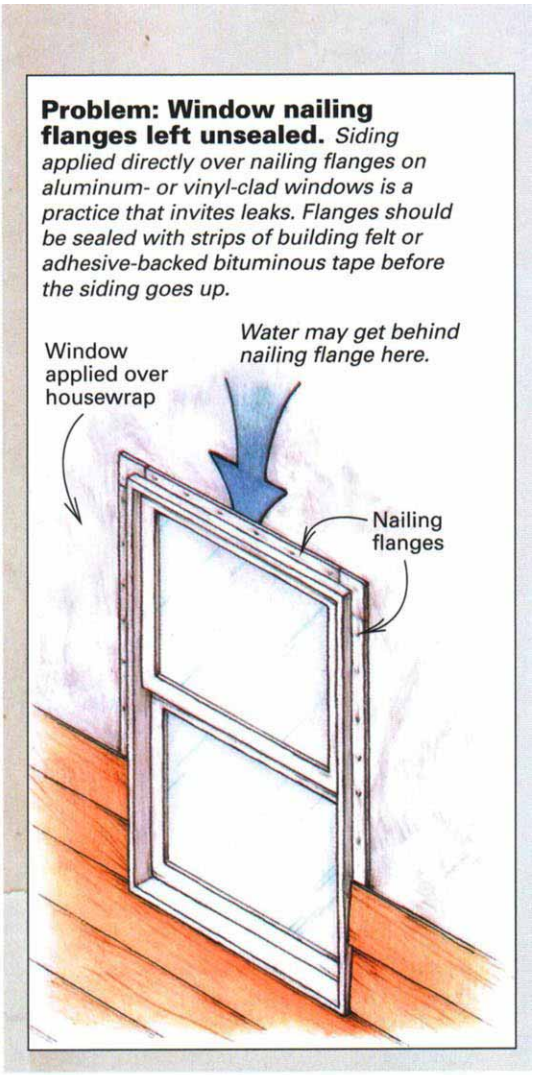
# How to Avoid Common Flashing Errors

## Building paper and adhesive-backed bituminous tape are vital ingredients in protecting a building from water damage




by James R. Larson

To understand flashing, try thinking about a house as essentially a tent with architectural embellishments. You'll know what I mean if you've ever been camping in the rain and inadvertently zipped up the door flap so that the bottom edge turned inward. The big puddle inside the tent, the one that soaked your last dry shirt, was a flashing problem not unlike those you can build into a house if you're not careful.

Flashing is one of the smallest parts of a building, so it sometimes doesn't get the respect it deserves. But it sure will exact its revenge when it is overlooked or improperly integrated with other building elements. I see a lot of that. For the past seven years, I've worked as an architectural consultant, and I've poked into many moisture-damaged houses whose troubles started with improperly applied flashing.

Water is a wily enemy. Driven by wind or sucked into crevices by negative air pressure inside the house, it can flow uphill between construction layers. Once inside, water will subject building materials to alternating spells of soaking and drying until first the paint and finally the wood just give up.

Flashing to me is more than metal. In a general sense, flashing refers to a configuration of materials that are arranged to direct water to the exterior. The materials could be metal, asphalt-impregnated building paper (felt) or, more recently, adhesive-backed bituminous tape. Together, these materials work to ensure that corners, openings and edges will exclude water. The wall tape (photo right) is an important ingredient. It's a modified bituminous material on a backer of cross-laminated polyethylene with an aggressive adhesive. It's sold by several companies (sidebar p. 75). Building felt, housewrap and bituminous tape are part of what the Uniform Building Code calls a "weather-resistive barrier," the final barrier to water penetration.

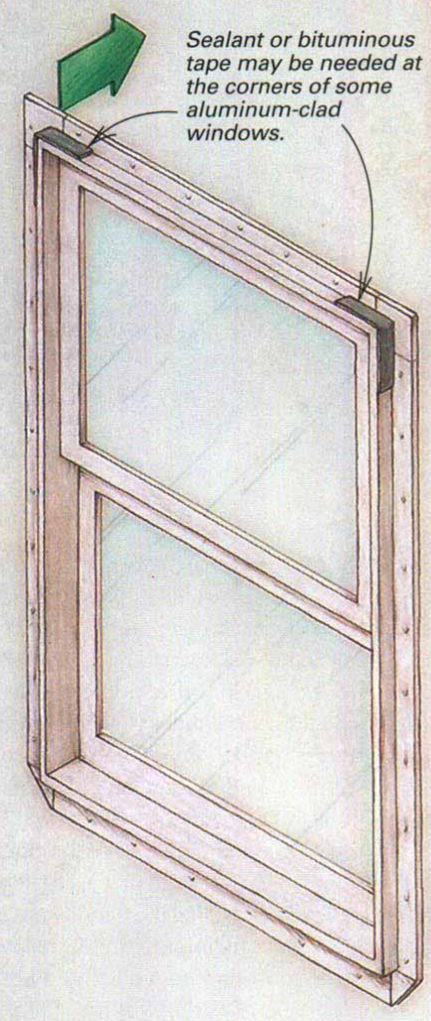
Flashing should be applied so that water flows to the exterior rather than being trapped behind one of the building's construction layers. If the correct installation of flashing could be boiled down to a single phrase, it would be this: Don't leave any edges looking uphill. This underlying principle is about as basic as placing the shower curtain on the inside of the tub before you turn on the water. In my dealings with problem-

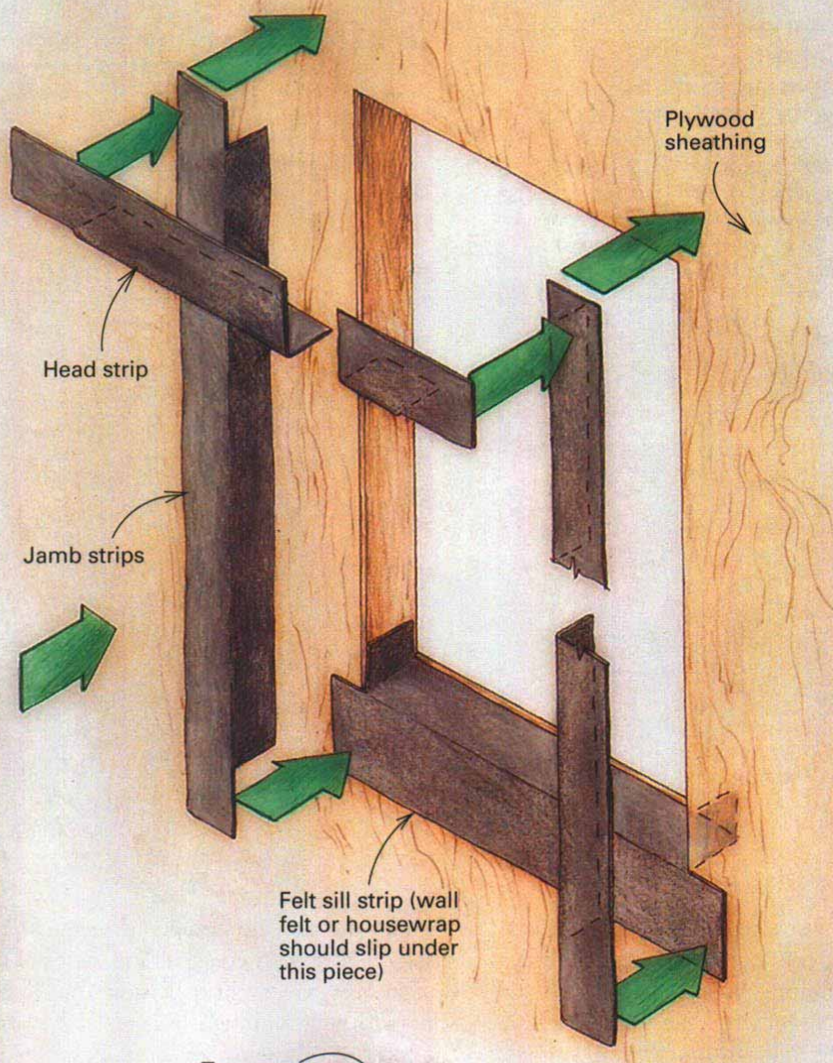
**It's sticky and waterproof.** Self-adhering bituminous wall tape has a variety of flashing applications, handling everything from window flanges to deck ledger boards. A list of manufacturers appears on p. 75.



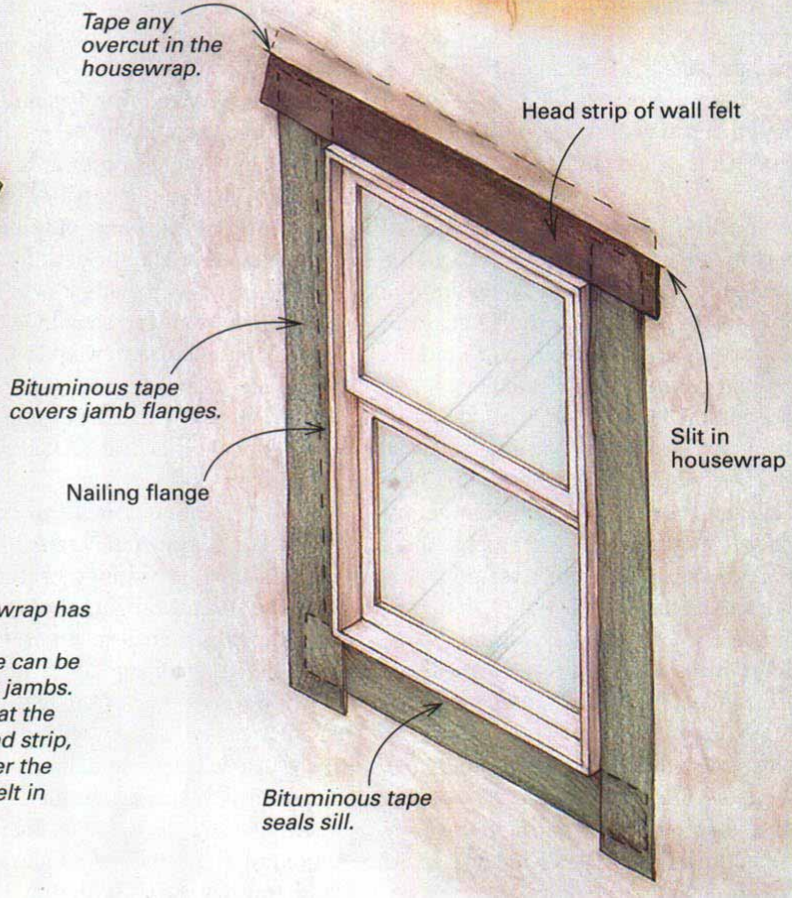
Drawings: Christopher Clapp. Photo this page: Scott Gibson.

**When windows go in before housewrap.** *If windows are placed in their openings before any wall felt or housewrap has been applied to the sheathing, felt prep strips should be applied first. Make sure that the corners of aluminum-clad windows are well sealed.*

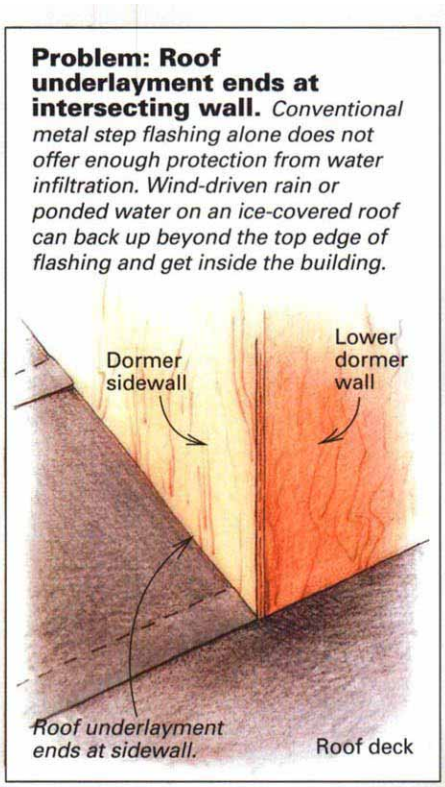


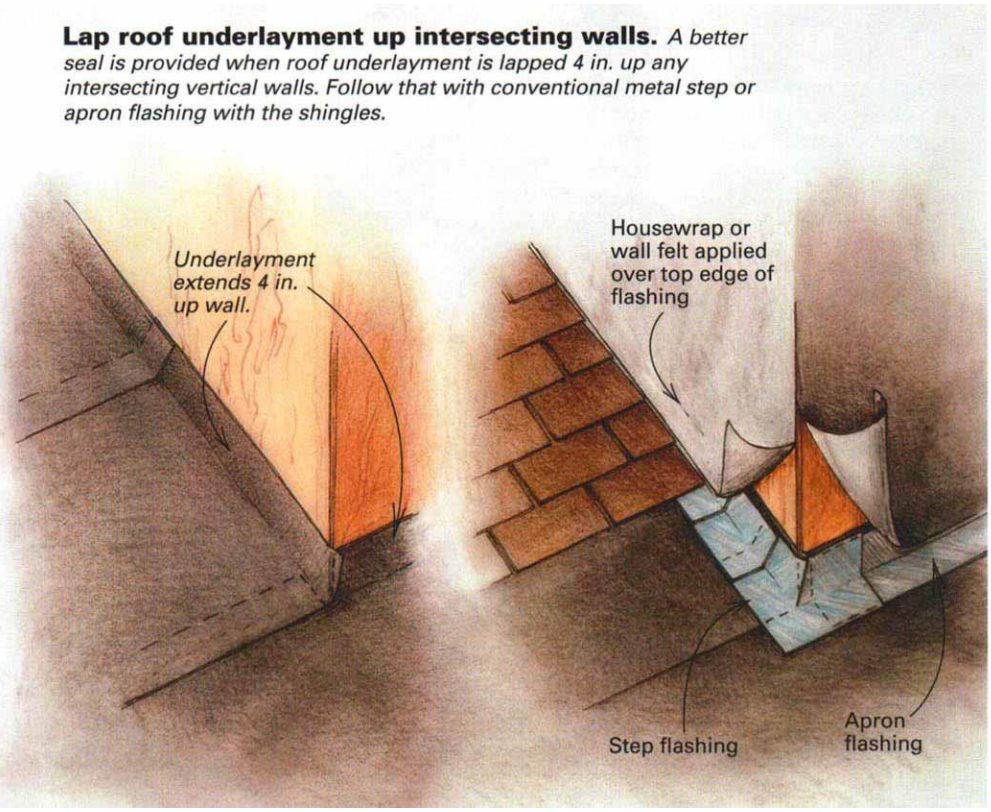




*Note: Add a metal drip cap at the head of the window if the manufacturer does not warrant the flanges as weatherproof.*




**When windows go over housewrap, use tape.** *If housewrap has been applied before the windows are installed, self-sticking bituminous tape can be used to seal flanges at the sill and the jambs. A strip of wall felt protects the flange at the head of the window. To install the head strip, make a slit in the housewrap right over the flange, and slide the top edge of the felt in behind the housewrap.*




flashing installations, I've found four situations where mistakes commonly occur: around vinyl-clad and aluminum-clad windows manufactured with nailing flanges, at the intersection of a roof and a sidewall (a dormer, for example), where an outside deck intersects the sidewall of a house and, finally, at the edge of a roof. Correctly flashing these spots won't take much more time than doing it wrong, and the effort will save you lots of heartache.

**Window nailing flanges should be sealed before they are covered up**—Back in the '50s, wooden windows arrived on the job site with brick molding already attached. After strips of building felt were put in place around the window opening, the window could be hoisted into place and nailed through the brick molding. A metal flashing cap lapped behind the final wall felt protected the head of the window. Aluminum-clad and vinyl-clad windows now arrive with nailing flanges around the perimeter. These flanges must still be flashed and sealed before siding goes on to prevent water and air infiltration. My rule of thumb is that if you can still see the nailing flanges at the jambs and at the head, you're not yet ready to install the siding (drawing p. 70).

There are two possible scenarios here: first, when windows are installed directly over the sheathing; and second, when windows are placed after the building is covered with building felt or housewrap.

When windows are installed over sheathing, strips of felt should go on all four sides of the opening just as in the 1950s version. The flanged window is nailed through these prep strips; then the felt or housewrap goes on. The sill strip should lap over the housewrap at the bottom. If the window manufacturer does not warrant the flange as weatherproof flashing, a metal drip cap should be tucked in behind the housewrap at the head. No tape or sealants are required.

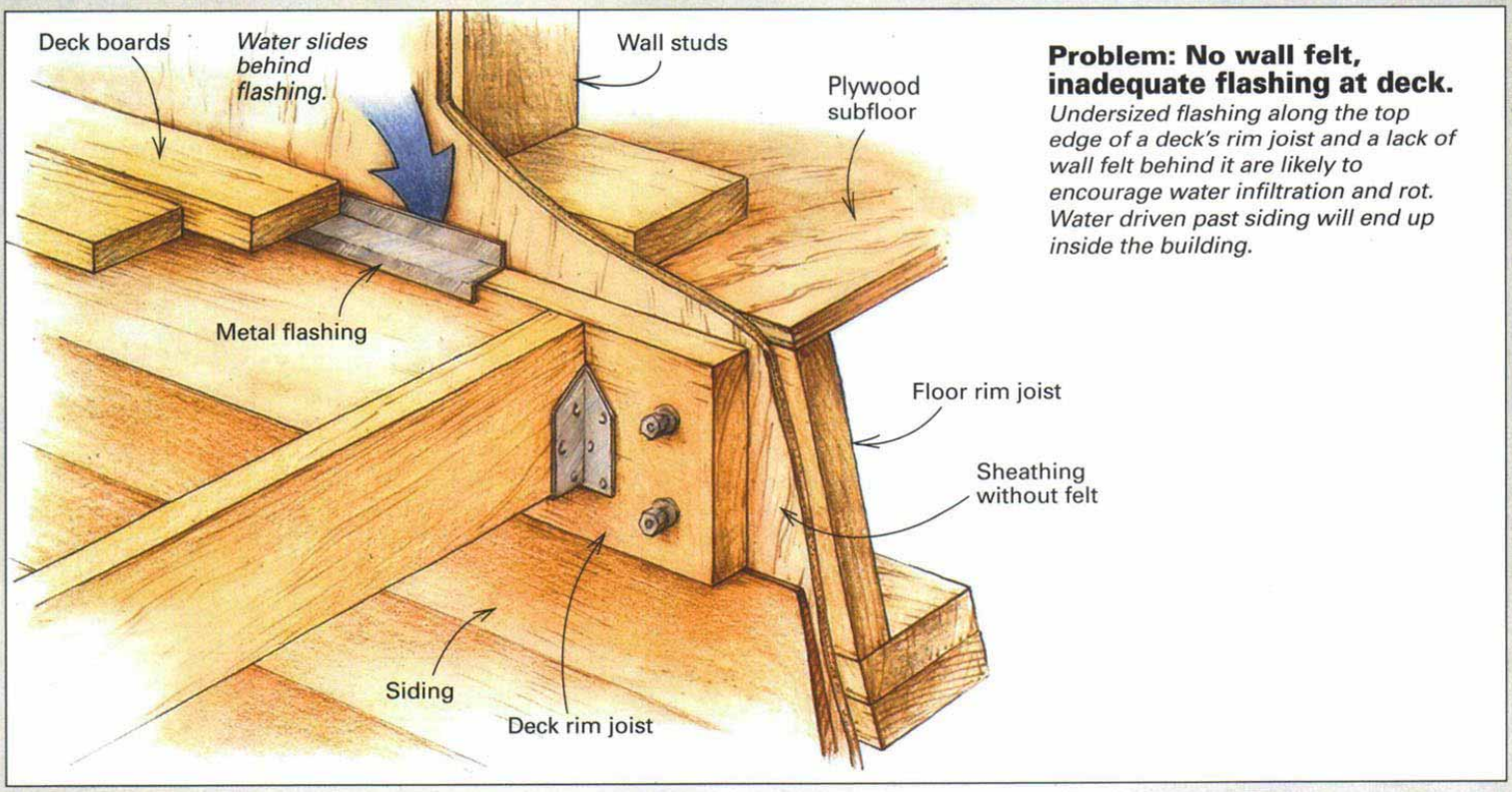
Lately, I've been seeing a more high-speed variation of this detail where only the sill prep strip has been used. The flanges are then sealed to the sheathing with either a bead of sealant between the flange and sheathing or sealed with strips of bituminous wall tape before being covered with the weather barrier. This variation trades in the principle of redundancy for a faith in chemical seals. But I have to admit that it seems to work effectively.

More commonly, houses are sheathed and covered in housewrap before the windows are even delivered. The windows get nailed on right over the housewrap, and before you know it, the siding has been installed. You have been left with the nailing flange at the head of the window on top of the housewrap. The top of the flange is now ready and willing to channel into the wall any water that passes its way.

One answer, as shown in the drawing (bottom drawing, p. 71), is to make a slit in the house wrap just above the head flange after the window unit has been nailed in place. The slit should extend 6 in. beyond each side of the window frame. A 6-in. high strip of felt is then slipped into the slit and brought down over the outside of the head flange. Strips of the bituminous tape 6 in. wide should be used to seal the sill and jamb flanges to the housewrap. (Don't use red vapor-barrier tape for this application-it was designed primarily for interior use, and the adhesive won't take too much water.) Applying a felt strip at the bottom of the opening before setting the window in place, just as you would if you were installing the window on bare sheathing, is a way to improve this installation method.

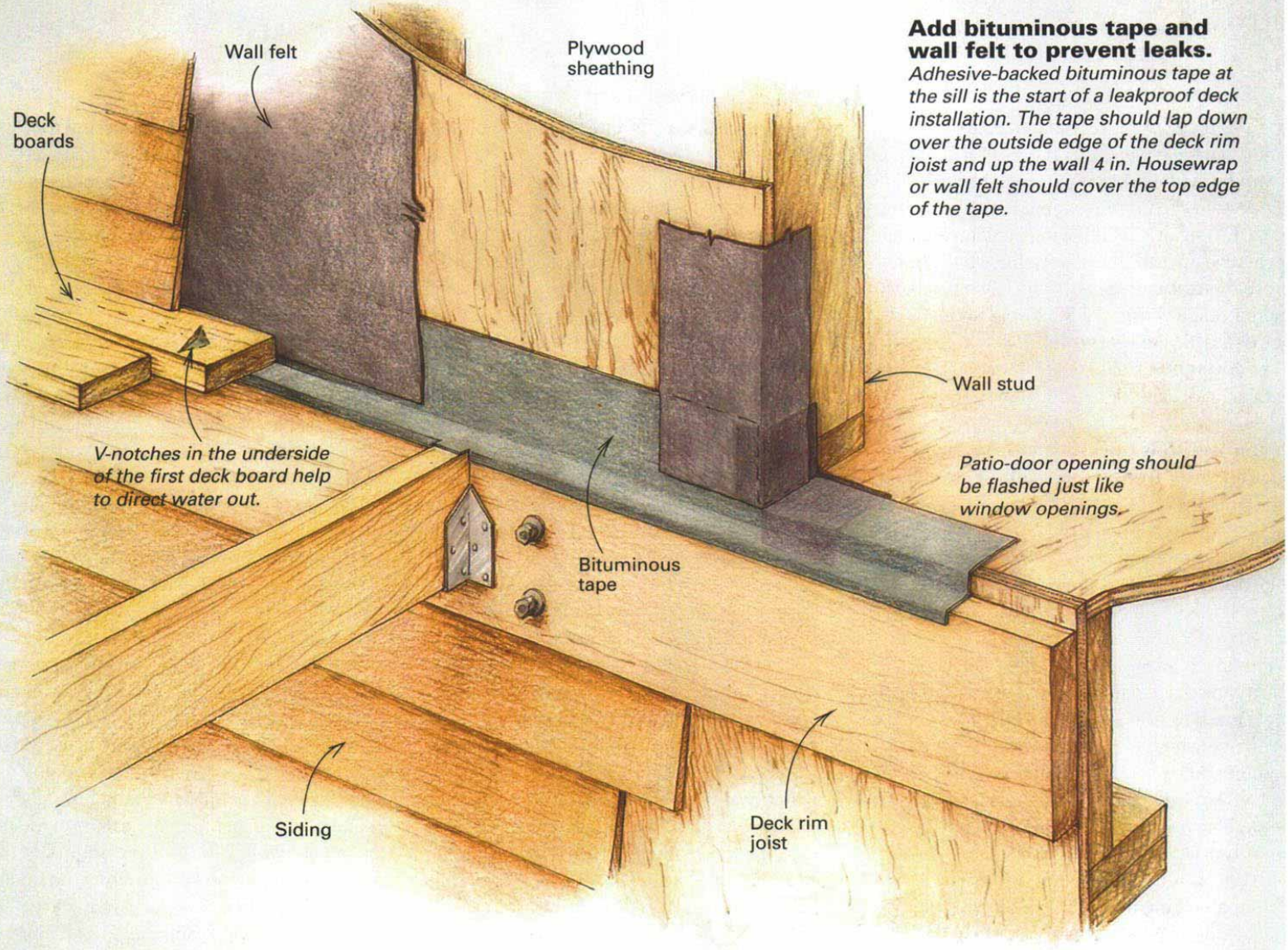
The most high-speed technique of all is simply to nail on the window flanges over the housewrap and then to seal the edges with bituminous tape, starting with the sill, then jambs, then head. This technique epitomizes an almost-complete departure from the traditional reliance on redundancy to a faith in new materials and adhesives. Unfortunately, at this point we do not have a 50-year history of performance of these materials to tell us whether our faith is well placed.

Do you need a metal flashing cap, too? Probably not, but don't forget to look at window corners carefully. Some aluminum-clad windows may show small gaps at the corners where the miter cuts in the metal cladding have separated slightly during shipping. Gaps no matter how small can cause serious water leaks. I'd add a patch of the bituminous wall tape if there's any hint of an open joint. Vinyl-clad windows gen-




**Problem: No wall felt, inadequate flashing at deck.**

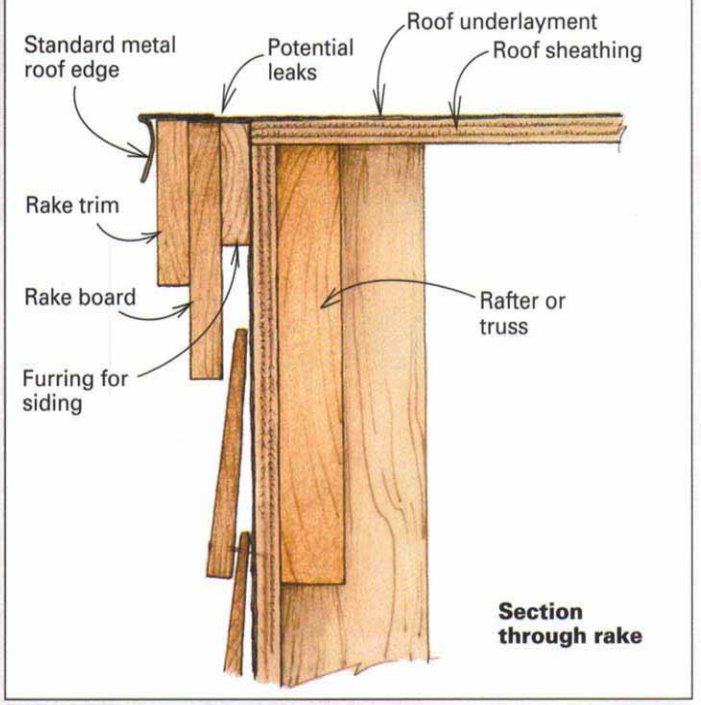
*Undersized flashing along the top edge of a deck's rim joist and a lack of wall felt behind it are likely to encourage water infiltration and rot. Water driven past siding will end up inside the building.*



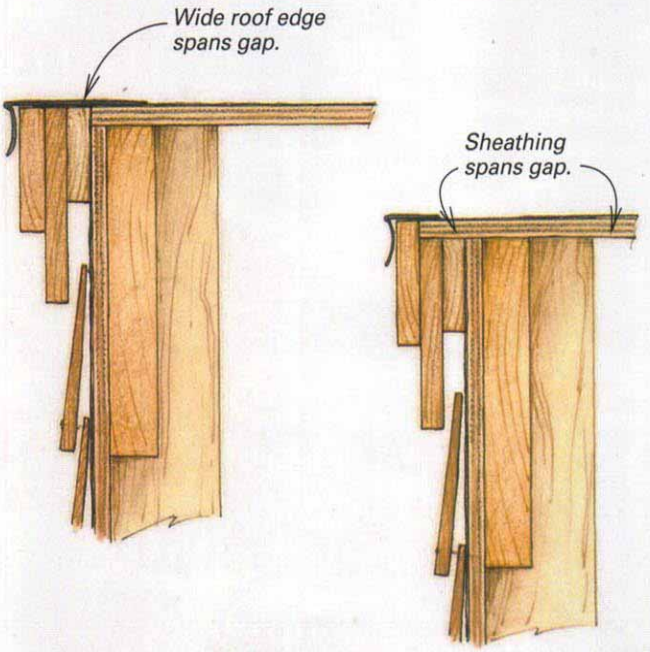

**Add bituminous tape and wall felt to prevent leaks.**

*Adhesive-backed bituminous tape at the sill is the start of a leakproof deck installation. The tape should lap down over the outside edge of the deck rim joist and up the wall 4 in. Housewrap or wall felt should cover the top edge of the tape.*

**Problem: Metal roof edge isn't wide enough.** *With a top flange only 1¾ in. wide, standard metal roof edge may not span vertical joints created by a rake detail or insulating sheathing. These seams are potential avenues for water.*




**Keep the seams covered.** *Applying metal roof edge that has a wider top flange will keep vertical joints along roof edges covered (left). A better option (drawing right) is to extend roof sheathing far enough to cover the seams. If so, standard metal roof edge would be wide enough.*




erally don't have this problem because they are made with heat-welded corners.

Another vulnerable point of aluminum-clad windows is the corners where the side flanges meet the top and bottom flanges. Manufacturers typically provide some sort of corner clip for these spots, but even with the clips in place, there is usually a pesky little hole about 1/16 in. across that doesn't get covered. This hole needs to be covered with either the bituminous tape or with a dot of exterior-rated sealant.

**When roof felt does not lap up an intersecting wall, trouble may follow**—A sloped residential roof often butts into a vertical surface, such as a dormer or a chimney. At the juncture of the roof sheathing and the vertical surface, there will be a crack—a perfect entry for water if this seam isn't sealed carefully (drawing left, p. 72). Metal step flashing isn't enough. Wind-driven rain or ponded water blocked by a snowbank or ice dam can creep up underneath metal flashing and get into the building.

Anyone who has worked with roofing underlayment knows how unwieldy long pieces of this material can be. It's no easy feat to take a 24-ft. piece of felt and get it on straight-it's even harder to do when you have to lap it up the bottom wall of a dormer by 4 in. before attaching it. But as the drawing shows, that's exactly what should be done (drawing right, p. 72). The roof underlayment should always extend up an intersecting wall by this amount,

The metal flashing is next in sequence (step flashing along with shingles on the sidewalls and a continuous apron flashing along the bottom edge of a wall). This should be followed by building paper or housewrap on the sidewall, which should lap down over the top edge of the roof underlayment to complete the seal.

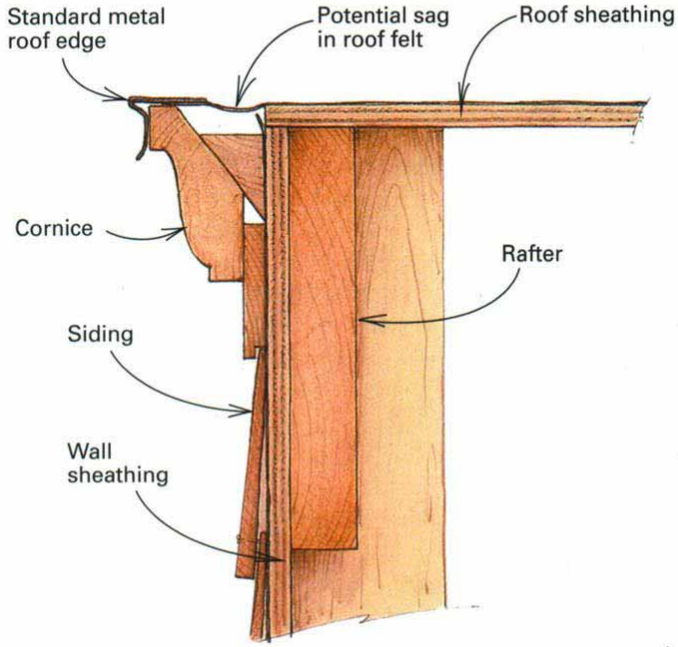
I recently worked on a house that leaked along the bottom edge of a shed dormer, not regularly but enough to puzzle the owner and the roofer about the source of the water. A hard wind-driven rain could be forced up the wall just enough to leak inside the building. We were able to loosen the metal apron flashing and the metal step flashing and shingles. We installed a strip of self-adhering bituminous tape from the vertical surface down onto the roof felt and replaced the metal flashing and shingles. Problem solved.

Lapping the roof underlayment up the adjoining wall is an approach that has the virtue of common sense. But trying to find an industry publication depicting it turns out to be a bit of a research project. You will, however, find a straightforward description of how to join a roof slope to a wall in the last place you might think of looking: right on the brown-paper wrapper that roof shingles come in. The one I'm looking at now is one I picked up out of my own yard after the roofers had finished work. It's from GAP Materials Corporation and suggests that the roof underlayment extend 4 in. above the roof/wall intersection. The instructions also advise adding asphalt plastic cement behind the turned-up felt. Why this information doesn't get transferred from wrapper to roof more often is a mystery.

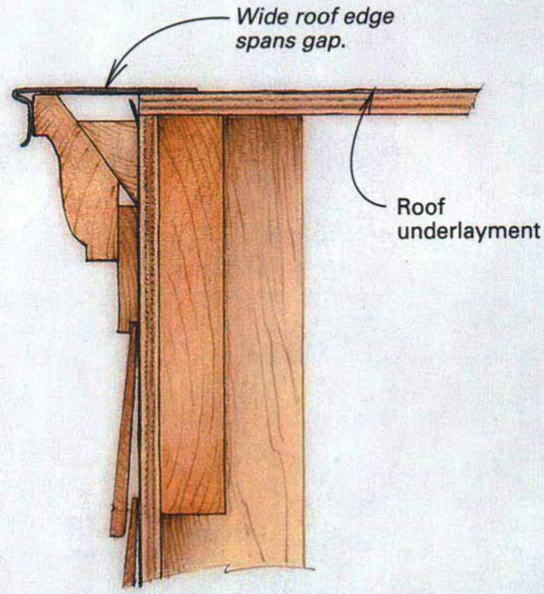
**Insufficient flashing along the edges of a deck usually leads to rot**—A project I recently looked into involved a typical condition, rot where a deck had been added along an exterior wall of a house. The deck was solid. But the wall had been leaking since the deck was installed. By the time I saw it, the sheathing had the consistency of soggy Shredded Wheat. This house had three problems: the absence of building paper or housewrap over the sheathing, flashing at the edge of the deck that was too narrow and a patio door that had been installed so that it allowed water leaks around the edges. The drawing (top drawing, p. 73) shows details.

You may think otherwise, but my experience has been that a small amount of water often if not always gets past siding. It may be driven by the wind or sucked in by capillary action. In the house I looked at, some water probably was making its way behind the siding in this way, and then getting behind the flashing at the bottom of the wall. The builder originally had caulked between the bottom siding board and the deck, but some water also may have been driven in here. The flashing did not extend far enough up the wall to prevent water from get-

**Problem: A sag may mean ponded water.** *Blocking nailed to a rake edge or an eave to support a cornice may create a dip in the roof underlayment. Standard metal roof edge doesn't cover the gap.*




**Wide roof edge spans gap.** *Metal roof edge with a 4½-in. flange will span any gap between a cornice detail and the roof sheathing, preventing sag in roof underlayment and shingles and cutting off a possible source of water leaks.*




ting into the framing. Any water coming from higher up the wall encountered no weather barrier to direct it out over the metal flashing.

To prevent these leaks, start with a 6-in. wide strip of bituminous wall tape as the base flashing, as shown in the drawing (bottom drawing, p. 73). The wall tape is a much better choice than metal flashing: It's self-sealing around nails and at lap joints and splices, it's easily formed, and it won't corrode or dissolve. (The original purpose of this material, in a wider form, was to make pond liners.) It is applied so that it overhangs the front edge of the deck rim joist slightly and goes up the sheathing by about 4 in. The first deck board is notched on the bottom at regular intervals to allow any water that gets in there a way to get out. You could just cut saw kerfs every 16 in. or so on the bottom of the board. But a better way is to set your circular saw to a 45° angle and make two cuts to produce V-shaped notches. They won't be as easily blocked by debris that happens to get in there.

Once the base flashing is applied, the building paper on the outside of the building should be lapped over the top edge to complete the seal. Patio doors should be flashed like windows, with sill, jamb strips and head strips applied so that they direct water to the outside.

**Standard metal drip edge sometimes isn't wide enough to prevent leaks**–Metal roof edge, also called drip edge, installed along the rakes and eaves of a roof establishes a smooth, clean surface and a straight line where roofing felt and shingles can end. It also covers over splice joints in the fascia board or the gap created at the junction of the fascia board and the roof sheathing. In typical metal roof edge, the top flange is about 1¾ in. wide. With some types of insulating sheathing or trim details, however, a gap can be created behind the fascia that is too wide to be covered by standard metal roof edge (drawing left, facing page).

Sometimes a dip can develop in the roof felt and shingles near the roof edges (drawing above left). This depression can encourage ponding of water driven into this area, and it increases the chance that water will work its way behind trim or into walls. If you're tempted to overlook this little glitch, don't. I've been called out to problem houses where that was the case. It takes about three years for the paint to peel off and four years for staining to start. Degradation of the wood follows shortly thereafter.

If the framers have left too wide a gap from the edge of the roof deck to the fascia, your best bet is to use an extra-wide metal roof edge. It will completely cover any gaps. In these situations, I recommend roof edge with a 4½-in. flange that extends onto the roof deck (for more on roof flashing, *see FHB* #107, pp. 84-89).

In many cases, the builder wants the shingles installed before the siding or fascia is in place. It is well worth the extra few minutes it takes to figure out the thickness of any insulation and fascia so that the metal roof edge can be properly placed to receive these materials. □

*James R. Larsen became an architect over 30 years ago. For the past seven years, he has had a solo practice as a consultant to builders, homeowners and other architects. He lives in St. Paul, Minnesota.*

### *Where can I get that flashing tape?*

Self-adhering bituminous wall tape is available from these three companies.

Bartech International
3441 S. Willow Ave.
Fresno, CA 93725
(800) 341-9917

Grace Masonry Products
7221 West Parkland Court
Milwaukee, WI 53223
(800) 558-7066

Protecto Wrap Co.
2255 S. Delaware St
Denver, CO 80223
(800) 759-9727