Sealants - Use with EIFS and EIFS with Drainage Clad Wall Assemblies

INTRODUCTION

Exterior Insulation and Finish System (EIFS), like many exterior wall coverings, commonly transition to a dissimilar material, an adjacent component (such as a window or door) and may also accommodate building movement via expansion joints. These transitions are often addressed using elastomeric sealants. Like many other building components, sealants must present a level of function, performance, durability, and aesthetic appeal that is compatible with both the design intent and the intended service life of the overall structure and/or building system to receive the sealant. The diversity of proprietary sealants in the construction industry provides flexibility in selection during the design process; however, the primary considerations in sealant selection are typically related to service life, performance expectations, maintenance requirements, and cost.

PERFORMANCE CHARACTERISTICS

Sealants used specifically in EIFS clad wall assemblies should be evaluated in accordance with ASTM C1382 Standard Test Method for Determining Tensile Adhesion Properties of Sealants When Used in EIFS Joints. Figure 1 provides an illustration of a specimen that has been prepared for testing. This test procedure evaluates sealant tensile adhesion to an EIFS reinforced base coat or coating after various lab-replicated environmental conditioning processes. These include:

- Seven-day water immersion
- 24-hour freezing
- 24-hour heat conditioning
- UV and condensation exposure cycling for 2,500 hours

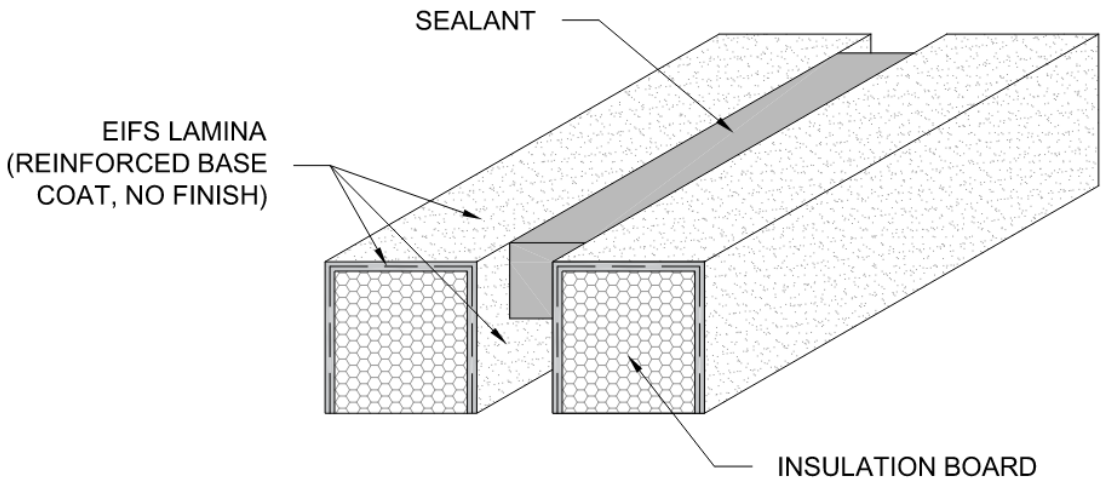

Figure 1: Illustration of a specimen configured for testing in accordance with ASTM C1382.

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The samples are then placed into tension and measured at 10, 25, 50, and 100 percent elongation. Load values are recorded at these intervals to verify the sealant will maintain adhesion to the substrate under these conditions when used with specific EIFS materials being tested. This test can also identify if the use of a primer is necessary for the configuration being evaluated.

Although ASTM C1382 does not include pass/fail criteria within the standard, the sealants are examined during testing for any failures, including adhesive failure, cohesive failure, and delamination of the coatings from the insulation board substrate. Ultimately, an appropriate sealant for use with EIFS must not cause a failure of the EIFS lamina while also maintaining its adhesive and cohesive properties over some reasonable expected service life.

SEALANT MODULUS OF ELASTICITY

Elastic modulus is a mechanical property of a material that is examined through tensile testing. The modulus provides insight on how much stress is imparted under a load that induces elongation of the material. The magnitude of the stress imparted by the sealant onto the EIFS lamina along the bond line is directly related to the sealant's modulus.

Additionally, the magnitude of sealant deformation (through elongation) is an indicator of the amount of stress along the surface of adhesion. A sealant with a high modulus will impart a higher stress along its bond to the reinforced base coat when placed into extension, while a low (or ultra-low) modulus sealant, will impart a much lower stress on the EIFS at the same amount of elongation. It is important to recognize that sealants typically impart a larger stress on the bond line under larger amounts of extension. This can influence the size of an expansion joint in design and construction. The EIFS manufacturer should be consulted for guidance on sealant recommendations or maximum allowable tensile stress along the bond line for their proprietary components.

GENERAL JOINT DESIGN & PLACEMENT

The size and location of sealant joints is the responsibility of the design professional while the EIFS and sealant manufacturers often provide guidance on joint design and placement. EIFS manufacturers will have different requirements for spacing of expansion joints in their systems due to the nature of the components used in the various types of EIFS on the market. ASTM C1481 Standard Guide for Use of Joint Sealants with Exterior Insulation and Finish Systems (EIFS) provides guidance on the use of sealants.

The following are locations that typically require placement of a sealant joint:

- Floor lines of multi-level, wood-frame construction
- Building expansion joints
- Dissimilar substrates
- Locations where the EIFS abuts a dissimilar building component such as window, door, etc.

The designer must also consider the substrate in the joint design, which may have more stringent requirements regarding location and spacing of expansion joints. Buildings in higher seismic zones may also require joints that are very wide to accommodate large movements associated with very high inertial loading conditions and therefore higher lateral deflections.

While a ¾-inch joint width is often used in the EIFS industry, manufacturers and designers have other options based on testing, judgement, and analysis. Some transitions may require smaller joints, while others may require joints larger than ¾-inch due to the amount of potential movement anticipated once in service. The size of the joint can also be influenced by the sealant selected for use. Use of a closed cell backer rod or other method such as bond breaker

tape to prevent three-sided adhesion is also necessary. Open cell backing materials can absorb and retain water which may cause a deleterious effect on the EIFS and therefore are not recommended.

ASTM C1193 Standard Guide for Use of Joint Sealants provides comprehensive guidance on various sealant joint geometries. Two of the most common cross-sectional geometries are the hourglass and the fillet. Both require use of a backing material to prevent three-sided adhesion when movement is anticipated. A closed cell backer rod or a bond breaker tape is commonly utilized to accommodate this. Figure 2 illustrates these two common configurations.

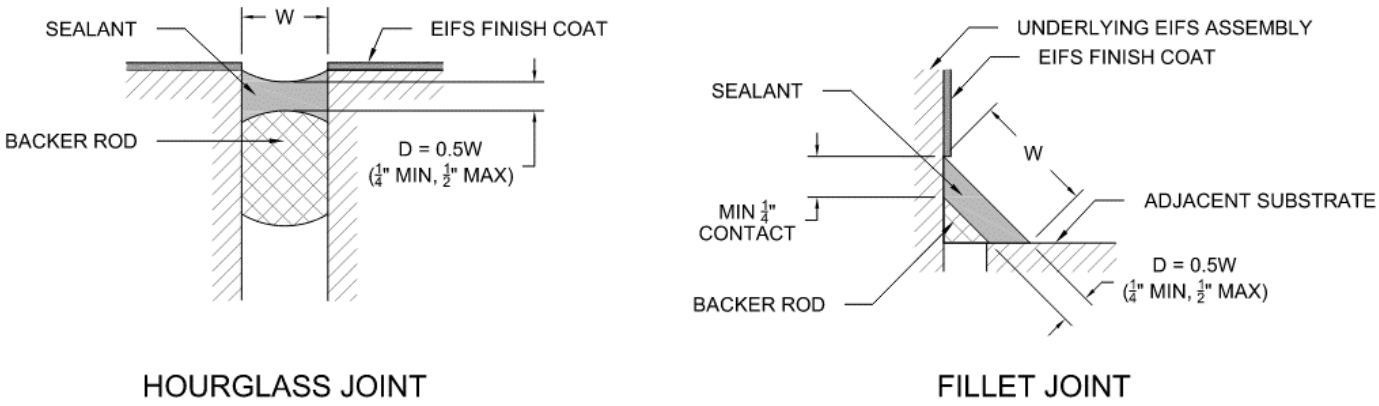

Figure 2: Common sealant joint configurations.

Sealants are generally installed such that the depth of the sealant is one half the width of the joint; however, most sealants will not adequately perform beyond a depth of ½-inch nor when the depth is less than ¼-inch. It is important the sealant manufacturer be consulted when the typical joint configurations are not achievable. Three-sided adhesion must also be avoided at joints that are expected to withstand any form of movement. Not addressing this in the joint design can cause delamination or premature cohesive failure of the material once in service. When used, backer rods should be sized approximately 25% larger than the joint so that the backer rod fits snugly and holds itself in place. This will allow the sealant depth to be more easily controlled during application.

Note also that application of sealant over or to the EIFS finish coat is not recommended. Adhering sealants to a finish coat can result in joint failure if the finish softens due to long-term exposure to the environment. Unless directed otherwise by an EIFS manufacturer, a sealant should never be installed directly to an EIFS finish coat in the configurations described in this bulletin.

SUMMARY

Proper joint design and sealant selection are critical to the performance of the building enclosure. Sealants play an important role in providing durability, longevity, and aesthetics in a time where there have never been more cladding types in the marketplace. Today's diversity in building enclosure assemblies has resulted in incredibly complex architectural detailing and an increased need for expansion and transition joints. Both sealant and EIFS manufacturers should be consulted when specifying sealants to verify what has been tested as well as confirm that the appropriate performance characteristics are provided. Not doing so could not only be detrimental to the cladding but adjacent assemblies as well.

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ABOUT EIMA

Founded in 1981, the EIFS Industry Members Association (EIMA) is a North American non-profit technical trade association dedicated to advancing and promoting the Exterior Insulation and Finish Systems (EIFS) industry. As a leading authority on EIFS, EIMA serves as a vital hub for leading suppliers, manufacturers, distributors, contractors, architects, and professionals in the industry. EIMA stands as a cornerstone for individuals and businesses seeking to thrive in the dynamic world of Exterior Insulation and Finish Systems. Learn more at www.eima.com.