A RAINSCREEN SOLUTION

USING FIBER CEMENT ARCHITECTURAL WALL PANELS

Presented by:

NICHIHA fiber cement

the power of possibilities™

University of Minnesota Riverton Housing. Photo courtesy of Nichiha

LEARNING OBJECTIVES

Upon completion of this course the student will be able to:

1. Identify the innovative characteristics of fiber cement products used in commercial buildings.
2. Describe the cause and effect of moisture intrusion in a wall system.
3. Examine the importance of rainscreens and weather barriers in water migration.
4. Review examples of rainscreen technology and testing standards that measure their performance.

CONTINUING EDUCATION

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FIBER CEMENT PRODUCTS IN COMMERCIAL BUILDINGS

Fiber cement is a composite that combines fibrous material with a Portland cement binder to produce a strong, dense product. Fiber cement was first developed in Europe in the early 1900's in response to a need to create a durable, lightweight, and affordable building product. Its first application replaced the traditional terra cotta tiles common throughout Europe with lightweight, fireproof roofing panels. In the mid-20th century fiber cement siding panels and shingles were introduced to the United States for residential buildings, but these early materials were produced with asbestos. Since the 1970's fiber cement products have been made without asbestos, and have become recognized as a safe, innovative, and even sustainable green building product.

FIBER CEMENT MANUFACTURING PROCESS

The fundamental manufacturing process of fiber cement products is generally the same, irrespective of the type, size or style of product. Wood fiber, Portland cement, silica filler and water are combined, providing flexibility, strength, weight reduction, and bonding respectively. Sometimes fly ash filler is used rather than silica because silica can pose health threats when cut, and fly ash is a recycled by-product of the coal industry.

Recycling fly ash is encouraged by many organizations with different stakeholders. The US EPA, the Natural Resources Defense Council and the U.S. Green Building Council have all agreed that recycling fly ash in building materials and products is beneficial and environmentally desirable. Fiber cement manufacturers are contributing to the growth of fly ash recycling while also finding that it improves the overall performance of their end products.

Once the ingredients are proportioned and combined, the resulting material is processed into the desired shape and length. In some cases, stamps or molds are used to create the appearance of wood grain, stone, brick, or other patterns. The final step is to apply protective coatings over the fiber cement products; these coatings are either prime coats for field finishing, or factory finish coats for a completely finished panel.

When aesthetic features are combined with a fully engineered installation system, commercial grade fiber cement architectural wall panels become an integral part of a high performance, durable, commercial exterior wall system. Photo courtesy of Nichiha

COMMERCIAL ARCHITECTURAL WALL PANELS

There are two distinct categories of fiber cement products—residential and commercial—but the two should not be confused since they are designed and produced to address fundamentally different needs, construction processes, and aesthetics. This discussion strictly pertains to commercial fiber cement products, which are best described as architectural wall panels. They are much better suited to the more demanding conditions placed on commercial buildings, particularly the forces of wind and rain on multi-story buildings. Recognizing the need for higher performance in commercial buildings, manufacturers offer not just the fiber cement panels, but also fully engineered installation systems.

The proper treatment of the exterior wall behind the fiber cement product, including appropriate moisture and air flow management, is key to the performance of commercial fiber cement products. The fully engineered installation systems are designed to work with and complement both the integrity of the substrate wall construction and the durability of the architectural wall panels.

Commercial fiber cement products are typically pre-finished in a range of standard or custom colors and textures with a corresponding warranty on the total finish. For improved appearances, some manufacturers use hidden fasteners to create the clean, uncluttered look desired in many commercial buildings. When these aesthetic features are combined with a fully engineered installation system, commercial grade fiber cement architectural wall panels become an integral part of a high performance, durable, commercial exterior wall system.

Many building materials can be used to assemble a rainscreen system, including fiber cement panels. Image courtesy of Nichiha

MOISTURE INTRUSION IN A WALL SYSTEM

Before we delve into the specifics of these various moisture management tools, let's discuss why they are necessary in the first place. There is no such thing as a water-tight structure. Because water takes the path of least resistance, it will find even the smallest opening in the building envelope, allowing moisture to enter the wall system, no matter how many layers of protection are provided.

Moisture in a wall system can originate from many sources, including elevated relative humidity (RH), precipitation and groundwater, interior sources such as broken water pipes, and even water evaporating from construction materials. This excess moisture, if not properly drained, can cause many structural issues for the building itself and health issues for occupants.

Persistent moisture can lead to rot, corrosion, expanding soil, ice dams, and other forms of deterioration. It also supports insect infestation, and if elevated moisture levels persist on or inside a wall or roof assembly, they can lead to the growth of microorganisms such as mold and bacteria. Mold produces allergens that can trigger allergic reactions or asthma attacks in those people allergic to mold spores. Most mold exposure symptoms result from inhaling or touching mold, with the most common symptoms being asthma, nasal or sinus congestion, sensitivity to light, skin irritation, shortness of breath, headache, fatigue, and burning eyes. Serious cases of mold exposure can lead to lung disease and a compromised immune system.

Therefore, it is imperative that wall assemblies are properly designed to manage moisture intrusion. In addition to keeping water out with various weather resistive barriers, systems must be put in place to allow water to exit the envelope once it inevitably does get in. Rainscreens are one such method of shedding water, while also providing a drying mechanism for the building. Many building materials can be used to assemble a rainscreen system, but we want to focus here on using fiber cement panels as rainscreens.

FUNCTIONS OF A BUILDING ENCLOSURE

The primary functions of a building enclosure are to separate the inside and outside of a building, protect the inside from external elements, and conserve energy. An enclosure's performance is determined by heat flow, air flow, and moisture flow, which are all interlinked. Moisture management is possible through the use of a combination of methods including weather resistive barriers (both air and water), vapor permeation, cavity drainage, as well as a rainscreen, which resists wetting and allows drying when moisture does permeate.

The four components of a successful building envelope design are deflection, drainage, drying and durability. Deflection limits the structure's initial exposure to rain with the use of overhangs and flashing. Drainage redirects any moisture that penetrates the wall to the exterior. Then, any moisture that penetrates the wall should be able to dry within a reasonable amount of time before causing damage to the structure. Finally, only durable, weather-tolerant materials should be used.

In conjunction with these four design considerations, a modern wall system should typically be designed with six layers. These layers are exterior cladding, stud framing, weather resistive barriers and flashings to manage water and drainage, insulation to provide energy efficiency, anchors and fasteners to hold the system together, and finally sheathing as the interior layer.

A successful wall design provides multiple pathways for drainage and doesn't allow the water to build up in the wall system. The wall should be "back ventilated," meaning air is allowed to circulate, which enables the wall to dry out as conditions moderate and change.

The four components of a successful building envelope design are deflection, drainage, drying and durability.

A successful wall design provides multiple pathways for drainage and doesn't allow the water to build up in the wall system. The wall should be "back ventilated," meaning air is allowed to circulate, which enables the wall to dry out as conditions moderate and change. Photo courtesy of Nichiha

EXTERIOR WALL ASSEMBLY ELEMENTS

First let's define the various exterior wall assembly elements, including air barriers, vapor barriers, and water resistive barriers/weather resistive barriers.

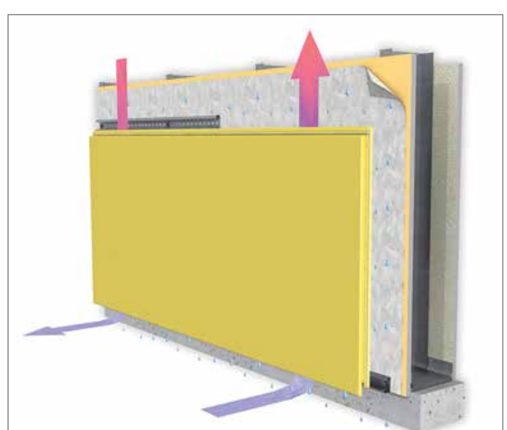
Air barriers are materials that are used anywhere in a building assembly to stop the movement of air into or out of the conditioned space. Note that water vapor can be transported by air. Any material that has an air permeability less than 0.02 L/(s·m²) at a pressure difference of 75 Pa (0.004 cfm/ft² at a pressure difference of 1.56 lb./ft²) when tested in accordance with ASTM E2178 is considered an air barrier material.

Vapor barriers are materials used to slow or reduce the movement of water vapor through a material. As we said, water vapor is also transported by air leakage but this can be resolved by installing an air barrier. Vapor barrier materials are installed **on the warm side of the insulation in a building assembly.** The position of the vapor barrier in a building assembly is determined by climatic conditions. In warm climates, it is located on the exterior while in cold climates it will be on the interior.

Water/weather resistive barriers are materials on the exterior of a building intended to resist liquid (bulk) water that has leaked, penetrated, or seeped past the exterior cladding from absorbing into the exterior sheathing or concrete wall (depending on the application) and further into the wall assembly.

When designing the make-up of the wall assembly there are a number of choices to consider and specify. Traditional sheet goods or building wraps are common for both residential and commercial construction and rely on paper or fabric materials that are bonded or fused with chemicals or other compounds. In essence, they are installed to seal the entire structure and create a barrier, most commonly for air infiltration control. These sheet goods are stapled or otherwise fastened to exterior sheathing with attention needed to joints and overlapping edges to create a full and complete barrier, albeit with some compromises made at the fastener penetrations.

By contrast, self-adhering sheet goods avoid the need for fasteners. These air and water barriers use multi-laminated layers or fibrous materials bonded together to form a large roll or sheet backed with an adhesive and easy-release protective film. The sheathing needs to be clean and ready to receive these adhesive backed goods and care needs to be exercised so they are installed cleanly without unwanted bubbles or other irregularities. The most continuous and seamless form of an air and water resistant barrier is a fluid applied type that is available in spray, trowel, and roll on formulations. In this case, all areas are continuously treated, but wall joints can be given appropriate special attention to be well sealed and reinforced at panel joints and sill areas.



Closed joint systems eliminate the open joints between panels creating a smooth, continuous surface on the exterior. The panels still function as a back draining, ventilated rainscreen, but with a much smaller depth. Image courtesy of Nichiha.

INTRODUCTION TO RAINSCREENS

There has been significant confusion regarding rainscreens and for many years there was never a true standard of testing or measuring the performance of products to be used in rainscreen applications. Rainscreens can be achieved with a variety of construction materials in various applications, in residential and commercial construction. Common rainscreen claddings include: brick veneers, stud back-up, stucco, clapboard, and panelized wall systems such as metal, alpolic, and fiber cement.

According to "The Rainscreen Principle" in the National Research Council Canada's Construction Technology Update No. 9, two exterior walls are better than one at controlling water penetration into a building. There are three required components of a rainscreen wall assembly, which offer multiple moisture-shedding pathways:

- The outer leaf or barrier is a vented or porous cladding (the rainscreen) that deters surface raindrop momentum.
- An air chamber or cavity—a few inches of depth is sufficient—separates the cladding from the support wall, reducing splashing and capillary moisture transfer. Large, protected openings (i.e. vents or weep holes) positioned at the top and bottom of the wall promote convective airflow, allowing moisture to quickly drain or evaporate from the air cavity.
- The inner leaf or barrier acts as the final moisture barrier and drainage layer that further protects against any moisture that bypasses both the cladding and air cavity. This is comprised of a weather resistive (air/water/vapor) barrier, insulation, and the building structural wall.

The effectiveness of a rainscreen cannot be achieved without an airtight weather barrier and appropriately-sized air chamber/cavity. In one type of rainscreen system, water is intended to be allowed into the cavity areas between the outer wall and the substructure.

Drained/Back Ventilated (D/BV) Rainscreen prevents most of the rainwater penetration at the outermost surface of the wall, while simultaneously providing for drainage and evaporation of rainwater that does get through. Photo courtesy of Nichiha

TYPES OF RAINSCREENS

There are two types of rainscreens that will be described in detail, drained/back ventilated rainscreen (D/BV) and pressure equalized rainscreen (PER). Drained/Back Ventilated (D/BV) Rainscreen prevents most of the rainwater penetration at the outermost surface of the wall, while simultaneously providing for drainage and evaporation of rainwater that does get through.

A Pressure Equalized Rainscreen (PER) prevents all rainwater penetration, while air is deliberately forced to penetrate the wall cavity in order to equalize pressure on the exterior and interior of the outer wall. This type of rainscreen allows pressure to rapidly rise behind the panels and reach equilibrium with the pressure available in front of the panels.

The first system allows water penetration and a way to drain and evaporate it; the other prevents water by equalizing air pressure in front of and behind the cavity. Both systems have an outer layer and an inner layer.

In a PER system, static and dynamic air pressures are theoretically in equilibrium. That is, pressure measured on the exterior of the rainscreen (outside) is equal to the pressure in the air cavity between the rainscreen and the substrate. Pressure equalization is important to prevent physical forces that force water to penetrate a building structure. The key to an effective and efficient PER lies in the ability to control the airflow within and through the wall assembly.

The cavity is divided into horizontal and vertical compartments, or breaks, that act as vent holes to provide horizontal and vertical air flow into and out of the cavity. This also allows the air space to respond to wind gusts rapidly, reducing the rain-driving force. Compartments are required to be closed at all building corners to prevent excess wind forces on adjacent wall faces.

The engineer determines the number and size (effective area) of these breaks according to known, expected, and calculated pressures that are dependent on building dimensions, height, exposure category, basic wind speeds, etc. The size and locations may vary within the same structure, since air pressure induced by wind can vary over the height and width of the building.

Applying PER technology to a wall or joint demands additional care with detailing. For example, short-lived sealants and foam gaskets that disintegrate will decrease the effectiveness and may incur future maintenance costs. Mechanical seals such as metal flashing and gasketed furring strips offer a more permanent approach, but increase cost and complication.

QUIZ

1. True or False: Residential and commercial fiber cement products have the same performance properties and can be used in the same applications.

2. True or False: The four components of a successful building envelope design are deflection, drainage, drying and durability.

3. True or False: A modern wall system should typically be designed with 3 layers.

4. Which of the following is a material on the exterior of a building intended to resist liquid water that has leaked, penetrated, or seeped past the exterior cladding from absorbing into the exterior sheathing or concrete wall and further into the wall assembly?

   a. Air barrier
   b. Vapor barrier
   c. Water/weather resistive barrier

5. True or False: The most continuous and seamless form of an air and water resistant barrier is a fluid applied type that is available in spray, trowel, and roll on formulations.

6. Which type of rainscreen prevents most of the rainwater penetration at the outermost surface of the wall, while simultaneously providing for drainage and evaporation of rainwater that does get through?

   a. Pressure Equalized Rainscreen (PER)
   b. Drained/Back Ventilated (D/BV) Rainscreen

7. True or False: Commercial architectural wall panels made of fiber cement can be used as a drained/back ventilated rainscreen, as long as they are always installed over an appropriately designed exterior substrate.

8. Which type of system is inherently simpler to design and install because it does not allow bulk water to penetrate into the cavity, reducing the space between the cladding and the substrate?

   a. Open joint system
   b. Closed joint system

9. Which test method was developed for the primary purpose of quantifying the volume of rain water contacting an imperfect Air and Water Barrier (AWB) and the system's ability to allow for ventilation/drying as measured by air flow through the cladding?

   a. ASTM E283
   b. ASTM E331
   c. AAMA 509
   d. AAMA 508

10. Which AAMA test method is intended to show performance at different pressures and to simulate real world conditions of wind driven rain against a building?

    a. AAMA 509
    b. AAMA 508
    c. AAMA 501.1

SPONSOR INFORMATION

Nichiha is a leading manufacturer of fiber cement siding and Architectural Wall Panels for commercial, national brand, and residential applications. Nichiha is headquartered in Atlanta, Georgia with 13 plants across 3 countries. Nichiha offers ever-expanding finishes and textures, the most comprehensive warranty in the industry, and a highly engineered installation system.

This article continues on http://go.hw.net/AR616Course2. Go online to read the rest of the article and complete the corresponding quiz for credit.

Commercial architectural wall panels made of fiber cement can be used as a drained/back ventilated rainscreen, as long as they are always installed over an appropriately designed exterior substrate. Photo courtesy of Nichiha

FIBER CEMENT PANELS AS RAIN SCREENS

Commercial architectural wall panels made of fiber cement can be used as a drained/back ventilated rainscreen, as long as they are always installed over an appropriately designed exterior substrate. Since the panels and the substrate will work together to create the weather resistance of the wall system, attention needs to be paid to such things as air barriers, vapor barriers, and weather resistive/water resistive barriers. As we've discussed, these items are common in many types of wall assemblies and are necessary elements in assemblies using fiber cement architectural wall panels.

In all cases, a water resistive barrier (WRB) is required when installing fiber cement architectural wall panels. In some cases the WRB may also serve as an air barrier, but if that is not the case a separate air barrier layer is required. Depending on the climate of the building location, an interior or exterior vapor barrier will also be required. Of course, all openings must have the appropriate flashing to prevent moisture penetration.

FIBER CEMENT PANEL JOINT TYPES—OPEN VS. CLOSED JOINT

Manufacturers of fiber cement architectural wall panels offer two types of panel joints and systems: open joint assemblies and closed joint assemblies.

Open joint systems are used to create a ventilated, rainscreen type of exterior cladding. Such a system emerged from the need for products to hold metal or fiber cement wall materials away from the substrate and literally provide a permeable screen against rain and other weather. As such, the water and air barriers over the sheathing are critical elements since they are the true exterior skin barriers and require significant attention to detail to function properly.

When properly designed, open joint systems allow for air and water to both penetrate and drain out from behind the panels and away from the rest of the wall assembly. As such, they are fully ventilated between the panels and the substrate. Naturally, that means they require the space to perform this function, meaning that some additional depth is needed in the wall assembly.

There are a number of details that need to be properly addressed when using open joint systems. The panels are commonly installed on a system of metal hat and J-channels to hold them off of the substrate and the weather barrier. This requires additional wall assembly depth, but it also means that the weather barrier is penetrated by fasteners that hold the metal channels in place, so the barrier must be self-sealing. Due to the open joints, this system also needs to be UV stabilized since it is partly exposed.

To allow for proper adjustment and for expansion and contraction, a series of slipping points instead of fixed points must be used when installing the architectural wall panels to the metal channels. At the corners, the panels need to come with the appropriate metal channels and maintain the proper alignment across two adjoining facades. In some cases, the joints can be filled or closed with materials suited to a particular manufacturer's system while maintaining the rainscreen function.

CLOSED JOINT SYSTEMS

Closed joint systems live up to their name by eliminating the open joints between panels and instead creating a smooth, continuous surface on the exterior. This more closely resembles metal or composite exterior wall panels that are often used to achieve the same continuous effect. However, fiber cement panels are generally less expensive and easier to install than metal panels.

Closed joint systems are inherently simpler to design and install than open joint systems. Since the closed joints are designed not to allow bulk water to penetrate into the cavity, the space between the cladding and the substrate can be greatly reduced. The panels still function as a back draining, ventilated rainscreen, but with a much smaller depth. This also means that the attachment of the panels in closed joint systems do not require metal channels, but instead rely on a concealed, narrow, clip system spaced at appropriate intervals. The clips use less material and require less time for installation, all of which translates to less cost.

The actual panel joints are often factory formed to lap or join fairly tightly, sometimes with the addition of factory applied foam gaskets along the edges that seals the joints once installed. Because the substrate barriers are not exposed and UV exposure is not such a large factor, there are more design options. When it comes to corners, the panels can be overlapped or butt joined to continue the appearance across adjoining facades.

Of course, just like most building materials, long facades require expansion joints to be incorporated into the design that work with the expansion and control joint mechanisms for the building. Closed joint systems can be modified in the field just like open joint systems but proper planning and coordination with available manufactured sizes is important. Any field modifications must address the edges of the panels to be sure the proper fit is maintained.

Like most manufactured building products, there are a number of relevant and useful tests that fiber cement architectural wall panels are subjected to in order to demonstrate their capabilities to perform in commercial settings. Photo courtesy of Nichiha

TESTING AND PERFORMANCE OF FIBER CEMENT ARCHITECTURAL WALL PANELS

Like most manufactured building products, there are a number of relevant and useful tests that fiber cement architectural wall panels are subjected to in order to demonstrate their capabilities to perform in commercial settings. However, the issue is that many of these tests are designed primarily for other types of wall assemblies and have limited usefulness on rainscreen systems. Some of tests most commonly referenced are summarized as follows.

ASTM E283 Standard Test Method for Determining Rate of Air Leakage

This test method determines the air leakage rates of exterior windows, curtain walls, and doors under specified differential pressure conditions across a sample or specimen product. The method calls for constant temperature and humidity across the specimen and is intended to measure only such leakage associated with the assembly sample and not the field installation. This test is often referenced for rainscreen type of walls, but the reality is that the cavity depth can alter the results and may not report readily comparable results between different systems.

ASTM E330 Standard Test Method for Structural Performance by Uniform Static Air Pressure Difference

This test method determines the structural performance of exterior windows, doors, skylights, and curtain walls under uniform static air pressure differences, using a test chamber. This typically is intended to represent the effects of a wind load on exterior building surface elements. However, the actual loading on building surfaces is quite complex, varying with wind direction, time, height above ground, building shape, terrain, and the structural performance of adjacent construction. As such, it is useful but not completely applicable or accurate when looking at rainscreen architectural wall panels.

ASTM E331 Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference

This test method determines the water penetration resistance of windows, curtain walls, skylights, and doors when water is applied using a calibrated spray apparatus while simultaneously applying uniform static pressure to opposite sides of the test specimen. The testing is performed by applying water to the exterior of the test specimen while lowering the pressure inside by means of an air chamber built on the inside of the test specimen. The water spray system has nozzles spaced on a grid to deliver water in such a manner as to wet all of the test specimen uniformly, wetting those areas vulnerable to water penetration. The calibrated spray apparatus delivers water to the test specimen at a rate of 5.0 gal/ft²-h at a minimum testing pressure of 6.24 psf. It is attempting to replicate the condition of wind driven rain on a building surface. Although intended more for fenestration than for opaque wall surfaces, it can be useful to determine if the wall assembly behind architectural wall panels is resistant to water penetration.

AAMA 509-14 Voluntary Test and Classification Method for Drained and Back Ventilated Rain Screen Wall Cladding Systems

As we have seen, most of the tests discussed so far were designed for some other purpose such as water and air penetration through the supporting back up wall or through fenestration systems. In response, the American Architectural Manufacturer's Association (AAMA) recognized the need to develop testing that was specific to rainscreen wall cladding systems, such as fiber cement wall panels. The AAMA test methods use an 8' x 8' mockup with a minimum of one vertical and one horizontal joint between panels that allow for observation of any potential water and air penetration through the weather barrier by placing a plastic sheet in the setup. There are intentional design defects in the weather barrier to better understand how each rainscreen system performs when installed over an imperfect weather barrier.

Like most manufactured building products, there are a number of relevant and useful tests that fiber cement architectural wall panels are subjected to in order to demonstrate their capabilities to perform in commercial settings. Photo courtesy of Nichiha

AAMA 509 was developed for the primary purpose of quantifying the volume of rain water contacting an imperfect Air and Water Barrier (AWB) and the system's ability to allow for ventilation/drying as measured by air flow through the cladding. It is understood that water will reach the AWB, which is both acceptable and anticipated. This is not a "pass/fail" type of test as many are. Rather, the question is how much water penetrates and whether the system is capable of allowing for subsequent drainage and drying.

Under this test, there are four essential design requirements that must be demonstrated:

- Water entry must be prevented from penetrating into or through the entire wall system (i.e. penetrating the AWB).
- The AWB should be designed to provide the primary weather protection.
- The wall system should be designed to manage and drain any water entering the cavity behind the cladding and must be sufficiently vented to allow the cavity to dry.
- In the event that water vapor diffuses through the wall and AWB from the building interior and ultimately into the wall panel cavity, that water vapor must be allowed to vent and/or drain to the exterior.

Because a D/BV system allows water penetration into the cavity, the only pass/fail criteria is that the weather barrier does not permit water penetration into the structure. The specifier must ENSURE the weather barrier will perform according to the above test's standards.

When specifying a rainscreen into their projects, designers/architects need to address all joints where water penetration is a possibility, such as butt joints, termination points, etc.

AAMA 508, Voluntary Test Method and Specification for Pressure Equalized Rain Screen Wall Cladding Systems

This specification and test method establishes the requirements for test specimens, apparatus, test procedures, test reports and minimum performance criteria to be used in the evaluation of pressure equalized rain screen wall cladding (panel) systems.

There are four design requirements for AAMA 508:

- Water penetration must be prevented throughout.
- Should water vapor diffuse through the interior wall (from inside structure into the cavity), then it must vent to the exterior (outside the rainscreen).
- The weather barrier must resist the full positive (internal to external) and negative (external to internal) wind load.
- The system must not trap or conceal water and it must be able to control rainwater penetration.

The Pass/Fail Criteria are:

- Mist/water droplets in excess of 5%.
- Water running in a continuous stream down the weather barrier.
- To test for pressure equalization, measurements of lag time between the cyclic wind pressure (exterior) and the cavity pressure must not exceed half the maximum pressure when tested at 25 psf for 100 cycles.

AAMA 501.1-05 Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure

Similar to the ASTM E331 test, this standard test developed by AAMA establishes the equipment, procedures and requirements for optional laboratory and field testing of exterior windows, curtain wall and door systems for water penetration. However this test is based on using dynamic pressure instead of static pressure to see the range of performance. As such, it is intended to show performance at different pressures. It is also intended to simulate real world conditions of wind driven rain against a building. ■

BERKSHIRE TERMINUS—BUCKHEAD LUXURY APARTMENTS, ATLANTA, GA.

Wood-look fiber cement panels for the corners and the most prominent façade of the building create texture and warmth next to the glass. Aluminum composite material panels make direct reference to the existing buildings which are made entirely of glass and metal. Photo courtesy of Nichiha

When the time came to develop the 355-unit, five-story Berkshire Terminus upscale apartment building in the Buckhead section of Atlanta, the design team had one goal: complement the neighboring institutional and corporate office spaces while still offering something distinctive. "We wanted to be a good neighbor," says Ben Hudgins, project manager and architect of Lord Aeck Sargent in Atlanta. "We wanted to conform to the design standard set by the existing campus while creating something unique."

This also required they follow zoning and code requirements already set for the area, such as the amount of glass the building had at the street level. They met the intense street-level fenestration requirement by incorporating a two-story leasing/lobby space and two-story townhome-style walk-up units.

Choice of exterior materials was one way the team successfully differentiated this building from those nearby. The team specified wood-look fiber cement panels for the corners and the most prominent façade of the building to create texture and warmth next to the glass. "The building is primarily gray and white, so the eye is immediately drawn to the cedar wood color and texture of product. This gives the building an artistic flair that adds life to an almost homogenous contemporary design," says installer Bryce Dryden, vice president and director of operations for Living Stone Construction in Kennesaw, Ga.

The use of aluminum composite material panels makes direct reference to the existing buildings which are made entirely of glass and metal. Fiber cement panels were also used on this project as a low maintenance, budget friendly option, while still retaining a durable and rich finish.

400 MEETING STREET APARTMENTS IN CHARLESTON, S.C.

Fiber cement cladding has become an effective and cost efficient alternative to wood siding in downtown Charleston, a historic area with strict design guidelines. Photo courtesy of Nichiha

Codes and design guidelines are a challenge for any project, but building a project in a historical area makes that challenge even more difficult. Add to that a project with a new façade product never before used in the jurisdiction. This was the recipe for 400 Meeting Street Apartments in downtown Charleston, S.C. Known for its history and historic architecture, the Charleston Board of Architectural Review takes its job maintaining the integrity of local architecture seriously.

The team chose fiber cement panels for this building's façade. "Fiber cement is a great addition on student housing projects because these projects typically feature tight budgets and need products with good longevity," says Stuart Barber, AIA, LEED-AP, project architect, McMillan Pazdan Smith Architecture, Charleston, S.C.

Because the BAR wasn't familiar with fiber cement panels, the team explained the benefits of the product for this building. In addition, the team wanted to build a modern structure in a historic area, adding to the importance of explaining how Nichiha best fit that desire. "We had to inform them that this new material and the building played a role in historic settings like Charleston," Barber says.

Fiber cement cladding has become an effective and cost efficient alternative to wood siding in downtown Charleston. "The Illumination panels build on this base by taking this material and using it in a more contemporary way with larger panels and seamed connections rather than trimmed connections," Barber adds.

The panel installers, Premier Exteriors, Ridgeland, S.C. were asked to create three wall mockups for the BAR. "I give kudos to the team who handled the review board process. The first time I saw the design, I wasn't sure it would get approved by the BAR because the requirements are so rigorous [due to the historic preservation needs of buildings in the area]," says David Winters, branch manager for Charleston Division, Premier Exteriors.

The neighboring buildings were also new construction which helped in the design flexibility of this project. In addition, the fact that it was a student housing building also lent itself to a bit more design creativity, Barber adds.

The project includes three shades of gray architectural wall panels that are laid out to appear like a checkerboard. The checkerboard design was chosen to enhance the building's contemporary architecture. The design and the need to use three different colors was a challenge for the installation team. "Once we realized the intention for the design, it was easier to lay out. For example, we figured out the architect wanted 50 percent of one color, 25 percent of another, and 25 percent of the third color," Winters says. "This project made us think on our feet." The building ended up using 23,000 sq. ft. of architectural wall panels in the three gray colors that delivered a modern appearance.

This area of South Carolina experienced a large amount of rain at the time of installation, affecting the building's stability. In addition, the state's damp environment made the building's wood construction shift, as is often the case with wood-built structures in this region. This shift affected the panel installation, because now the walls were no longer level. To accommodate this challenge, the manufacturer offered shims to level the walls, which was a key component to installing the panels.

In the end, both the architect and installation team are proud of the end result. "The architectural wall panels offered a new way of using an established material like fiber cement," Barber says. "When it's detailed correctly, it can be appropriate in any number of applications, especially in historical settings."

This project showed the BAR that this design and material choice can complement historical design. In fact, this project opened the door for several more projects in the area with fiber cement cladding. In addition, because Charleston is an area with a strong architecture community and a lot of architecture firms, the use of architectural wall panels in the area allows this influential community to literally see how well the product complements new and old buildings in such a historical setting.