by Russ Minkovich

INSTALLING

Water-Managed Synthetic Stucco

New products that allow moisture to drain hold promise for EIFS replacement jobs

EIFS — exterior insulating finish system — has been a popular alternative to traditional stucco and brick — that is until its failure rate started to increase (see "EIFS Under Scrutiny," *Eight-Penny News*, 4/96). EIFS is a "barrier" system that relies on coatings and sealants to make every square inch of the house shed water 100% of the time. But because building materials expand and contract and caulking doesn't last forever, even a perfect barrier-EIFS installation is bound to let some water in. And since an EIFS home is covered in insulating plastic foam, whatever water goes in *stays* in.

It doesn't take a big leak to do big damage — once a wall is affected, framing, windows, doors, sheathing, insulation, even interior drywall and finish flooring may have to be removed and replaced.

Water-Managed Systems

An alternative to barrier EIFS is a *water-managed* system. In a water-managed system, it's assumed that the installation will not be perfect and that some water will eventually penetrate the building's skin. A managed system directs that water back to daylight, and allows the wall system to dry out before damage can occur. Some EIFS manufacturers — Senergy and Sto, for

example — now offer a managed drainable EIFS, which has great potential. In North Carolina, however, where failures have been rampant, builders and homeowners are still dubious about *all* foam systems. For my EIFS replacement work, I need a non-EIFS alternative, and USG's Duro-Screen 1000 system fits the bill (see Figure 1). Instead of rigid foam board, DuroScreen uses Durock cement board and other components to create a drainage plane between the sheathing and the stucco skin, allowing any water that penetrates to escape.

Assessing the Damage

After fixing more than 40 of these EIFS-clad homes in the Greensboro, N.C., area, I've concluded that all EIFS replacement projects have one thing in common: The total damage can't be determined until the house is stripped of the EIFS, so there is no way to price the job ahead of time. The most vulnerable places are always around windows and doors, and where first floor roofs meet second floor sidewalls. After a visual inspection, we can use a hand-held moisture meter with long probes to determine how much of a given wall is involved. We'll do three "snake bites," penetrating the foam first directly below the problem area, and then down the wall in 1-foot increments. Moisture content above 19% in the underlying structure spells trouble.

I charge by the hour to do the initial investigation, then provide a fixed price per square foot to remove and replace the EIFS with a water-managed system. All repairs to the structure are handled separately on a case-by-case basis, and the scope of work and cost can vary wildly, depending on the extent of the damage.

Preconstruction Meeting

A week or so before the work starts, I schedule a meeting with the homeowner, architect or building designer, the engineer if there is one involved, a USG field representative, and any other subcontractors who will be involved on the job. My main goal is to acquaint everyone with the proper details of the

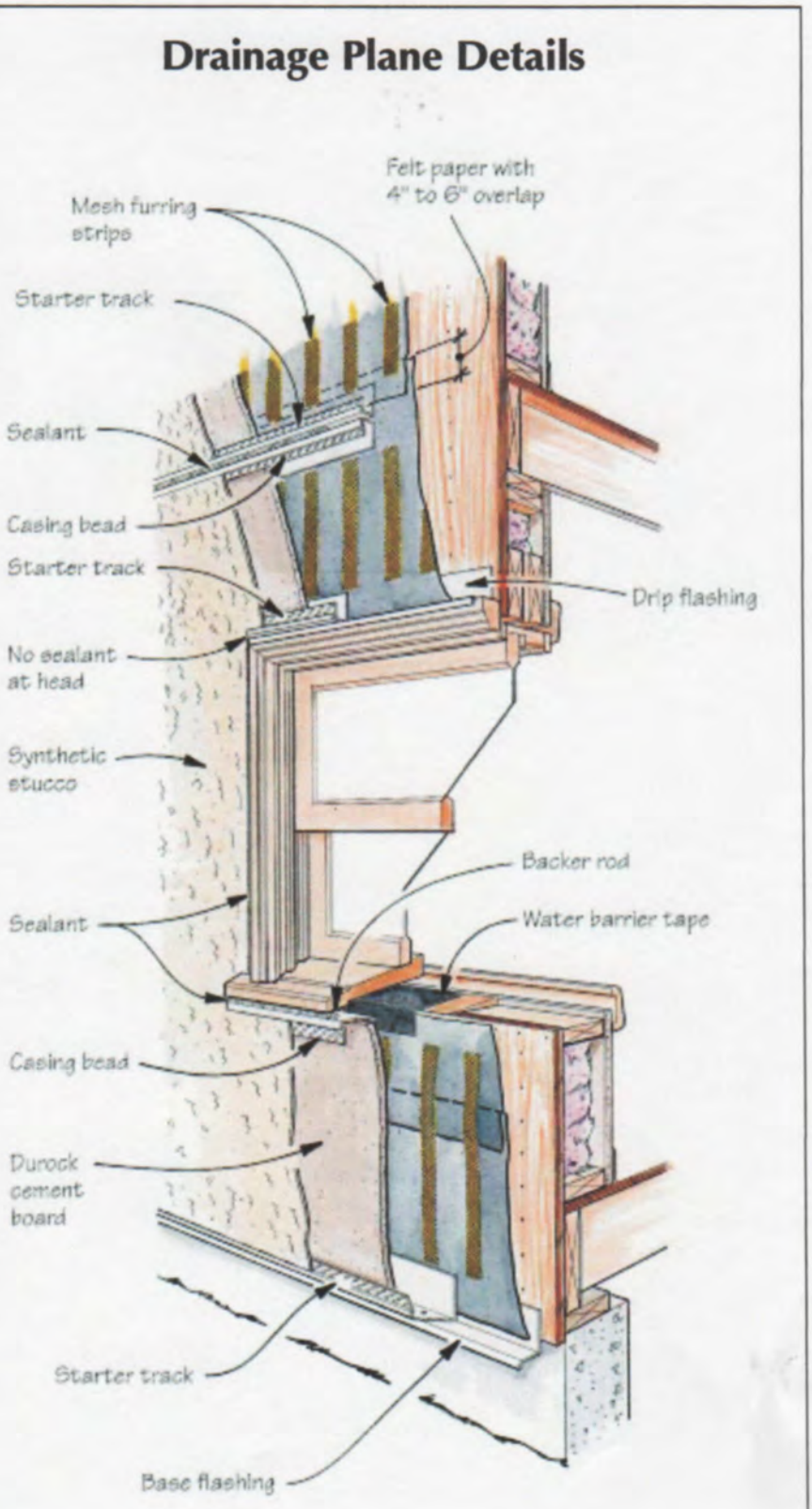

Figure 1. USG's water-managed system uses Durock cement board over a moisture-resistant drainage plane. Any water leaking past the stucco skin is directed to weep holes at the bottom of the wall.

Figure 2. This three-year-old Greensboro, N.C., home was damaged when water leaks around windows and poorly-flashed roof-wall connections became trapped behind the EIFS cladding (above). Even window trim, jambs, and sills were rotted (inset) and had to be replaced.

Figure 3. To remove the EIFS cladding, the author's crew first cuts 1/4-inch-deep kerfs in the stucco skin, using a 4-inch masonry grinding wheel (left). The 3x5-foot sections or "skins" are then peeled away, exposing the underlying foam (right).

system, particularly the flashing details that will be necessary for the finished product, such as the roof-to-sidewall "kick-out" flashings. Much of the water damage I've seen on EIFS as well as traditional stucco could have been avoided if the various parties had met first to coordinate the details.

Next, I inspect the house to locate as many water damaged areas as possible. In areas around windows, it's important to get underneath the cladding to assess the carpentry work that will be needed. At this point, I get the subtrades involved, because their repairs could hold up the rest of the process.

Case In Point

One of the tear-off and replacement jobs I recently completed was on a 7,000-square-foot home in an upscale subdivision of Greensboro, N.C. The $1.7 million home was only three years old when the owners discovered extensive water damage behind the barrier EIFS exterior (Figure 2).

Whole sections of the OSB sheathing were blackened and rotting. Both the sheathing and the fiberglass insulation in the wall cavities were still wet and moldy. Most of the home's 40-plus windows had rotting sills and mullions — in fact, mushrooms were growing out of some of the sills. We discovered a colony of carpenter ants in the structure, and shelf fungi were growing inside the wall cavities. The home required the replacement of all windows, all the OSB sheathing and insulation, some door frames, much flashing, and many of the studs, as well as the entire barrier EIFS stucco system.

The Skins Game

Once the damage hunt is complete, we cover any landscaping near the house with canvas tarps, put up the necessary pipe scaffolding, and begin the tear-off. It took us about a week with seven men to complete the tear-off on this home. First, we removed the mesh and finish coat to reveal the foam underneath (Figure 3). Using a circular saw or a side grinder with a 4-inch

masonry grinding wheel on it, we cut about 1/4 inch deep, slicing the mesh and finish coat into 3x5-foot squares for easier handling. After removing the sections — we call them "skins" — we use them instead of dropcloths to protect the driveway, sidewalks, and any decks.

Removing the Foam

We try to choose a relatively wind-free day for removal of the foam; otherwise, we end up in the neighbor's yard collecting it. Typically, five workers pry away at the foam on the house while two cleanup workers handle pickup on the ground (Figure 4).

We rake back any mulch or decorative stone to about 3 feet out from the house before we start — it's hard to pick foam out of mulch once it falls. A leaf blower is helpful to get the foam to one corner where laborers can pick it up, and we use leaf rakes to pull it through the grass. Any tiny particles trapped between deck boards or in the grass are picked up with a shop vac.

Weather is a big factor at this point. You can't leave any work in progress exposed if it's going to rain, especially flashing details where roof and sidewall meet. These areas have to be felt-papered immediately, as do studs or other structural members that are scheduled for replacement.

Hidden Damage

With the sheathing removed, we can see any additional water damage that we missed during the initial search. On this house, the south wall (which faced the street) was in worse shape than we thought. The whole wall was rotted and had to be reframed, reinsulated, and resheathed, and all of the windows and doors had to be replaced (Figure 5). The source of the leak appeared to be missing copper kick-out flashings at roof/sidewall junctions, which we installed (Figure 6, next page).

Once the house is opened up, the engineer and the city inspectors may also discover code violations, like missing flashing or building paper. All of these items have to be brought back to

Figure 4. Large sections of foam are pried off with flat-faced shovels; smaller pieces and detailing are removed with spatulas or trowels. A crew is stationed on the ground during tear-off to clean up.

Figure 5. Hidden damage to the structure was discovered during tear-off on the south wall. The wall had to be torn out and replaced, including wiring and insulation (left), and doors and windows (right).

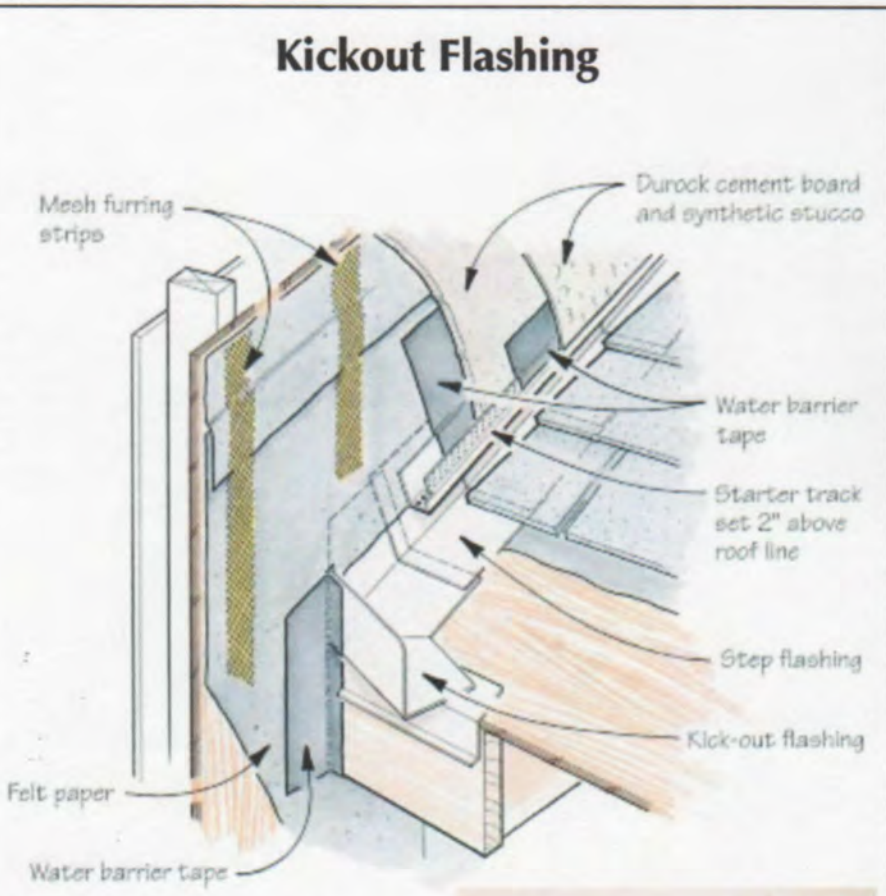

Figure 6. Missing kick-out flashings at roof-wall junctions are a common source of leaks in EIFS failures. The author prefers a heavy-gauge copper for these flashings.

code before the framing inspection, as if it were a new home.

Drainage Plane

Installation of the DuroScreen system begins with the base flashing, followed by the barrier paper (Figure 7). On this job, we used 15-lb. felt paper. (As an alternative to felt paper, DuPont Stuccowrap was recently approved by USG for use with its systems. Similar to Tyvek, Stuccowrap is ribbed to encourage drainage.) The lowest course of felt is lapped over the upper leg of the base flashing, and successive courses are overlapped 4 to 6 inches. We pull the paper around outside corners and seal any holes with water barrier tape, a heavy self-sealing bituminous tape with a release sheet.

At windows, doors, and other openings, we cut the felt paper horizontally at the top and bottom of the opening, then vertically down the center, and wrap it into the opening around the jack studs. To keep the drainage plane intact, however, it's important not to wrap the felt paper around headers. Instead, we use a piece of starter track together with a special vinyl drip cap. When correctly installed, the felt covers the flanges of these flashings so that any water is channeled away from the building.

Furring lath, when specified, goes on next. The special mesh strips are designed to be stapled on top of the weather-resistive barrier at each stud location to create a small gap behind the Durock. Many engineers will specify the furring lath as extra drainage insurance in a retrofit, but it's not needed if the house is wrapped with ribbed Stuccowrap.

Hang the Board

The Durock we use is the same cement-based product tile installers use on floors and walls under ceramic tile. Typically, we score and snap the panels using standard drywall or utility knives with a heavy-duty blade or carbide scoring tip; for crisp edges, we cut it with a circular saw equipped with either a dry diamond or carbide blade. (We've tried using standard masonry "mesh" type blades, but they don't last.) Sawing creates a lot of dust, so dust masks are standard equipment for the crew.

We use 4x8 sheets for the first two courses, which we can reach from the ground, and 32-inch-wide sheets for everything higher (Figure 8, page 44). It generally takes two men to handle a 4x8 sheet, plus an additional man per level of scaffolding to pass it up. The smaller panels can be managed by one man.

Durock installation begins with a starter track, a vinyl accessory with weep holes that allow water to escape from the bottom. Starter track is optional at the base flashing, but we use it to ensure a clean line at the bottom of the Durock. We use a water level to make a level line at the foundation and check the concrete or block for stray mortar and any other obstructions. Then we nail the track using 1¼-inch hot-dipped galvanized roofing nails.

We seat the first course into the starter track perpendicular to the framing, taking care not to distort the track

or block the drain holes. We use nails to space sheets both horizontally and vertically, creating a 1/16-inch mechanical key like with plaster systems.

We use hot-dipped galvanized roofing nails to attach the cementboard and all the accessory channels. We tried the special Durock screws, but found them difficult to use. We follow the recommended fastening pattern and stagger the butt joints as we go. As with drywall, we avoid seams at door and window jambs; instead, we run sheets past the top and bottom of the openings by 6 to 12 inches.

To accommodate expansion and contraction, the Durock layer is divided into sections with 3/4-inch-wide control joints that are filled with foam backer rod and caulking. Many homeowners and building designers object to the obvious spaces, which are visible from the street, but they are necessary evils of this system. The effect can be minimized, however, with color-matched sealants.

At floor framing lines and at the intersection of dissimilar materials, we use either a vinyl casing bead or L-bead. At the heads of windows and doors, we use a vinyl drip flashing. The edges of openings receive either a 45-degree bead or a casing bead. Any non-reactive metal would work for these flashings, but we typically stick to the vinyl flashings that come with the system to avoid any galvanic reactions with the Portland cement in the base coat, like you would get with aluminum or galvanized flashings.

On this house, as is true with many houses using a synthetic stucco system, most openings called for built-up foam detailing (Figure 9). To strengthen these foam details, the system calls for either applying trim bead along the edges or "back-wrapping" the foam using an exterior-grade fiber mesh. For typical rectangular foam details, the mesh is cut wide enough so that it extends 2 inches under the trim, wraps completely around the three exposed faces, and then extends 2 inches onto the face of the Durock. It's left loose on the face of the foam

Drainage Plane Details

Figure 7. Installation of the drainage plane begins with vinyl or metal base flashing (A). The building is then wrapped in felt paper or Stuccowrap, with 4- to 6-inch overlaps at the joints (B), followed by staple-on mesh furring strips, which provide an air space behind the Durock (C). Extra care is taken to make windows and other openings watertight (D), using a self-sealing barrier tape where needed.



Figure 8. With the drainage plane and scaffolding in place (left), the Durock cement board panels are applied in a staggered pattern (middle). Spaces between panels provide a keyway for the stucco. A vinyl starter bead maintains a clean reveal along the exposed bottom edge of the cement board (right).


Figure 9. Hand-carved foam details are common in synthetic stucco systems (left). For extra durability, the foam trim is either bedded in mesh tape or capped with vinyl beads, as shown here (right).

buildup until the base coat is applied, at which time it will be embedded in the base coat.

Base Coat

The stucco goes on in several stages: First the joints are bedded, then two layers of base coat are applied, followed by the finish coating (Figure 10).

We paddle-mix the dry base coat with water, then let it slake for at least 15 minutes so that the dry latex in the plaster can react fully with the water. This improves the working properties.

Using base coat, we bed all joints, fill inside and outside corners, and spot all fasteners. At joints and at the flanges of beads and trim components, we embed 8-inch-wide strips of mesh. This is all done with a stainless steel straight trowel — conventional steel could cause staining.

After the bed coat has cured for at least four hours, we level base-coat the entire wall. During this step we flatten any bumps or hollows using one of several USG products that go on a little

thicker for this purpose. In new construction, we can usually avoid this extra work by having the builder fix any bad framing before we start. In a tear-off job, however, we often have to live with what we've got for framing, so we feather the base coat to hide the imperfections.

The base coat goes on in two steps: The initial coat is followed immediately by a second coat to achieve the proper thickness of 1/16 to 3/32 inch. We try to coat an entire elevation at one time to prevent cold jointing, where resuming the finish coat later on could cause differences in color and texture. If the wall is too big, we use control joints, corners, and windows as natural breaks.

Caulking comes next, after the base coat has cured for 24 hours. Though water-managed systems don't rely on the sealants, USG recommends continuous caulking at all doors, windows, vents, and trim beads, and where required by code. Where there's no vinyl bead, we insert backer rod first. Of course, weep areas, such as the heads of windows, should never be caulked — they need to drain freely.

Trim Details

We prefer to apply the foam detail trim at the same time the base coat is being done. We cut the pieces according to the plans using a hot knife or a table saw fitted with a masonry wheel.

One person on the ground back-butters the foam shape with base coat using a notched trowel, then sends it to a person on the scaffolding, who trims it to fit with a fish fillet knife, positions it over the pre-installed mesh, and presses it onto the wall. As the trim is troweled with base coat, the mesh is pulled back over the foam and embedded, completing the back-wrap.

Finish Coat

After the base coat and detail areas have cured for 24 hours, we apply the finish coat. It comes ready-mixed in various textures, but we intermix pails to ensure uniform color and good aggregate distribution. The finish coat can be applied by one or two men, depending on the size of the house (this house took two). The finish coat is troweled on to a thickness of 1/16 inch with a stainless steel trowel, again avoiding cold joints. We sometimes use a wood or plastic float to create a unique texture. The surface dries to the touch in 2 to 4 hours, but must be protected from rain for at least 24 hours. If rain is threatening, we'll hang tarps from the eaves.

Figure 10. The base coat plaster is first used to bed all joints and to fill inside and outside corners (left). Once the bedding cures, the base coat is troweled onto an entire elevation at one time to avoid cold joints. After the base coat has cured for 24 hours, the finish coat is troweled on and textured, much like conventional stucco (right).

Cost

Overall, the owners spent $55,000 to replace the windows, another $8,000 for framing repairs, and $60,000 to remove the old stucco and replace it with the DuroScreen system. It took us three weeks to put in all the new windows and two weeks to repair the structural damage.

Russ Minkovich owns Future Plastering in Greenville, N.C. He has been installing stucco and synthetic stucco systems for more than 20 years.

For More Information

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