

**C**himneys are built like heavy little houses. They have walls and a roof so that they stay dry inside. The roof, or cap, is usually a low-slope mortar bed suspended between the flues and the exterior walls. Often, these caps are built poorly and deteriorate rapidly. When the caps break and leak, water flows into the masonry walls, staining the exterior with salts from the mortar. Combustion residue that washes off the flue tiles can flow inside the house to produce stains and odors. In cold climates, soaked bricks freeze, split and spall. The whole chimney can really take a beating.

Homeowners rarely see their chimney caps, and few people have ever called me to repair them. But when I'm asked to inspect a roof or an attic, I generally find myself looking down at the top of the chimney. Obviously, leaks here should be stopped before new roofing or insulation is installed.

**Protect the roof during the job**—Repairing the cap can be messy work. Unless it is about to be replaced, the roof should be protected from foot traffic, tools and wet cement. Working on roof-mounted tarps or drop cloths is not recommended. On lower slopes, I sometimes

stand on cleated sheets of plywood or oriented strand board (OSB) that is supported by roof jacks. When the roof is too steep to stand on, you can work tarps around roof brackets and planks to provide coverage without compromising safety.

By the time I get an order to replace a chimney cap, it is usually so thoroughly destroyed that demolition is a minor concern. A few taps from a 20-oz. hammer are all it takes to clean it off. And because little material was used to make these old caps, the remains fit nicely in an old drywall bucket. After the loose, broken and missing bricks are fixed and dusted off, I can begin the formwork.

**A simple form, wire mesh and rebar make a better pour**—To build the cap, I want to contain the perimeter, support the bottom and isolate the flue tiles against thermal expansion. First, I ring the chimney with a frame of 2x lumber (photo right). This gives the drip edge a healthy overhang. Strips of OSB give the form a minimum depth of 1 in. I nail the strips to the frame with 6d nails 12 in. o. c. to keep the 2xs from splitting. This form is light but strong enough to contain the little pour. A few small

## THE PREP



**Simple wooden form creates a stronger cap.** The author nails a frame of 2x lumber together for the basic form. Strips of OSB nailed to the sides give the form a depth of 1 in.

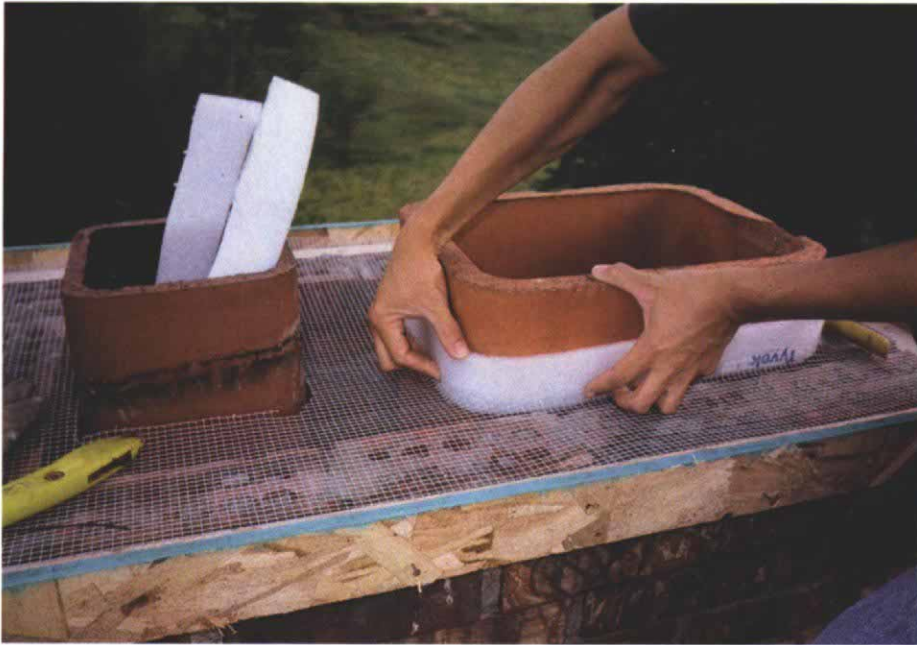
# Replacing a Chimney Cap

"Homeowners rarely see their chimney caps, and few people have ever called me to repair them. But when I'm asked to inspect a roof or an attic, I generally find myself looking down at the top of the chimney."

by Fred Lugano







**A foam collar reduces the risk of cracking and subsequent leaks.** The author wraps a strip of closed-cell foam around the flue tile to isolate it from the mortar. When the flue does expand, the mortar will not crack. The galvanized-steel mesh reinforces the mortar during and after the pour,



**Rebar strengthens the weak spots.** Wiring the first of two pieces of  $\frac{1}{2}$ -in. rebar into the space between the flue tiles reinforces the weakest spot in the cap.

**Without expansion joints, most caps will eventually crack**





wedges between the frame and the brick level the form at the right height to the chimney.

A mat of galvanized-steel mesh (sometimes called hardware cloth), available at any hardware store, supports the cap before and after it hardens (photo left, p. 77). The ¼-in. mesh is tight enough to keep fresh mortar from pouring through but open enough to incorporate into the slab for reinforcement. The wire cuts easily with snips. I fit the mat closely to the flues but hold it back from the sides of the form. I don't want mesh to protrude from the concrete when I strip off the form.

### Closed-cell foam protects the flue from thermal expansion

—One critical and commonly overlooked problem with chimney caps is thermal expansion in the flue tiles. The tiles have a greater rate of expansion than the surrounding mortar, although the movement is just a few thousandths of an inch, it can be destructive. If the mortar is allowed to constrain the tiles, the cap will crack during the first heating season. When the mortar is perforated, water penetration and frost expansion will finish off the cap, so I take pains to isolate the flues with a closed-cell polyethylene-foam expansion joint. A 2-in. or 3-in. strip is cut to fit each tile snugly. I tuck it into the wire mesh and secure it with tape. The cured mortar ultimately holds it in place. I wire in ½-in. rebar to support the pour further in the center and in other weak places (photo right, p. 77).

### Mixing on the roof makes for an easy pour

—The last element in building a better chimney cap is superior mortar. I want higher strength, more flexibility and minimum moisture saturation. Acrylic resin fortifiers do the job for me (sidebar above). The additive replaces some of the water used to make up the mortar. When cured, the latex fills the spaces between the aggregate. Many companies make similar

products but vary their formulas and specified applications, so I strictly follow their mixing directions. To a degree, I am working with a sand-filled rubber compound.

I like to mix the mortar on the roof (photo right). I use a premixed mortar from Sakrete (U. S. Mix Products Co., 112 S. Santa Fe Drive, Denver, CO 80223; 303-778-7227), and mix it with the latex additive to a stiff consistency; a trowelful dumped on a flat surface should hold its shape and not flatten out right away. A ½-in. right-angle drill with a stainless-steel whisk makes a great mixer. When safety and cleanliness concerns prevent roof mixing, I whip up smaller batches on the ground. The old bucket that hauled broken mortar is used as a container.

The mortar is dumped onto the form and packed into the mesh (photo left, facing page). I carefully tamp the mix into the form's corners, making sure that I don't leave air pockets; then I float the mortar to the top of the form and expansion joints. This produces a gentle slope with a 1-in. rise from the drip edge to the flues. I trowel the cap to a smooth surface as it sets (photo right, facing page).

I like to cover the fresh pour with plastic to protect it from rain erosion or from rapid drying in sun. I make a small hole to vent the flue, stretch the plastic over the tiles and staple the sides to the form. After a few

days, I take the form apart and then seal the expansion joint with a heavy bead of polyurethane caulk.

Now the chimney has a stronger, thicker reinforced cap, far more durable and resistant to water and frost. The thicker edge of the cap becomes an architectural element that bothers some people, but you can judge whether form should follow function. □

*Fred Lugano owns Lake Construction and is a weatherization contractor in Charlotte, Vermont. Photos by the author and Li Ling Young.*

## THE POUR



**Acrylic additive makes a superior mortar.** To increase the strength and the flexibility of the mortar, the author likes to add an acrylic resin fortifier to the mortar mixture.

