Weather Barrier Update: Good, Better, and Best

Choose the right WRB and use it with a rainscreen

BY MATT RISINGER

Water hasn't changed how it enters a house, but how we deal with it as builders certainly has. Let's start with an oft-mentioned truism: All wall claddings leak. What we might think of as a house's first line of defense against the elements turns out to be relatively defenseless. Regardless of your level of craftsmanship, water is going to find its way behind whatever you cover your exterior walls with—wood, masonry, metal, or vinyl.

In the not-so-distant past, when houses were not as well insulated or as tightly built as they are today, water that infiltrated behind the siding might have stained the flower-patterned wallpaper in the parlor, but chances are, the house didn't rot.

It's a different story with today's tighter and more energy-efficient homes. We began to understand this in the early 2000s, when mold was discovered in buildings throughout the U.S. With the mold came rot. Home builders remedied some of the problems by paying attention to things like ventilation and source control, which they previously had the leisure to ignore. But more than a few needed to buy back new homes from disgruntled homeowners.

And it got worse: As further measures were taken to improve building airtightness and energy efficiency, even more rot and mold problems arose.

Photos: Matt Risinger

But there are solutions. Building science has shown us what to do with water that leaks behind wall claddings. Proper installation of a housewrap—also known as a water-resistive barrier (WRB)—preferably with a rainscreen behind the wall cladding, enables us to build resilient homes that will last for generations. In this article, I will tell you what I've learned as a builder about keeping water away from sheathing and framing and discuss some of the good, better, and best systems currently available.

ALL THAT WATER AND NO PLACE TO GO

The main reason that rot and mold didn't substantially affect older homes is because the water that got past the leaky siding had a chance to dry. Before the days of plywood sheathing and drywall, not to mention insulation, caulking, and other airtightness measures, air flowed more freely through the building and any water that got in dried out.

Wood doesn't rot and mold doesn't grow when wood gets wet; it happens when the wood stays wet and can't dry. And engineered-wood products (OSB in particular) don't stand up to constant wetting as well as solid-wood framing and sheathing products do.

DESIGN CONSIDERATIONS

Dr. Joseph Lstiburek, the founding principal of Building Science Corporation (buildingscience.com), has said, "Rain is the single most important factor to control in order to construct a durable building." And the architectural design of a home can influence how much rainwater lands on the walls of a building.

Roof overhangs. The absence of roof overhangs in many new houses allows more water to hit the walls. Here's an analogy: Roof overhangs are like an umbrella in a rainstorm. If you don't have an umbrella, you better make sure you're wearing a high-quality raincoat, or you're going to get wet. Think of a good WRB system as being like a raincoat for the house.

Roof pitch. Shallow-pitch or flat roofs also contribute to the amount of water hitting a wall during rainy, windy conditions. A steeper roof, on the other hand, can act like an airfoil, pulling rain up over the roof and pushing it away from the walls.

Wall height. The system that should be used is dependent on the location and design of the house you're building. It's a matter of the walls' exposure to water infiltration—more exposure will require a higher level of protection. For instance, a single-story house

How Much Protection Do You Need?

	DEGREE OF PROTECTION		
DESIGN/ENVIRONMENT	GOOD	BETTER	BEST
Annual rainfall less than 30"	X		
Single-story house, 2-foot overhangs	X		
Two-story house, 1-foot overhangs		X	
Two-story house, annual rainfall more than 30"		X	
Coastal, or annual rainfall more than 40"			X
No overhangs			X

The degree of protection from water that house walls need depends on a house's design and the climate it's exposed to. That protection can be provided by good, better, or best ways to keep water away from the sheathing. Wet sheathing that can't dry will eventually rot, encourage mold growth, and lead to callbacks.

with a pitched roof and broad overhangs located in an inland location that doesn't receive much annual rainfall won't need nearly as much protection as a two-story building (which will have higher, more exposed walls) with a flat roof located on a windy, rainy seacoast (see chart, above).

MANUFACTURER SPECS

Don't get too hung up on a housewrap's perm rating—the amount of water vapor that a housewrap will allow to pass through it. For cold-climate houses, a perm rating of 5 to 30 is sufficient, and in a warm climate where the vapor drive is primarily from outside to inside and the air conditioning removes the majority of water vapor, a zero perm rating is fine. In a hot, humid climate like I have, where the walls should be allowed to dry to the inside, no interior vapor barrier, such as vinyl wallpaper, should ever be used.

Capped fasteners. Some housewrap manufacturers recommend, or require, the use of a cap stapler to install their products, for the extra water resistance and holding power staples provide. We use a Stinger CH38 hand cap stapler (stingerworld.com) **(1)**.

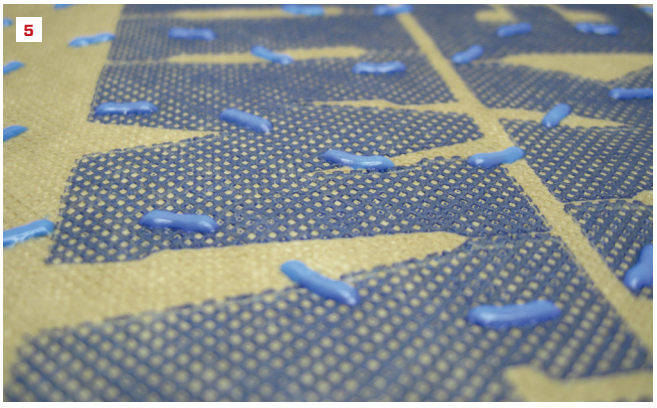
WHAT NOT TO USE

Don't skimp on the WRB—either the product you use or the care you take to install it. Any WRB system you use will never be seen again once the cladding is on the house—unless it fails and someone needs to come in and remove the siding and repair any water-related damage **(2)**.

Although tar paper is still considered a code-compliant WRB material and is still used behind stucco and brick by many builders, my advice is to stay away from it—for two reasons. First of all, it won't stand up to constantly moist conditions. Second, it tears easily. Anyone who has ever stood a ladder against a tar-paper-covered wall knows this.

In general, avoid any housewrap that's not durable. My crews are diligent and careful, but some wraps can't stand up to much, if any, abuse. If a product tears easily, steer clear of it **(3)**.

I also avoid perforated, pin-pricked plastic housewraps sold by the big box stores. If you can see though a sheet of housewrap when you hold it up to the light, it's a good indication that it isn't going to keep out water. To see the fallibility of the pin-pricked wraps, you can easily duplicate a quick demonstration that I show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on my YouTube channel (youtube.com/MattRisinger). Place a 12x12-inch square of one of the good housewraps mentioned below and a similar-size square of pin-pricked housewrap on top of a paper towel. Pour a few tablespoons of water on each housewrap square, then set a coffee mug on each water puddle. Wait five minutes, then lift up the mug and the housewrap and see which paper towel is soaking wet.

You might want to try this simple test using any housewrap you're considering. Then decide which product you want on the next house you build.

GOOD CHOICES

As building scientist David Nicastro, P.E., of Building Diagnostics (buildingdx.com), says, "It's not about keeping water out, it's about letting water out."

I like to use a housewrap that has a textured surface as the first defense for draining out moisture that infiltrates behind wall claddings. The small gap it creates between the back surface of the cladding and the sheathing allows water to drain away to the ground. Manufacturers use a variety of patterns and technologies to hold the siding away from the sheathing when it's installed.

Dupont (dupont.com), the parent company of Tyvek, manufactures a family of small-gap housewraps. Two that I use are Tyvek Drainwrap and Commercial Wrap D **(4)**. The main differences between them are that Commercial Wrap D is slightly tougher, and it has a longer UV-exposure time, so it will last longer if it's going to be a while before you install siding. Both have a slight, almost crinkled corrugation, which when installed properly creates vertical channels for water to run out. Regardless of how tightly the siding is attached to the sheathing, Drainwrap and Commercial Wrap D create enough of a space between the back of the siding and the wall for water to drain away.

Benjamin Obdyke's Hydrogap housewrap (hydrogap.com) has 1-mm-thick blue plastic oblong dots bonded to its surface. The thickness of the dots holds cladding away from the wall and creates a space for water to drain away **(5)**. One of the things I like about Hydrogap is that it can be installed in any direction, even rolled out vertically, without its draining abilities being affected.

All the housewrap manufacturers sell proprietary tapes and flashing materials to use with their products. I stick with the man-

ufacturers' branded tapes that go with their housewraps and prefer ones with butyl adhesives. Tyvek's StraightFlash and FlexWrap are among the best in the market.

Not all brands of housewrap are available everywhere in the U.S. If you can't find one of the brands I prefer, look for a wrap with some kind of built-in air gap. Once you find one, give it the tear test, and if you can get a sample, try the water test, too. Some housewraps can even be bought online. Benjamin Obdyke, for instance, will sell direct from its store website, and it offers free shipping (buyobdyke.com).

BETTER CHOICES

While the textured housewraps listed above do a good job of keeping water off the sheathing and from entering the house, if you want more protection, install a rainscreen under the wall cladding. Rainscreens are typically installed as vertical strips that are fastened to the wall to which the siding is fastened. The thickness of the strips holds the siding away from the housewrap and the sheathing underneath.

When you install a separate rainscreen, you can first cover the sheathing with any housewrap that passes your water and tear tests; it's not necessary to use one of the textured wraps discussed above. I've also used taped Zip Wall sheathing (huberwood.com) with a rainscreen **(6)**.

There are lots of different materials you can use to form a rainscreen, including 1x3 solid wood strapping, or ripped strips of HardiePlank (jameshardie.com) for walls covered with that product **(7)**.

My favorite rainscreen material is Coroplast (coroplast.com), a two-layer recycled-plastic sheet product that's sold in 4x8-foot sheets and used mainly by sign makers and print shops. The outer layers of the product are held apart by parallel flutes that give the material thickness and rigidity **(8)**. The flutes are continuous along the product's 8-foot length. Coroplast is available in various thicknesses; for rainscreens, I use ⅜-inch-thick Coroplast.

The material is easy to rip into strips on a table saw, though I buy it from my sign supplier already cut into 2-inch strips .

For the top and bottom of a wall, we use other, 3-inch-wide strips with the flutes running vertically, which allows convective ventilation behind the siding at the top of the wall and water drainage at the bottom of the wall. Before installing the top and bottom strips,

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we staple on an 8-inch-wide strip of insect screening, then fold it back over the Coroplast to keep out bugs **(9)**.

You can also use Coroplast as a rainscreen for vertical siding by attaching the strips horizontally. You'll need to rip the Coroplast sheets across their 4-foot width and attach them so the flutes run vertically to allow water to drain through them **(10, 11)**.

For houses with a reservoir cladding—that is, stucco, stone, brick, or any cementitious product that is going to soak up lots of water—I use a zero-perm product, Delta-Dry Stucco & Stone (cosella-dorken.com). It's a ⅜-inch-thick dimpled plastic mat that's stapled to the housewrap **(12)**. The exterior side of the product has a built-in mortar screen that prevents scratch coats from filling the dimples. The beauty of Delta-Dry is that it provides an air gap on both sides—between it and the stucco and between it and the sheathing.

BEST CHOICES

For the ultimate protection on walls, there is another category of WRB systems that includes fluid-applied membranes and peel-and-stick membranes. Unlike some other WRBs, these products have the added benefit of air-sealing a wall, as well as protecting it from moisture. Both should be used in conjunction with an installed rainscreen.

I've been very impressed with a German peel-and-stick product, Delta-Vent SA (cosella-dorken.com) that we recently used on a house. There is a fair amount of labor involved in the installation: The sheathing is first covered with a paint-on primer. Then the 3-foot-wide material is unrolled on the wall; once it's in position, you pull off the backing paper and smooth it into place **(13)**. A double-stick layer at the edges creates an airtight seal at all the overlapping seams. There are also proprietary tapes for flashing windows and wall openings.

Another peel-and-stick WRB product we've used is Aluma Flash (polyguardproducts.com)—a laminated rubberized-asphalt product. The rubberized-asphalt layer is 40 mils thick and laminated to two layers of polyethylene film, with a top protective layer of aluminum. The aluminum outer layer helps this product withstand UV rays almost indefinitely **(14)**. It's applied similarly to Delta-Vent SA.

We have also used fluid-applied flashing and seam-sealing

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products from Tyvek. They work extremely well for tricky inset window installations. You squirt them on from a caulking gun, then use a trowel or brush to spread the materials, which have the consistency of thick paint. Once cured, they form a rubbery, airtight and watertight bond.

We have not yet used any fluid-applied products to completely cover the walls of a house, but some of the products that look promising are Tremco's ExoAir 230 (tremcosealants.com), Tyvek Fluid Applied WB (dupont.com), and Grace's Perm-A-Barrier Liquid (grace.com).

Fluid-applied WRBs are elastomeric products that can be sprayed, rolled, and even brushed on a wall. Depending on the product, some joint and seam filling or priming may be needed first. The cured products form an elastic, airtight, vapor-permeable, and waterproof covering that will stretch and contract a bit as a building moves.

Residential-grade fluid-applied products are thinner, however, than commercial-grade products, which range in thickness from 30 to 75 mils. At that thickness, the material is almost squishy when cured and provides something of a gasketing effect around fasteners for brick ties and the like. My current preference at this point would be to specify one of the commercial products.

DURABILITY TESTING

I recently visited the University of Texas at Austin Construction Durability Lab to see its ongoing testing of WRBs. Mocked-up wall panels were covered in a variety of WRBs, as per manufacturers' specifications, then left out in the weather, where they've been for almost two years now **(15)**.

As would be expected, the tar-paper-covered panel has not fared well, whereas the thicker, commercial-grade fluid-applied WRBs have performed the best. The thinner, residential-grade fluid-applied WRBs are no better than elastomeric paint, and do not perform very well. I've written about the tests on my blog at mattrisinger.com, and I'll continue to post about them as more test results come in.

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