

Making Sense of Housewraps

These plastic-based barriers help to keep wind and water at bay, but only if you choose the right product and install it correctly

BY FERNANDO PAGÉS RUIZ

When I started building houses nearly 30 years ago, we lapped lightweight 15-lb. asphalt- or rosin-impregnated building paper directly over the stud framing before installing the siding. Nowadays, concerns with energy-efficient construction and moisture infiltration have focused a great deal of attention and no small amount of high-tech chemistry on this thin layer of paper. Although some builders still advocate the felt-paper barriers of yesteryear, most have switched to plastic-based housewraps, products designed to stop air infiltration and wind-driven rain while allowing water vapor to evaporate—a great concept.

However, like everything high-tech, new solutions come with new problems. The range of choices and the precise installation requirements of modern housewraps challenge builders with terms like spun-bonded, polyolefin-based moisture, and air-infiltration fabric. Even if you can't remember the technical terminology, you have to learn how to install these products correctly. Yet a quick look around a construction site reveals that most builders, with 30 years or with three behind the hammer, are having a hard time handling this new technology.

There's plenty of confusion surrounding weather-resistive barriers. Many homeowners and builders don't know which product to choose, others never learned how to install it correctly, and many have no idea what housewrap does in the first place.

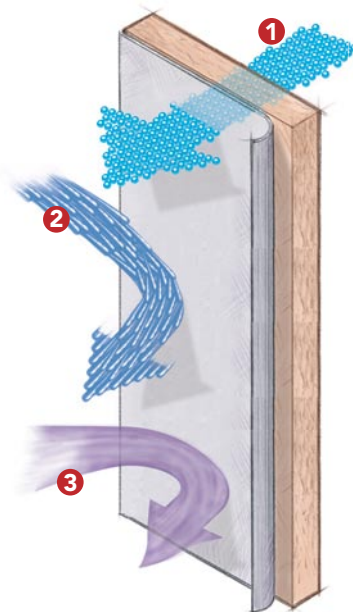
What does a housewrap do?

Placed beneath the siding, housewrap is a second layer of defense for your home. When installed properly, it performs three basic functions (drawing right).

First and foremost, housewrap acts as a backup barrier that keeps water off the structural sheathing and framing. Properly installed siding is the first line of defense, but sometimes wind-driven rain and snow still find a way through. Housewrap also functions as an

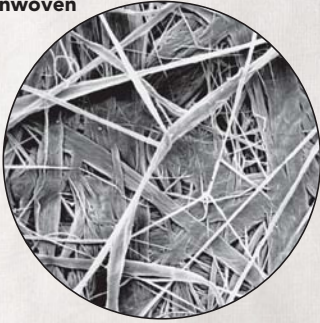
THE THREE FUNCTIONS OF HOUSEWRAP

1. Provide a **vapor-permeable membrane** that allows moisture in framing lumber or insulation to escape.
2. Create a **secondary weather barrier** behind the siding, preventing wind-driven rain and other water from reaching the sheathing.
3. Serve as an **air barrier** to prevent air infiltration, helping to reduce heating and cooling costs.



Drawing: Dan Thornton. Magnified photo courtesy of Tyvek.

Nonwoven



HomeWrap

Type: Nonwoven polyolefin

Perm rating: 58.0

Notes: The first housewrap on the market more than 30 years ago; accounts for 70% of total housewrap sales.

800-448-9835; www.tyvek.com

PinkWrap

Type: Perforated, woven polyolefin

Perm rating: 14.0

Notes: Translucent membrane makes it easy to see where to nail siding.

800-438-7465; www.pinkwrap.com

Woven

TYVEK ISN'T THE ONLY CHOICE

StuccoWrap

Type: Nonwoven polyolefin

Perm rating: 50.0

Notes: Designed specifically for use under traditional- and synthetic-stucco applications; helps to reduce cracking because it won't absorb water, or expand and contract. Surface texture channels water. www.tyvek.com

Typar

Type: Nonwoven polyolefin

Perm rating: 11.7

Notes: Excellent protection against surfactants, making it ideal for use under stucco or cedar siding; guaranteed to be tear-resistant.

615-847-7000;

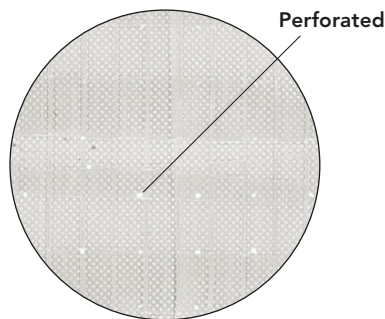
www.typarhousewrap.com

HOUSEWRAP CHOICES CONTINUED



Weathermate Plus

Type: Nonwoven polyolefin
Perm rating: 6.7
Notes: Membrane has a more substantial, foamlite texture compared to other housewraps. 866-583-2583; www.dow.com/styrofoam



Weathermate

Type: Perforated, woven polyolefin
Perm rating: N/A
Notes: Translucent; perforated products are less resistant to water intrusion; does not meet the air-barrier requirement of the National Building Code of Canada. 866-583-2583; www.dow.com/styrofoam



Barricade

Type: Perforated, woven polyolefin
Perm rating: N/A
Notes: Perforated products are less resistant to water intrusion; resists UV-degradation for 12 months. www.ludlowcp.com



R-Wrap

Type: Nonwoven polyolefin
Perm rating: 59.0
Notes: Membrane can be installed with printed logo in or out with no change in performance; manufacturer will replace product if damaged by wind; highest perm rating. www.ludlowcp.com

air barrier that stops hot- and cold-air movement through the wall cavity. As long as joints are sealed properly, housewrap is designed to cut utility costs and increase comfort by reducing air infiltration and potential drafts.

But the real magic of housewrap lies in its third function: allowing the free passage of water vapor so that wall cavities and framing lumber can dry to the outside of the building, reducing the threat of mold and rot. Without this feature, installing housewrap would be like putting a thick raincoat over your house: great for keeping out the rain, but terrible at releasing water vapor from within. Instead, housewraps are designed to act like a Gore-Tex jacket, allowing water vapor to pass through the building envelope in case moisture problems arise.

Side-by-side comparison is often pointless

Nowadays, any approved weather-resistive barrier, from #15 felt to high-tech housewrap, touts the dual benefit of being a weather-resistive drainage plane that also allows the passage of water vapor. But not every product balances these two features equally. To add to this confusion, housewraps are now available in dozens of varieties, so how do you choose? Unfortunately, there's no easy answer.

The American Society for Testing and Materials (ASTM) is working to standardize the tests used to evaluate weather-resistive barriers. For now, when trying to gain code approval, manufacturers may choose from at least two dozen different tests. And even if two manufacturers choose the same test, there is nothing to regulate the way in which the test materials are set up. This variability makes it nearly impossible to compare one product's performance to another's.

According to Paul Fiset, director of building materials and wood technology at the University of Massachusetts, one tested value that

usually stands up to side-by-side comparison is a material's permeance rating, but sometimes even that can be misleading.

Perm ratings tell part of the story

Permeance ratings, or perms, reflect the measure of a material's ability to transfer water vapor; the higher the perm number, the more permeable the material. For instance, 6-mil polyethylene sheeting has a perm rating of 0.06, which means that it does an excellent job of preventing the passage of water vapor. Current building codes require a weather-resistive barrier to match or exceed grade-D building paper, which has a perm rating of about 5.0. To meet this requirement, perm ratings for commonly available housewraps range from about 6.7 for Dow's Weathermate Plus to 59.0 for Simplex Products' R-Wrap.

Materials with higher perm ratings essentially speed the escape of trapped moisture. But higher ratings do not necessarily equal better housewraps because the methods of achieving a high perm rating can be different.

For instance, some low-tech housewraps achieve their high perm ratings with mechanically punched perforations in the membrane. These perforations increase the passage of water vapor, but they also make the housewrap more susceptible to bulk water leakage.

On the other hand, more advanced nonperforated housewraps—such as HomeWrap and R-Wrap—offer even greater moisture-vapor transmission (higher perms) than their perforated counterparts and are more effective at preventing the movement of bulk water.

Independent tests yield clear performance comparisons

Fisette conducted independent testing of housewrap not to establish quantifiable data that mimicked real-world performance, but rather to subject the products to a set of simple laboratory conditions to



GreenGuard Value

Type: Perforated, woven polyolefin

Perm rating: 15.0

Notes: Low-cost housewrap designed for value-conscious builder. Resists UV-degradation for 12 months; translucent membrane makes it easy to see where to nail siding. 800-241-4402; www.green-guard.com



GreenGuard Classic

Type: Perforated, woven polyolefin

Perm rating: 15.0

Notes: Resists UV degradation for 12 months. Highly tear-resistant; translucent, glare-reducing green color. 800-241-4402; www.green-guard.com

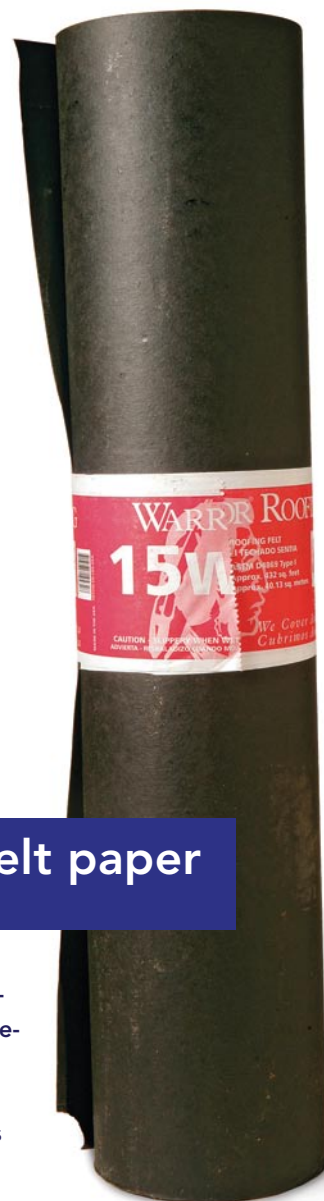


GreenGuard Ultra

Type: Nonwoven polyolefin

Perm rating: 48.0

Notes: Uses a reinforcing scrim that makes it highly tear-resistant. Translucent membrane makes it easy to see where to nail siding. 800-241-4402; www.green-guard.com



see how they compared. For more on Fisette's testing, see www.umass.edu/bmatwt.

According to Fisette's research, the best housewraps (those that resist water infiltration and also permit water vapor to evaporate) include Tyvek HomeWrap, R-Wrap by Ludlow Coated Products, Typar (manufactured in 2003 or later) by Reemay, and—believe it or not—traditional #15 felt paper (sidebar right).

I prefer Tyvek, which scored well for resisting water penetration in the Massachusetts study while also having one of the industry's highest perm ratings for water-vapor diffusion. Although #15 felt paper costs less and scores well in all categories, I like housewrap products because the variety of sizes available (3-ft. to 10-ft. widths) really speeds up the installation process. Also, the compatible sealing tapes and accessories make housewrap a superior air barrier compared to felt paper.

Siding often determines the type of housewrap

When you're using vinyl siding, which comes with built-in drainage holes and fits on the wall loosely, an ordinary smooth-faced housewrap provides good drainage. But if you use tightly fastened board siding or T-111 panels, any water trapped between the siding and a smooth housewrap will sit and eventually could make its way through the housewrap and into the framing. Remember, many housewraps are good at resisting bulk water, but they should not be considered waterproof.

In these cases, it's a good idea to choose a furrowed rain-screen housewrap. Its embossed texture provides just enough airspace for liquid water to drain away before it has a chance to penetrate the membrane (see "Rain screen and housewrap combined," p. 70).

When applying stucco, choose a housewrap designed specifically for masonry, such as DuPont's StuccoWrap, which not only provides a

I still prefer felt paper

By Paul Fisette

Based on my lab testing at the University of Massachusetts, if I were buying housewrap today, I likely would choose a nonperforated product because it displays the best water resistance.

As it happens, I have felt paper on my own home. If I could do it over again and choose between felt and housewrap, I'd still choose felt. That's because I believe that under certain circumstances, felt paper outperforms housewrap.

For example, an ice dam or a roof leak may allow liquid water to get behind the felt or housewrap. It's also possible for the sun's heat to drive water vapor through the housewrap from the outside, where it can con-

dense on the sheathing. In either case, you have liquid water on the wrong side of the wrap. Under these conditions, the liquid water is trapped by the housewrap, which is permeable only to diffusion of water vapor. Felt, on the other hand, absorbs water and dries more quickly to the outside.

—Paul Fisette is director of building materials and wood technology at the University of Massachusetts.

Rain screen and housewrap combined

No matter how tight the joints, how thorough the flashing installation, or how far the roof overhangs the walls, water always finds a way behind the siding of a house.

Housewrap or felt paper is a good safeguard for protecting sheathing and framing, but many builders also add a ¼-in. to ⅜-in. drainage plane between the housewrap and the siding by tacking up vertical furring strips. This vented space allows moisture to dissipate naturally, so paint won't peel prematurely, surfactants from

the siding won't be in contact with the housewrap, and bulk water won't be trapped behind the siding with nowhere to drain.

Several manufacturers have started combining the water-shedding benefits of rain-screen-wall construction with the ease of installation and the added benefits found in typical housewrap, creating a separate category sometimes referred to as "drainscreen."

To the right are a few different designs that aim to accomplish the same basic task.

DrainWrap

Type: Nonwoven polyolefin

Perm rating: 50.0

Notes: Uses accordion-style vertical grooves to channel water. Because the product behaves like wrinkly housewrap, it isn't as rigid as other rain-screen products. 800-448-9835; www.tyvek.com

corrugated surface but also is compatible with the chemicals in stucco that reduce the performance of other building wraps.

Housewraps are susceptible to certain chemicals

Builders have debated the chemical compatibility of housewrap for years. Studies have found that certain types of wood siding, like cedar and redwood, leach surfactants (surface-active contaminants) that can affect the water resistance of housewraps. The surfactants reduce the surface tension of water, easing its ability to pass through microscopic openings in the membrane. To combat the problem, manufacturers recommend back-priming potentially troublesome wood siding with a water-repellent primer. In a limited study, Fisetta found that the newest version of Tytar had superior resistance to surfactants compared to the performance of similar products.

In addition to the water-soluble extractives found in wood siding, the water resistance of housewrap also can be compromised by soaps, power-washing chemicals, and even some types of latex paints. The perforated variety is most susceptible, so consider choosing a high-quality, nonperforated housewrap.

It's also important not to leave housewrap exposed for longer than necessary. Housewrap left uncovered for longer than its intended UV-rating will deteriorate and decline in performance, and should be covered with a fresh layer before the siding is installed.

Weatherproofing comes with workmanship

Here's the bottom line: Installation is more important than material choice. No matter what brand of housewrap you choose, you will be wasting your money unless you install the stuff carefully.

Seam tape and fasteners are vital to the system

It never ceases to amaze me how many builders omit seam tape from their housewrap installations. Although proper lapping is enough to create a watershed, you still have to seal all the seams to stop air infiltration. Taping the seams also helps to preserve the integrity of the housewrap system throughout construction and makes the membrane

less likely to catch the wind and tear.

Seam tape also provides a means to repair cuts, but always remember to treat every cut or penetration like a horizontal or vertical seam.

Never use seam tape to make up for improper lapping. In fact, you should assume that the tape adhesive will fail eventually, allowing water to pen-

etrate the drainage plane and wet the framing. In contrast, a proper lap can last forever.

Almost every housewrap manufacturer provides a seam tape for their product. You should use it and avoid generic building tapes such as duct tape, which might fail sooner.

Housewrap can be attached with plastic cap





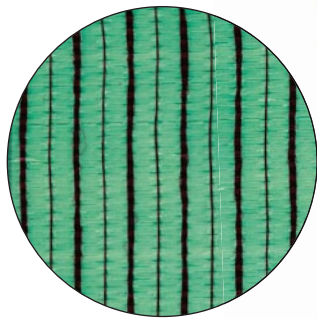
Weather Trek

Type: Perforated polyethylene

Perm rating: 6.5

Notes: Designed with a clever nondirectional surface pattern (reminiscent of the texture of a basketball) to ensure that water drains easily, regardless of orientation to the sheathing.

www.ludlowcp.com



Raindrop

Type: Woven polyolefin

Perm rating: 10.0

Notes: Relies on drainage channels woven into the surface to direct water down and out. Channels must run vertically to be effective. 800-241-4402; www.green-guard.com



Homeslicker

This bound-nylon three-dimensional meshlike rain screen physically separates the housewrap and the siding. Three different versions are available (above, left to right): **Traditional**, **HomeSlicker Plus Jumbo Tex** felt paper, and **HomeSlicker Plus Typar** (polyolefin housewrap).

800-346-7655; www.homeslicker.com

Poorly installed housewrap will cause more problems than it solves. Getting the installation right is not hard, but it requires a basic understanding of how housewrap works. Detailed installation instructions can be found on manufacturers' Web sites and often at the lumberyard or home center where housewrap is purchased.

The basic installation premise is to think like a raindrop. Imagine a drop of water hitting the side of your house at the top of the wall. Gravity pulls the drop down along the face of the wall, and as long as all the courses, joints, tears, and penetrations are sealed and lapped in shingle fashion, the drop eventually will reach the ground. The moment that raindrop finds a puncture, a reverse lap, or an unflashed component, it will seep behind the housewrap and into the framing.

Start every housewrap installation from the bottom and work your way up, making sure to overlap all horizontal joints at least 6 in.

and all vertical joints 12 in. If you apply housewrap to the sheathing before raising the wall, be sure to leave enough material to cover the band joist. Horizontal laps are as important as vertical laps because windblown rain can travel sideways, or even up and over a properly installed lap.

You should always install housewrap with the same care and attention that you would devote to siding. Although no one will see your good work underneath the siding, correctly installed housewrap still pays off in the long run. □

Fernando Pagés Ruiz is the author of *Building an Affordable House: Trade Secrets for High-Value, Low-Cost Construction* (The Taunton Press, 2005). Photos by Scott Phillips, except where noted.

nails (photo right), 1-in.-wide crown staples, or large-head roofing nails. Many carpenters use a hammer tacker to fasten the wrap with staples, but this type of fastener is much more likely to pull through the housewrap before the siding is installed.

For a better installation, manufacturers

recommend the use of plastic cap nails or cap screws, which are available for manual fastening or collated for use in pneumatic nailers (photo right). Cap nails also act as a gasket to keep water from leaking through the nail holes.

Whatever fastener you use, follow the manufacturer's recom-

mendations for spacing. The most common spacing is 8 in. to 18 in. vertically, and 16 in. to 24 in. horizontally. Always drive fasteners into studs or sheathing such as plywood or OSB.

Bostitch N66BC
800-556-6696
www.bostitch.com
Cost: \$320



Hitachi NV50AP3
800-706-7337
www.hitachipowertools.com
Cost: \$400