

## Hydraulic Lime Mortar On a Chimney Cap?

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As a company, we are committed to the challenge of using sustainable building methods in our historic restoration projects. Sometimes we are asked specific technical questions as to how these two objectives are reconcilable--how can we use historic methods over modern techniques to stand the test of time? Recently, we received just such a question: "I am committed to using the sustainable and historically accurate natural hydraulic lime mortar on my chimney cap, but how will the natural lime mortar hold up in the long run?"

This is a valid question. After all, Portland is harder than natural lime mortar, right? So although it is historically accurate, how is it sustainable to use a softer material on a chimney, one of the hardest to reach places and one of the most vulnerable spots on your historic house? Shouldn't your chimney, of all places have a durable and water proof cap? Beautiful homes, that have been meticulously maintained, have often been found to have small plants growing out of the chimney.

First let's consider a few of the attacks a chimney has to endure. The most obvious is the extreme exposure to all forms of moisture: rain, snow, dew and frost. Constantly varying temperatures throughout the year, from cold winter nights to scorching hot summer days add an additional assault on the chimney--the constant expansion and contraction takes its toll. In the dead of winter, when the furnace kicks on and 400 plus degree air suddenly hits a 15 degree chimney flue, then what happens? The resulting pressure has an effect much like putting an untempered glass into a hot oven: it cracks. This expanding and contracting phenomenon has another destructive effect; the clay liner which your chimney is built with will expand upward as it heats up then contract back down as it cools. This effect may further compromise your chimney's structural integrity. As if this was not enough, a surprising attack comes from another part of nature. A chimney is a natural resting place for birds. We have seen the corrosive effect that bird droppings have on the integrity of a chimney cap. While we won't attempt to address all of these issues here, we will address the basic way that we apply a chimney cap.

Needless to say, the chimney has a very difficult and challenging life and it would be advisable for the responsible homeowner to inspect a chimney for integrity much as he would inspect his gutters for leaks. Just as a leaky gutter will ultimately wreak havoc on any masonry construction, a leaky chimney will do the same. Add the chimney cap to the schedule of five year maintenance checks. Eventually, you may have to repair it, or even replace it completely. As I like to say, a chimney cap replaced in time can save nine.

So, now let's go back to the historical use of hydraulic lime mortar on the chimney cap instead of Portland. Portland is harder and water proof right? Doesn't that mean it will last longer, and need fewer repairs? It's a good theory. But there are more destructive forces at work on a chimney cap than just moisture.

Recall our description of one of the most destructive attacks: thermal expansion and contraction from the flue gasses as they heat a very cold chimney. Portland may be harder, but hardness doesn't handle that kind of expansion very well, it cracks easily and once it cracks it doesn't heal. Earlier, we raised a concern that natural lime

mortar is softer, right? But now we see that the softness is a positive thing because it will permit more movement than Portland. If it does crack, it heals itself! This is how it works chemically: the content of natural free lime actually attracts to itself and thus it self-heals, sealing the crack.

The tried and true method we use to apply a chimney cap is as follows:

We apply three coats of mortar. The first two coats consist of two parts coarse concrete sand, one part 3.5 natural hydraulic lime mortar, and one handful of natural hair or fiberglass. The third and final coat we apply is proportioned as follows: two and one half parts sand, one part 3.5 natural lime mortar, this final coat has a bit more sand; no fiberglass or hair. This method will allow the first two coats to act as a stronger mixture--the fiberglass acts as a rebar of sorts--and the final layer seals the fibrous ends so they won't act as a wick for water absorption; we don't want a conduit for moisture. For a few weeks after the new chimney cap has been applied, it should be covered from moisture--depending on the temperatures--and should be kept damp in hot temperatures.

While the exact method of applying a new chimney cap may vary extensively, we have found that our method works quite well and lasts for many years. It is our commitment to balance the use of natural and sustainable products, while enabling the use of historically accurate products and procedures.