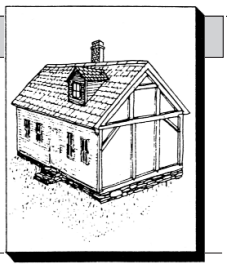


Standing-Seam Roofs

by Walter Jowers

A generation ago, sheet-metal workers built a lot of cornices, skylights and roofs—usually standing-seam roofs. While few new roofs of this type have been installed on houses since about 1940, a growing number of old-house owners today are opting to replace their original standing-seam roofs.

Most roofing contractors won't go near the job unless they can tear off the metal and install asphalt shingles or roll roofing—or worse yet, coat the metal with a horrid black ooze that will not stop leaks. But anyone with time, gumption and good native skills can install a standing-seam roof using pre-formed panels and the proper tools.

Materials

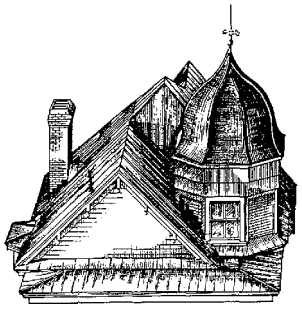
Most of the older standing-seam roofs in this country are made of terne metal, though more than a few are galvanized iron or steel. Some are copper, and, in rare instances, black iron or black steel. There even are a few zinc roofs around.

Terne is a copper-bearing steel that is coated on both sides with terne alloy, which is 80 percent lead and 20 percent tin. It has been used as a roofing material in this country since the 1700s.

The bad news about terne: "You have to paint it—and keep it painted—or it will rust. The good news: You get to paint it any color you like, and the roof should outlast the rest of the house if it is kept painted.

Material cost is about $75 per square, which is not much more than good asphalt/fiberglass shingles. Terne is available through distributors of the Follansbee Steel Corp. in Follansbee, W. Va.

Terne-coated stainless (TCS) is stainless steel coated on both sides with terne alloy. The good news: You don't have to paint TCS to prevent it from rusting. The bad news: It's silver, so you'll want to paint it.

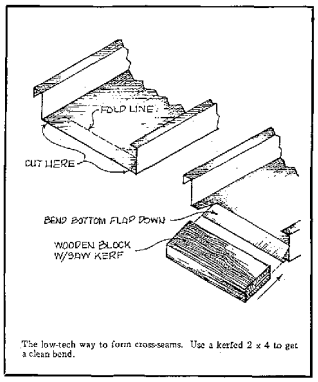


TCS costs about $150 per square; it also is available through Follansbee Steel distributors.

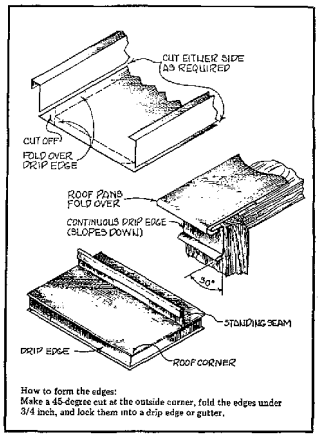
Copper and lead-coated copper roofing can be bought in sheets or rolls. You don't have to paint copper, but it turns green if you don't. (Many people like this green patina, and it is designed into many buildings.)

Copper is seldom used on a large pitched roof because it is (and always has been) relatively expensive. It costs $200 to $250 per square and can be purchased at most sheet-metal supply houses.

Aluminum and galvanized steel are popular with contractors and home owners alike. While some argument could be made for the use of these metals as low-cost flashings or gutters, it is not cost-effective to use less durable metals on such a labor-intensive job as the application of a standing-seam roof.



The low-tech way to form cross-seams. Use a kerfed 2 x 4 to get a clean bend.



How to form the edges: Make a 45-degree cut at the outside corner, fold the edges under 3/4 inch, and lock them into a drip edge or gutter.

illustrations by Larry Jones

Sizing It Up

If the roof you're working on is a simple shed or gable roof (and most standing-seam roofs are), the installation should not be too difficult. A hip roof is slightly harder to execute. A new standing-seam roof full of hips, valleys, cross-gables and ells is a job for a real pro.

Pre-formed terne and TCS pans are available through Fbllansbee Steel distributors and cost about $10 a square more than the unbent metal rolls. (This is a bargain. A sheet-metal shop would be unlikely to bend the pans for anything near this price.)

If you use copper, buy the metal and have it formed locally.

Measure the roof and figure for a standing seam at the centerline. Make a sketch showing the layout of the pans on the roof, and calculate the number of pans you'll need.

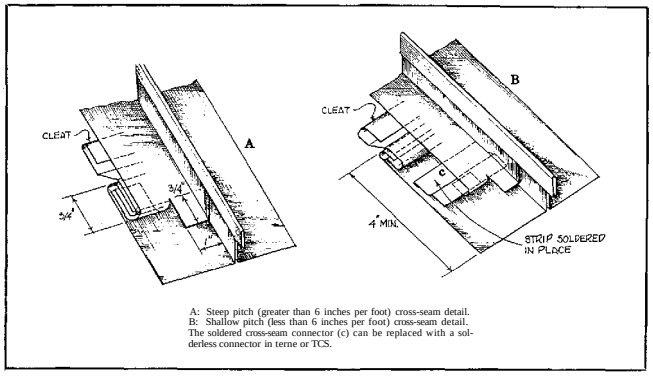
If your sketch shows that the pans running along the gables (or at the corners, in the case of a hip roof) will be less than half a pan wide, shift the seams to allow one set of the edge pans to be full-width.

Allow 1½ inches for cross-seams; that is, consider an eight-foot pan to be 94½ inches long. For a shallow-pitch roof (less than six inches per foot slope), consider an eight-foot pan to be 86½ inches long; the cross-seams are deeper on this type of roof to allow for the installation of a cross-seam connector strip.

Pre-formed pans come in 20- and 24-inch widths. As a general rule, use the 24-inch-wide pan. Most of the work is in forming the seams, and wider pans mean fewer seams. You wouldn't want to use pans wider than 24 inches because they buckle—or "oil-can"—as they expand and contract.

You might want to use pans narrower than 24 inches when the standing seams are used as a visual effect to echo existing architectural features, or on a small roof (for proportion).

Standard lengths for pre-formed pans are eight, 10 and 12 feet. It's hard to handle a pan longer than eight feet without wrinkling the metal, so in most cases, you should use the eight-foot pans. (One exception is when a slightly longer pan would cover the whole roof, as on a small porch.)



A: Steep pitch (greater than 6 inches per foot) cross-seam detail.
B: Shallow pitch (less than 6 inches per foot) cross-seam detail.
The soldered cross-seam connector (c) can be replaced with a solderless connector in terne or TCS.

For a roof comprised of pre-formed pans that are 24 inches wide, allow 21 inches between seams; in other words, consider a 24-inch pan to be 21 inches wide. For 20-inch-wide pans, allow 17 inches between seams.

Figure the gable-end pans this way: When using pre-formed pans, you must cut off the upstand on the gable side and allow ¾" to fold over a drip edge. So consider the pans that will run along the gables to be 20¼ inches wide (for 24-inch pans), or 16¼ inches (for 20-inch pans).

Some Things You'll Need

You'll need a few specialized tools (see box) that you can either rent or buy at a sheet-metal supply house.

Some other things you'll need include:

- Enough drip edge and/or gutter to run around the roof perimeter. (Gutters for the eaves, drip edge for the gable ends.)
- Enough 2x4 metal cleats to be spaced at 12-inch centers around every roof pan.
- Flashing, for chimneys or where the metal roof meets a wall.
- Optional: Valley flashing (necessary, of course, if your roof has valleys) and a ridge cap (more on this later).

All of these components should be made of the same material as the roof pans. Pre-formed drip edges, cleats, flashing and ridge caps are available in terne or TCS. If you're using copper, you'll have to have these items made locally.

Don't forget to allow for waste when you order materials; order 15 percent extra of everything, and a greater percentage for a small roof.

If you use terne, specify IX-40# terne. This indicates 28-gauge metal with a 40-pound terne coating. If you're using TCS, specify 28-gauge TCS. For copper or lead-coated copper, specify 16-ounce material.

Final Preparations

A metal roof must be applied over a wood deck. Do *not* use treated wood for the deck. If the roof is covered with roll roofing, built-up roofing, shingles or other roofing material, you must remove this covering before installing the metal roof.

The decking must be clean, smooth and dry. Lay rosin-sized paper over the deck—just lay it, don't nail it. This paper serves as a slip sheet between the metal and the deck.

Don't use roofing felt (tar paper) under a metal roof. The asphalt in the felt can cause the metal roof to corrode.

Load, transport and work the metal carefully. Coated metals derive much of their durability from the coating, so nicks in the coating allow moisture and/or corrosive pollutants to reach the underlying metal. Dimples in the metal act as little pools to collect moisture and corrosive agents.

Don't let workers or delivery people mishandle the roof. And most important, when you are on the roof, wear sneakers, crawl as often as possible, don't step on the seams, and don't store other materials on the roof.

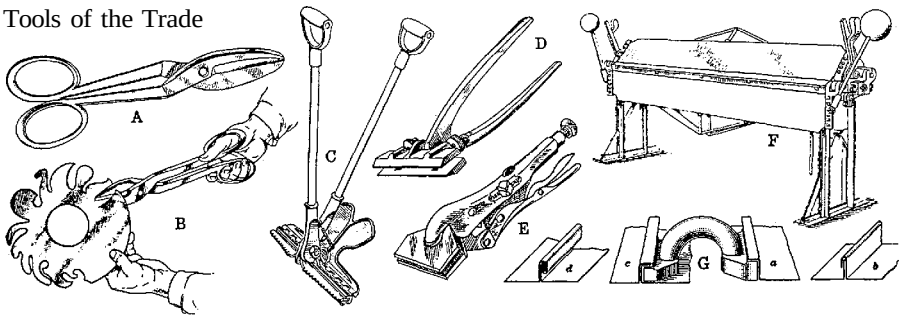
If you are using terne, it must be painted before it is installed on the roof. Paint the undersides of the pans with one coat of a good metal primer suitable for ferrous metal. The exposed side of the metal also must be primed, so it's good to give the pans one coat of primer, top and bottom, before installation. Terne cleats, drip edges and flashings also must be painted on both sides before they are installed.

The paint *must* be applied with a brush. Do not spray or roll. You can use any compatible top coat (from the same manufacturer as the primer) on the exposed side of the metal. With TCS or copper, painting is optional. (Remember, unpainted TCS is silver-grey.)

If you're using pre-formed pans, you'll have to cut some half-length pans. Use your straight or combination snips. You'll need one half-length pan for every row of pans on the roof. This allows for the cross-seams to be staggered as required for proper strength. If a local shop is forming your pans, simply order the correct quantity of half-pans. You'll probably need some pans of various lengths to fill out odd sections of the roof; you'll have to form these on-site.

If you don't have access to a sheet-metal brake, you'll have to bend the cross-seams on-site. On all of the pans except those that will be installed at the roof peak and along the gable ends, make two ¾-inch cuts into each end of the pan, one inch in from the standing-seam upstands. Cut a

Tools of the Trade



A Straight Snips — For cutting straight or slightly curved lines in sheet metal 24 gauge or lighter. They come in right-handed and left-handed versions.

B Combination Snips — Similar to straight snips, but they make highly irregular or scroll cuts.

C Roofing Double-Seamer — This hand-and-foot-operated tool closes the standing seams of pre-formed pans. It can be rented from Follansbee Steel.

D Handy Tongs — For bending the edges of light sheet metal. Good for forming drip-edge seams.

E Vise-Grip Crimpers — More commonly available than handy tongs, they do the same job and stay clamped where you put them.

F Sheet-Metal Brake — This is a stationary shop tool used to form sheet metal into roof panels (and cornices, gutters, etc.).

G Hand Roofing Double-Seamer — An ingenious antique tool that forms double-lock standing seams. Some very old roofs were formed with just this tool and a mallet.

2x4 board to the length of the flap created by these cuts, and saw a cut ¾" deep into the length of the 2x4. This board is your low-tech sheet-metal brake

Insert the flap of metal into the saw cut, bend the bottom flap down 90 degrees, then bend the top flap up 90 degrees. Then place these flaps against the 2x4 and bend them loosely over, roughly parallel to the pan. The pans that will reach the roof ridge will have this seam only on the bottom. Leave the tops of these pans uncut for now.

Using a kerfed board, bend the seams that mate with the drip edges. With pre-formed pans, you first must cut off the upstand on the gable side of the pan.

Installation

Install the drip edges (or gutter) according to the manufacturer's directions. (You can buy these pre-formed in terne or TCS or have them formed locally.)

To install the pans, start at the bottom left edge of the roof and hook the first pan into the drip edges. Using a mallet and a block of hardwood, flatten the seams at the drip edges. Then, using Vise-Grip crimpers or roofing tongs, crimp the pan/drip-edge seam tightly together.

Install hold-down cleats at 12-inch spacing up the right side of the pan and across the top edge of the pan. Fasten the cleats to the deck with two one-inch roofing nails.

For terne and TCS, use cleats of the same material as the roof, fastened with galvanized nails For copper, use copper cleats and copper nails. Fold the tail of the cleats over the nail heads.

Install the second pan above the first pan by hooking it into the top of the first pan and into the drip edge. Close the seam at the drip edge as before. Flatten the cross-seam between the two pans with your mallet and wood block.

Be careful to keep the seams straight. Installing, a standing-seam roof is a lot like hanging wallpaper; small errors at the beginning of the run create impossible problems at the end.

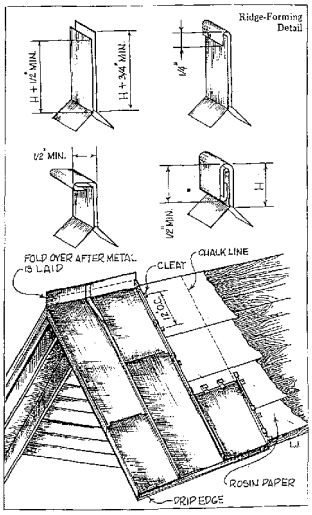
Anchor the second pan with cleats, then install the remainder of the first row of pans all the way to the ridge of the roof.

To install the first pan of the second row, hook the triple bend over the double bend and slide the pan up until it hooks on the drip edge. Crimp the seam at the drip edge, and install cleats along the right edge and top edge of the pan.

Now you are ready to close the first standing seam. Here are two ways to do this:

Method 1: Use roofing tongs or Vise-Grip crimpers to close the seam. First, crimp the small flange tight with the top of the horizontal flange on the adjacent sheet. Then use your mallet and wood block to bend this seam down enough for the Vise-Grip crimpers to close the seam. This is the cheap but labor-intensive way to do it.

Method 2: Rent a pair of seamers from Follansbee Steel. You have to pay a



healthy deposit, but you get your deposit back when you return the tools intact, less $50 a week for the use of the seamers. This method costs a little more, but it's a lot quicker.

Install the rest of the pans in the manner described above. Remember to stagger the cross-seams and keep the pans properly aligned (a chalk line is recommended).

Finishing Touches

Here are two ways to finish the ridge of a gable roof:

Method 1: Ratten the standing seams three inches from the ridge, loosely fold back the ends of the pans 180 degrees, and install a ridge cap. This is the modern way to do it. Ridge caps for this type of installation are available pre- formed in terne or TCS.

Method 2: Ratten the standing seams three inches from the ridge and form one more standing seam along the ridge line. You might have to do this with your mallet and wood block, as neither light tongs nor the Follansbee seamers will easily bend this many thicknesses of metal. This is the traditional method.

There are roofing tongs large enough to form these seams, but they're very expensive and nearly impossible to rent. (This ridge finish also applies to a hip roof. The only difference is that the ridges of the hip roof are mitred together.)

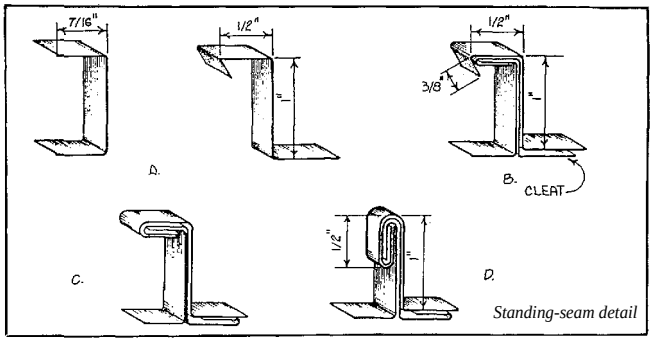
If the roof abuts a vertical wall, flatten the standing seam just before the wall, bend the pans up the wall, then counterflash over them, using the same material as the roof for the flashing.

To flash a chimney, treat the roof pans as if they were base flashing. Use your mallet and wood block to bend the pans to conform to the vertical surfaces of the chimney, then install the counterflashmg.

Never use any black glop (asphaltic roofing compound) or caulk to seal joints on a metal roof. Asphalt attacks metal roofing, and no caulk lasts long enough for this application.

Installing a standing-seam roof is a lost art, and there aren't many things more satisfying than relearning a lost art. And few things will ensure the endurance of an old house more than a handcrafted metal roof. ■

Walter Jowers is a former writer for The Old-House Journal.



Standing-seam detail

Postscript

Paint for Terne: If painting an entire terne-metal roof doesn't sound like fun, just try to find the right paint at your local paint store, writes Larry Jones in a recent issue of *The Old-House Journal.*

The paint needs to contain red iron oxide and linseed oil. The right stuff for the job is Tin-O-Lin National Tinners Paint, manufactured by Calbar, Inc., 2626 N. Martha St., Philadelphia, Pa. 19125; phone 215/739-9141.

Ask for some guidelines on how to apply it correctly—which is crucial to prevent rusting—and don't be surprised when you're told it takes 72 hours to dry and requires at least a seven-day wait between coats.

Sheet-Metal Manual: If you're really serious about sheet-metal work, whether on roofs or other building components, you won't want to be without the *Architectural Sheet Metal Manual* published by the Sheet Metal and Air Conditioning Contractors National Association (SMACNA).

If you don't want to pay the price (about $50, but architects and engineers get a hefty discount), check to see whether your local library or state historic preservation office has a copy. Otherwise, contact the SMACNA at P. O. Box 70, Merrifield, Va. 22116 (phone 703/790-9890), and make a good investment. ■