Integrating Fluid-Applied Air- and Water-Resistive Barrier Membranes and Accessories with Elements of the Building Enclosure

By Bill Egan

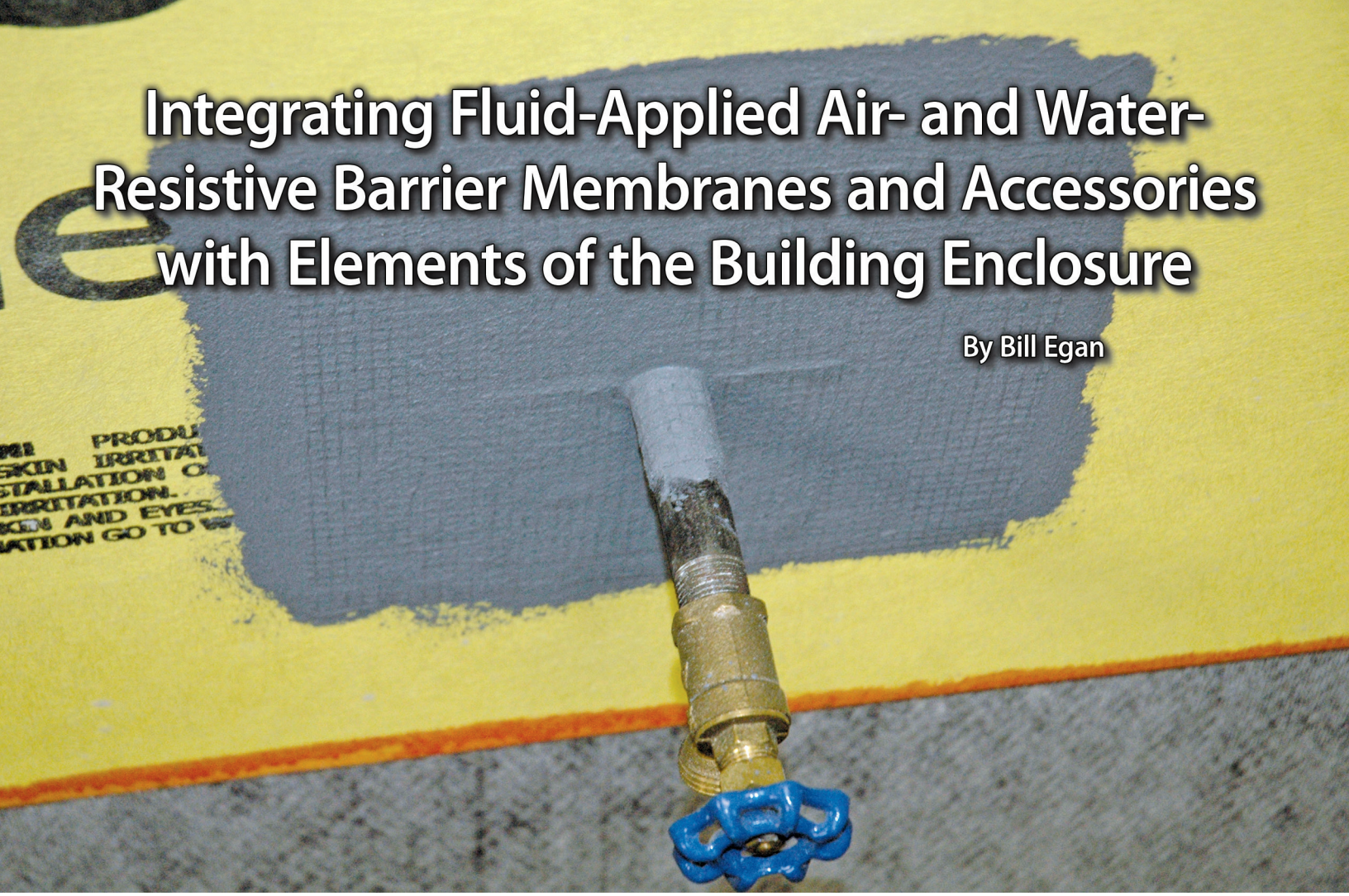

Figure 1. An example of a penetration that has been made air- and watertight using a reinforcing mesh/fluid-applied material.

The primary element of the building enclosure that restricts air movement is referred to as an air-barrier material, which is used in conjunction with transitional components, known as accessories, to create an air-barrier system. The function of an air-barrier system is to reduce or restrict air movement between different building environments. While air barriers restrict air movement, water-resistive barriers resist liquid moisture that bypasses the exterior cladding and protect underlying building elements. Unlike a water-resistive barrier, which is continuous behind the exterior cladding, an air-barrier system provides continuity across the entire building enclosure and its elements. An air-barrier material may be on the exterior or interior of the building enclosure, with the location depending on factors such as design strategy and material type. The same material may be used as an air-resistive barrier and a water-resistive barrier, provided it meets all of the applicable performance and installation requirements for air as well as water resistance.

Building codes set forth the different performance requirements for air and water resistance. There are numerous approaches and products that can comply with one or, in some cases, both sets of criteria. Products that meet air and water resistance requirements are commonly referred to as an air- and water-resistive barrier (AWRB). Self-adhered membranes, concrete, spray foam, building wraps, integrated sheathings, sheet goods, thermal insulation board, and fluid-applied membranes are examples of products that, with supporting compliance data, may qualify as an air-barrier material, water-resistive barrier, or AWRB.

FLUID-APPLIED MEMBRANES

Fluid-applied materials that qualify as AWRBs are used behind a variety of claddings such as metal panels, brick, stone, stucco, high-pressure laminates, and exterior insulation and finish systems (EIFS). Some fluid-applied materials can also qualify and are used as flashings around rough openings, penetrations, and elsewhere. Fluid-applied materials form a membrane upon drying or curing, are often available as vapor-permeable or impermeable, and can be installed on many types of substrates.

Examples of accessory materials used in conjunction with fluid-applied materials to provide continuity of air or water resistance include reinforcing mesh, tapes, sealants, sheet goods, elastomeric materials, self-adhered membranes, extrusions, and foam products. Accessories may be available from the fluid-applied material manufacturer or another approved supplier. Some accessories will likely have to be obtained from sources other than the fluid-applied material manufacturer because a single supplier may not have all accessory material options available.

There are numerous items to consider when selecting and integrating the fluid-applied membrane with accessories and other building enclosure elements. These items can vary by project and should be based on identified needs, conditions, and design considerations. The following sections offer guidance and assistance for choosing accessories.

SUBSTRATE

Accessories provide a transition from the fluid-applied membrane to one or more building enclosure elements or substrates that may include, but are not limited to, sheathing, wood, concrete, concrete masonry units, flashing, roofing, deck coating, waterproofing, damp-proofing, insulation, doors, windows, sealants, and deck membranes. Accessories commonly rely on adhesion to the substrate; therefore, to achieve intended performance, they must be compatible with all materials to which they connect, interface, and adhere. For a variety of reasons, all accessories may not necessarily function with all substrates or under all situations; therefore, compatibility should be confirmed for each unique substrate or condition through laboratory testing or field evaluation, or by consulting the manufacturer.

Exterior Cladding

Compatibility of the accessory with the exterior cladding is important because some accessories may not be suitable or recommended for use with all claddings or applications. For example, accessories are generally installed in concealed spaces behind the cladding and therefore are not subject to permanent weather exposure. However, in the case of an open-joint rainscreen cladding system, the accessory may be permanently weather-exposed. Consequently, there should be information that supports use of the accessory in this application.

Another example is an EIFS with drainage, which is generally adhesively fastened directly to the fluid-applied membrane. For this application, the accessory must be compatible with the fluid-applied material and the substrate or building element to which it will transition. Additionally, because the EIFS will be adhesively fastened over the accessory, the EIFS adhesive should also be compatible with the accessory surface.

ACCESSORY MATERIALS

Building codes, standards, and performance requirements are different for air and water resistance. Accessories should be suitable for the intended use and meet applicable requirements depending on whether the application is part of an air-barrier system, water-resistive barrier, or AWRB. Additionally, some accessory materials may meet the requirements for flashing, which often integrate with the AWRB and presents another selection consideration.

The overall installation of the accessory varies depending on material type and can impact the project from many perspectives. Examples of issues to consider are as follows:

- **Environmental:** Some materials may have limitations or stipulations with regard to minimum application temperatures, ultraviolet exposure, substrate moisture content, or other issues. Depending on the project, these concerns may impact factors such as use, scheduling, and costs.
- **Support:** In general, accessories require a solid support or backing due to imposed loads plus the accessories' finite ability to bridge gaps and voids in the substrate itself or as it transitions from substrate to substrate. The ability of an accessory to bridge gaps or voids can differ by material type and may influence selection for a particular condition or detail. Manufacturers of accessories typically publish or can provide limitations in terms of allowable gaps or voids of a particular product, which can factor into material selection.
- **Installation methods:** Depending on the material, accessories are installed by adhesives, mechanical attachment, trowel, spray, roller, or dispenser guns, or other methods. Installation needs to be in accordance with the manufacturers' instructions and recommendations. The cost of the accessory as well as installation can vary widely from one type to another. This cost variation can be significant and therefore merits consideration. Additionally, some products may require a primer, entail multiple application steps, or involve a specific drying or curing period prior to installation of other building enclosure elements. As an example, accessories that do not require lengthy dry times may be preferable if there is a tight schedule and imminent desire to start installation of other building elements, such as the exterior cladding. Scheduling and sequencing can also play a role in the selection as accessories may need to be installed or integrated in a particular manner with the fluid-applied material and other substrates. If sequencing changes the intended installation process of the accessory, it should be confirmed that expected performance will not be affected by the method of installation.
- **Details, conditions, and transitions to other building elements:** Many locations of the building enclosure will require an accessory to transition and provide continuity from the fluid-applied material to another substrate or building enclosure element. Examples of common transition locations and elements include tops and bottoms of walls, pipe penetrations, foundations, sheathing joints, brick anchors, fasteners, flashings, fenestrations such as windows and doors, hose bibs, through-wall joints, and the like.

Selecting the type of accessory should include consideration of the detail and conditions such as anticipated movement, connection flanges, and gap sizes, along with the type of substrate, as some products may be more suitable than others under certain conditions. For example, **Fig. 1** shows a hose bib penetration that has been made air- and watertight using a reinforcing mesh/fluid-applied material, which is easily manipulated around the rigidly secured small-diameter pipe. For this condition, the primary fluid-applied material is applied to the sheathing substrate after installation of the accessory around the hose bib. This is feasible due to the seamless nature of the fluid-applied material; also, the same material will be used around the penetration and in the field of the wall, which ensures compatibility. Confirmation of compatibility is necessary when different materials adjoin, overlap, or adhere.

Figure 2 shows an accessory used to transition between joints of adjacent pieces of sheathing, as occurs in the field of the wall on framed construction, and this accessory is used to spot or provide coverage to the sheathing fasteners. The product illustrated is a trowel- or gun-applied elastomeric material. However, other products used for this type of condition include self-adhered membranes and a reinforcing mesh or fluid-applied material, similar to Fig. 1. As with Fig. 1, the sheathing joint treatment in this application is completed prior to application of the fluid-applied material to the field; therefore, adhesion of the fluid-applied material needs to be compatible with the elastomeric material.

Figure 3 shows an example of a nail flange window where the fluid applied is qualified as flashing and has been continued into the rough opening. The next steps are installation of a self-adhered membrane on the sill, window, and self-adhered membrane, which transitions from the fluid applied to the flanges of the window jambs and head.

Figure 2. An accessory used to transition between joints of adjacent pieces of sheathing is visible in this photo.

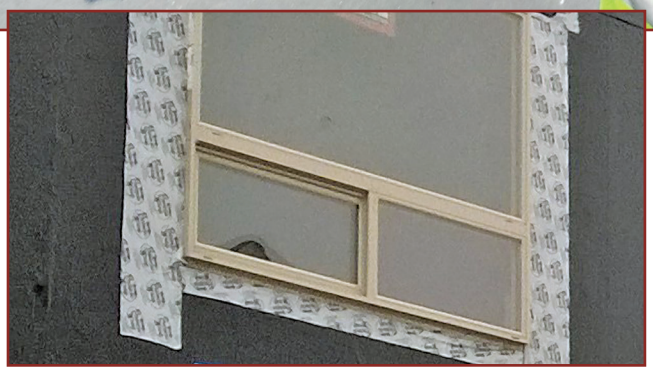

Figure 3. This photo shows an example of a nail flange window where the fluid applied is qualified as flashing and has been continued into the rough opening.

PROJECT DOCUMENTS

For each unique project condition, specifications and details should include sufficient information to show or describe the interface or connection of the accessory to the AWRB and other building elements. Examples of important information to provide include the following:

- Accessory descriptions
- Performance requirements for air or water resistance, or both air and water resistance
- Uses
- Tolerances
- Substrate conditions
- Limitations
- Overlaps
- Details with the type of accessory that should be used under specific conditions

With regard to performance, each material type or technology may have somewhat different performance attributes. Therefore, it is important that the specified performance requirements align with the type of accessory material that will be used. Performance information and other resources are available through industry associations such as the EIFS Industry Members Association and Air Barrier Association of America. Additionally, organizations such as ASTM International and American National Standards Institute have published standards and others under development.

Quality assurance and quality control can help verify compliance with applicable documents and requirements during the construction process. Some quality control options to consider include third-party site observations, quality assurance programs, contractor accreditation, and performance testing by an independent laboratory.

The AWRB is part of an assembly composed of multiple products that create or form a system to provide air and water resistance to the building enclosure. Individual product warranties, particularly when sourced from different manufacturers, may not result in a comprehensive remedy if there is an issue with the system or assembly—for example, at the interface of different products. Material manufacturers can generally provide sample warranties that set forth duration and type of coverage, including whether it applies to individual products or the system in its entirety.

Preconstruction Conferences and Mock-Ups

Preconstruction conferences and mock-up panels can be beneficial because installation of the AWRB and accessories typically involves multiple contractors and multiple products that generally are sourced from multiple manufacturers. The conference provides an opportunity for the construction team to discuss scheduling, sequencing, trade coordination, contractor responsibilities, weather protection, material types, uses, installation, and construction details. Mock-up panels representative of project conditions can be useful to confirm constructability and view conditions.

CONCLUSION

Integration of accessories with the fluid-applied membrane and other building-enclosure elements is important to achieve the intended air- or water-resistance performance for the building enclosure. With many product options available, consideration of the accessory type and project conditions is important when selecting accessories.

Please address reader comments to elorenz@iibec.org, including "Letter to Editor" in the subject line, or IIBEC, IIBEC Interface Journal, 434 Fayetteville St., Suite 2400, Raleigh, NC 27601.

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Bill Egan has more than 35 years of construction experience that includes product and system design, standards development, testing, building code compliance, and claims and construction defect litigation. He is principal of the Bill Egan Group and is associated with Intertek Building Science Solutions as a part-time senior project consultant. He previously held technical roles with manufacturers of EIFS, stucco, air- or water-resistive barriers, and architectural coating systems. Egan graduated from Roger Williams University with a BS in civil engineering, holds numerous patents, and actively participates in various industry associations. He also serves on ASTM International committees related to stucco, lath, and air- and water-resistive barriers, and he is ASTM E6.58 subcommittee chair for performance of EIFS.