

Leak-Free Skylights

A peel-and-stick membrane under the flashing guarantees that the skylight won't leak—ever

BY MIKE GUERTIN

I used to worry every time I installed a skylight. Even with the best installation detailing, I could still expect a storm to hit from just the right direction and drive water behind the flashing. When I discovered peel-and-stick membranes, my worrying days ended. Now I follow a series of simple steps that hasn't failed in more than 15 years' worth of installations. The key to success is integrating the membrane and the flashings with the shingles to direct water back to the surface of the roof. Although the project shown here is a retrofit, I would flash it the same way on a new home.

Put the skylight here

This project called for adding two 22-in.-wide skylights (for 24-in. on-center framing) into rafters spaced 16 in. on center. To support the opening and tail rafters, I sistered the inside face of the existing rafters to close the overall opening down 3 in. more. Then I positioned the skylight up the roof plane so that

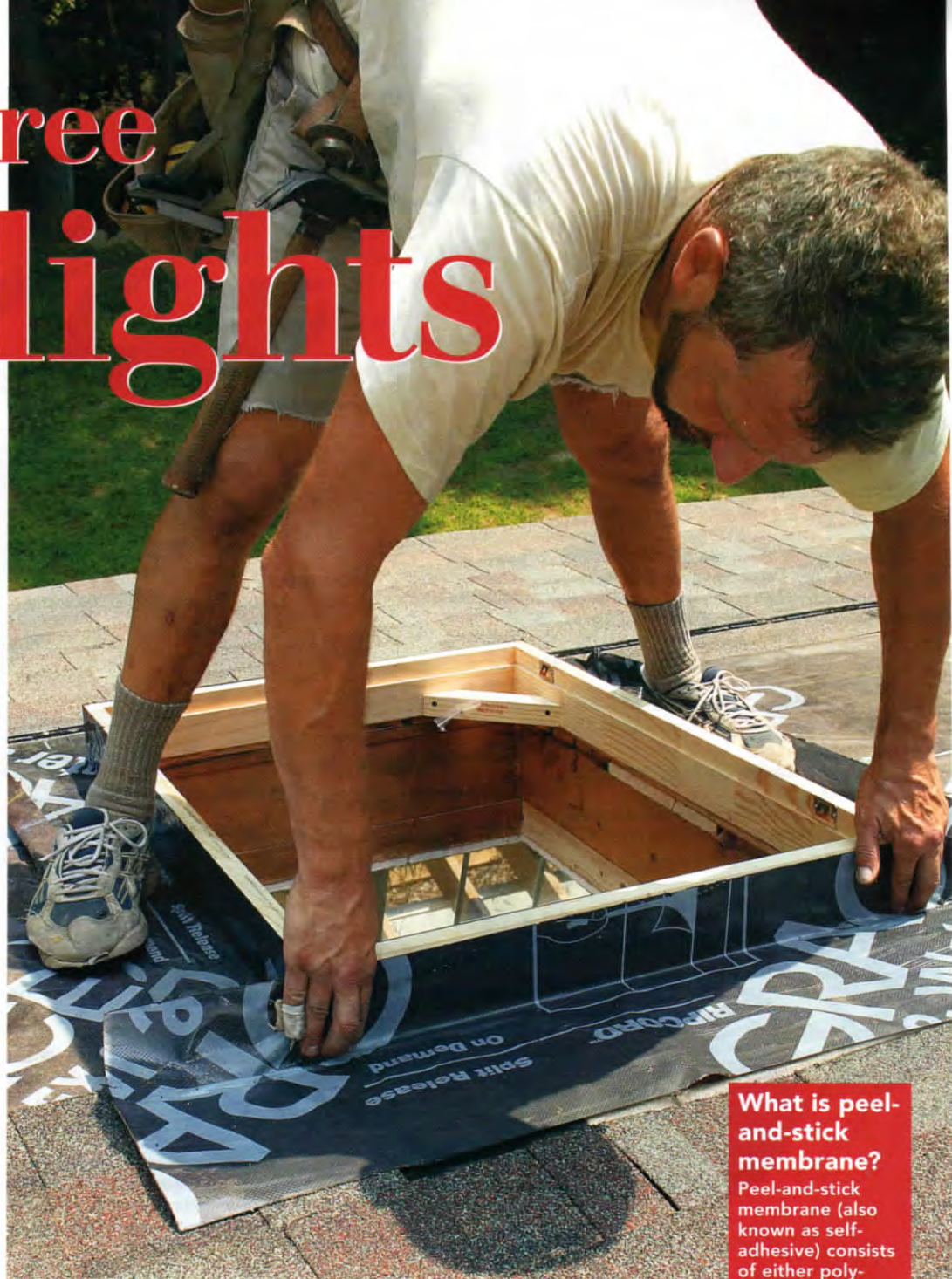
the opening would be centered on the interior room's ceiling. I framed the skylight openings from the inside, as shown in the drawing (facing page).

Cut the opening one layer at a time

With the rough opening framed, the easiest way to locate the skylight on the roof is to stand inside and drive screws up through the sheathing and the shingles at all four cor-

ners. Then I can go out and snap chalklines between the screws to mark the location.

To start the hole, I strip back the roof shingles, beginning three courses above the top of the skylight. To free the third course, I pull the nails at the center and at the course above. A carefully inserted thin flat bar breaks the shingles' self-adhesive strip and wedges up under the nails. It's easier to separate the self-adhesive strip when the shingles are cool. In



What is peel-and-stick membrane?

Peel-and-stick membrane (also known as self-adhesive) consists of either polyethylene sheets backed with rubberized asphalt-based adhesive or a mineral-surfaced fiber reinforced with an asphalt-based adhesive. The asphalt adhesive self-heals around fastener penetrations. The plastic-sheet type is the best choice for skylight flashing because it's flexible and elastic, and has a more aggressive adhesive tack.



REFRAME, STRIP, AND CUT

Skylight openings sometimes need additional modifications. In this example, the center rafter was cut out to create a space wide enough for the skylight. The amount removed included the thicknesses of both headers to be added. The rafters on each side of the space must be doubled from ridge to plate if the tail rafter (the remnant below the skylight) is more than 3 ft. long. In this case, the extra rafters were added to the inside to reduce the rough opening's width. Finally, headers were installed above and below the skylight's position.

2x8 rafters, sistered from the ridge to the top plate

Diagonal cut

1. Strip back the shingles first

Unless the entire roof is being replaced, shingles must be removed carefully so that after the skylight is attached, the shingles can be re-integrated properly with the step flashing and the waterproof membrane.

The middle rafter is cut to make room for headers.

2x8 headers added between rafters at top and bottom of skylight opening

Tail rafter

5. Install the skylight frame

Most frames mount to the roof deck with metal brackets screwed to both the skylight and the roof framing.

2. Fold back the underlayment

Once I've located the skylight's position and stripped back the shingles, I snap a set of chalklines on the roofing underlayment and remove that section. Next, I make 3-in.-long horizontal cuts at the bottom and 6-in.-long diagonal cuts at the top that splay out about 3 in. Then I fold away the underlayment flaps. I integrate these flaps into the flashing later.

3. Seal out grit

I tape the leading edge of the shingles with housewrap tape to keep sawdust and grit from getting under the roofing.

4. Cut the hole

To keep sawdust and roof debris from falling into the house, I staple a sheet of poly over the skylight opening from inside before cutting the sheathing.

Things to consider when framing skylights

BUILDING CODES
Check local building codes to verify framing details.

STANDARD SIZES
Many skylights are sized to fit between rafters 16 in. or 24 in. on center, and only need a header installed between the two rafters.

ROOF TRUSSES
Don't cut trusses without consulting an engineer. For more information on framing skylights in roof trusses, see "Q&A" in *FHB* #132 (p. 24) and "Dramatic Skylight" in *FHB* #164 (pp. 92-97).

hot weather, I break the seal early in the morning before the sun has hit the roof. I remove full shingles to the next joint left and right of the skylight opening rather than cutting them in the middle.

Once the upper course of shingles is done, successive courses are easier to remove because the nails are exposed; just pull the nails and separate the self-adhesive strip. I remove shingles until I reach the course whose top edge is within 2 in. above

or below the bottom line of the skylight opening. I save the shingles I've pulled to reuse around the skylight.

With the shingles removed, I snap chalklines between the screws to outline the skylight location, then remove the screws. Inside, I staple plastic over the skylight opening to contain the dust. Then I go back to the roof, where I use a circular saw to cut the roof sheathing.

After I've swept the roof, I separate the glass portion of the skylight from

the frame and install the frame per the manufacturer's instructions. I prefer to remove the glass from the frame to reduce the skylight's weight and to cut the chance of scratching the glass, and to make it easier to run the peel-and-stick membrane to the top of the frame.

Peel-and-stick membrane seals the frame to the roof

Despite the layers of underlayment, shingles, and flashing, I count on the

SLICE, WRAP, AND PROTECT WITH A WATERTIGHT SEAL

Although metal step flashing is the primary weather barrier between the skylight frame and the roof shingles, self-adhesive membrane, when applied first, makes a watertight seal that also self-heals around nail penetrations. I cut 9-in.- to 12-in.-wide strips of membrane for each side of the skylight (there should be a minimum of 5 in. adhered to the roof) and make each one about 12 in. longer than the skylight edge.



INSTALLATION TIP
After I cut strips of self-adhesive membrane, I dry-fit them in place, then flip them over and score the release sheet along the fold line. Now I can stick the membrane to one surface and stick the other half when it's in place.

1. Start at the bottom

Center the membrane, and align it with the edge of the frame. Remove the top half of the release sheet, and press the strip onto the frame. Then remove the second half of the sheet, and stick the membrane to the top edge of the shingle below the skylight. Trim the membrane just above the self-adhesive strip on the shingle course so that it won't be exposed when base flashing and shingles are reinstalled.

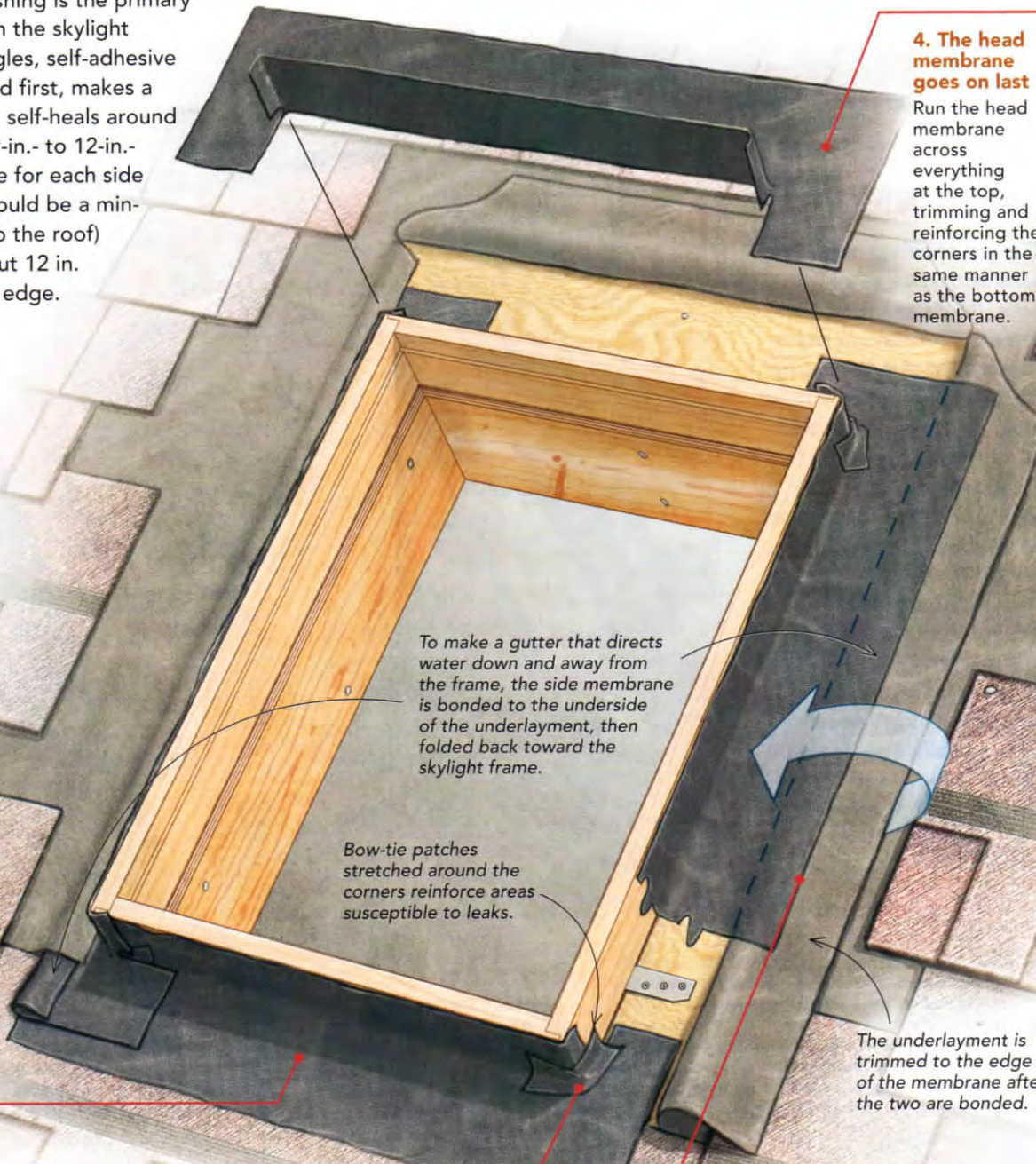
2. Reinforce the corners

Make vertical cuts in the membrane at the sides of the frame $\frac{1}{2}$ in. to $\frac{3}{4}$ in. from the corner. Press the narrow strip around the corner and let the ears fold down onto the roof. Because the skylight corners are potential leak points, I back up this vulnerable area with small patch pieces of membrane $1\frac{1}{2}$ in. to 2 in. wide. I make them bow-tie shaped so that they have more surface area that can bond to the skylight frame. I apply the strip firmly along one edge first, then stretch it through the corner before bonding to the other edge.



3. Create side gutters

Run membrane strips up the side of the frame, and let them overlap the underlayment by 1 in. to 2 in. After adhering the strip to the frame, fold back the underlayment, bond the membrane to the underside of the underlayment, and fold the two layers back toward the frame. Apply a small patch of membrane across the top of the fold, just above the frame.



4. The head membrane goes on last

Run the head membrane across everything at the top, trimming and reinforcing the corners in the same manner as the bottom membrane.

To make a gutter that directs water down and away from the frame, the side membrane is bonded to the underside of the underlayment, then folded back toward the skylight frame.

Bow-tie patches stretched around the corners reinforce areas susceptible to leaks.

The underlayment is trimmed to the edge of the membrane after the two are bonded.

INTEGRATE THE METAL FLASHING WITH THE ROOF

Once I've brought the shingle courses back to the bottom of the frame, I install the base-flashing piece, then begin to alternate between the step flashing and the shingles up along the frame. This skylight was a fixed frame, so the gasket was built into the window frame. If the skylight is operable, the gasket is separate, and I tuck the top edge of the flashing beneath the gasket first, then attach the step flashing with short nails or screws to the side of the skylight frame. I position the bottom edge of each step flashing above the self-adhesive strip of the shingle below.

1. Base flashing

After bringing the shingles back up to the bottom of the frame, secure the base flashing to the frame with short nails or screws.

peel-and-stick membrane as the final line of defense against leaks. Applied meticulously around the skylight frame, the membrane collects water that gets beneath the metal flashing and redirects it to the shingle surface below the skylight.

The key is to lap the peel-and-stick membrane over the top edge of the shingle course that runs along the bottom of the skylight. Without this step, water that reaches the membrane will empty onto the roof underlayment and have to travel the length of the roof slope beneath the shingles until it reaches the eave. Along the way, the water has hundreds of nail holes that it could leak through.

Skylights are easy to install

Reshingling and flashing are the simplest parts of the process. The base flashing wraps around the bottom of the curb, the step flashing is integrated into the shingle courses

along the sides, and the head flashing caps the top. I slip the top edge of the flashing under the skylight gasket, then secure the base flashing to the frame with short nails or screws at the top corners. When replacing shingles, I don't drive nails through the step flashing; their rigidity prevents the last several inches of shingle from lifting up.

With the head flashing nailed in, I slip the last couple of shingle courses beneath those still in place, lifting up the shingles to hammer the nails. Most important, I keep in mind that I have to renail the courses above the skylight. It's a place that's easy to forget at the end of a long day spent working on the roof. □

Mike Guertin is a remodeling contractor in East Greenwich, R.I., and a contributing editor to *Fine Homebuilding*. His Web site is www.mikeguertin.com. Photos by Charles Bickford.

3. Head flashing

Once the head flashing is nailed off, I overlap its upper flange with the underlayment and seal the seam with strips of membrane.



Trim the shingles above to leave a 2-in. space above the head so that it won't collect debris.

Trim the shingles ½ in. from the sides of the skylight frame.

2. Step flashing

Beginning at the bottom of the frame, the step flashing is woven into the shingle courses.



The window, at last. With the curb flashed and virtually watertight, I can fasten the window to the frame. This skylight was a fixed frame, so the counterflashing was part of the window frame. Don't forget to remove the protective plastic sheet before you descend the ladder.