of the stucco, cracking of the stucco, and corrosion of ferrous (iron-containing) metal materials and components.

Issues pertaining to and resulting from moisture infiltration in these systems have resulted in both individual and class action litigation regarding EIFSs. This litigation made it apparent that the causes of moisture infiltration and accumulation behind EIFSs had to be evaluated and addressed or these systems would no longer be used.

Close examination and evaluation of “defective” EIFSs revealed that the primary problem with such systems was not so much the materials themselves as it was the installation/application of these systems.

Conventional cement stucco wall finishes on wood frame walls are applied over a sheathing that is first wrapped with a water resistant building paper then, a layer of metal lath is installed between the building paper and the stucco is applied over the lath. The lath provides an air gap between the unexposed side of the stucco and the building paper allowing any moisture to drain out through a weep screed (also called a weep screen) at the bottom of the stucco as long as the stucco terminates above the soil line. In addition, metal or other flashing materials are installed at all penetrations (windows, doors, vents, sleeves, etc.) in the walls and at all changes in direction and terminations such as at the tops and bottoms of walls.

However, in most residential EIFS applications over wood frame walls, water resistant housewrap is not used because the foam insulation layer of the EIFS is installed directly on the wall sheathing. Also, rather than flashings at penetrations and changes in direction, an EIFS uses caulking/sealants instead. If these areas where caulking/sealants have been applied are not regularly inspected and maintained, water can migrate through gaps and get behind the stucco between the insulation board and the wall sheathing. Once moisture gets in, because it cannot drain out, it tends to stay for long periods. It can follow glue lines and sheathing joints causing damage far from the point of initial infiltration.

In instances where these systems have remained trouble free, the following steps have been taken in their application:

Prior to installing the foam insulation board to the wall sheathing, the sheathing itself is checked to make sure that it is flat, well-secured and free of damage or defects. Then, a strip of fiberglass mesh is applied to the sheathing at all areas where the sheathing terminates such as at the tops and bottoms of walls and at all penetrations. Enough extra mesh is left extending beyond the areas where it is applied to permit it to be wrapped a minimum of 2½ inches back around the edges of the foam board insulation once the insulation has been installed. The insulation board is installed in a staggered joint manner to prevent alignment of vertical joints and **always terminates above the soil line.**

Next, a co-polymer stucco base coat is applied over the insulation board and a fiberglass reinforcing mesh is embedded deeply enough in the base coat that none of the color of the fiberglass mesh is visible. Some installers will allow the base coat to dry for 24 hours and then they will apply a second base coat until no mesh is visible through the coat. Experienced installers will also add impact protection in the form of diagonal strips or butterflies of mesh at the corners of doors and windows and around any other penetrations. They will also pay particular attention to installing contraction joints where an EIFS passes below a floor level and on long runs of wall.

Once the base coats have dried, it is imperative to apply caulk or other appropriate sealant products at all joints between the base coat and the insulation board. Here, it is important that installers exercise care not to allow the caulk to adhere to anything other than the base coat and the insulation board – never to a third surface such as the sheathing.

Finally, the finish co-polymer stucco coat is applied over the base coat. After the finish coat is dry, all joints, changes in direction, and terminations are caulked.

The adhesives, base coats, finish coats and caulking/sealants all must be applied in full accordance with manufacturers' specifications regarding temperature, humidity, protection from dust, etc. if an EIFS is to perform their designed and intended function.

Since the introduction of EIFSs and the recognition of the potential problems associated with these systems, new products and materials have been designed to reduce the potential for both moisture infiltration and moisture accumulation. When used with an EIFS, these products and materials create a drainage type system instead of a sealed barrier system. Drainage type EIFSs utilize a plastic mesh drainage mat between the sheathing and the foam insulation board and others use an insulation board that has vertical grooves or channels cut into its backside. Both of these facilitate drainage of any moisture that gets between the sheathing and the insulation board. Some EIFSs use cement board sheathing instead of OSB or plywood. The cement board system requires that building paper first be installed over the wall framing, then the cement board is installed over the building paper (in high humidity climates, an expanded metal or plastic lath is installed between the building paper and the cement board), and a perforated weep screed is installed at the bottom terminations of the walls. Because a drainage type EIFS provides a means for relieving trapped moisture, many EIFS contractors and installers prefer them to the sealed barrier type systems. However, every EIFS requires regular inspection and maintenance to reduce the potential for moisture related problems. Not only will caulked and sealed joints deteriorate over time, birds, hailstones, baseballs, and other things can damage an EIFS creating openings through the finish coat that allow water to penetrate the system.

Determining whether a stucco system is a conventional or an EIFS is not always possible unless this information has been provided prior to the inspection. Typically, because conventional stucco is hard and brittle, when it is tapped on, it sounds solid. By contrast, because of the foam insulation board between the stucco and the wall sheathing (and, in some systems, the drainage mat), when an EIFS is tapped on, it sounds hollow.

If you suspect that a house is clad with an EIFS, your report should indicate that the exterior stucco wall cladding is consistent with an Exterior Insulation and Finish System; however, this can only be definitively confirmed by obtaining additional information from the original builder or other sources or through destructive evaluation, both of which are beyond the scope of this inspection and the standards under which this inspection is conducted.

The presence of an Exterior Insulation and Finish System on a house never justifies immediate alarm. It simply tells home inspectors that there are specific conditions to look for and specific maintenance and other information to provide to customers.

For addition information regarding EIFS, go the website of EIFS, Stucco & exterior Consultants at: www.eifs.stucco.com