Clay Saggars in a Raku Kiln

By Linda and Charlie Riggs

The practice of making pots, burnishing them, firing without glaze, and using available combustible materials, stretches back in time for thousands of years. Today potters fire using similar techniques and fuel bringing to life the legacy of these ancient firing techniques. One of these techniques fires a pot within another clay chamber.

A saggar also has its own unique history. The term "saggar" originally meant "to protect." A delicate glazed pot can be placed in a larger clay container (saggar) and fired along with other pots in a large kiln. This container protects the pot from ash and other particles in the kiln atmosphere. In our work, we were using the saggar for the opposite purpose: to fire a pot in a saggar with the elements of a pit firing in its own "mini environment" within the saggar. All the ingredients of a pit firing (wood shavings, salt, copper sulfite/carbonate, seaweed, etc.) are put to a saggar along with the burnished/polished pots, and fired in a kiln.

In the early 1990s we began to experiment with the firing of burnished pots to achieve a black shiny surface. Maria Martinez was our hero and we enjoyed our excursions into the farmer's fields asking for and then gathering cow or horse manure for pit firings. These firings eventually morphed into group fun firings with other potters where we were happy with any outcome and thrilled if we got a pot or two with red on the surface in addition to black white and gray.

Over the years we read about more controlled sawdust firing techniques and were taken with the sawdust firings of Karen Hessenberg and Jane Perryman. Other work that inspired us were the saggar fired work of Ruth Allen and Judith Motzkin and the red and black pots made by Duncan Ross. There are many other alternative firing potters that influenced us but if we named them all we would not have room for the rest of the chapter.

After a rather dismal pit firing, Charlie looked at the bisque pots in the studio and decided to throw together an experimental saggar firing. He chose

Wheel-thrown white stoneware, polished with terra sigillata, saggar-fired in a clay container with wood shavings, by Linda and Charlie Riggs, ht: 10 in.

a bisque fired bowl and plate waiting to be glazed and raku fired. He threw in a few handfuls of wood shavings and other basic components of a pit fire—salt, copper carbonate/copper sulfate and wire encircling a white burnished pot. He placed the plate on the bowl as a lid and put the whole ensemble into a top-hat raku kiln.

Since he did not have an instruction manual, he began by roughly estimating the temperature in a pit firing and continued with a mental calculation about the temperature difference between the exterior and interior of the saggar. After several tries and temperature variations he had a successful firing. We began to see a pattern with a pot that was fired singly in its own saggar—the colors were dynamic and had hazy almost fog-like transitions on the pots surface. We determined that this was due to the fast firing and fast cooling of the saggars. We now wanted to try tumble-stacking pots in one large saggar or placing pots on shelves in large clay saggars with combustibles and chemicals.

Making the Saggars

We make our saggars on the wheel with a clay body that contains grog so it can withstand the quick rise and fall of temperatures that occurs in our fast firing method. Most raku clays and some stoneware clays with grog fit in this category.

The saggars are deep bowls with the same rim diameter so that they fit rim to rim when one is inverted on the other. The firing is quick and you will need a bit of air flow to re-oxidize your pot in the final stages of the firing therefore you do not want to totally seal the saggar with a flange or other methods.

The saggar firing is more successful if the saggars are similar to the size and shape of your pot. A tall vase will require two elongated bowl shapes, or one very tall saggar with a shallow bowl lid. A small pot round pot needs a smaller round saggar. For the best results, allow at least an inch of air space between your saggar wall and the sides of your pot. The amount of air space on the top of the saggar is not as critical, and variations in space provide variations in your finished pot. Typically, you should have at least an inch to about 5 inches of space above the pot.

The walls of the saggar are thrown to about 1/8 to ¼ of an inch thick. A consistent thickness throughout the saggar walls helps to prevent cracking during the firing process. Even so, the saggars will eventually crack. The crack can be patched with kiln cement and used until they completely fall apart. The saggars are bisque fired to cone 08–06.

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Making Pots for Saggar Firing

Saggar firing is the most dramatic on pots that have a satin or shiny polished surface. The clay body that you choose for making your pot, and the way you treat the pot when finishing the throwing process, can assist you in achieving this. The clay bodies that provide the most dynamic surfaces are clays low in grog or sand. This can be anything from cone 5–10 porcelains to cone 5–10 white porcelain-like stoneware clays. The goal is to use a clay body that will have a smooth surface when the pot comes off the wheel. Because the saggar protects the pot while firing, it is not important to have a clay body that withstands the thermal shock of raku firing. The saggar takes the abuse of rapid thermal changes.

Handling Greenware

The surface of the fired saggar pot chronicles the entire process of throwing, trimming and applying terra sigillata. Surface scratches, uneven terra sigillata application and fingerprints translate into distinct discoloration on the finished surface. There are ways to minimize these surface variations and get as close

to perfection as possible. First, use latex/vinyl gloves when handling the greenware, when applying terra sigillata and when loading into the bisque kiln; and second, spray terra sigillata on the pots instead of brushing or dipping. It provides a smooth surface that absorbs the fumes and smoke without leaving brush marks or dipping drips. Spray 3-4 layers of terra sigillata. Then polish the pot with soft plastic (dry-cleaning bag), a soft cloth, or a microfiber dust cloth. If it appears that the pot needs more of a shine, spray on a couple more layers and buff the pot again. Repeat this process until you are happy with the result. We usually try for a satin to shiny surface rather than a mirror-like finish. If you decide to hand burnish your pot, use a technique that minimizes burnishing lines as they will show up in the finished surface of the pot. Load each pot directly into the bisque kiln, handling them as little as possible. Bisque fire to cone 010 or 08.

Preparing the Pot in the Saggar

Add wood shavings to your saggar. The amount you use will determine the lightness or darkness of your pot. A good place to start is put in enough that you fill the bottom third of the saggar. Add a couple of tablespoons of your salt copper carbonate mixture around the outside edge of your woods shaving against the side of the saggar.

Place the pot into the nest of wood shavings. If you would like the pot higher, use a piece of old kiln shelf. Unroll the steel wool. Pull out long strands and arrange them on the pot. Place the other half of the saggar (lid) rim to rim on the lower saggar half. Arrange the lid so that a small amount of air can enter into the saggar. A small pea size bit of rolled up steel wool between the two parts or a small shaving of dried clay will work to create a very small space for air flow, (a $^1/_8$ inch opening). Load the saggar into your raku kiln.

MATERIALS FOR SAGGAR FIRING

Materials you will need for a saggar firing include: wood shavings (animal bedding is fine), coarse steel wool and table salt/copper carbonate mix (5 parts salt to one part copper carbonate.). Note: Rock salt will not break down in the firing to produce fumes.

1. Place several handfuls of wood shavings into the bottom half of the saggar.

2. Spoon 2–3 Tbs. of a salt/copper carbonate mixture around the outside edge of the saggar (5 parts salt, 1 part copper carbonate).

3. Put pot into the nest of wood shavings. If you would like the pot higher place piece of old kiln shelf on the bottom of the saggar.

4. Pull apart steel wool taking care not to cut your fingers. Arrange the strands of steel wool on the surface of your pot.

5. Place the top half of the saggar over the pot. Make sure the rims of the saggar halves are not completely sealed so that some of the vapors and smoke will escape during the firing. Place the saggar in the raku kiln.

6. Open the saggar when the temperature of the kiln is below 200°F (93°C) and remove the pot. Clean the surface with a soft rag then polish or seal it.

Firing and Finishing

Warm up the kiln to 500°F (260°C) for 10 minutes. Increase the amount of fuel about every 10 minutes. When the kiln temp reads 1600°F (870°C), start a count-down timer for 20 minutes. Hold the temperature between 1600°F and 1700°F for 20 minutes. After 20 minutes off turn off the gas. Let the kiln cool naturally. Remove the saggar and the pot when you can touch them with your bare hands. This will preserve the life of your saggar and will also prevent you from causing thermal shock to your pot by removing it while it is hot. Caution— do not use raku gloves to remove the hot pot from saggar. Raku gloves build up layers of carbon and dirt. If this touches the hot pot, the surface will be ruined with carbon marks that are permanent. Carefully wipe off all the steel wool, ash etc. from the pot's surface. Polish and seal the pot with paste wax or spray it with a satin artist's charcoal fixative or a non-yellowing satin acrylic spray.

Considerations

Temperature: The highest temperature that you reach will affect your firing. If the kiln gets too hot, the heat will fuse the steel wool onto your pot and over-fire the terra sigillata, dimming your shine. Too low of a temperature and the salt and copper will not fume and the pot will be black to grey without any steel wool decoration.

Time and temperature together: The length of the firing at the top temperature is important. Firing too long can burn away all the color and carbon from the surface of the pot. Too little time and you will have a dark pot even at the right temperature. Try the recommended firing schedule. If your pot is too dark, add a couple of minutes. If it is too light, take off a few minutes.

Amount of reduction material in the saggar: If you place too much reduction material (wood shavings) into the saggar, the pot will not oxidize and you will have a dark pot with little color. Too little reduction material and your pot may be too light.

Position of your pyrometer in your kiln: The temperature in a raku kiln varies according to the position of the pyrometer in the kiln. Place it halfway down from the top and on the side of the kiln away from the direct intake flame. Keep your pyrometer in the same position in your kiln as you experiment with this process. Also, the older the pyrometer tip, the less accurate the readings. Saggar is closed too tightly: If your saggar is tightly

closed, the fired pot will not re-oxidize as quickly, which can result in a dark or black pot. Make sure there is a sliver of a gap on at least one side of the saggar. You can achieve this by slipping a couple of small wads of steel wool or ceramic fiber between the saggar and lid. Much of the time there is a natural small gap just due to the slight difference in the shapes of the saggar and lid.

Using Other Ingredients for Varied Effects

- Make designs with copper or steel wire on the pot.
- Make designs by cutting up thin metal sheets or mesh sheeting into geometric shapes and wire them onto the pot.
- Wrap your pot in a few strands of seaweed.
- Instead of or in addition to wood chips, try other reduction materials such as straw, pine needles etc.
- Use paper tape to make designs on a pot and see if it will act as a resist to the smoke and fumes.
- Use your imagination and add weird ingredients (not toxic) like cat food, crushed vitamins tablets, banana peels, etc.
- Put ferric chloride on a pot or parts of a pot but wear a vapor mask if you are close to the kiln.

Saggar Firing with Naked Raku Pop-Off Slip

For an interesting effect using naked raku pop-off slip (see page 76), apply slip as instructed and place the piece into a prepared saggar. Various effects include black, when closed in a sealed saggar; or gray, black and sometimes peach when loaded just like a regular saggar. Fire at 1500°F–1600°F (815°C–870°C) for 15 minutes then turn off the gas. Leave in kiln until cool (firing at a higher temperature adheres the slip to the pot and it is difficult to remove.)

Conclusion

Saggar firing takes patience in discovering the right combinations mentioned above, and the right temperature for your kiln. Do not give up. The results are always different but can produce beautiful surprises. Ceramic art is so full of possibilities that even within the area of alternative firing there are many more areas to explore. In the future we would like to work with red and black terra sigillata, firing red terra sigillata in a variety of techniques and go full circle in our alternative firing experience by returning to blackened-ware pottery.