April 2020 | White Paper

DRAINABLE BUILDING WRAPS OFFER SOLUTION AGAINST MOISTURE INFILTRATION

TYPAR®

Figure 1. TYPAR® Drainable Wrap™ features a layer of polypropylene fibers that is integrated into the housewrap material, leading to a 94.8% drainage efficiency.

Drainable Building Wraps Offer Solution Against Moisture Infiltration

With as many ways as there are to construct a wall system, there are an equal number of ways to try to keep that wall dry. But as the race to waterproof wall assemblies continues, we may be inadvertently making it easier for moisture-related issues to fester. After all, no matter how tightly buildings are constructed, water will inevitably find its way in. There's no such thing as a "waterproof" wall.

The walls that will perform the highest are the ones that have been designed to realistically manage moisture and dry out—not those designed to achieve the unachievable goal of completely blocking out all moisture. Choices for managing moisture are expanding, driven by advances in technology, evolving building codes, and remaining concern with mold prevention, indoor air quality, and energy efficiency, among many other factors.

Thankfully, advances in weather-resistant barriers (also known as WRBs, building wrap or housewrap) have resulted in high-performing, labor-friendly solutions for protecting homes and buildings from the elements, while allowing them to both release vapor buildup and drain bulk water. And with a growing number of products hitting the market to address this need, it's important to understand the building codes related to weather protection, moisture drainage, and how specific a building wrap performs in order to specify the right building wrap for your project.

The Building Code

The 2018 International Building Code (IBC), Section 1402.2, "Weather Protection," requires exterior walls "provide the building with a weather-resistant exterior wall envelope… designed and constructed in such a manner as to prevent the accumulation of water within the wall assembly by providing a water-resistive barrier behind the exterior veneer… and a means for draining water that enters the assembly to the exterior."

This water-resistive barrier, as defined by Section 1403.2, "Weather Protection," comprises at least "one layer of No. 15 asphalt felt, complying with ASTM D226, Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing, for Type 1 felt or other approved materials… attached to the studs or sheathing."

It is important to note the difference between a weather-resistant barrier (WRB) and a water-resistive barrier, as they have distinct purposes but are often confused with one another. The American Architectural Manufacturers Association (AAMA) defines WRBs as a surface or a wall responsible for preventing air and water infiltration to the building interior. The differentiating factor is a WRB must also prevent air infiltration, while water-resistive barriers are only responsible for stopping water intrusion.

WRBs are commonly specified for commercial buildings or projects where a higher level of performance is desired of the vertical building enclosure, and when it is critical

Figure 2. Building wraps made of polyethylene or polypropylene fabric have been a popular method of protecting homes and buildings against moisture intrusion since the 1970s.

to have greater control of interior environmental conditions. Water-resistive barriers, on the other hand, are usually limited to residential and low-rise structures.

Recently, some states have added even more prescriptive measures to their codes that now include the use of drainage planes, and others are expected to follow.

Oregon, for example, requires that the building envelope consist of an exterior veneer, a water-resistive barrier, a minimum 1/8" (3 mm) space between the WRB and the exterior veneer, and integrated flashings. The envelope must provide proper integration of flashings with the water-resistive barrier, the space provided, and the exterior veneer. In lieu of providing the 1/8" space between the exterior veneer and the water-resistive barrier, builders can install the exterior veneer over a water-resistive barrier that is manufactured to enhance drainage and meets the 75% drainage efficiency requirement of ASTM E2273 or other recognized national standards.

These considerations are driving the adoption of new WRB solutions that meet both bulk water blockage and drainage needs that satisfy the requirements for today's high-performing wall systems.

More Than One Way to Keep a Wall Dry

Due to their durability and ease of installation, building wraps made of polyethylene or polypropylene fabric have been a popular method of protecting against moisture intrusion since the 1970s. But as building assemblies have gotten tighter, building wraps have taken on a new function—helping to remove trapped water from the building enclosure. Their unique functionality enables them to both block moisture from the outside, while also allowing walls to "breathe" to prevent vapor buildup. And the very latest innovations in housewrap technology are taking this moisture removal function one step further to incorporate drainage capabilities, as well.

Water can find its way into a wall via numerous paths. High humidity and extreme temperatures can cause vapor diffusion with moisture flowing from warm to cold and condensing on the colder surface. Reservoir cladding materials such as brick and stucco can absorb and store moisture, which can be driven back into the wall assembly when warmed by the sun. Wind-driven rain can be forced into small openings in the exterior cladding at joints, laps, and utility cutouts. Further, wind blowing around the buildings can create a negative pressure within a wall assembly, siphoning water into the wall.

Drainage is widely accepted as one of the most effective measures for reducing the risk of potential damage due to rain penetration and is a critical component in allowing a building wrap to do its job—particularly in keeping walls dry. Historically, drainage has been achieved through the use of furring strips that separate the wrap from the structural sheathing and framing, but new technologies have emerged that are helping to simplify this process.

Figure 3. The American Architectural Manufacturers Association defines WRBs as a surface or a wall responsible for preventing air and water infiltration to the building interior.

Today's most advanced building wrap products feature integrated drainage gaps through creping, embossing, weaving, or filament spacers. These new products eliminate the need for furring strips, helping to reduce material costs and streamline installation.

The drainage efficiency of a building wrap is generally tested in accordance of ASTM E2273. In simple terms, this test involves spraying water onto a wall assembly and measuring its collection over time. However, given the variety of drainable building wraps available, how quickly bulk water is drained can vary significantly.

The Latest in Building Wrap Technology

One method for achieving bulk water drainage is attaching a rainscreen material onto the building wrap. These products eliminate the cost and time-consuming labor of installing furring strips by creating a gap between the sheathing and the cladding, which facilitates both drainage and continuous airflow. Where wood strapping only vents approximately 85 percent of the wall, building wraps with an integrated rainscreen provide a continuous vented airspace over the entire surface area of the wall, providing greater drainage and more effective drying. And because many rainscreen products use a matrix of plastic material to achieve the gap, they aren't subject to saturation and decomposition that could compromise wood furring.

Rainscreen products are recommended in areas with wind-driven rain, high amounts of rainfall (40 to 60 inches annually), or high temperature and humidity. Coastal areas and hilltop exposures are prime examples of when this technology would be ideal. In these situations, the importance of creating a drainage plane is heightened when using an absorptive cladding material like wood or fiber cement.

The cutting edge of drainable building wrap technology is products that create a drainage gap through an additional layer of polypropylene fibers. TYPAR® Drainable Wrap™ for example, uses this technology to create a 1 mm drainage gap and has been shown to achieve 94.8 percent drainage efficiency per ASTM E2273—without sacrificing any of the durability and ease of installation benefits builders and contractors have come to expect from premium building wraps. TYPAR Drainable Wrap essentially handles and installs the same as a standard TYPAR® BuildingWrap™ In addition, it is backed by an industry-leading, lifetime limited warranty that includes both materials and labor.*

These products can also be installed in any direction without affecting performance. And they are vapor-permeable, so moisture will not become trapped in the wall assembly and lead to mold or rot issues.

Making the Right Spec

With so many options to choose from, how do you know what type of weather protection is best for your project? In addition to the scenarios described within this paper, there are a number of factors to consider.

Figure 4. As building assemblies have gotten tighter, building wraps have taken on a new function—helping to remove trapped water from the building enclosure.

A key consideration is the type of cladding being used. When installing vinyl siding—which has built-in drainage holes and fits loosely on the wall—an ordinary smooth-faced building wrap should provide adequate drainage. However, tightly fastened cladding, such as cedar siding or fiber cement board, might allow water trapped between the siding and a smooth building wrap to pool and could eventually make its way through the building wrap and into the framing. These are cases where a drainable wrap would provide significant benefit.

Reservoir claddings, such as brick, stucco, and stone, present another set of issues. Because these materials hold water, once they get wet, the stored water can migrate elsewhere and cause problems. In these applications, it is imperative to separate the cladding from the rest of the assembly with a capillary break, which can be an airspace or a material that sheds water or does not absorb or pass water.

Geography and climate are important, as well, specifically as it relates to annual rainfall. As a rule of thumb, the Building Enclosure Moisture Management Institute recommends that any area receiving more than 20 inches of annual rainfall should incorporate enhanced drainage techniques—especially if using an absorptive cladding material—while areas receiving 40 inches or more should utilize rainscreen design regardless of cladding material. The geographic orientation of the wall, amount of overhang, altitude, and even nearby trees can also have an impact on how much water intrusion can be expected and how likely it is to dry.

Conclusion

While we can't completely stop water from getting into walls, advances in building wrap technology are a welcome way to help ensure potential damage from water intrusion is mitigated. And with a variety of drainable products to choose from, each offering a different approach to bulk water drainage, builders and contractors have many ways to keep walls dry in any climate or condition.

*Certain limitations and exclusions apply.

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