C. BATES

by Jim Buckley

Fireplace Hearth Details

Hearths tend to get short shrift in books and articles about fireplaces. But the hearth is the base on which the whole chimney is built. And because it's usually up to the builder to frame the hearth opening — and sometimes to pour the hearth as well — it behooves him to understand the codes governing fireplace hearths and the techniques used to build them. Having built fireplaces all over the country, I've learned that a successful job requires good communication and coordination between the builder and the mason. In this article I'll outline what the code says about fireplace hearths and describe three methods of building them.

Here are three code-approved options for building a self-supporting masonry hearth

Terminology

A fireplace hearth consists of an inner hearth, which is the floor of the fire box within the fireplace opening, and the hearth extension, which is the part that extends out into the room. The finished hearth materials — whether brick, marble, or tile — are laid over a hearth base of solid masonry. The hearth base must be supported by a masonry foundation that rests on concrete footings placed below the local frost

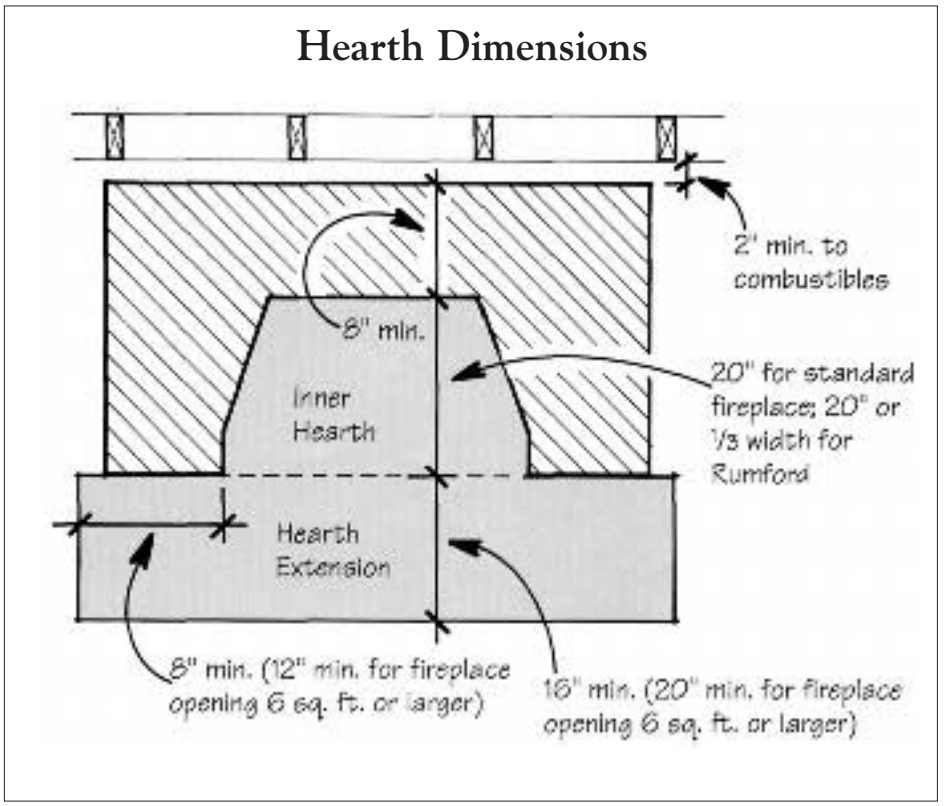

Figure 1. *By code, a fireplace hearth must extend 36 inches from the back of the firebox to its front edge. It must also support its own weight and the weight of anything placed on it.*

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Figure 2. *A typical hearth base, seen here from below, cantilevers off its masonry foundation. All combustible forms are removed after the concrete sets.*

depth. The foundation for an exterior fireplace is a bump-out in the house foundation. Most interior fireplaces have freestanding foundations that may or may not get built at the same time as the house foundation.

Code Requirements

Building codes regulate almost everything about fireplace and hearth construction. This includes the depth of the firebox, the square footage of the finished opening, the required hearth size, and distance to combustibles (see Figure 1). Though local jurisdictions have a lot of flexibility in the requirements they adopt, I find that more and more are using the Council of American Building Officials' *One and Two Family Dwelling Code* — the CABO code for short. The reason is that it's the only model code that's designed specifically for residential construction.

A good example of this is Columbus, Ohio, where I used to live. The city relied on the BOCA (Building Officials & Code Administrators) code for years, but since BOCA is oriented toward commercial buildings, they had to make a lot of exceptions for homes. This meant adding code language, which in turn required lots of committee meetings and paperwork. To simplify things, they finally decided to adopt the CABO code.

Most codes require that hearths and hearth extensions be at least 4 inches thick (including the hearth base and the finish hearth materials), be made of solid masonry, and be self-supporting (reinforced to carry their own weight and the weight of all imposed loads). In other words, the hearth should cantilever off the masonry foundation and should support itself such that it would remain in place if the building burned down around it (Figure 2). No plywood or other combustible concrete forms may be left beneath the masonry. The reason is that if any cracks develop in the hearth, burning embers could fall through and ignite the forms.

Hearth extensions must extend at least 8 inches past either side of the fireplace opening — 12 inches if the fireplace opening's cross-sectional area is more than 6 square feet. The hearth should extend at least 16 inches in front of the opening if the area of the opening is less than 6 square feet, and at least 20 inches if the opening is larger than 6 square feet. The inner hearth for a standard fireplace should be 20 inches deep; the inner hearth for a Rumford should be 12 inches deep or 1/3 the width of the fireplace, whichever is greater.

Framing the Opening

If the hearth extends into a wood-framed floor, the framing must be cut out and any joists headed off. The ends of the cut joists must be supported by a doubled 2x header that's hung on metal joist hangers. I usually tell the framer to make the floor opening 2 feet wider than the fireplace opening and deep enough that it extends 2 feet out into the room from the wall on which the fireplace will be built. This usually gives me a slab that's 5 feet wide by 4 feet deep. This is bigger than the minimum requirements for some fireplaces, but it's worth it for the simplification.

In general, it's up to the builder to frame the opening. (Masons don't even carry the tools to cut wood and drive nails.) In an ideal world, this would be done while the floor was being framed,

but in reality that only happens with cookie-cutter houses on one end and with some architect-designed homes on the other. That's why, on most jobs, my main objective during the first day is to get the builder to frame the hearth extension the way I want it.

Reinforced Concrete Hearths

Poured reinforced concrete hearth bases are the most durable (Figure 3). Framing and pouring the hearth takes two workers a half-day from start to finish. Once the hearth opening has been framed and headed off, you have to bring the masonry foundation up to about 7 inches below finish floor level. This leaves 4 inches for the concrete and 3 inches for a brick hearth. (Even if the hearth extension will be finished with tile or marble, you still need 3 inches for the firebrick of the inner hearth.)

The plywood form should fill the bottom of the hole in the opening, while its surface should be flush with the top of the chimney foundation. It should be supported on a 2x4 nailed to the header and braced from below to hold the weight of the concrete. The form should be easy to remove after the concrete has cured by taking away the braces. Where the foundation is enclosed in such a way that it will be inaccessible after the pour, the form for the hearth must be made from solid concrete block or some other noncombustible material.

A typical 4-inch-thick hearth base only requires 1/3 yard of concrete (about 10 cubic feet). Since the minimum redi-mix load is usually 1 yard, I mix and pour the concrete by hand. (The preblended concrete mix available at any lumberyard is more than adequate for this.) Working by hand also gives me time to set gas lines, ash dumps, and reinforcing bar. I start by pouring three-quarters of the concrete in the form. When it has thickened just enough to support the weight of 1/2-inch rebar, I lay the rebar from side to side on 1-foot centers. On top of these I place a second layer from front to back — again on 1-foot centers. I then pour the rest of the concrete and level and puddle it with a 2x4 to work it into all the spaces. When finished, the rebar should be covered by 1/2 inch of concrete. It's important that the top layer of rebar — the layer running from front to

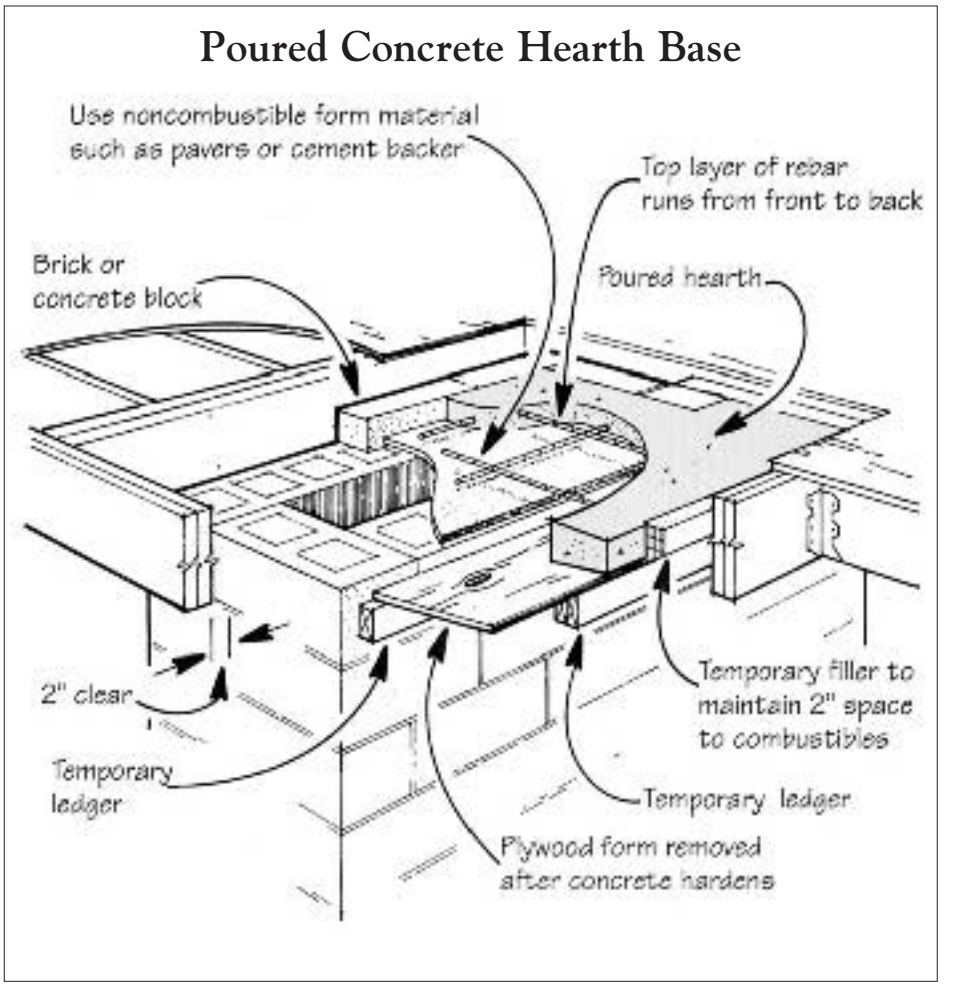

Figure 3. *The author reinforces concrete hearth bases with 1/2-inch rebar set in a 12-inch grid. Because the face of the self-supporting hearth will be in tension, he places the rebar that runs from front to back close to the top surface. Combustible form materials are stripped after the concrete hardens.*

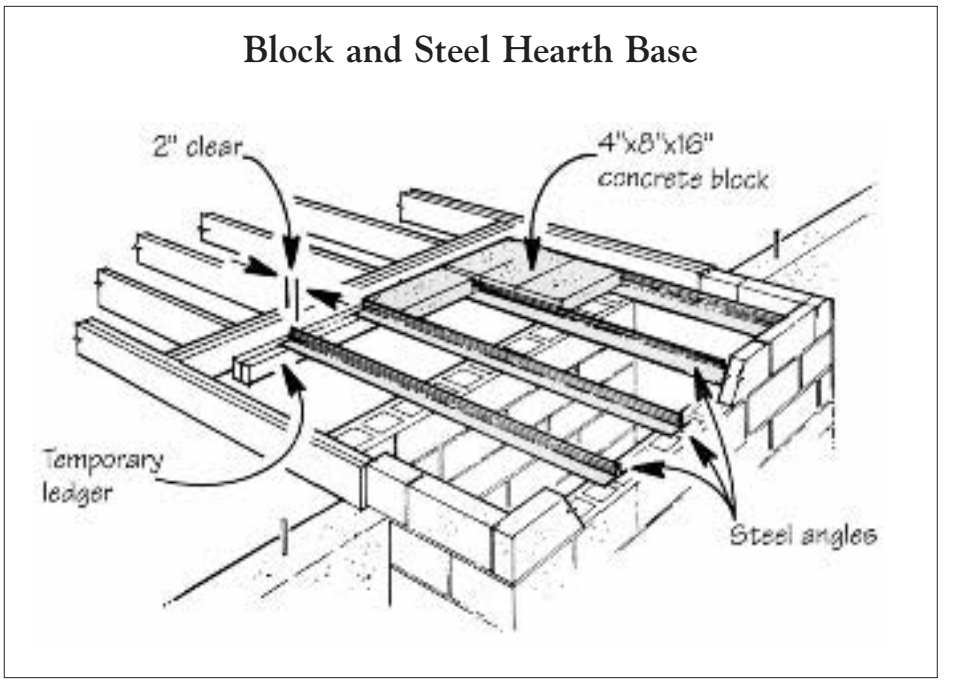

Figure 4. *A hearth base built with steel angles and solid block takes less time to build than a poured concrete one — the mason can build the hearth and begin laying up the fireplace in the same day. However, block hearths are less durable over the long term because the steel angles are exposed and subject to rust.*

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Figure 5. *Common in the Northwest, corbel slabs are even quicker than block and steel hearths. Here, a pair of masons set the first hundred-pound corbel slab into place (left). Within an hour, the hearth base is complete (below).*

back — be near the surface of the hearth base, since it will be in tension after the forms have been removed.

Block Hearths

The problem with pouring the hearth base is that you can't build on it until the next day. For this reason some production-minded masons build hearth bases with angle iron and solid block (see Figure 4). It takes them less time to complete than a poured reinforced hearth, and lets them begin the chimney the minute the hearth is complete.

The solid blocks are 16 inches long, 8 inches wide, and 3 1/2 inches thick. They're supported by 3 1/2x4-inch steel masonry lintels that bear on the masonry foundation at one end and are temporarily supported by a 2x4 nailed to the floor header at the other. The blocks are laid without any mortar. When the job is done, the weight of the fireplace holds the steel lintel in place.

Block hearths are faster to build than reinforced concrete hearths but they're not as durable. The exposed steel angles can rust and cracks can develop between the block. While this could take years to happen, the danger still exists.

Building a Hearth With Corbel Slabs

The first time I saw a mason laying corbel slabs was in Oregon a few years ago. It got my attention: In less than an hour he laid two courses of block to bring the foundation up to the bottom of the floor joists, set a series of precast slabs in place for the hearth base, and was ready to start on the firebox.

The precast slabs, called corbel slabs (Figure 5), are sold in every masonry materials yard in Washington and Oregon, though I haven't seen them used in any other part of the country. They're made of reinforced concrete, and are a foot wide, about 3 inches thick, and come in various lengths. The mason lays enough block to bring the foundation wall up to the desired height, then lays the slabs from front to back. They're supported temporarily at the front by a 2x4 nailed to the header. After a cut here and there for an ash dump, gas starter, or combustion air, the mason is ready to continue building the fireplace and chimney.

Using corbel slabs is like using steel angles and block, except that corbel slabs weigh over 100 pounds each. However, the end product is more durable because the steel reinforcing is inside the precast concrete slabs — not exposed where it can rust. It's also less expensive, because instead of 30 blocks and eight angles, the mason only needs to lay five slabs.

Putting It All Together

Once you understand how hearths are built, you can speed production by making sure the mason knows a few things before arriving on the job. For instance, will the hearth be built on a concrete slab, a footer, or a stem wall? Will the floor joists be headed off by the builder beforehand or will the mason and the builder have to do it together? If the builder intends to pour the hearth base, he should coordinate with the mason to make sure it's big enough, low enough, and strong enough.

Mistakes cost both time and money. I once accepted a job in California in a gated community on the side of a mountain. Just getting to the job took hours — which meant I didn't have the chance to inspect it before starting. Then, although our materials had been delivered, it took us all morning to carry them up the hill by hand, and the rest of the day to erect scaffolding on a steep slope to get up to the top of the stem wall to pour our hearth base. This added a day's worth of labor costs to the job. Unexpected cost overruns are to nobody's advantage. These could have at least been planned for had the builder understood how hearths were built and informed me about the site conditions. As is often the case, a little communications would have gone a long way. ■

A mason for 15 years, Jim Buckley of Port Townsend, Wash., has built more than 600 fireplaces.