Flashing Walls

Keeping water moving out and down is the key to effective sidewall flashing

by Scott McBride

As a carpenter for over 20 years, I've seen the mischief water can do when it gets under a building's skin. I've also studied ways to prevent this situation from happening. What I've learned is that water can be coaxed and persuaded to remain on the outside of a building, where it belongs, if you know the right methods and use the right materials. Although these methods and materials are similar for sidewall and roof flashings, this article will look specifically at flashing the various sidewall trouble spots.

Flashings are membranes woven into a structure's exterior cladding at key points to keep water moving out and down (photo right). They work primarily by means of gravity. The underlying principle, therefore, in all flashing, siding and roofing work is that which is above overlaps that which is below. In addition, well-designed flashing should break the surface tension of water, which will help prevent moisture migration along cracks and between materials.

Yes, some windows can be flashed with tarpaper and housewrap. Lapping asphalt-felt paper and housewrap over the nailing flange of this clad window will help keep water out of the framing.

Copper and lead are traditional choices—Metal has long been used for flashing because it can be beaten or rolled into thin sheets. Copper in particular has been a popular choice because of its excellent corrosion resistance, even in the presence of an alkaline material such as concrete. It is also strong enough to hold a shape yet soft enough to work easily. Finally, copper can be easily and permanently joined by soldering. This trait makes it possible to fabricate complex, watertight shapes that can't be made by means of bending alone, which is particularly important in roof flashing. Copper for flashing is usually sold in a 16-oz. weight (1 sq. ft. weighs 16 oz.) and is available in soft and hard tempers. Hard, or cold-rolled, copper is stronger and is preferred for most flashing work.

Copper is often used for its traditional appearance, and as it weathers, it develops an attractive, protective surface, or patina. Lead-coated copper has even better corrosion resistance than plain copper, with a price tag to match, and is used primarily in urban environments where air pollution can corrode plain copper prematurely.

Despite its advantages, however, copper does have a few drawbacks. Runoff from plain copper can sometimes cause a greenish staining, although this problem does not occur with lead-coated copper. Another problem is the incompatibility of copper and cedar: The extractives from red-cedar shingles and shakes will deteriorate copper and, therefore, make it a poor choice where red cedar is present. Copper's main disadvantage is price; its cost is three to four times that of aluminum.

Like copper, lead has a centuries-long tradition as a flashing material. It has good corrosion resistance and is highly malleable. It's still used occasionally for custom work where a flashing must be bent to conform to an irregular surface, such as a tile roof. On the downside, lead's softness makes it vulnerable to punctures, and its low melting point makes it difficult to solder; the lead sheet will melt as readily as the solder.

Aluminum is a good choice for simple flashings—Most residential flashing work these days is done with aluminum. It is easy to work, is inexpensive and has good corrosion resistance in most environments. It also readily accepts paint, which can be applied in the field or, better yet, in a factory. However, the paper-thin aluminum that's sold in rolls at lumberyards is barely adequate for flashing work. A better choice is the prefinished 0.029-in. coil stock sold by aluminum-siding distributors. It often comes painted brown on one side and white on the other. The white side makes layout with a pencil easy.

Photo this page: Andrew Wormer

Unfortunately, aluminum can't be soldered easily, so it's limited to situations where simple overlapping will keep water at bay. Caulks and sealants can be used on aluminum, but they often fail due to the metal's high degree of thermal expansion. As the metal stretches and contracts, its bond with the sealant will often break.

Tin-plated steel (terne) and zinc-plated steel (galvanized) can also be used for flashing, though their corrosion resistance is limited without periodic painting. Flashings, though, can't be fully painted after installation because they're hidden behind other materials. Still, galvanized flashing is preferred over aluminum flashing in coastal areas where salt air is particularly corrosive to aluminum.

Galvanic corrosion can deteriorate flashing—An important consideration in the use of metal flashings and fasteners is galvanic corrosion. This reaction occurs when dissimilar metals in the galvanic series—a ranking of a metal's tendency to react with other metals in a specific environment—are brought into contact (see *FHB* #62, pp. 64-67). For this reason, it's best to keep all metal components in a roof/sidewall system the same, or at least as close as possible to each other within the galvanic series. That includes all metal roofing, roof and sidewall flashings, nails, gutters and downspouts.

Do you need a brake?—For bending flashings, a portable brake is hard to beat (photo right). It's one of the most timesaving tools I know of. My 8-ft. aluminum J-Brake (Van Mark Products Corp., 24145 Industrial Park Drive, Farmington Hills, Mich. 48335; 810-478-1200) has served me for a decade with no more attention than the occasional dab of grease. (Van Mark no longer carries the J-Brake, but the company sells similar brakes with different names.)

Operating a brake is simplicity itself: stick in the sheet of metal, throw the clamp bar, and lift the brake bar. Voila! A precise bend. If you need to make a custom flashing but don't have your own brake, call sheet-metal suppliers. Some places keep an old shop brake in a corner of the warehouse for their customers' use.

A site-built brake, made with three equal lengths of 2x6, is an inexpensive alternative (drawing right) and will produce crisp bends. You can also improvise with a 2x4 straightedge and mallet. Use light blows, going back and forth along the length of the bend several times until the desired angle is reached.

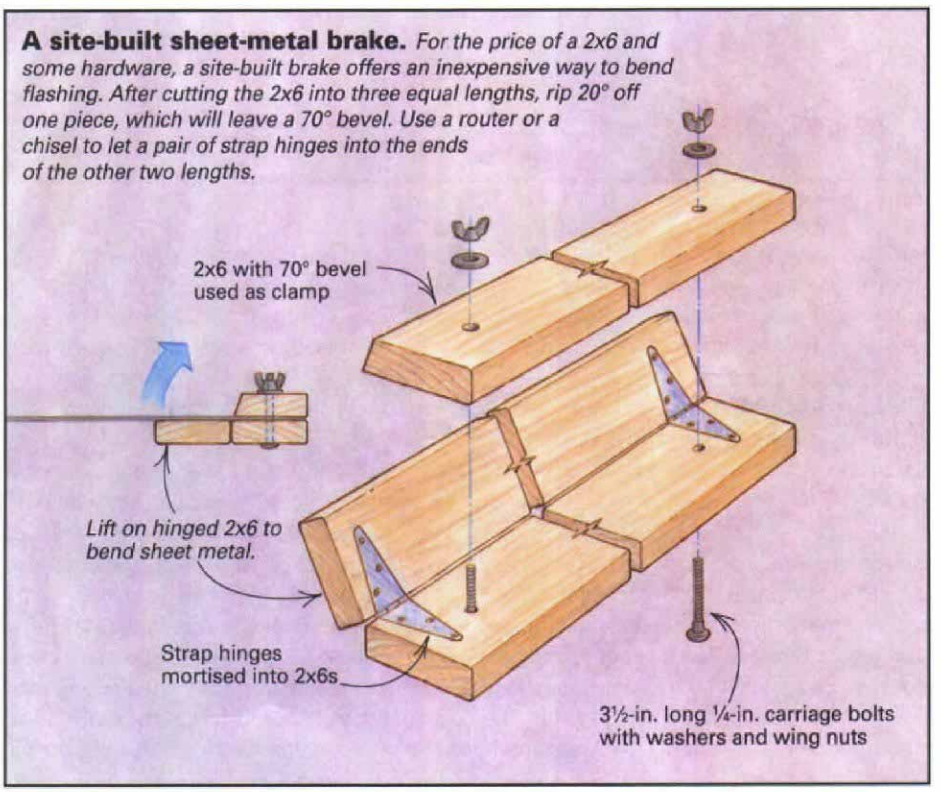
To make small bends and to turn up tabs, I use hand seamers. This tool is a pair of pliers with wide, flat jaws. While I generally use the straight-handled type (Malco Products Inc., 14080 State Highway 55 NW, Annandale, Minn. 55302-0400; 612-274-8246), I also have a bent-handle version, another compound-leverage style that is handy in certain tight spots. I use several pairs of spring-locking seamers for clamping assemblies during soldering. Deep-throat locking pliers with C-shaped jaws are also good for this process.

Cutting metal doesn't require a big investment in tools, either. I do most of my straight cutting with plain tin snips, which are easy to sharpen. For curve cutting, I use aviation snips. Originally developed for the aircraft industry, aviators are maneuverable, and compound action gives them plenty of crunch. Aviation snips are available in right-hand curve, left-hand curve and straight (traditionally color-coded red, green and yellow, respectively). Mostly, I use the right-hand curve.

Aluminum flashing is generally cut with a utility knife, a process known as slitting. After it is scored, the aluminum is folded back and forth until it breaks. With a sharp knife, only one or two wags of the metal are necessary to snap the pieces apart.

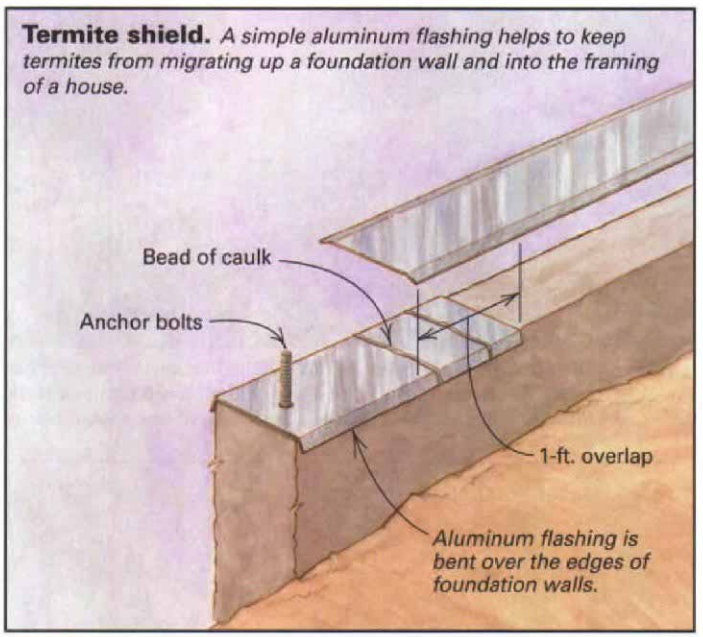
For soldering copper flashing, I use a soldering iron heated continuously by a small acetylene flame. The hose and tank are a nuisance, but I don't worry about the iron cooling off. The more

A sheet-metal brake speeds up flashing work. After he checks the measurement at either end of the metal strip, the worker lowers the clamp-bar lever held in his right hand and bends the flashing to the proper angle. An alternative to this portable brake is the site-built one shown below.

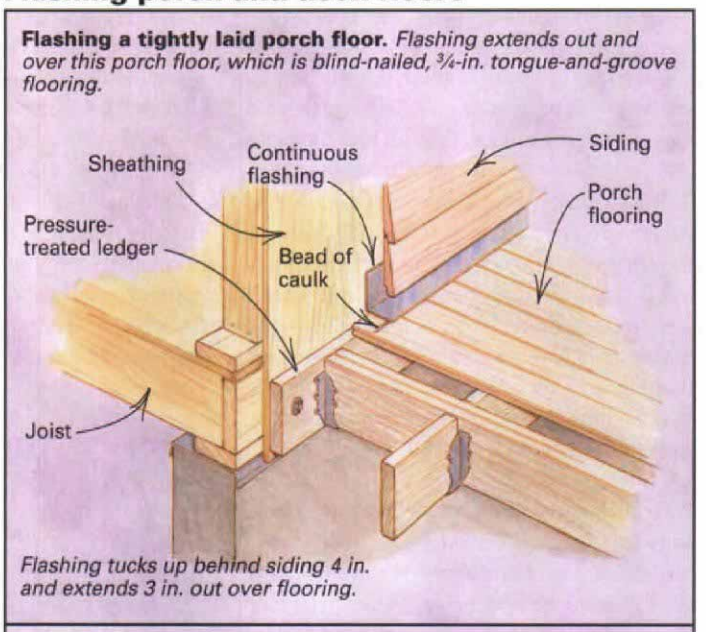


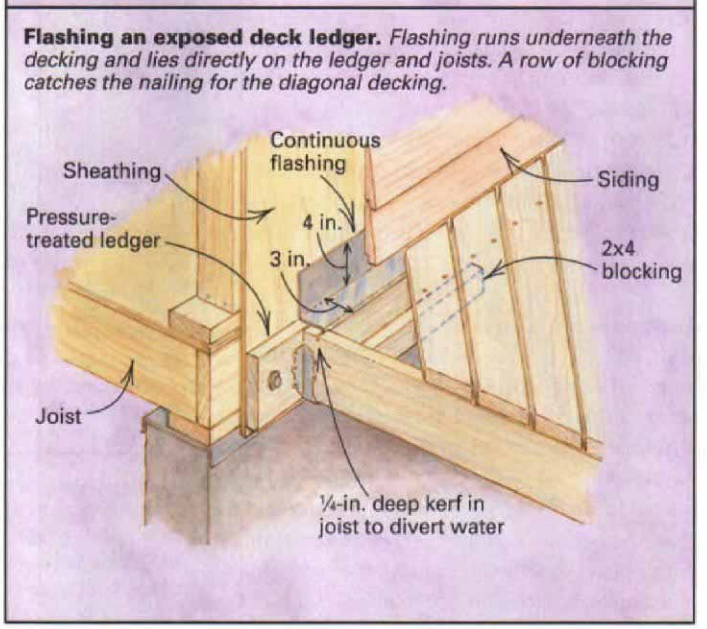
Drawings: Dan Thornton

Everything converges at the water table. Flashing keeps water from sneaking in behind the water table; it tucks under the housewrap and the asphalt-felt door splines.



Flashing porch and deck floors





traditional apparatus for soldering is two or more irons heated in a brazier. While one iron is in use, the other is heating in the flames. Braziers can be fueled with charcoal or propane.

Flashing keeps the termites out of the building—Where required by code, the first flashing to go in a typical house is the termite shield (drawing above left). It prevents termites that travel through masonry foundations from getting into wood framing. For termite shield, I use thin aluminum-roll flashing that's 2 in. wider than the foundation wall. I simply roll out the flashing on top of the foundation, beating it down over the anchor bolts as I go, using a mallet or my hammer and a scrap of wood. The wood protects the anchor-bolt threads and is kinder to the aluminum than my framing hammer would be. At corners and splices, I give the aluminum 1 ft. of overlap and caulk between the layers. Then I go back and beat the overhanging metal down over the sides of the foundation. It looks rough, but it eventually gets covered by the sheathing and siding.

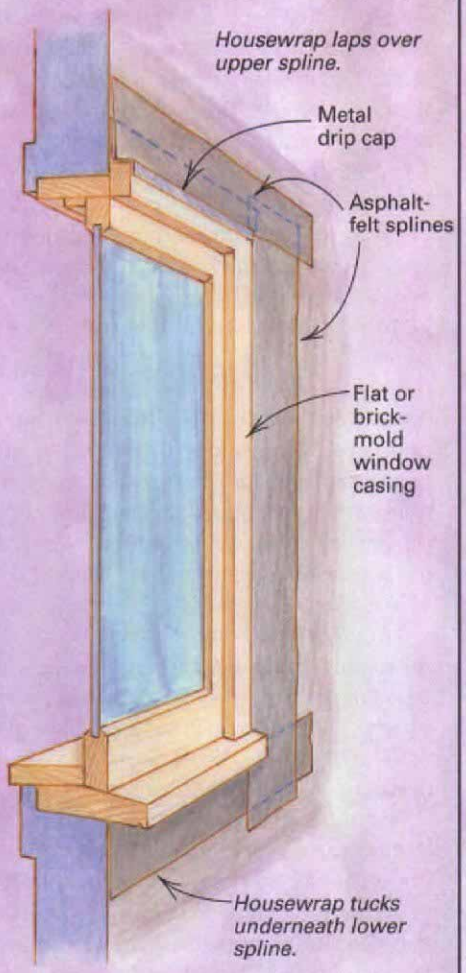
Flashing a water table—Some houses, especially older ones, have wide skirtboards between the foundation and the siding. The skirtboard is capped by a sort of sloped sill known as a water table. I flash over the water table with a simple dogleg flashing before starting the siding (photo above). Prefabricated drip cap from the lumberyard may work, or the dimensions may require that I custom-bend flashing on my brake.

To make such a flashing, I first cut off 8-ft. lengths of copper or aluminum roll (the maximum capacity of my brake). I then cut the 8-ft. lengths into strips about 3 in. wide so that the finished flashing can follow the water table profile and extend up the wall at least 1½ in. At both ends of each strip, I punch prick marks with an awl to indicate the fold lines. Prick marks are precise, and they can be read from either side of the sheet of metal, an advantage when bending metal because a piece often needs to be flipped upside down in the brake to fold the right way. For simple flashings, the layout step can be avoided by simply measuring the distance that the metal protrudes beyond the brake.

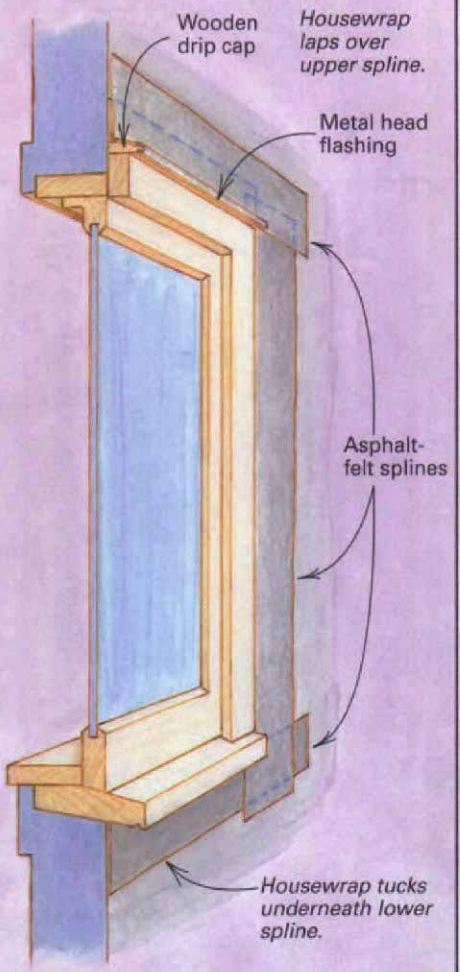
After marking out, I fold each piece in the brake, eyeballing the degree of bend to approximate the angle between the wall and the sloped water table. It's better to underbend than to

Weatherproofing windows and doors with splines and flashing

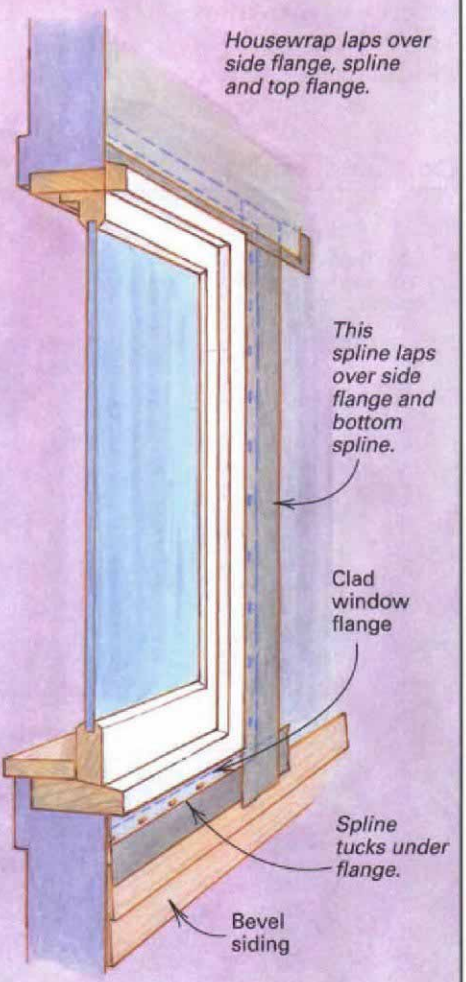
Wood-cased window should have a metal drip cap. *Prefabricated or custom-bent metal flashing laps over the window casing and extends up the wall. Splines and housewrap then overlap this drip cap.*



Windows with wooden drip caps also need metal flashing. *The L-flashing laps onto the wooden drip cap and extends up the wall. An asphalt spline laps over this flashing and is overlapped by housewrap.*

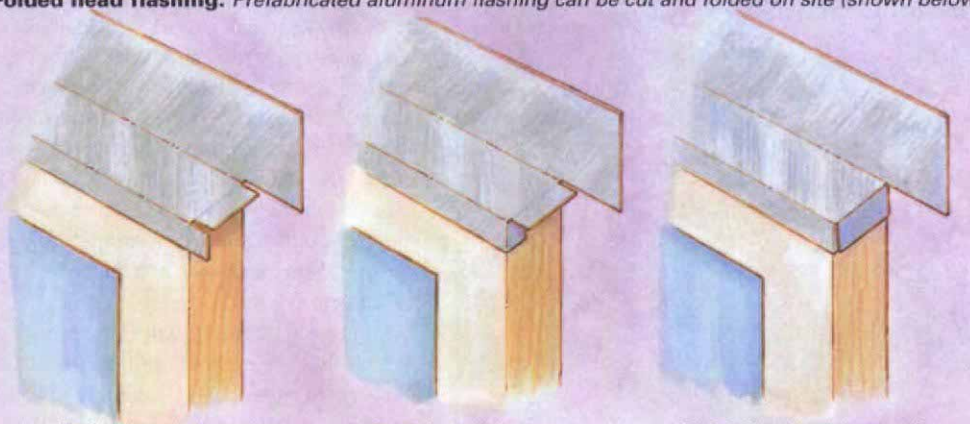


Clad windows don't need metal head flashing. *The window's integral nailing flange acts like a flashing. The top flange should be overlapped by an asphalt spline; housewrap laps over top spline and flange.*



Metal head flashing for windows and doors

Folded head flashing. *Prefabricated aluminum flashing can be cut and folded on site (shown below).*

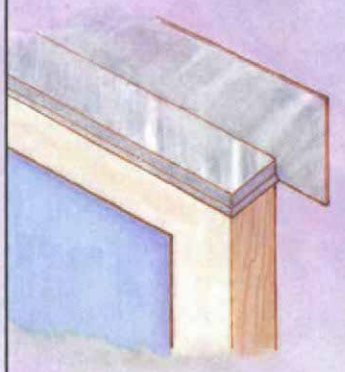


1. Trim flashing longer than head casing, notch back to casing, and fold in flashing.

2. Fold front tab back against side of casing.

3. Fold horizontal part of flashing down over side of casing.

Soldered head flashing



The best head flashing is soldered at the end so that the end profile matches the side profile. Upper section of flashing extends past head casing.

overbend; that way, the siding will spring the flashing down tight. I generally overlap flashing sections about 6 in.

Porch and deck ledgers can be traps for water—Where a porch or a deck connects to a house, flashing is used to keep water from running down between the ledger board and the house's band joist. In the case of a tightly laid porch floor, I run a simple L-flashing up under the siding about 4 in. and out over the floor about 3 in. (drawing top right, p. 60). Because such floors are pitched outward, water runs away from the flashing. To prevent capillary action from sucking moisture back up between the floor and the flashing, I run a bead of caulk between the two. The caulk also helps to hold the flashing tight to the floor.

For exposed decks I also use an L-flashing, but the lower flange runs between the decking and the joist, not on top (drawing bottom right, p. 60). I lay the deck boards diagonally with their ends cantilevering past a row of blocking set in about 4 in. from the ledger. The decking covers the flashing and is nailed only into the blocking because nailing directly through the flashing into the ledger board would defeat the flashing's purpose. The diagonal decking also adds enormously to the stiffness of the structure.

To prevent water from running back between the joist and the flashing, I make a ¼-in. deep chainsaw kerf in the top of each joist before the flashing goes on. This kerf catches the seepage and diverts it down over the side of the joist. If kerfing the joist makes you nervous, you can caulk instead.

Asphalt-felt splines keep the water out of door and window openings—It's common practice today to install windows directly over housewrap, with no felt flashing around the sides or bottom. The problem is that if the caulking between the siding and the window fails, water seeps in.

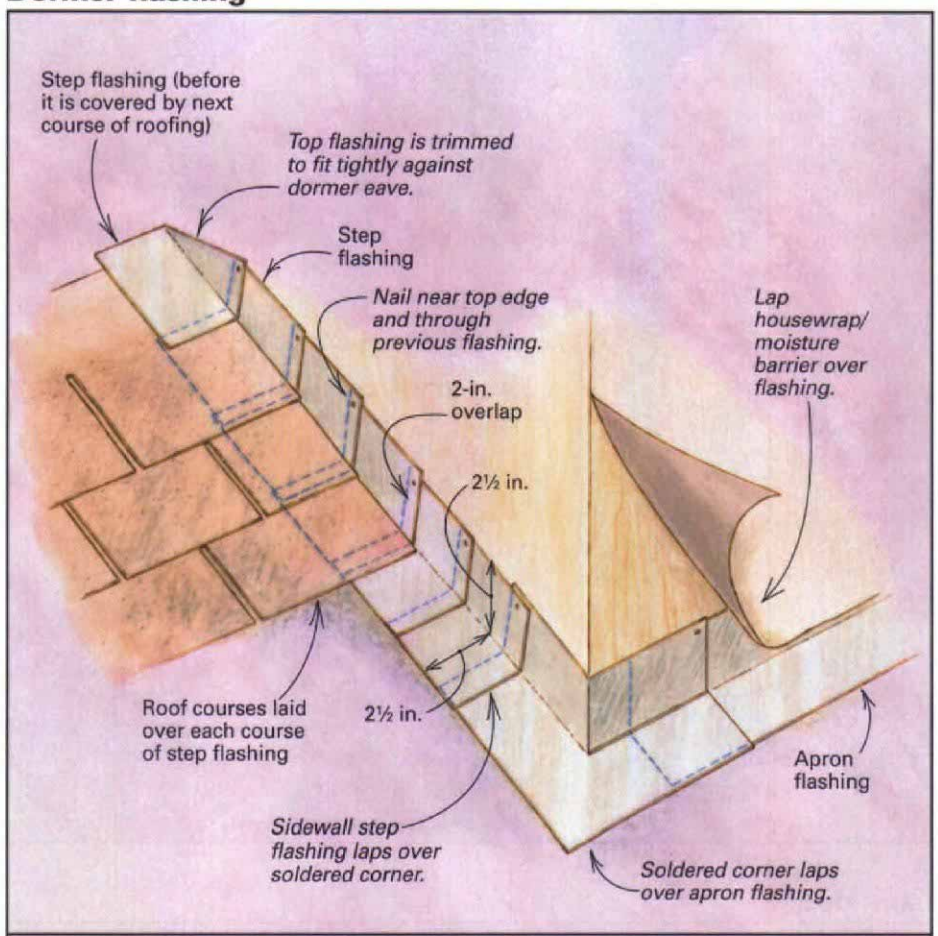
The old-fashioned way of flashing around windows with felt splines is still best. It's done while installing the windows, before the housewrap goes on. The 6-in. wide splines are cut from rolls of 30-lb. felt and installed as shown in the drawings on p. 61.

Next, the metal head flashing goes on. This flashing can be installed directly over the window's exterior head casing (top drawing left, p. 61), or a wooden drip cap can be mounted between the flashing and the casing (top drawing center, p. 61). The ends of the head flashing should be turned down over the end grain of the wooden drip cap to make a neat finish (bottom drawing, p. 61). With windows that are flanged, the head flashing is not necessary (top drawing right, p. 61).

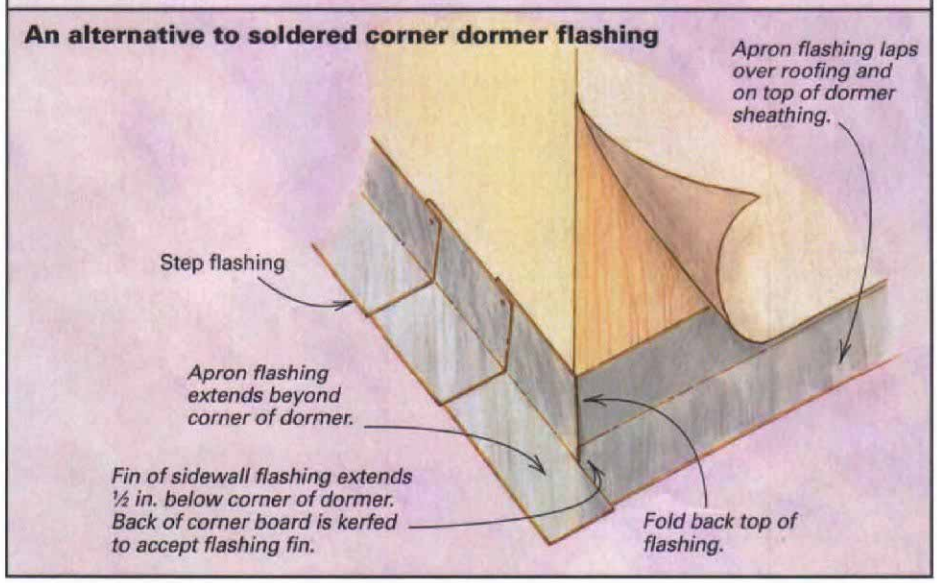
After the head flashing is installed, the housewrap goes on. It runs under the bottom spline and over the head flashing. The housewrap can go over or under the side splines, as long as there is a good overlap. When siding reaches up as far as the bottom spline, the spline laps over the top edge of the last siding course before the next course goes on. That feeds any seepage quickly to the outside rather than let it creep behind the siding.

Doors are flashed the same way as windows except that the bottom spline should be replaced with metal that folds in a few inches over the subfloor. Because door bottoms sit closer to the moist ground, they require the superior protection of metal. A pan with edges that turn up around the door sill and down over the housewrap provides maximum protection from water

Dormer flashing



An alternative to soldered corner dormer flashing



infiltration. Such pans can be soldered, but prefabricated plastic pans are also available for purchase (Jamsill, P. O. Box 485, Talent, Ore. 97540; 800-526-7455).

Round-top windows can be tricky—Most round tops today come clad in vinyl or aluminum, thus eliminating the need for a separate head flashing. That doesn't make them foolproof, however. As rain strikes a regular square-top window, most of the water will immediately run off the head flashing and down over the window. In the case of a round top, however, the water would rather travel laterally down along the more steeply pitched arc of the window, directing a concentrated flow to the outside corners of the round top. This flow should be shunted to the exterior if possible.

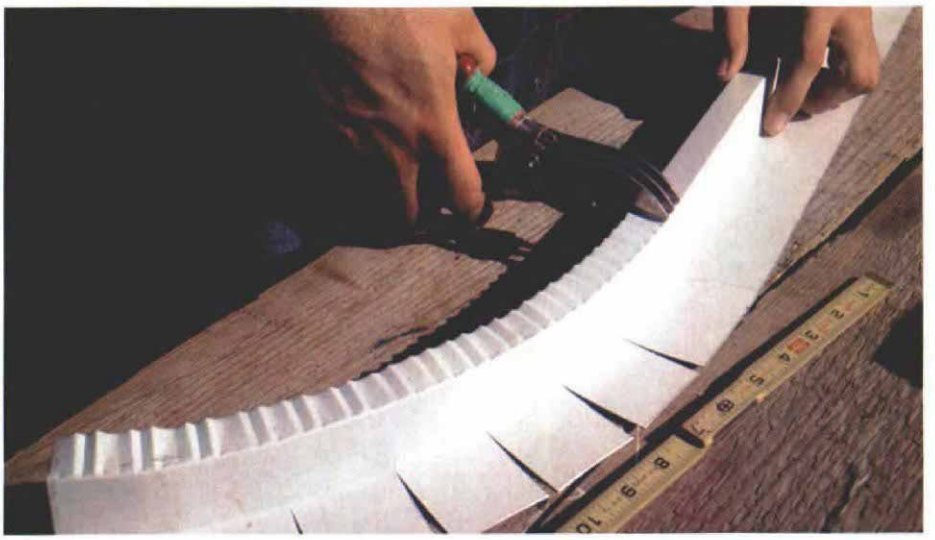
The best solution would be to let the window's lower horizontal nailing flange lap over the siding. Because this design would look bad, the next best thing is to make sure that a hidden piece of felt or sheet metal tucks under the nailing flange and laps over the top edge of the first available piece of siding under the window. In the case of stucco or vertical siding, there's really no clean, fail-safe way to flash to the outside; a good bead of caulk between the wall and the head flashing then becomes the main line of defense against water infiltration.

When installing round-top and square-top windows that are mulled together (or combined) to make a Palladian-style window, make sure that the head flashings have been properly sealed at the point where the arc meets the level head casing. That means caulking for aluminum-clad windows, or a solvent weld for vinyl clads. Leaks here are common.

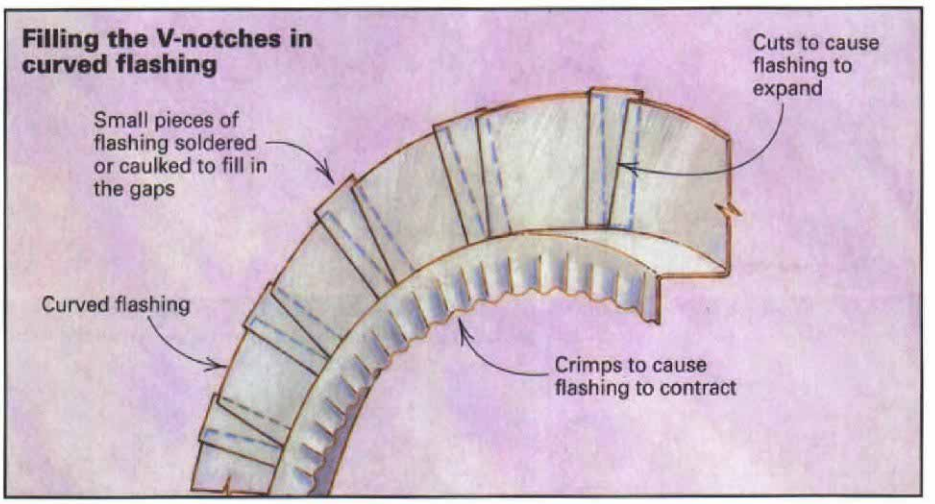
In renovation work it is sometimes necessary to custom-flash an existing round-top window. To make custom flashings for round-top windows, I first bend an ordinary, straight Z-flashing on my brake. I then snip the flange that will eventually turn up under the siding, cutting at regular intervals depending on the tightness of the radius. The flange that will turn down over the window gets crimped with a hand crimper. These steps effectively stretch the upturned flange and contract the downturned flange, causing it to bend (photo above).

During bending, the cuts in the upturned flange open to become V-notches. To fill the notches, I cut small squares of flashing and slip one into each notch, sort of like slipping cards into a poker hand. If I'm using copper, I can solder the "cards" in place. For aluminum it's the caulk gun (drawing above).

The crimped, downturned flange has a piecrust texture, which is generally unnoticeable when the window sits high in a gable. In cases where the crimping looks objectionable, the crenellations can be leveled off with solder or auto-body filler.



Compensate for the curves. Crimps in the bottom flange and cuts in the top flange allow the flashing to follow the bend of the arch-top window casing. Small squares of flashing are either caulked or soldered to fill the V-shaped spaces left by the cuts.



Step flashing keeps water running down and out—Where a sloped roof meets a sidewall, step flashing is used. Step flashings are small, rectangular pieces that are bent down the middle into right angles. Each course of roof shingles gets one step flashing (top drawing, facing page). In effect, the step flashing is just a flexible metal shingle that turns up under the siding.

A typical step flashing measures 5 in. by 7 in. The 5-in. dimension gets folded in half so that 2½ in. turns up under the siding, and the other 2½ in. extends under the adjoining shingle. The 7-in. dimension runs downhill, stopping just above the butt edge of a roof shingle. Because the standard exposure for asphalt shingles is 5 in., 7-in. step flashings will have a 2-in. overlap. One nail is driven through both step flashings where they overlap on the sidewall. Siding then comes down over the upturned sides of the step flashing. I hold the siding ½ in. above the roof to keep the edges of the siding dry.

Flashing a dormer isn't difficult—To flash a dormer, I first shingle as far as the front of the dormer. Then I apply the apron flashing (bottom drawing, facing page). This piece laps about 4 in. over the roofing and up about 4 in. onto the front of the dormer. When I'm working with copper, I can solder a separate piece to the apron for a positive wraparound seal at the corner. When I'm working with aluminum, I let the lowest piece of step flashing extend beyond the corner by ½ in. or so, as a sort of fin. Later, I kerf the back to accommodate the fin. After I install the apron, the sidewalls of the dormer are step-flashed. The top step flashing gets angle-trimmed to fit tightly under the dormer roof overhang. □

Contributing editor Scott McBride builds custom millwork in Sperryville, Virginia. Photos by the author, except where noted.