EIFS Troubleshooting

PART II

By Robert G. Thomas, Jr.,
CMD Associates, Inc.

PART I of this two-part article covered cleaning and refinishing EIFS and diagnosing water vapor problems.

Cracks

Cracks are breaks in the surface due to internal, non-impact loads. Properly detailed and installed, EIFS don't crack on their own.

Repairing a crack in an EIFS is easy. Before doing so, however, find out why it occurred so you won't have to repair it again and again. Here is a checklist of items to investigate when diagnosing cracks:

• Check the construction drawings for design and engineering errors. Clearly, even a perfectly installed EIFS cannot be expected to perform well if the original design is flawed.

Two common design-induced cracking causes include deflection of floors as they are loaded and unloaded and excessive flexing of the wall under wind loads due to too-limber substrate.

• Even if the drawings look okay, check the building to be sure the EIFS and the building were constructed as designed.

• Check the EIFS for the following common crack sources:

- Stress concentrations at corners of openings. A prying action occurs as the opening racks out of square, causing stress to concentrate at the comer. If required extra diagonal reinforcing mesh has been omitted, the EIFS will often crack.
- Gaps between the EPS board ends leave the lamina unsupported at the gap. The lamina can flex as it expands and contracts and gets overstressed.
- If there is no joint where one should be, the movement in the joint is transmitted through the EPS to the lamina. If the movement is significant, the stress capacity of the lamina is exceeded and a crack occurs.

If you see an EIFS job with lots of tiny cracks all over the lamina, take a look at the reinforcing mesh. Once in a great while the mesh is defective and loses its ability to reinforce the coatings. To see if the mesh is the cause, remove a sample of the lamina and have it checked by a lab. Microscopic analysis can detect whether or not the mesh is still okay.

Non-overlapped reinforcing mesh can also cause cracks. The forces in the lamina are transferred through the base coat adhesive and the finish. Neither the base coat adhesive nor the finish has enough strength to resist the stress.

The method used to fix cracks depends on their cause. Here are some ways to fix common types of cracks:

Non-propagating hairline cracks can be repaired by applying an elastomeric coating over the crack. The coating alone is viscous and flexible enough to bridge the crack.

Cracks up to 1/8 in. wide can be fixed by applying a knife grade elastomeric putty into the crack and then applying an elastomeric coating over the putty.

A quick fix for cracks, especially if they are not straight is to use a "band aid" sealant detail. This method, thoughnot attractive, does work.

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Long, straight, wide cracks (such as those caused by the lack of an expansion joint where one should have been installed originally) can be repaired by installing a new joint. The replacement process includes wrapping the edge of the EPS, using a backer rod, applying a sealant and so on. This is a lot of work but is a permanent solution.

Large cracks in a limited wall area can be repaired by patching the affected area. This is a common repair and is described below. (This

method also applies to impact damage repairs.)

1. If repairing impact damage, remove the EIFS back to the substrate. This involves cutting through the EIFS at a distance of 4 to 6 in. outside the damage.
2. Using a grinder, remove the finish to the base coat. Be careful not to damage the base coat.
3. If any foreign material exists in the crack, remove it.
4. Fill the opening or crack with a *tight-fitting piece* of EPS. Sometimes cracks are too small to allow this. In this case, enlarge the crack slightly to allow inserting a bigger piece of EPS. Do not fill the crack with any hard material, especially not the base coat adhesive.
5. Apply a layer of base coat adhesive to the EPS and theground away area. While the adhesive is still wet, embed a layer of reinforcing mesh into the adhesive.
6. After the adhesive is dry, apply the finish. Feather the new finish into the old finish. Eventually the color should weather-in and look fine.
7. When applying coatings, remember that achieving a reasonable appearance usually requires applying the coating to at least some of the adjacent wall area. This includes the crack area, as well as back to the nearest joints.

Note: This is a summary procedure. Many EIFS manufacturers make materials suitable for use in repairing cracks. These coatings are often sophisticated materials and are used as part of a crack repair system (coating, putty, primer and so on). Manufacturers have details instructions about the specifics of using their particular coating systems.

Water Leaks

The EIFS is leaking. Really?

Most of the leaks I have investigated are *not* in the EIFS itself but in the materials and systems that surround the EIFS. Since the field of an EIFS wall is seamless, tracking down

water leaks that are due *exclusively* to the EIFS is easy. To do so, simply look for cracks in the EIFS surface. If the field of the EIFS is okay, then the problem is somewhere else.

Well...it's not quite *that* simple.

Leaks in EIFS wall systems usually start at the perimeter of the EIFS. This means the places where the EIFS comes against other materials (windows, doors, penetrations, sealant joints and the like) or at EIFS-to-EIFS interfaces (such as at expansion and panel joints).

Diagnosing leaks is a laborious, step-by-step process. You don't have to be a Rhodes Scholar to find leaks, but experience and a thorough, unassuming attitude help a lot. Here are some tips to make the process more efficient:

- Check the construction drawings to see if the details as designed will keep the building watertight. Occasionally a detail is used that is a "leaker by design.
- Don't assume the building was built according to the architect's drawings. Do a physical survey of the building to see what is actually there before assuming the details as designed (and supposedly built) will keep out the water.
- When looking for leaks, I usually start at the top of the building and work my way down. After all, gravity tends to pull the water downward, and the leaks may be coming from way up at the top of the building.
- If the whole building leaks, start on the side of the building that gets the worst weather. Wind-driven rain can push water up the wall and around the seals. It can also force water through small openings due to the air pressure differential. The local weather service has information on prevailing winds and storm patterns.
- Do your checking on a cool day. Low temperatures cause materials to contract, which tends to cause joints to open up.
- "Thinksmall" when dealing with leaks. Water molecules are microscopic and can get through amazingly small cracks. Just because a joint is butted tight does not mean it is water tight. Gently pull the sealing device (flashing, sealant and so on) away from the joint and see if it is really doing its job.

Tracking down leaks often involves digging into the wall. Standing on the sidewalk, staring at the building and then theorizing over the phone is usually a waste of time. Action is necessary. Sometimes getting the okay to take action can be a project itself (dealing with lawyers and all) because it can get expensive.

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Make sure the owner and tenants (if any) know what is happening before beginning a prolonged investigation or using destructive test methods. Also, be prepared to patch the test area right away. This will help keep the building watertight until the final repairs are done and keeps the building looking good.

Here are the areas that typically cause problems:

- Roofs: parapet caps, flashings, counterflashings, parapet-to-roof transitions, the roof surface itself, roof penetrations, and scuppers/drains
- Penetrations: ducts, railings and downspouts
- Windows, including drips and flashings at head and sills, operable sash, mounting hardware holes, weep holes, window frame joints and gaskets
- Flashings in general, particularly at comers and laps
- Corners of openings in the EIFS, where diagonal reinforcing mesh should be used to prevent cracking
- Sealant joints, especially joints with a narrow width and joints between large expanses of EIFS. When looking for leaks at sealant joints, remember: if the joint is compressed on the day you look at it, the split in the middle of the sealantbead might also be compressed shut; and just because the sealant appears to be in contact with EIFS does not mean it is *bonded* to it; it may be *resting against* it.

In both of the above cases, the opening that lets in the water may not bevisible. To test the continuity of the seal, use a dull knife and tug at the sealant. The bead itself and the sealant-to-EIFS interface should not open up. Check *all* the sealant joints along their *entire* length. This is time-consuming and boring but necessary. Just because one part of the building looks okay does not mean the rest of the building is faultless.

If you are really, really sure that the field of the EIFS and the rest of the wall and roof are okay, then take a look at the lamina again. It is possible for water to get through the EIFS if the lamina is porous. Porosity can be caused by defective coatings or improper application technique. Porosity problems are rare. Lamina porosity is rarely visible to the naked eye.

[Some EIFS finishes commonly exhibit visible pin holes in their outside surface. While this certainly does not help prevent water penetration, it is not necessarily a sign

of porosity problems. The base coat, if properly formulated and applied, should keep water from getting to the EPS.]

You can try to check for porosity by flooding the wall with water from the outside and looking for leaks indoors. This method is often inconclusive. Better approaches are listed below. In both cases, it is important not to damage the lamina in the process, because the test resulk themselves can be affected.

• Remove the substrate system and the EIFS up to the back side of the lamina) from the inside. Then spray the EIFS from the outside to see if water comes through. This approach is really only feasible with stud wall construction.

Sometimes leaks are not leaks at all, but are bad cases of condensation. An engineering analysis can determine if condensation is the problem.

• Remove a sample of the lamina from the outside and have it tested for porosity at a laboratory.

If the lamina is found to be porous, it can often be fixed by applying an elastomeric coating to the finish.

One simple but effective way to locate leaks is to spray the suspected area with water and watch for leaks. To do so, carefully seal off the area around the leak location with a waterproof membrane. Thenspray the leak area with water and go inside to see if it comes through. Use plenty of water since most walls can absorb quite a bit before the leak finally appears. Portable apparatus (known as a spray rack) is used by building diagnostic companies for this type of testing. The ASTM E 547 test method describes how to use a spray rack for water leak tests.

Often "leak work" is part of litigation proceedings. Even if it's not, it is a good idea to "be a real nerd" and thoroughly document your work. This helps display the logic of the test procedures which, in turn, aids in getting acceptance of the diagnosis by others.

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Sealants

Modem sealants are miraculous materials, but they don't last forever. In other words, even if the sealant does last for its normal life, it will still need to be replaced at some point. Sealant replacement is inevitable.

Sealants fail in two basic ways: adhesive failure and cohesive failure. Adhesive failure occurs when the sealant doesn't stay bonded to the wall or to its substrate. Cohesive failure occurs when a material in the joint area fails internally.

Sealant failures can come from a number of sources:

• The joint moved too much, pulling the sealant off the EIFS or pulling the sealant itself apart.

• The sealant quality was inadequate for the application.

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• The bond of the sealant to the EIFS was inadequate.

• The quality of the bond of the sealant to the EIFS was reduced for some reason.

Regardless of the reason for the sealant failure, there are four common ways to repair sealant joints:

1. If recessed sealant beads were used in the original design, then there will be room to put new sealant in the joint and over the old one.

2. If the EIFS sealant joints are flush with the outside face of the finish, put new sealant on the *outside* face of the finish. Mask the "band aid" area with tape and then apply a wide bead of sealant to the area. The bead is thenshaped using a template.

This method is effective but is difficult to install so that it looks good. Even if the installation workmanship is excellent, some people feel it ruins the clean lines of the wall.

3. Remove the old sealant and replace it with a new one. Gingerly clean away all the excess sealant using gentle force and mild cleaning materials. A clean bond area is required in order to get good adhesion to the existing surface.

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This method requires patience, time, craftsmanship and often more money than you want to spend. Removing the old sealant completely can be difficult because it must be done gently to avoid tearing up the lamina. Also, because the surface is textured, old sealant gets stuck in the texture grooves where you can't get at it.

4. Rebuild the joint area. This

approach involves cutting away the joint area, including the EIFS and the sealant, back to (and often including) the substrate, and replacing the area with a new EIFS.

This is obviously expensive and time-consuming. With sheathing substrates this can be especially laborious because the sheathing already may have been damaged by a leak, not to mention the repair process itself. For example, it may be necessary to remove the sheathing back to the next stud, just to be able to splice-in a new piece.

This method also tends to create stripes of new material around the joint which are difficult to match to the adjacent existing finish. To ensure a good color match, the whole adjacent wall area, as well as the patch area, is often painted.

Also Watch Out For...

Sometimes repair strategies go awry, and the battle plan needs to be changed en route. Here are some things to be prepared for:

When fixing failed EIFS joints, the base coat can get damaged to the point that it will not provide a proper surface for applying the sealant; rebuilding the entire joint may be necessary.

Sometimes, when diagnosing building problems, the process reveals problems that are much worse than were expected. For example, water may have gotten into the wall and ruined the substrate, or the metal or wood studs may have become rusted or rotten. The whole wall is in jeopardy. The moral is not to assume anything in terms of repair costs until a *thorough* diagnosis has been done.

This article was based on excerpts from Exterior Insulation and Finish System Design Handbook Copies of the book are available for $49.95 each plus $5 shipping and handling. To order, or for further information, write: CMD Associates, Inc., 21236 Tramp Harbor Road Southwest, Vashon Island, WA 98070, or call 206-463-9840.

Robert G. Thomas. Jr.

About the Author:
Robert G. Thomas, Jr. is a wall systems consultant. A graduate of Carnegie-MellonUniversity's architecture program, he has been involved in the exterior wall business for his entire career. Formerly Manager of Technical Services at Dryvit Systems, Inc., he played a major role in establishing technical standards for the US EIFS industry. ❑