

# EXTERIORS



## Installing Effective Rainscreens

Simple, low-tech systems that can work for any type of siding

BY STEVE BACZEK

Most of us are all too familiar with old houses that lose heat needlessly and easily. But it was this heat loss that continually baked those houses dry and helped contribute to their continued longevity. Adding insulation and creating airtight building envelopes drastically reduces the “baking” effect in today’s houses, which makes using an effective rainscreen almost a requirement now when building a house.

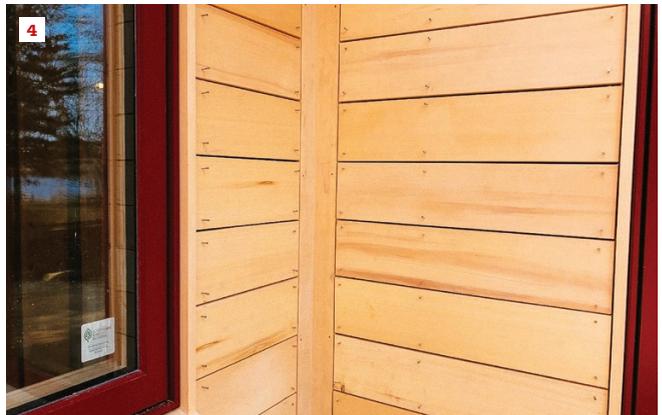
A rainscreen is a system composed of a water-protection layer along with an air space behind the siding that allows excess moisture to drain away, while allowing the siding and sheathing to dry properly. Rainscreens are applied over the sheathing, and there are many materials and systems on the market that can create

successful rainscreen assemblies. These include beaded or dimpled housewraps, plastic mesh material (1), and linear corrugated strips in metal and plastic. They are all designed to let water that gets behind the siding drain away safely. But another option that I often recommend for the homes I design is creating a rainscreen on site with the old carpenter’s standby—wood furring strips, or strapping (2). Strapping is inexpensive, readily available at virtually any lumber store, and easy to install.

In our area, strapping typically comes as 1x3 stock (2 1/2-by-3/4-inches actual). The crews usually install the strapping vertically for horizontal siding applications, letting the wood strips align with the wood-stud framing on the other side of the sheathing for

Photos by Steve Baczek

## INSTALLING EFFECTIVE RAINSCREENS



Siding nails directly over commercially available rainscreen materials like this mesh (1). With site-built systems, the siding nails to furring strips (2). With a closed rainscreen, the siding installs with a lap joint or it overlaps, as with clapboard (3). In an open rainscreen, the siding nails to the furring strips with air gaps between the boards (4).

a strong, long-lasting installation. The strapping we use for our rainscreen systems is not treated to avoid rot, although I've seen many builders who use treated 1x4 or ribs of treated plywood for this application. Sometimes we paint the strapping, but that is for reasons other than avoiding rot. The reasoning behind my choice of strapping in its natural state will become clearer when we look at how this rainscreen system actually works.

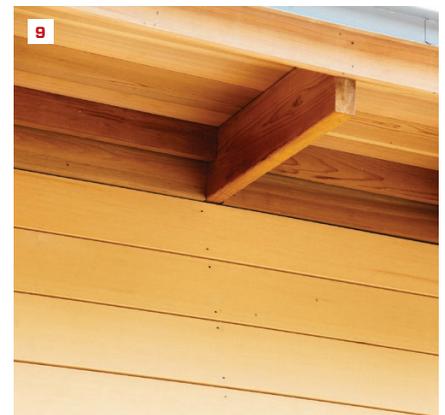
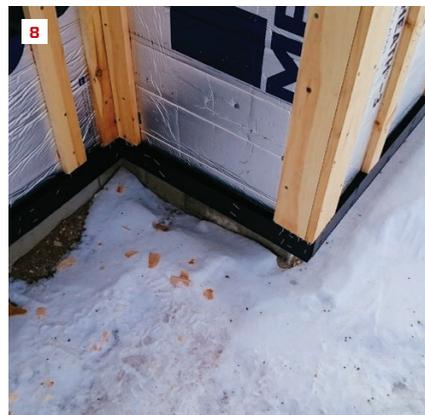
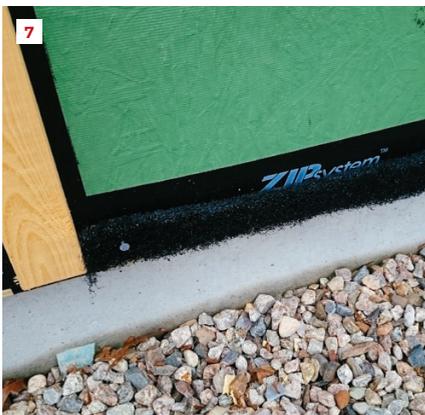
### OPEN VS. CLOSED RAINSCREEN

The rainscreens that we build with strapping can be broken down into two basic types: closed-plank systems and open-plank systems. As the name suggests, with a closed system, the siding is installed with some type of closed lap joint or simply installed as a lap siding (3). An open rainscreen has joints between the in-

stalled planks (4). Both types of systems rely on the assumption that the underlying sheathing as well as the window and door penetrations are airtight, weathertight, and properly water-managed (5). The siding and rainscreen are just "makeup" on the exterior of the building. But that makeup should drastically reduce the challenges and risks to the sealed building within.

In a closed system, the sheathing is treated normally. For sheathing with an integrated barrier, such as Zip System, the strapping installs directly over the sheathing. If the building has regular OSB or plywood sheathing with housewrap or felt paper as a WRB, the strapping installs over the WRB.

In an open rainscreen system, the gaps between the boards would allow sunlight and damaging UV rays to reach the sheathing, so that system starts with a layer of 15-lb. felt paper over the



Site-built rainscreens install over the WRB, so it should be complete with all seams and openings sealed and flashed properly (5). With an open rainscreen, building paper covers the WRB to protect it from UV rays (6). Protection from critter intrusion can be either mesh (7) or corrugated vent material (8). Air space at the top of the wall allows ventilation for drying (9).

sheathing (6). The felt paper blocks sunlight from hitting the sheathing and degrading the WRB, while creating an effective, low-tech, and inexpensive water-shedding surface for the sheathing. The strapping then installs over the building paper.

At the bottom of both types of the strapping rainscreens, the 3/4-inch space between the strapping strips lets water drain out readily, but a space like that can be an invitation to little furry friends and the like. To close it off, but still allow for drainage, I use ridge-vent mesh cut to fit and nailed in between the strapping (7). Another option is using manufactured corrugated plastic vents (8).

### MULTITASKING RAINSCREEN

We've already discussed the fact that the air space between the strapping and behind the siding is great for draining away the

bulk water. But while a rainscreen's ability to drain water gets the biggest hype, the ventilation that these site-built systems provide is just as important. That 3/4-inch space behind the siding allows air to travel up and through the space, letting the cladding (along with the exterior sheathing based on its permeability) dry quickly from the inside.

With an open system, the gaps between the siding boards provide ventilation space, so that system is virtually air open (9). At the top of the wall in a closed system, I either vent the air spaces into the soffit (provided the soffit is part of a vented roof assembly) or devise a detail to properly vent the air space at the frieze at the top of the wall.

In a typical wall assembly, the exterior sheathing, WRB, wood lap siding, and paint finish all get wet when it rains, and the water

## INSTALLING EFFECTIVE RAINSCREENS



A second horizontal layer of furring provides nailing for vertically applied siding, such as this corrugated metal (10). If there isn't enough depth for the second layer of furring, the strips can be installed diagonally with breaks to allow water to drain down and out of the bottom (11). Site-built rainscreens can be used for shingle siding, but this application is labor intensive (12).

that makes it into the assembly is temporarily stored. When the sun warms the outside surface of the siding, the drive to dry the assembly is from the inside outward. The moisture moves through the assembly relatively freely until it hits the exterior paint surface, which usually challenges the drying process. Over time, this challenge to the paint surface continues, pushing on it from within and eventually causing the paint to blister. Ultimately, the blisters break, and the paint peels. In some cases, paint failure can happen in as little as four to five years.

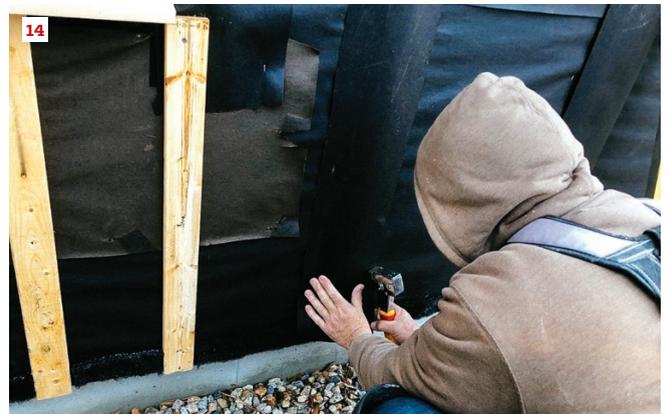
With the 3/4-inch strapping as the rainscreen, water also moves inward when it rains. But the water cannot bridge a 3/4-inch gap, so the majority of the water drains out of the system more quickly than with a rainscreen that is directly attached, where the surface tension of the water slows the draining process. With less mois-

ture in the strapping system, less drying is required.

Now look at the fact that the 3/4-inch airspace also promotes ventilation, dramatically increasing the drying potential. In a rainscreen, the amount of drying is inversely proportional to the amount of wetting. So the strapping rainscreen system severely reduces the wetting problem, and at the same time, exponentially increases the speed of the drying.

### RAINSCREEN FOR OTHER TYPES OF SIDING

Some building projects call for vertical siding, such as board and batten. In these cases, we simply lap the strapping—adding a horizontal layer over the vertical layer—to allow for the vertical orientation of the siding. In one case where part of the elevation called for corrugated metal siding, double-lapping the strapping



Open rainscreen systems leave the furring strips exposed in the gaps between the boards. Many different strategies can be employed to hide the natural color of the strips. One option is painting the strips before they go on (13). The entire furring strip can be covered with building paper (14), or tabs of building paper can be inserted as the siding goes on (15).

was a perfect solution (10). In another project, we installed vertical siding sections above corrugated metal siding. We did not have the luxury of making those sections 3/4 inch deeper, so we simply installed the strapping on the diagonal, leaving intermittent breaks to let the water drain out below (11).

Site-built rainscreens can also work for cedar shingle siding (12). For the project (which was not one of mine) in the photo, the builder essentially created an aggressive skip-sheathing layer over the vertical strapping. While this particular assembly seems a bit excessive in terms of both material and labor, it does work well.

For the record, when a project calls for shingle siding, I usually specify the commercially available product that the builder is most comfortable with installing.

### OPEN RAINSCREEN DETAILING

As an architect, I prefer the open-plank rainscreen system for the projects that I design. While this system is tried and true from a performance standpoint, there are a couple of concerns that need to be solved for installation. We already mentioned covering the sheathing with felt paper to prevent UV exposure, which can also void the warranty of some manufacturers. To keep the strapping from being visible through the gaps between the boards, we either paint it black (13) or cover it with a strip of black building paper (14). On a recent open-plank installation, the carpenters slipped in short felt-paper tabs before nailing off the tops of the boards (15).

Most building walls have windows and doors to deal with. Integrating these openings into our rainscreen system is extremely

## INSTALLING EFFECTIVE RAINSCREENS



Seal all window openings and integrate them with the WRB. A flap of building paper below the window (16) layers into the building paper of the open rainscreen so that it sheds water properly (17). This mock-up of a corner shows how to leave the boards open for maximum air circulation in an open rainscreen system (18).

important. Remember that the siding is just “makeup” for the building’s exterior—the real work is literally behind the scenes. Window and door integration starts with a well-designed and well-executed sill detail that allows any intruding moisture to drain away quickly. Meticulous detail should be paid to flashing and sealing the window into its opening (see “Installing High-Performance Windows,” Oct/15) (16). The flap of paper under the window integrates with the layer of felt paper of the open rainscreen (17). Before the siding is installed, each window is completely water-managed and fully integrated with the rainscreen.

We also have to properly drain and ventilate the corners (18). In the mock-up shown in the photo, the corners and butt ends of the siding are free to drain and ventilate. As the open plank siding goes on, most of the installers I work with use narrow strips of wood

as spacers between planks. They use the same strips to maintain the gaps around windows (19) and at corners (20). And with an open-plank rainscreen, maintaining the gap above the top board is crucial for clear ventilation.

In my years of designing and installing rainscreens, I have developed a list of practices to avoid. First, always make sure corners have plenty of ventilation. Never build up columns of strapping installed next to each other. I recommend leaving a horizontal gap of at least 3/4 inch between any vertical strapping.

At window openings, resist the urge to install horizontal strapping at the bottom of the opening or under the sill of the installed window. Flashed sills should run freely into the rainscreen. Be sure to integrate any weep systems in the windows you are using into the sill and the rainscreen system. And treat the head of the window



A carpenter scribes a board around a window in an open rainscreen system, with spacing between the boards and a space left under the window sill (19). A temporary strip creates the open space at a corner board (20). Furring strips end well above the head flashing over a window (21). Services such as this electrical meter are furred off the wall as part of the siding (22).

like the sill, with the ability to drain completely (21). Always terminate the strapping for the rainscreen a good distance above the head flashing.

Any services attached to wall should be considered part of the cladding, not the wall sheathing, so items such as an electrical meter get furred off the wall just like the siding (22).

### **RAINSCREEN INVESTMENT**

When the subject of rainscreens comes up with contractors or clients, the inevitable first question is, “How much does the strapping cost?” I could always look up the current prices at the local lumber store and apply a dollar amount, but I usually answer that question with another question: “How much does that paint job cost every five years?”

As a conservative estimate, let’s assume that we paint the siding every seven years on a house with a typical direct-nailed rainscreen assembly. I know of homes that have gone beyond 20 years without their lap siding needing to be repainted when that siding was installed on a site-built strapping rainscreen system. That amounts to three paint jobs in that span of 20 years. So instead of thinking of this rainscreen as a “cost,” I like to think of it as an “investment.” The money that would be spent on those additional paint jobs would more than outpace the cost of installing the rainscreen, and that investment extends the durability not only of the paint job but of the whole wall assembly and the house itself.

*Steve Baczek, of Reading, Mass., is an architect specializing in energy-efficient design and certified passive homes. [stevenbaczekarchitect.com](http://stevenbaczekarchitect.com)*