

Casting a Concrete Fireplace Surround

BY BUDDY RHODES

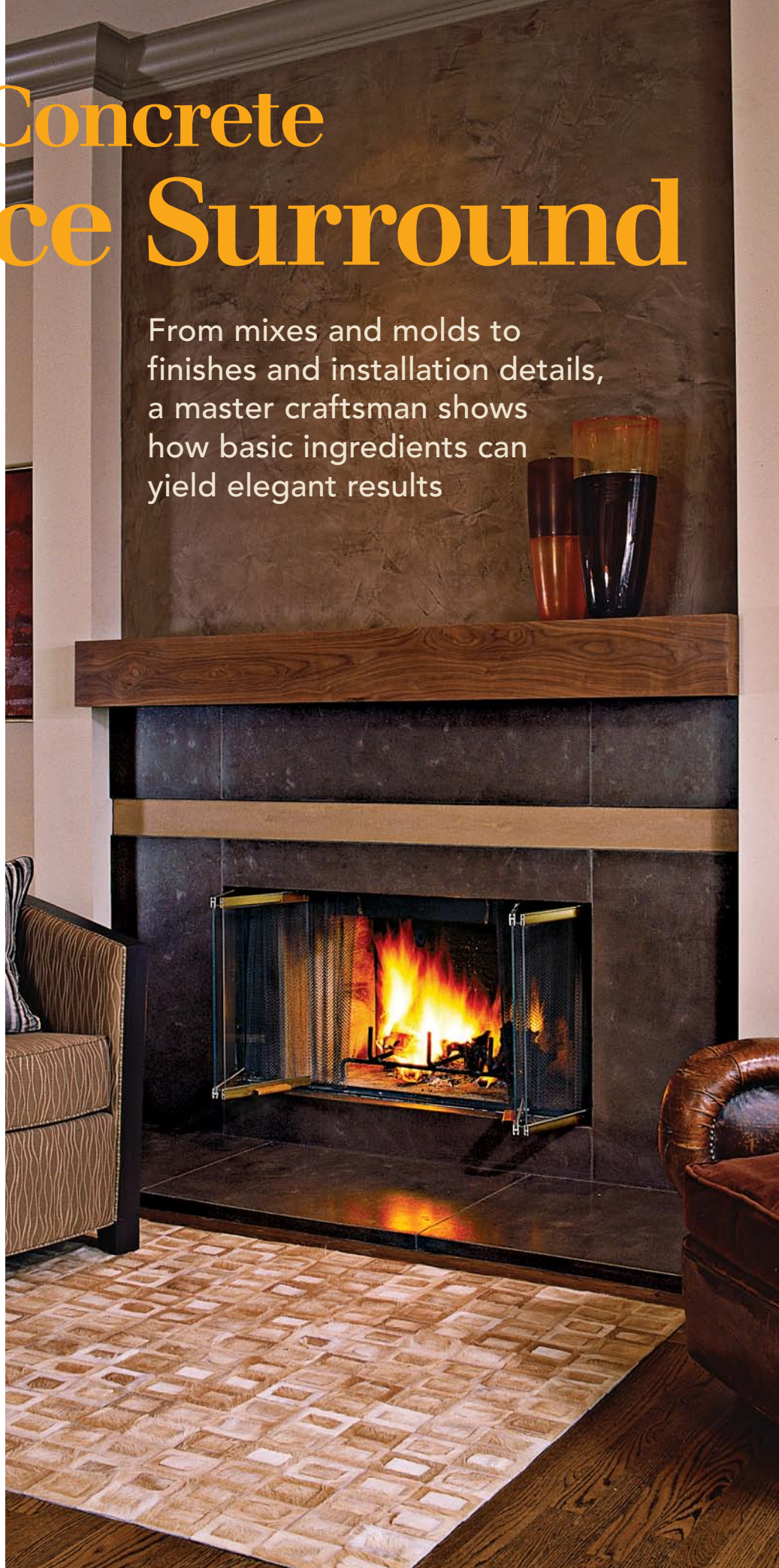
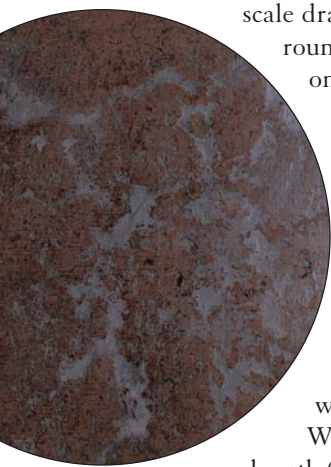
Lately, I've been getting a number of requests for concrete fireplace surrounds, and of course, that makes sense to me. Concrete is an exquisite medium that can show the hand of the craftsman like few other materials, and it's as well suited for a fireplace surround as it is for a countertop or a decoratively stained floor. The finished installation can be a unique composition of shapes, textures, and colors that amplifies the impact of any fireplace. The massive appearance of a concrete surround is a major factor in its aesthetic appeal, but this effect is created simply by stacking a series of thin slabs together and securing them to the wall (drawing p. 89). The process has five stages: designing; mold-making; casting; finishing; and installing.

Draw the picture, and make a template for the hearth

During the design stage, our resident artist, Jim Scott, goes on site to design and make a full-scale drawing of the fireplace surround. Once he has the concept on paper, Jim likes to transfer the drawing onto the wall, which gives him the opportunity to check the scale and design in the room. Sometimes we also create a full-scale cardboard mock-up of the surround so that we can discuss details of the design with the homeowner.

We make a template of the hearth (and also occasionally of the vertical surround) with 2½-in.-wide strips of ½-in. plywood tacked together with hot glue. Using a template lets you follow every little curve in the wall and ensure that the piece fits perfectly. For the rest of the surround, we base the design on the measurements taken on site. Except for

From mixes and molds to finishes and installation details, a master craftsman shows how basic ingredients can yield elegant results





THE PARTS ARE CAST UPSIDE DOWN IN SIMPLE MELAMINE MOLDS

The molds are made of strips of $\frac{3}{4}$ -in. melamine ripped to a width equal to the depth of the slab and screwed down to a large sheet of melamine. Here, the molds are assembled around templates made from strips of plywood tacked at the corners with hot-melt glue ①. Used to attach concrete to the wall, 6-in.-long brick ties are marked and notched into the top of the mold, then are secured with a drywall screw ②. Any exposed end grain should be sealed with packing tape or auto-body filler. To make disassembly easier, a dab of modeling clay keeps the concrete out of the screw heads ③. It's a good idea to measure and cut the reinforcement before filling the molds ④. Allow 2 in. of space between the inside mold perimeter and the reinforcement.



For slabs 3 in. thick or less, use one of these reinforcements

Galvanized expanded mesh



6-in.-grid mesh

$\frac{1}{2}$ -in.-grid hardware cloth



KEEP THIS MIX ON THE DRY SIDE

A pressed finish depends on a first layer composed of a relatively dry mix. First, add a shovelful of portland cement per bag of premixed concrete to give the mix a more claylike consistency.



Combine any coloring with about 1½ gal. of water, then gradually add the mixture to the dry ingredients **1**, stirring thoroughly with a shovel or a hoe **2**. If necessary, add water sparingly until the concrete mix has the feel of bread dough **3**. The voids in the pressed finish are created by loosely packing the

the hearth, molds are built from these detailed measurements and drawings, not from the templates.

We always note any site information on the template or drawings. Although concrete does not crack or become damaged from proximity to heat, we never plan for it to extend into the opening of a masonry firebox. Also during this stage, we decide how the surround will be divided for casting and where the seams will lie. I try to design a slab that won't exceed the size of a pickup's bed—about 8 ft.—and also try to consider access to the job site, especially doorways and stairs. Here in California, we also must consider the potential for earthquakes; a 2-in.-thick slab weighs about 20 lb. per sq. ft. The weight of the surround should bear vertically and be supported from underneath.

The last thing to note is the location of the framing in the fireplace wall. We cast brick ties into the slabs to serve as hanger straps during installation, so the ties and the framing locations need to correspond.

Simple melamine molds are the negative of the cast

We make the molds from ¾-in. melamine because it is inexpensive, is readily available, gives the concrete a smooth finish, and releases easily. Assembled around the template or laid out according to the drawing, mold pieces are screwed on edge to a larger sheet. Corners are fastened from the outside to keep the inside-mold face smooth. Because this surround is cast upside down, labeling the various parts helps to avoid confusion. If we're using a template, we transfer all written notes and information from the top of the template to the bottom, then flip the template over and label "up in mold."

If we're building a mold for a project that's getting a hand-troweled finish, we seal all mold joints with a latex-silicone caulk that keeps the water in the mix from leaking out. Because the mix used for the pressed finish that we're doing here is fairly dry, though, there's no need to seal the mold. Once the molds are completed, I double-check





dry mix a handful at a time into the mold, filling it halfway **4**. At this stage, it's important to pack the mixture firmly into the corners and edges. Heavy gloves are a must to protect hands from the caustic effects of concrete.



THE SECOND LAYER IS WETTER

After a second, wetter batch of concrete is mixed, the reinforcement is set into the mold and is covered with the looser mix. I like to use a broad putty knife as a squeegee to force the concrete down into the wire **1**. When the mold is full, the excess can be screeded off with a wooden float **2**. A straight piece of lumber works, too. After the slabs have dried overnight, the forms are stripped, and the surround elements are placed on 2x4s **3** and allowed to cure for at least two days. They should not be placed in direct sunlight. Periodic misting with water from a plant sprayer helps the concrete to reach its maximum strength.



them to ensure that they match the drawings and transfer them to a level table.

Reinforcement keeps concrete from cracking

Before we begin to mix the concrete, we prepare the reinforcing material. The type of reinforcement used depends on the thickness of the slab and the size of the aggregate in the mix. Any slab that's more than 3 in. thick should be reinforced with rebar or galvanized threaded rod; thinner slabs can be reinforced with hardware cloth or welded wire, which is sold in grids of 2-in., 4-in., or 6-in. squares. (If you can, buy it in flat sheets, not rolls, which tend to spring out of the wet mix.) I use galvanized expanded wire mesh, which works well in a mix with aggregates smaller than $\frac{3}{8}$ in.

If the aggregate is larger than $\frac{3}{8}$ in., I don't use expanded mesh; its holes keep the mix from integrating with the reinforcement. Instead, I recommend using larger-grid hardware cloth or welded wire. When slabs are longer than 4 ft., I use two layers of reinforcement; otherwise, one is sufficient.

A pressed finish combines dry and wet mixes

The pressed finish is cast in two layers. The first layer forms the visible surface; it's a fairly dry mix that's hand-packed to create voids that are filled later with a contrasting color. The second layer is a wetter mix that adds more strength to the back of the slab. I use my company's prepackaged concrete mix. A standard gravel mix with a compressive strength of 5000 psi works, too, but I add an additional shovelful of portland cement per concrete bag to make it more malleable. I then add the color mixture and enough water for the desired consistency. The first layer's mix should be fairly dry, akin to bread dough. I press the concrete into the mold in small handfuls to half the depth of the mold.

I allow this layer to sit for 15 minutes while I make the next, slightly wetter batch of cement, this time more like the consistency of cottage cheese. I smear some of this wetter concrete into the mold and place the reinforcing wire, then fill the rest of the mold. I always make sure that the wire is buried in the cement and not too close to the bottom surface, lest its shadow appear in the finish when the slab is turned over. Once the molds are packed, I screed the top of

A TINTED PASTE FILLS THE VOIDS

After the slab has cured, the next step is to mix a paste of portland cement, water, coloring, and concrete bonder to the consistency of yogurt **1**. The bonder should be added to the other ingredients at a 1-to-10 ratio; a heavier concentration will make the finish difficult to polish. The paste is spread onto the surface of the slab and worked into the voids with a broad putty knife **2**. After 30 minutes, the paste can be reapplied until the voids are filled. The following day, the slab surface is wet-polished with a 220-grit diamond pad **3**.



the concrete with a straight length of 2x4 so that the slab's back is smooth and uniform.

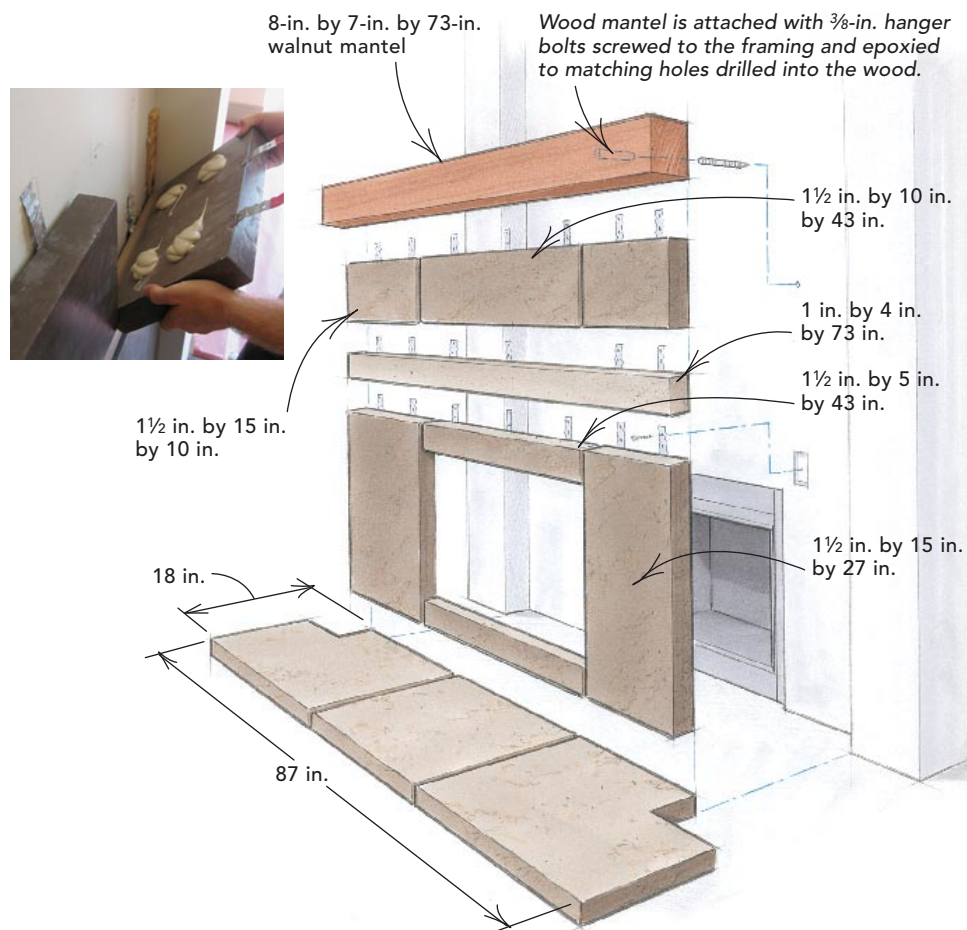
After the concrete has hardened overnight, I unscrew the molds and flip over the pieces. Here, it's important to identify and label seams and finished edges. During finishing, mating edges should not be sanded down because they need to fit together tightly. Exposed edges are rounded for safety and durability.

Now the concrete must cure for a couple of days. High heat and a lack of humidity will make the slab cure too fast and crack, so I always keep the slabs out of direct sunlight and keep them wet with a spray bottle. I elevate bigger slabs on 2x4 sleepers so that both sides can cure evenly. Sometimes we just flip them: One day is upside down; the next day, right side up. The colder it is, the longer the cure time. When it's hot, we use plastic sheeting to retain moisture.

A LAYERED INSTALLATION HIDES THE FASTENERS

After layout lines are established on the wall and floor, we dry-fit the hearth, shimming if necessary to get the pieces level and flush with the floor. (We use the plastic U-shaped shims sold at tile stores.) It's a good idea to space the shims at about 6-in. intervals so that the hearth doesn't crack under any loads. Once we're happy with the fit, we apply construction adhesive or thinset to the subfloor and drop in the hearth. Next, we

dry-fit the vertical legs, marking and excavating the drywall behind each brick tie so that the piece above sits flush on the wall (photo right). After checking the fit, we apply construction adhesive to the back of each panel (photo below), lift them into place, and screw them to the framing.



Making concrete look like marble

After the concrete has cured, I clean off the slabs with a blast of compressed air and mix a batch of the filler paste that accents the main slab. The mixture consists of white portland cement and pigment. I also add latex concrete bonder sparingly, 1 part bonder to 10 parts portland-cement mix. The resulting mixture should have a creamy, yogurtlike consistency. I load a 6-in. putty knife with paste, then coat the entire surface of each piece (not the seam edges) to fill the voids. I let it sit for a half-hour; when cracks start to form in the paste, I apply another skim coat and let it sit overnight.

In the morning, I use a 220-grit diamond pad to remove any burrs and to round the finished edges. The slab is finished with a concrete sealer that I apply with a foam brush. Two to three thin coats are better than one thick coat. One of the tricks of applying a sealer is to

buff between coats with a fine nylon scrubby pad. After a paste wax is applied and buffed out, the surround is ready to install.

Screws add strength to the glue

For this design, the hearth is installed first; the surround pieces stack above. If the material is 1 in. thick or less, it can be installed with construction adhesive or thinset, as you would tile. For thicker slabs, however, we like to integrate brick ties into the slab that we then screw to the framing (drawing above). For larger pieces, such as mantels that cantilever beyond the plane of the slabs, we use lag bolts screwed into the framing and epoxied into the back of the concrete. □

Buddy Rhodes lives in San Francisco. His Web site is www.buddyrhodes.com. Photos by Charles Bickford, except where noted.

SOURCES OF SUPPLY

The concrete, reinforcement, and other materials used to build the fireplace surround in this article can be purchased at most home centers or masonry-supply retailers. Below is a partial list of Internet resources for both information and manufacturers.

Color

Solomon Colors
www.solomoncolors.com

Davis Colors
www.daviscolors.com

Bonders, sealers, wax
Elmer's
www.elmers.com

White Mountain
www.tricoat.com

Glaze N Seal
www.glaze-n-seal.com
800-486-1414

Diamond hand lap pads
3M Corp.; www.3m.com

All materials for decorative concrete projects (except reinforcement, abrasives, and melamine) also can be purchased from Buddy Rhodes Studio (www.buddyrhodes.com; 877-706-5303).

For more info
The Portland Cement Association
www.cement.org

