

SAGGAR FIRING

IN AN ELECTRIC KILN

A Practical Handbook



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2 REQUIREMENTS YOUR WORK MUST MEET



2. REQUIREMENTS YOUR WORK MUST MEET

The size of the pieces you can fire is limited by the size of your saggar. As I explained in chapter 1, it is not wise to construct a saggar larger than 11" by 11"/30 x 30 cm. Large pieces are therefore not suitable for saggar firing. If you are looking for an alternative way of firing larger pieces of work, think of pit firing.

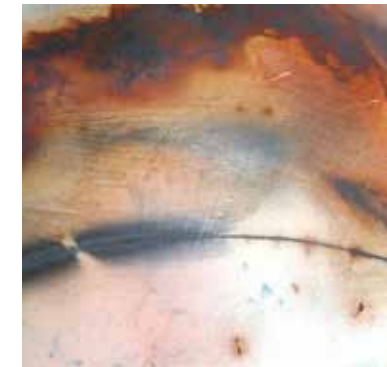
2.1 CLAY TYPE AND SURFACE OF THE WORK

You can use all types of clay for your work, both casting slip and molding clay, with or without grog. It is not necessary to use a special clay type, like raku. White-firing clay will give a white background, on which colors will stand out nicely. Colors will become even brighter when you apply terra sigillata to your piece (see section 2.2). Of course you can also use colored clay.

Saggar firing can produce quite busy-looking patterns and colors. These will stand out nicely on a smooth surface. I enjoy exploiting that. However, a rough surface can also yield very beautiful results.



A smooth surface with terra sigillata



A coarse surface without terra sigillata



TERRA SIGILLATA RECIPE | Instructions

A very thin engobe for a slight sheen. Recipe with ball clay.

You could write a book in itself about making and using terra sigillata. I have one recipe that I use all the time, because it gives a nice, white terra sigillata.

RECIPE WITH 250-GRAM BALL CLAY:

- > 0.55 lb. ball clay
- > 0.84 pt. water
- > 0.1 tablespoon sodium silicate
- 0.05 oz. sodium carbonate

If you want to make more or less, you can increase or decrease the quantities proportionally.

Add the sodium silicate and sodium carbonate to the water and make sure everything is dissolved.
Add the solution to the ball clay and stir well.
Leave this for at least 24 hours. You will see three layers:
water (top, a very thin layer), terra sigillata (middle), and the more heavy particles (bottom).
The layer of water is so thin that I don't bother to separate it.

Carefully pour the terra sigillata together with the water into a sealable container. The heavy particles remain on the bottom. The longer you leave it, the finer the terra sigillata will become. Stir well every time you use it.



Do not discard the rest of the ball clay.
Let it dry and use it to make an engobe or slip.



water

terra sigillata

heavier particles

2.2. USING TERRA SIGILLATA

To give your work a light shine, you can polish it. But I always find polishing quite a chore. Another way to obtain a shine is to use terra sigillata. In addition to a shine, your work will also get a nice, white background and colors will become brighter.

Terra sigillata (literally: sealed earth) is a very thin, watery engobe that contains only the very lightest clay particles. Terra sigillata will lose its shine at firing temperatures above 2012°F/1100°C. If you are going to fire your work at such high temperatures, applying terra sigillata makes little sense.

You can buy terra sigillata ready-made or make it yourself. I make my own and I always use the same recipe, with ball clay, because this produces a beautiful, white terra sigillata. If you want a base of a different color, you can also use a colored terra sigillata.



Sibelco 2502 after the bisque fire (1922°F/1050°C). Left with terra sigillata and right without terra sigillata.



APPLYING TERRA SIGILLATA | Instructions

Apply the terra sigillata to the bone-dry clay. This is best done using a slip trailer or other spraying applicator. You can also use a brush, but take care: you can easily wipe off a previous layer. When using a brush, apply three layers; using a slip trailer, two layers should suffice.

1

Place a drip tray (mixing bowl or the like) on a turntable.



2a

Put a sieve inside the drip tray, in such a way that it does not stand on the bottom.



2b

If your drip tray is larger than the sieve, put your sieve in upside down.



4

Place your piece on the sieve and spray on the terra sigillata while rotating. Work quickly in order to minimize streaks. Cover the complete surface of your piece in one go. The terra sigillata runs through the sieve into the container below, thus preventing the piece from ending up standing in a whole layer of terra sigillata.



3

Fill one or more slip applicators with terra sigillata. The tip should be at least 2 mm.



If your work is too big for the sieve, place it on two slats above the drip tray. Use narrow slats and do not leave the work on it for too long, because you will soon see the imprint of the slats in the work.

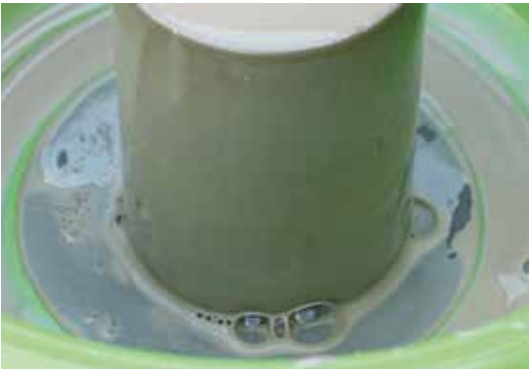
5

Wait for the clay to absorb the terra sigillata. This occurs in only half a minute; the terra sigillata will then still be wet, but it will no longer shine. Spray on a second layer.











6

The sieve remains wet, so once the terra sigillata has been absorbed, remove your work from the sieve. Once the piece has absorbed the terra sigillata, you can handle it without leaving fingerprints. Wait for a few seconds until the part that was in contact with the sieve has also absorbed all the terra sigillata, then put the work down. With pieces built from slabs, you will have to be careful that joints do not get too wet, which could make them come off again. Work quickly, and then blow-dry the piece. When the work is completely dry again, you can rub it with a soft cloth; this will make the shine even stronger.



Results of saggar firing at different temperatures of the bisque firing (casting clay)

	No bisque firing	Bisque at 1742°F/950°C	Bisque at 1922°F/1050°C	Bisque at 2102°F/1150°C
WITH terra sigillata				
WITHOUT terra sigillata				

The pictures on the left show my results for a number of test cups. You will notice that the absorption of colors from added materials during saggar firing decreases sharply when the bisque firing is done at temperatures that exceed 192 °F/1050°C. There is little difference in color absorption between the test pieces that went without bisque firing and those that were bisque fired at 1742°F/950°C. However, the risk of breakage is much higher when saggar-firing unfired clay pieces. I therefore recommend to always have your work bisque fired first.

The images give a good indication of the results, but the outcome will not be the same for every type of clay. Moreover, in this series I used only copper wire, steel wool, and cobalt carbonate as coloring materials. Other colorants may give different results. So feel free to experiment with different types of clay and with other oxides and carbonates.

2.3. BISQUE-FIRING TEMPERATURES

I wanted to test the difference in color absorption during saggar firing for a range of bisque-firing temperatures. That is why I made test cups from casting slip, with and without terra sigillata. For good comparison of the results, I always used the same coloring materials: copper wire, steel wool, and cobalt carbonate. Amounts of steel wool or cobalt carbonate are difficult to keep exactly equal between tests. However, I was not interested in small variations due to a little more or less colorant; I wanted to see if any significant differences arose. All test cups have been fired at 1742°F/950°C in an identical-size saggar, with the same combustibles (wood shavings and hay) added in about equal quantities.

In the beginning I bisque-fired at 1742°F/950°C, because I assumed that colors would be less well absorbed by pieces fired at higher temperatures. After a number of tests I found that bisque-firing at 1922°F/1050°C also gives good results. The advantage of a higher firing temperature is that the piece will be stronger than when fired only up to 1742°F/950°C.



2.4. GLAZING YOUR WORK BEFOREHAND

With saggar firing, you add color to your work without using a glaze. Sometimes, however, you still want to glaze an object, such as a vase, on the inside. You can do so before or after the saggar firing. Glazing a work on the inside before saggar firing has a number of drawbacks: the glaze penetrates into the shard, which may reduce the absorption of colors during saggar firing. Ash particles can also get stuck in the glaze, and you will have to use a glaze that is fired at a maximum of 1922°F/1050°C. At higher temperatures, the shard will absorb fewer colors during the saggar firing (compare the results of different bisque-firing temperatures in section 2.3).

The best option is to glaze the inside after the saggar firing. The colors produced by oxides and carbonates will persist, and you can use any type of glaze, high or low temperature. Any blackness created by reduction (lack of oxygen in the saggar firing) will be fired out and disappear (more information on reduction in section 5.3).



Jar 29 was glazed on the inside before saggar-firing it. Because of that, the absorption of colors during the saggar firing is much less. The cobalt carbonate, which was attached to the work, is not even visible at all.



There are several products that you can use to waterproof your ceramics. However, none of these are permanent.



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2017

Slip casting with terra sigillata, 5" by 4"/12 x 10 cm

In the saggar fired with steel wool, copper wire, and other pieces.

2017

Sibelco 2502 without terra sigillata, 9" by 4.5"/23 x 12 cm

In the saggar fired with steel wool, manganese dioxide, and copper wire.
