DOES EIFS REALLY LEAK?

Three Critical Non-EIFS Components That Make a Difference

By Alan O. Campbell

There has been much debate about Exterior Insulation and Finish Systems (EIFS) and water intrusion problems, but a large part of the problem really boils down to components that are not part of the EIFS. Traditional EIFS cladding consists of only four components that form the system. A complete system includes the insulation board, base coat, reinforcing mesh, and finish coat. Minor variations may include adhesive if the base coat is not used for adhesive and the use of polyisocyanurate foam insulation in place of the more common expanded polystyrene (EPS) insulation. A water management (or drainable) EIFS may also include mechanical fasteners and a moisture barrier. This article pertains to a barrier-type EIFS that includes only the four basic components.

Many EIFS applicators and contractors exclude some of the most critical components that are not part of the EIFS cladding. These additional components are essential, and the system is likely doomed to fail without them. Critical non-EIFS components that are commonly omitted but that have contributed significantly to the failure of EIFS cladding (as well as many other cladding types), include the kick-out flashing, sealant joints, and sill flashing for windows and doors. These components are discussed in detail below.

Kick-Out Flashing

The kick-out flashing is one of the few components related to an EIFS installation that is typically the responsibility of the roofing contractor. Kick-out flashing is required at all roof-to-wall interfaces to divert water from the vertical sidewall away from the EIFS. The two most common application areas for this piece of flashing are the 90-degree intersection between a roof and a wall and where a roof terminates into the side of a chimney.

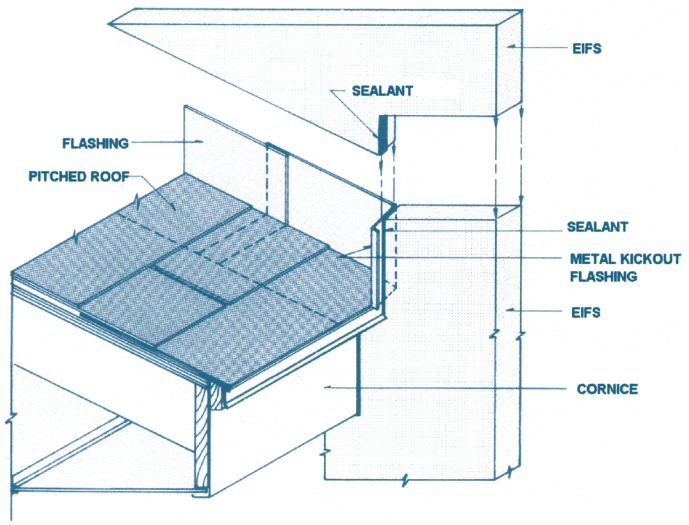


Figure 1: Metal Kickout Flashing

The concept of the kick-out flashing is relatively simple in that it has an angled leg to divert runoff from the roof rather than allowing moisture to penetrate behind the EIFS and into the wall assembly. Since these roof-to-wall interfaces occur well above the ground, the consequence of unmitigated water intrusion at these locations can be detrimental to the performance of the cladding. Leaks can occur at the location of an omitted kick-out flashing and go unnoticed for a period of several years. It is not uncommon for this condition to allow water intrusion that can totally deteriorate the sheathing substrate and cause major structural damage to the underlying framing. A detail of a typical kick-out flashing is shown in *Figure 1*.

Sealant Joints

There are three accepted methods for installing sealant joints in conjunction with EIFS cladding, but whatever the method, the sealant joints are absolutely critical. The three acceptable sealant methods include:

1) Backer rod and sealant (sometimes referred to as an engineered sealant joint),
2) Seal tape, and
3) A fillet bead.

The sealant method selected is dependent upon the building detail being considered. Sealants are required at the juncture of dissimilar materials at all openings, penetrations, and terminations. An opening would be considered a large void in the wall for windows or doors, a penetration would be for such items as pipes or cables, and a termination would be an area where the EIFS butts into a concrete slab or masonry wall.

The sealant method shown in most typical details, and arguably the most effective method, is a joint consisting of backer rod and sealant. This method forms an expansion joint to account for movement between dissimilar materials caused by thermal movement and shrinkage. The backer rod is used as a backup material to control the depth of the joint and create proper sealant geometry. The sealant joint should be approximately 3/8 to 1 inch in width, have a width-to-depth ratio of 2 to 1, and resemble an hourglass cross section *(see Figure 2)*.

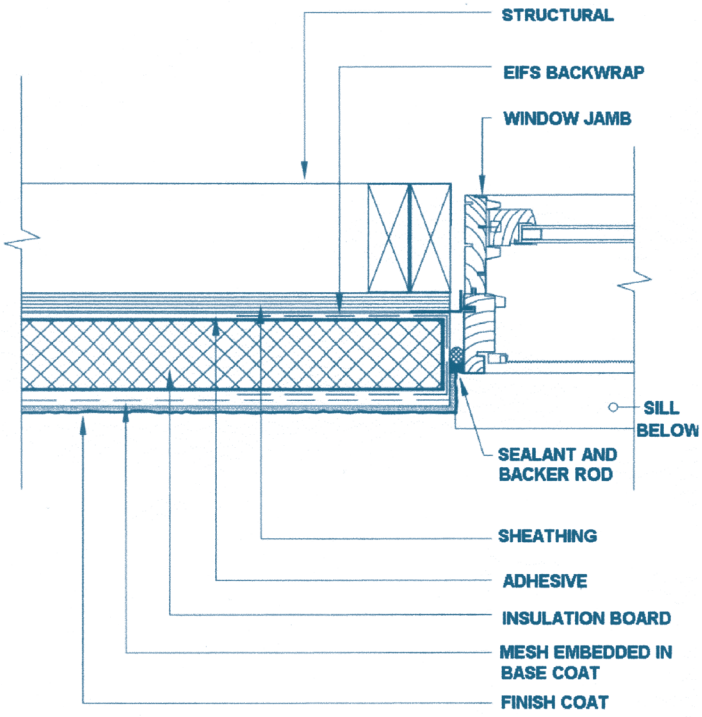


Figure 2: Sealant joint with backer rod

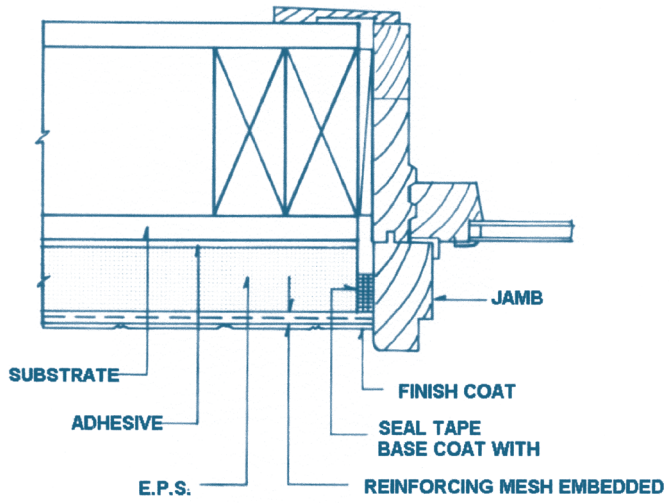


Figure 3: Seal tape.

It is important that the sealant is not applied to the EIFS finish coat. An EIFS finish coat is not waterproof and is primarily an aesthetic layer. Under certain conditions, if the sealant is applied to the finish coat, an adhesive failure can occur as a result of the tensile force of the sealant pulling the finish coat away from the base coat. This condition typically takes several years to occur as a result of long-term softening of the finish coat in the presence of moisture. The matrix formed between the base coat and reinforcing mesh is the waterproof layer of the EIFS, and therefore, it is important that the sealant on the EIFS side of the joint be applied only to the base coat. Absence of the backer rod for this type of sealant joint can cause problems such as joints that are too thick or too thin and joints that fail due to adhesion to the substrate (three-point adhesion).

As a method to make the installation of sealant joints in EIFS more economical, some EIFS manufacturers have allowed the use of seal tape systems. A seal tape is simply a compressible foam tape with a peel-and-stick surface which can be field installed. This method is more economical than the backer rod and sealant joint method and typically goes in more quickly. It can be very effective if properly utilized and installed. A typical seal tape system is shown in *Figure 3*.

An alternative method of installing sealant joints on an EIFS cladding is the use of a fillet bead in conjunction with bond breaker tape. This method can be used with new construction, but is more commonly seen in retrofit applications. For example, if EIFS was defectively installed without proper sealant joints, a fillet bead with bond breaker tape could be utilized as a retrofit, provided that water intrusion has not already compromised the system. The sealant should still be applied to the base coat of the EIFS for the reasons already noted, and the bond breaker tape is required to create proper geometry of the sealant joint. As shown in *Figure 4*, the bond breaker tape does create an approximate hourglass profile of the sealant joint. Most bond breaker tapes have a peel-and-stick surface, but a thin bead of non-compatible sealant can also be used as a bond breaker. For example, silicones and polyurethane sealants will not stick to each other, and the use of these two sealants together form an effective bond breaker and sealant joint.

Sill Flashing Under Windows and Doors

Metal sill flashing is quite frequently omitted under windows, even though it is shown in most typical details. Window manufacturers have adopted a self-serving position that the entire window is not designed and manufactured to be leakproof, and it actually has what is classified as a wet zone and dry zone. The dry zone of a window is typically from the face of the sheathing inward and the wet zone is from the face of the sheathing outward. This position may be suitable for those claddings that utilize building paper, but for those claddings that do not utilize building paper, water intrusion onto the face of the sheathing can be quite harmful. For the record, there are also various wood

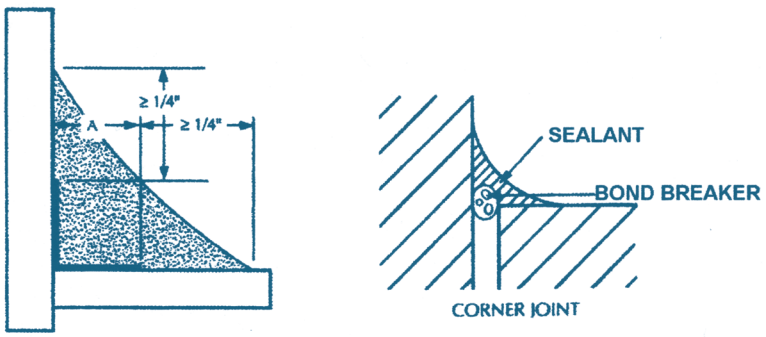


Figure 4: Example of typical fillet beads termination.

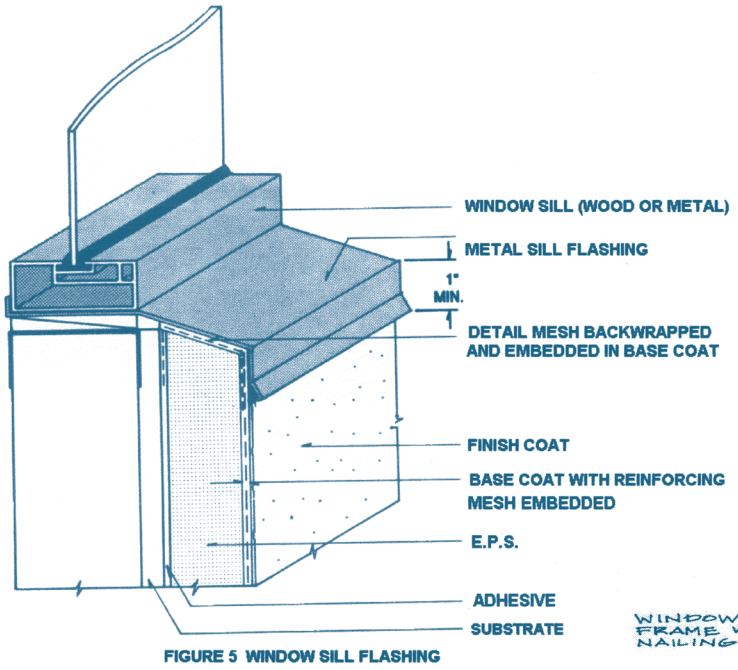


Figure 5: Window sill flashing.

and composite claddings other than EIFS that do not utilize or require building paper. EIFS cladding is considered to be a barrier wall system and introducing moisture into the wall assembly as a result of window leakage can be very harmful. The solution to this problem is the use of metal sill flashing (see *Figure 5* for typical window sill flashing).

The installation of a properly configured window sill flashing is sometimes easier said than done. Many residential windows and some commercial windows have nailing fins and flanges under the sill. The sill flashing will discharge moisture from the wet zone of the window beyond the face of the EIFS. However, nailing fins (or flanges) will completely obstruct the installation of the sill flashing. Some contractors have gone so far as to remove the nailing fins from the bottom of the window, but this procedure typically voids the window manufacturer's warranty and may create a building code violation. If the window manufacturer is contacted, he may be able to provide assistance, or the detail can simply be modified as shown in *Figure 6*. This method is still effective but is somewhat more expensive. It should also be noted that an effective sill flashing under a window should have end dams and be configured in the shape of what is sometimes called a sill pan. If the window is fastened through the sill flashing, provisions should be made to protect the fastener holes with sealant or a self-healing, peel and stick flashing.

Conclusion

Omission of any of the three non-EIFS components addressed by this article can be detrimental to the performance of EIFS cladding. Although they are not part of traditional EIFS, they are critical to system performance. These components are also shown in EIFS manufacturers' typical details. Proper installation of these components will add to the cost of construction; however, this cost should be considered negligible when compared to the cost of repairs when these components are omitted or installed improperly. For this reason, proper installation of these components should be considered mandatory.

A barrier EIFS can be an attractive, functional, and dependable cladding and will provide satisfactory performance if properly installed. However, EIFS shares many similarities with roofs, which are also barrier systems and will fail quickly in the presence of long-term and excessive water intrusion. We are now beginning to see more significant and costly consequences of system failures. In addition to the obvious problems associated with water intrusion, mold claims are becoming serious concerns for contractors and insurance companies alike. As most of us are aware, it only costs a little more to pay attention to the details and do it right the first time. ■

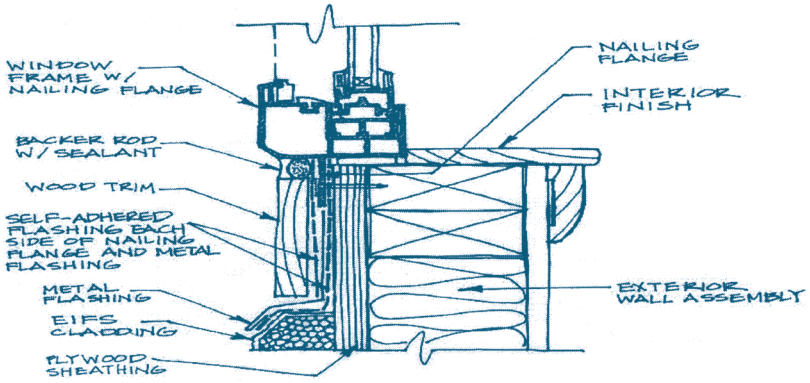
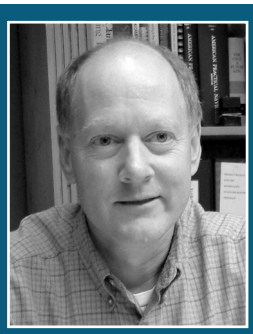


Figure 6: Modified window sill flashing.

About the Author



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Alan Campbell is a principal with the firm of Campbell, Schneider and Associates, LLC. He has over 21 years of experience as a structural engineer and roof consultant and is responsible for facility condition inspections, failure analyses, damage assessments, roof surveys, and engineering investigations of all types of structures. This effort is related to structural failures and deficiencies, faulty construction, building code violations, and expert witness testimony. A large percentage of Mr. Campbell's practice focuses on the evaluation of building envelope problems related to synthetic stucco, conventional stucco, and roofing systems. Mr. Campbell's practice also includes the evaluation of structural defects and failures attributable to catastrophic events such as hurricanes, windstorms, and earthquakes. Mr. Campbell has provided expert testimony related to wind versus flood, building code violations, defective construction, coating failures, roofing problems, and life safety issues.