



Rebuilding a Brick Chimney

Temporary repairs are the common solution to a failing chimney, but often, a better choice is tearing down and rebuilding

BY BRENDAN MOSTECKI

Chimneys are a lot like toilets: You tend to take them for granted until they are leaking water on the floor. I think chimneys are at a bigger disadvantage, though, because they're high up on the roof and are therefore way down on most to-do lists when it comes to regular maintenance. As a result, chimneys are often left to the elements until they are crumbling. The good news is that most old chimneys can be deconstructed and rebuilt without much trouble.

How long should a chimney last?

I'm often asked this question, and I always say the same thing: anywhere from one year to 100 years. The answer might sound eva-

sive, but it's not a simple equation. There are several factors that determine the life span of a chimney.

- **Climate:** Does the chimney sit in the shade for most of the day, where it will likely be plagued by moss and algae? This vegetation holds water against the chimney, which can lead to premature deterioration. Is the house exposed to frequent rain, sleet, and snow or repeated swings in temperature? If water soaks into the bricks and mortar, and then freezes, the expansion leads to cracks.

- **Usage:** Is the chimney used to vent the furnace and fireplace, or just a fireplace? A constant trickle of heat from a furnace usually makes the chimney warm enough in the

winter to keep snow and ice from building up. But if the chimney lies dormant most of the year, and then is heated suddenly to a high temperature by a roaring fire on a cold Christmas morning, you are likely to start seeing problems.

- **Construction:** How the chimney was built is the most important consideration. Cored bricks need less maintenance because the mortar in the holes acts as a buffer that helps to absorb moisture that seeps into the joints. Unless sealed frequently, solid bricks are more prone to separating from mortar joints. Problems also can result from mortar that is mixed with too much sand, too much water, or not enough of either. Finally, the temperature during installation—too hot or



Don't demolish; deconstruct. The existing chimney should be taken apart the same way it was put together, piece by piece. A 3-lb. sledgehammer works best for loosening the bricks in a small chimney in poor condition. If the chimney is large or if the mortar bonds are strong, use a rotary hammer. Remove the bricks one at a time, place them into 5-gal. buckets, then carry the buckets off the roof. If the flue tiles are in good condition, remove them carefully and reuse them on the new chimney to save money. At the least, use an angle grinder to cut the flues into four flat pieces, which can be used as a base for pouring the new chimney cap.

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START ON A STABLE BASE

To hide any slight changes in color or brick layout (sidebar p. 83), I prefer to deconstruct the old chimney to below where the new lead flashing will be installed. The starting point should be a stable course of bricks.



When it's time to rebuild, mix a batch of mortar, but don't wing it on this step. Mixing mortar is all about consistency. I mix my own batches on site using sand, cement, and water, but you can also buy mortar mix that just requires water. I combine one 80-lb. bag of type-S cement, three 5-gal. buckets of fine sand, and 3½ gal. to 4 gal. of clean water. If mixing by hand, I cut the quantities in half. The mortar should look smooth and fluffy.

SAFETY NOTE

Brendan and his crew feel comfortable working on this roof using only roof jacks and planks, but OSHA guidelines call for the use of fall protection.



Leave the lead long. The apron flashing should cover the entire lower face of the chimney and wrap a few inches around the corners, where it will be covered by the side cap flashing. To lock the flashing in place, use the point of a trowel to push the soft lead into the holes in the brick. Once cured, the mortar joint will hold the lead tightly. The flashing needs to be folded back when the roofing underlayment is installed, so leave plenty of extra flashing material to work with.



Mortar joints that won't crack. With the apron flashing in place, set a brick at each corner, check for square, then fill in toward the middle. Leave the mortar joint above the lead flashing tight (just less than ⅜ in.); too wide, and the joint could crack as the roofers are moving the lead around.



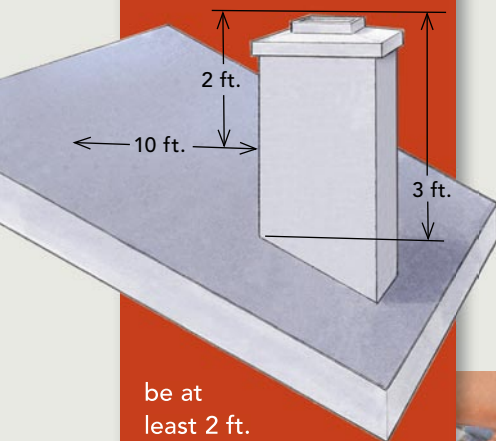
Flash as you go. As the chimney is built, work toward the ridge as you install additional pieces of side cap flashing, overlapping each piece about 3 in. over the adjacent piece. Check each piece of lead for plumb as you work; then tie it into the holes in the brick.



Mortar, tap, level. When laying bricks, I apply a healthy mound of mortar to the bottom of the brick, set it in place, and then use the handle of my trowel to tap the brick into position until the joint is even and the brick is level. Any mortar that squeezes out can be scraped off and thrown back into the mud pan to be reused. After the mortar has set up a bit, the joints can be tooled with a ⅜-in. jointer. I strike the head (vertical) joints first, then the bed (horizontal) joints, filling in any gaps with extra mortar. Clean up the bricks and joints with a mason's brush, and strike them one last time.

GET THE HEIGHT RIGHT

Chimney styles vary. For this installation, we topped the chimney with a bell-shaped corbel and poured a simple sloped-concrete crown. Whatever the design, residential building codes require that a chimney extend at least 3 ft. above the highest point where it exits the roof and that it



be at least 2 ft. higher than any part of the roof within 10 ft., including dormers. These distances are the minimum; chimneys often need to be built taller than is required by code to provide adequate draft.



Gauge the corbel. To dress up the top of the chimney, I like to step out the brick into what's called a corbel. Each brick should overhang around $\frac{3}{8}$ in. to $\frac{1}{2}$ in. Any more, and there won't be an adequate connection to the underlying course. I use the white ovals surrounding the bubble on my level as a gauge.



Stack levels to find the flue height. To find the height of the last section of flue tiles, which are sold in 2-ft. lengths, lay one level across the chimney opening to represent the rough height of the finished chimney crown, typically 2 in. or so. Then lay a second level perpendicular to the first to gauge the height that the new flue tile will extend past the crown, typically about 3 in. Finally, cut the flue tile to size using an angle grinder.



Flue mortar must be smoothed. Clean up the top edge of the existing flue tiles with a stiff-bristle brush, add a healthy dose of mortar, and then lower the new flues into place. Rough, ragged mortar joints can lead to dangerous creosote buildup. Reach down inside the flue tiles, and make sure that the gap is mortared fully. Then smooth it out with your hand.



too cold—can affect the way the mortar sets up and the concrete crown cures.

Maintenance matters

Assuming a competent mason, the right materials, and an average environment, a minimally maintained chimney will likely last from 15 to 30 years before it needs a major maintenance overhaul, a crown replacement, or a rebuild. As with most things, regular maintenance will help to extend this life span. I recommend that the

chimney be sealed twice a year for the first two years, then every other year after that. I've had great luck with Umaco's transparent penetrating sealers (www.umaco.com). For a matte look, choose a breathable sealer. If the high-gloss look doesn't bother you and you really want to seal the chimney thoroughly, use a nonbreathable sealer.

If cracks appear, I seal them using a silicone caulk with a masonry bonding strength of 10. Before applying caulk, I clean the crack with a brush; then I apply the silicone to

both the crack and to the area surrounding the crack.

Not every older chimney needs to be torn down and rebuilt. Often, the deterioration is limited to the chimney's concrete crown, which takes the most abuse from sunlight, snow, and ice. In this case, the crown can be chiseled away and repoured. If the clay flue tile is in poor condition, it's most easily repaired at the same time, before the new crown is poured. If the mortar joints between bricks are loose or crumbling, they can be



Scraps become the base for the crown. Fill the empty space between the bricks and the flue tiles with scrap bricks and mortar as you work. Lay the flat sections of an old flue tile across the top of the chimney in a bed of mortar.



Crown curing is crucial. The concrete crown is made from a mixture of portland cement and sand; it is poured in place and tapered slightly to shed water. Fill the space between flue tiles with mortar to prevent snow and ice buildup. Smooth the cement with a sponge every 15 to 30 minutes over a three-hour period, smearing the concrete against the flues. Cover the crown with a plastic sheet with a hole cut in it to allow flue gases to escape. Leave it covered overnight; if the concrete dries too quickly, it will separate from the flue tiles and bricks.

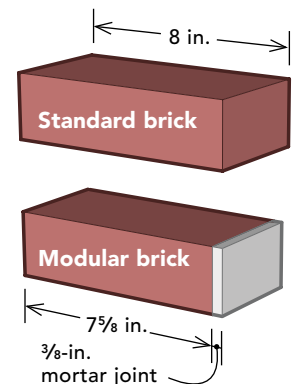


New bricks might not fit the old layout

A brick is a brick, right? Not exactly, and flues vary, too. Although an 8-in. brick is often still called a "standard" brick, it's less common today and is frequently a special-order item. That's because when combined with a typical $\frac{3}{8}$ -in. mortar joint, a standard brick creates an $8\frac{3}{8}$ -in. unit. Nowadays, masons often use $7\frac{5}{8}$ -in.-long "modular" bricks, which make an even 8-in. unit after mortaring. Modular bricks set in a standard-brick layout must be cut to fit or set in wider mortar joints. For a chimney, this awkward transition can be hidden behind the flashing.

The size difference applies to flue tiles as well. A standard flue is 1 in. wider than a modular flue tile. If the existing flue tiles are in good shape, they can be reused, but when you're working 20 ft. up from the firebox, this size difference isn't a major problem. Just pack the misaligned joint with mortar, and smooth it out from the inside to prevent creosote buildup.

Whether standard or modular, cored bricks, which have holes through them, are almost always preferred over solid bricks. Cored bricks are lighter, are less prone to expansion and contraction, break more easily with a hammer, and form a better bond than solid bricks.



cut back with an angle grinder, washed with acid, and repointed with fresh mortar.

The decision to rebuild a chimney is really based on the difficulty of the repairs. If there are lots of problems, it often makes sense to start over. It will likely be the same amount of work to rebuild the chimney, and at least you can be sure that it's done correctly. □

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