

A Watertight Second-Story Porch

With a rubber membrane and careful flashing, you can create an outdoor room above and shelter the living space below

BY GREGORY BURR

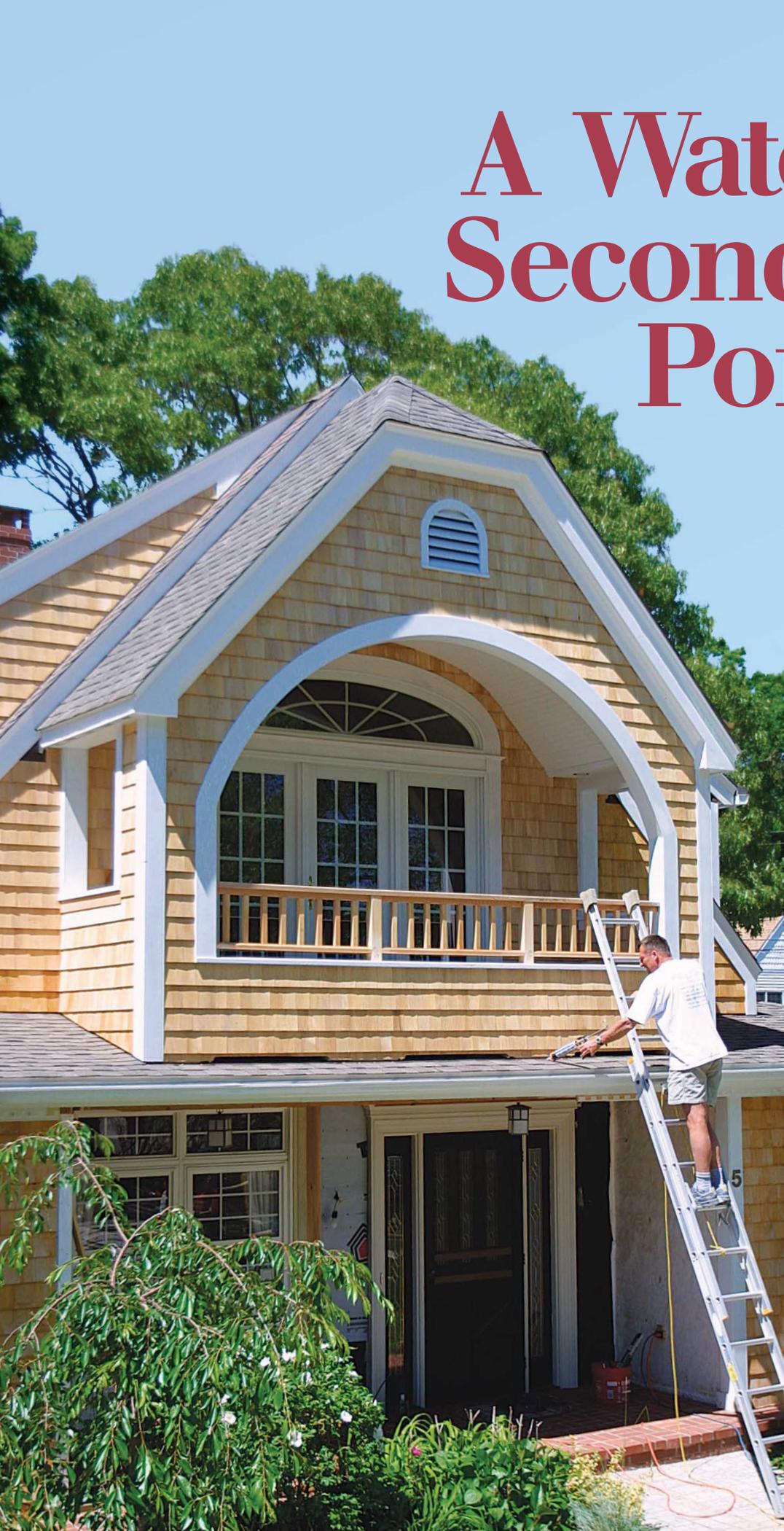
With Long Island Sound closer than a short fly to the outfield in Yankee Stadium, this house was begging for a porch to take advantage of the views. A roof that skirts the second floor offered a choice of locations. But it was obvious that the porch should be above the entry and adjacent to the master bedroom.

Waterproofing is an issue anytime you attach a new feature to a house. On the ocean, strong windswept rain is a good reason for concern. And because the porch is over an entryway designed to shelter the front door, the area below the new porch needs to stay dry.

Meeting these challenges is a lot easier today than it used to be, thanks to seamless rubber membranes and the underlayment, flashing, and adhesives designed to work with them. The key to creating a watertight porch lies in careful detailing: installing each layer correctly and in the right sequence.

Drainage starts with the subfloor

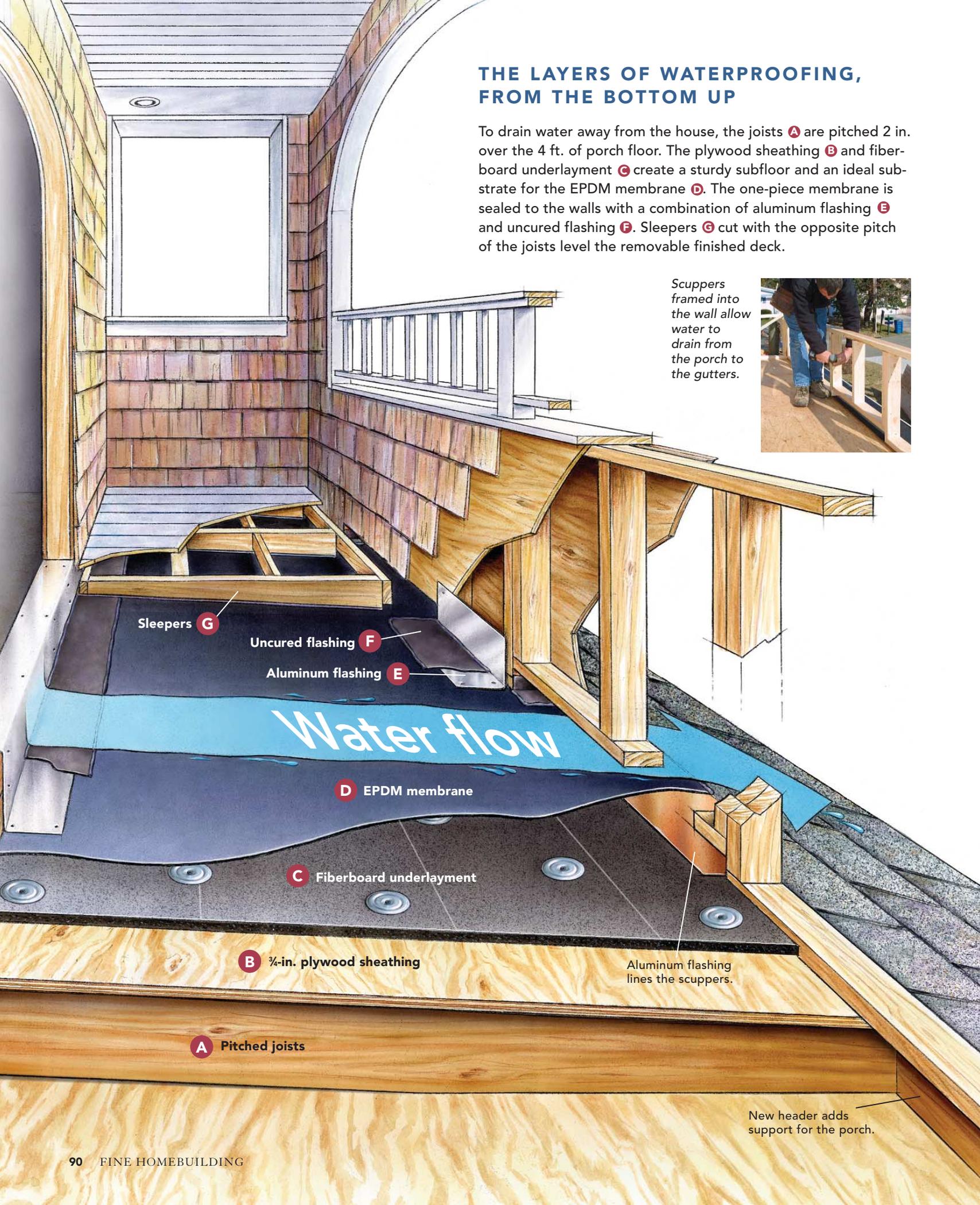
To drain water away from the house, I built a sloped subfloor (drawing p. 90). Adding



THE LAYERS OF WATERPROOFING, FROM THE BOTTOM UP

To drain water away from the house, the joists **A** are pitched 2 in. over the 4 ft. of porch floor. The plywood sheathing **B** and fiberboard underlayment **C** create a sturdy subfloor and an ideal substrate for the EPDM membrane **D**. The one-piece membrane is sealed to the walls with a combination of aluminum flashing **E** and uncured flashing **F**. Sleepers **G** cut with the opposite pitch of the joists level the removable finished deck.

Scuppers framed into the wall allow water to drain from the porch to the gutters.



Sleepers **G**

Uncured flashing **F**

Aluminum flashing **E**

Water flow

D EPDM membrane

C Fiberboard underlayment

B 3/4-in. plywood sheathing

A Pitched joists

Aluminum flashing lines the scuppers.

New header adds support for the porch.

USE SPECIAL FASTENERS FOR THE FIBERBOARD SHEATHING

The high-density fiberboard that supports the membrane needs to fit tightly. Gaps where the membrane is not supported will cause failure. The fiberboard is screwed to the plywood subfloor with rust-resistant screws and large washers called stress plates. The stress plates hold down the fiberboard and also recess the screw heads so that they can't damage the membrane.

High-density fiberboard



Rust-resistant screw and aluminum stress plate



new joists strengthened the porch and offered a simple way to create a pitched surface. It takes only a slight pitch to drain water. But to be safe, I pitch the joists $\frac{1}{2}$ in. for every foot of subfloor.

I sheathed the floor first with $\frac{3}{4}$ -in. plywood, then with a high-density fiberboard (www.gp.com/build) designed to be used with rubber membranes. The fiberboard has no inherent strength. It is used because it is smooth and won't damage the membrane. It also is compatible with the adhesive used to glue down the membrane.

I screwed the plywood to the joist to avoid nail pops that can damage the fiberboard and made sure the fiber-

board sheets fit together tightly. The membrane can tear if it is not supported across gaps in the fiberboard. Then I fastened the fiberboard with stress plates and galvanized screws. A stress plate is a 3-in. round washer with a built-in recess that prevents the screw from rubbing against and damaging the membrane.

Water needs a place to escape

A second-story porch needs to have either walls or railings. In this case, the homeowner decided to have a kneewall with a short railing on top.

The kneewall is a small stud wall. The top plate is continuous, but the bottom plate is segmented to create scuppers, or drainage openings that allow water to escape and run into rain gutters.

After all the walls were built and sheathed, I applied waterproof shingle underlayment so that it starts on the roof and extends onto the walls. Then I nailed aluminum base flashing along the front wall and step flashing underneath each

course of roof shingles going up the sidewall. I overlapped the step flashing as I worked up the roof. I also made aluminum flashing pans to line the scuppers.

Because this flashing dumps water on top of the roof shingles, I sealed the flashing to the roof with a bead of lap sealant to keep water from wicking up underneath the flashing pans. Lap sealant is an elastomeric caulk used to seal all the exposed edges of the membrane and flashing.

EPDM is waterproof, but not bulletproof

The benefit of using a rubber, or EPDM, membrane to waterproof the porch is that it covers the 56-sq.-ft. area in one piece. EPDM membranes are available in 10-ft. by 50-ft. or 10-ft. by 100-ft. rolls and thicknesses from 0.045 in. to 0.090 in. You also can order custom sizes to fit your project. For residential applications, 0.060-in. material is a good choice. But even with the thickest material, I have to be careful not to puncture the mem-

EPDM
membrane



1

2

GLUE THE MEMBRANE

Cut an oversize piece of the EPDM membrane on the ground **1**. Then put the membrane in place and trim it to fit the porch **2**. Glue the membrane to the fiberboard underlayment in manageable sections **3**. Be careful to keep the membrane aligned while you work.



3

Using commercial products at home

EPDM is the most commonly used roofing in commercial construction. Although there are fewer flat roofs in residential construction, EPDM is an excellent choice when a job calls for waterproofing a horizontal surface.

According to Tom Hutchinson, a technical adviser for the EPDM Roofing Association (www.epdmroofs.org), a properly installed EPDM membrane will last 20 to 30 years in a residential setting.

Hutchinson recommends purchasing the membrane, adhesives, and flashing materials from only one company. If the system fails, it is not likely that a manufacturer will honor the warranty if materials from various companies were mixed and matched. All the products used in this article, except the fiberboard, are from Mule Hide (www.mulehide.com).

brane during installation or while finishing the porch.

Because a roll of EPDM is large and cumbersome, I first cut an oversize piece of the membrane on the ground. While rolling out the membrane, I check it carefully for holes or tears. If it looks OK, I cut a piece a few inches larger than I need. Then I use a pair of scissors to trim the membrane in place on the porch floor. The membrane does not extend onto the sidewalls, but it should extend through each scupper. The sidewalls are flashed later.

To reduce the risk of punctures, I clear debris from the fiberboard before gluing down the membrane. It's impossible to glue down the entire membrane at once, but this piece was small enough to be glued in two sections. I put the membrane in place and folded it back, exposing half of the fiberboard underlayment.

The membrane is glued down with a bonding adhesive; the fiberboard and





FLASH THE WALLS AND CAULK THE SEAMS

The edges of the membrane are sealed to the walls with layers of flashing and caulk. First, nail aluminum flashing around the entire porch **1**. Seal the aluminum flashing to the membrane with uncured flashing **2**. Apply a bead of lap sealant to all the seams **3**. Caulk keeps water from wicking under exposed aluminum flashing **4**.



Uncured flashing



1



2



3



4

the membrane must both be coated. I apply the adhesive with a paint roller. When the adhesive is dry, I can move the membrane back into place.

Once the glued-up surfaces touch, it is difficult to separate them. I make sure the membrane is lined up and fits the porch floor before I glue it down. When I roll the membrane back into position, I work slowly and smooth out wrinkles and air bubbles as I go.

When one side is finished, I roll back the other side and start again. I save small areas for last. Although the glued-down membrane is stable, it's smart to protect the installed membrane with a scrap piece of fiberboard when working on top of it.

Flashing and caulk seal the deal

I nailed aluminum flashing around the inside of the porch walls and sealed it to the mem-

brane with uncured flashing. Uncured flashing is a flexible rubber flashing that comes in rolls and is glued down. It seals the aluminum flashing to the membrane, and it can be stretched to seal difficult areas like the corners of the scuppers.

I use a primer to clean the area where the uncured flashing will be installed. This cleaning ensures that the glue will bond to the surface. The primer that I use is toxic, so I wear rubber gloves when cleaning with this product. I dip a cotton rag into the primer, and then I scrub the area where the uncured flashing will be glued.

Next, I apply seam adhesive to the uncured flashing, the aluminum flashing, and the membrane. When the adhesive is dry on all the surfaces, the uncured flashing can be applied. I use a small roller to press the flash-

ing to the membrane and caulk all the seams with lap sealant.

Allow easy access to the membrane

The last thing that I did on this job was build a finished floor for the porch. I built the floor in three sections that can be removed for cleaning, refinishing, or inspecting and repairing the membrane beneath. To level the floor, I cut joists, or sleepers, that reverse the pitch of the subfloor. Then I glue strips of the EPDM membrane to the bottom of the sleepers with construction adhesive. The strips prevent the wood sleepers from damaging the membrane. □

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