Exterior Insulating and Finishing System (EIFS)

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Importance of proper installation, maintenance and special hazard considerations

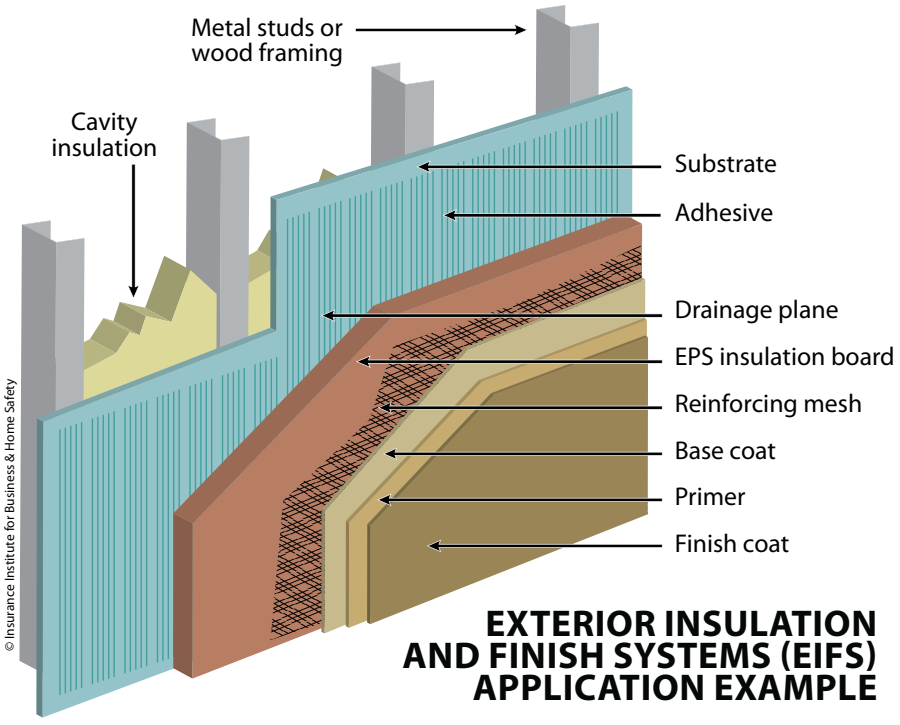
Typical hotel with Exterior Insulating Finishing System.

Exterior Insulating and Finishing Systems (EIFS) have changed the architectural landscape of residential and commercial neighborhoods everywhere. However, businesses looking to build or retrofit with EIFS should be aware of the importance of proper installation, periodic maintenance, and special hazard considerations to make sure that EIFS is an effective design solution, rather than a structural or financial problem.

EIFS options

Popularly known as "synthetic stucco" because of its visual resemblance to this more traditional construction material, EIFS is an exterior covering for residential, commercial and institutional structures of all types and sizes in all parts of the United States. The term EIFS incorporates the two main components of this covering system – insulation that is attached to the exterior of the building and a finishing system is that is applied afterward. Although EIFS was first developed shortly after World War II, it's become increasingly popular over the past three decades because it's relatively inexpensive for both new construction and retrofitting, and provides effective thermal insulation.

Additionally, EIFS provides a wide range of design options, including color, texture and shape. Look around at hotels, office buildings, retail stores, restaurants, supermarkets, strip malls and homes that appear to be stucco over masonry. Upon closer inspection, they are most likely covered in EIFS. You can quickly differentiate between EIFS and masonry with stucco by tapping on EIFS walls and columns. Listen for the hollow sound. Also, the material will be slightly pliable. By comparison, masonry with stucco produces a very solid sound when tapping and will feel as hard as concrete.



EXTERIOR INSULATION AND FINISH SYSTEMS (EIFS) APPLICATION EXAMPLE

Proper Installation Critical to Long-Term Performance

Because EIFS are proprietary systems developed by individual manufacturers, there's no single formula for every wall system. As shown in the figure on page 1, the general components are:

- Metal studs or wood framing, often including a cavity insulation such as fiberglass batts, for the surface substrate
- Surface substrate such as an existing wall, or gypsum board, plywood, OSB board, or cement board
- Water drainage systems will include a drainage plane (cavity) that is created by an adhesive used to attach the expanded polystyrene (EPS) to the substrate
- EPS Insulation board that is adhered as described above or mechanical attached to the substrate
- Base coat applied to a reinforcing glass fiber mesh on the face of the insulation board
- Primer and finish coating that can be applied in a wide variety of colors and textures to create a stucco or stone appearance, as well as many other kinds of appearances.

One important aspect of EIFS design and installation is the prevention of water infiltration and trapped moisture. There's an increased chance that the moisture infiltration rate will exceed the drying rate within the wall, particularly in regions where the climate is humid. When this occurs, the trapped moisture will begin to deteriorate the wall. Trapped moisture within the wall cavity also can lead to mold growth, rotting of wood framing and wall board, rusting of metal studs and fasteners, and weakening of the EIFS components. If untreated, the effects can propagate into the building causing odors to emit from rotting components and mold, or damaging window and door frames, interior walls and carpets.

In the 1970s and 80s, EIFS systems were designed as a "barrier wall" system, also known as a "face seal" approach. The premise was simple in theory – keep all water out of the system by creating a waterproof wall system. However, due to the inherent design of a multi-component wall system with hundreds or thousands of joints requiring sealants, water often penetrated the wall system. In the mid 1990s, the first water drainage wall was introduced to the construction market. EIFS requirements for barrier and water drainage systems are now included in the 2009 and 2012 International Building Code.

This water drainage wall is designed to manage and remove any trapped moisture through the addition of a drainage plane. Moisture barriers are placed over the substrate, and a drainage plane is put in place by creating a space between the moisture barrier and the EPS.

While an improvement over its predecessor, the water-drainage approach is not foolproof. There are multiple types of materials that require precise installation, and even the slightest undetected flaw can quickly become the Achilles heel of the system. Attention to detail is required for the installation of the multiple component materials, adhesives and fasteners as well as sealing properly around windows, doors, various joints, flashing, corners, edges, ridges, wall-mounted air conditioner units and wall penetrations. Moisture can be trapped if any of these aspects of installation do not meet the manufacturer's specifications.

EIFS is more complex today than the early forms of this wall system. EIFS contractors are now required to install a multitude of building components with varying designs that necessitate a large amount of installation knowledge, expertise, and precision. Building codes require special installation inspections for EIFS unless it is installed with a moisture barrier and drainage plane, or if the wall is masonry or concrete.

Advice for Hiring an EIFS Contractor

- Look for an established, licensed and bonded professional that is a certified installer and a member of EIMA (EIFS Industry Members Association).
- Meet manufacturer's specifications as well as the installation and wind requirements of the 2009 or 2012 International Building Code.
- Use building code approved products.
- Third-party inspections for quality control is recommended.
- Request and check the contractor's references. Visit completed buildings and ask the building owners questions about their satisfaction with the installation.
- Ask to see the contractor's certificates of insurance.
- Make sure that coverage for liability and Workers' Comp insurance are current.
- Discuss available warranties from the manufacturer and the contractor.

EIFS with multiple corners, edges, windows, joints, penetrations, and wall-mounted AC units.

Small crack near this wall-mounted AC unit can lead to leaks and trapped moisture.

Maintenance Matters

Thousands of existing EIFS buildings are 20 or 30 years old, and even older. As these buildings age, UV rays, rain water, and temperature extremes can cause expansion and contraction that wreak havoc on the exterior face of the EIFS, as well as the sealed joints. Whether it's a face-sealed or managed water-type EIFS, long-term weathering affects the integrity of the wall, and the older EIFS walls get, the greater the potential for problems.

Along with installation, proper maintenance of EIFS is critical to its performance and longevity. From a short distance, an EIFS wall may look like it is very well sealed with no apparent flaws; however, a close-up and thorough inspection can reveal minor maintenance issues that can grow into big problems. Even though the system may be designed to manage and drain trapped moisture, the best way to prevent trapped moisture is to prevent it from entering in the first place. Over time, UV rays and continued weathering will eventually deteriorate even the most resistant caulks and sealants, and small cracks and punctures can allow for significant water intrusion. A thorough preventative maintenance plan is important to ensure the wall system performs as intended. Periodic inspections of the entire wall system are needed to quickly identify and fix any cracks, chips, holes, or punctures in any part of the wall, including areas that have sealants.

Conduct visual inspections

Building owners can conduct self inspections. Simply walk the building's perimeter and look closely. While looking for cracks and punctures, also pay attention to anywhere there are sealants at transition points such as joints, corners, ridges, windows, doors, and any wall penetrations. Binoculars can help for taller buildings. A camera phone can zoom in on areas that may be difficult to see and show you close-ups of potential concerns.

Small holes in the EIFS; if left unrepaired, this can result in water infiltration and trapped moisture.

Wind and Fire Considerations

In geographic locations that may be exposed to hurricanes, severe windstorms and windborne debris, wind-rated EIFS should be installed that includes a trowled adhesive, which attaches the EPS to the substrate, forming a bond between the two surfaces. A proper amount of well-dispersed adhesive will distribute the wind loads evenly across the entire substrate. Adhesives are also useful because they can create a small void to allow for a drainage plane. There also are wind-rated systems that include an adhesive for securing the EPS to the substrate and mechanical fastening of the substrate to the framing.

By contrast, non wind-rated EIFS will typically include mechanically fastened EPS, which concentrates the wind loads at the point of fastening. In severe wind events, mechanically attached EPS can pull over the fasteners and peel away from the system. EIFS that includes mechanically fastened EPS is not recommended for hurricane-prone areas.

Proper installation of EIFS also will influence wind performance. For example, if there are not enough adhesives and overdriven fasteners, the walls will not meet their windrated expectations. Additionally, to protect against windborne debris, wind-rated EIFS typically will have a thicker mesh installed over the EPS to resist the impact.

Fire is another potential hazard associated with EIFS. The EPS insulation boards that are integral to EIFS have the same composition as Styrofoam cups, and are extremely flammable. Anytime the EPS is exposed, as shown in the photo below depicting a corner section of a building, the potential for fire exists. If an ignition source, such as wildfire embers, sparks from a backyard barbecue or a lit cigarette comes in contact with the EPS, it can ignite a fire within the wall. When EPS burns, it liquefies and spreads very rapidly, which can result in a serious fire within the wall cavity.

One common-sense precaution for structures with EIFS walls is to maintain outdoor smoking sections that are located well away from the building and include adequate ash trays and receptacles. By contrast, it's common for hotels to have smoking areas at their entrances and under porticos. These areas often have nicked and chipped EIFS due to luggage, carts and deliveries. Building managers should pay special attention to walls with increased hazards. This includes increased periodic visual inspections to ensure there is no exposed EPS, and that proper smoking controls are being followed. Similarly, outdoor grilling should be kept away from EIFS walls so that flames, radiant heat and embers do not come into contact with EIFS walls.

Summary

EIFS has many architectural and economic advantages, but it must be properly installed by qualified contractors and properly maintained to remain an economic advantage with a positive cost benefit over time. Manufacturer's installation and maintenance specifications should always be followed with meticulous detail. Visual inspections must be conducted on a regular basis to spot any problems early. Taking some small preventive measures can go a long way toward preserving the integrity of an EIFS wall, assuring both the visual appeal and the quality performance you need for your business.

Chipped EIFS with exposed EPS at a hotel entrance near an outdoor smoking area.

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