



Updated 5/4/10

**Hadar Jacobson**  
**Art in Metal Clay**

[hadar@pacbell.net](mailto:hadar@pacbell.net) • [www.artinsilver.com](http://www.artinsilver.com)



## White Bronze Guide

### Instructions for Hadar's Clay™, Quick-fire White Bronze

This guide is written under the assumption that you are familiar with the Instruction Manual for Hadar's Clay™, Quick-fire Copper and Bronze.

#### What is White Bronze?

Quick-fire White Bronze is a copper alloy powder which, after firing, yields a metal with a color very similar to that of silver. It is not to be confused with nickel silver (also known as German silver or alpaca). It contains no nickel.



**Important note:** Just as different silver clays can be very similar in color, the color of White Bronze (both powder and mixed clay) is somewhat lighter than that of bronze but still very similar. Be sure not to mix White Bronze with bronze or to use one instead of the other.

**Compatibility.** White Bronze is compatible with Quick-fire Copper and Bronze. That means: 1. that they bond with each other, unlike silver and copper, and 2. they can be fired together without undesirable reactions like the those that occur between silver and bronze.



However, White Bronze fires at a lower temperature than copper and bronze clay. Therefore, when combining the copper and White Bronze, usually the copper needs to be fired first. After firing the copper, White Bronze can be added and fired a second time.

*White Bronze can be fired in combination with bronze, following the firing schedule of White Bronze (see below).*

**Fusing.** Whenever metal clay that has not yet been fired is fired together with metal clay that has already been fired, pressure is required in order for them to fuse. Since White Bronze can only be fired with *fired* pieces of copper and bronze (as explained in the previous paragraph), it will fuse with them only if there is enough pressure between them. Inlaying white bronze in copper and bronze works fine.

## Preparation

Same as Hadar's Clay™, Quick-fire Copper and Bronze (see demo at [www.youtube.com/artinsilver](http://www.youtube.com/artinsilver) – select the video entitled “Hadar's Clay™ (Improved Formula) – Mixing”).

## Tools

There is no need for separate tools. Just clean the tools when switching from one clay to another.

## Firing Schedule

The firing process is the same as for Hadar's Clay™, Quick-fire Copper and Bronze. It is recommended to fire White Bronze in a fiber blanket box or a ceramic cloth with no lid, and to use coconut-shell carbon as described in the instruction manual for Quick-fire Copper and Bronze.

Like bronze clay, **White Bronze clay cannot be fired with a torch or without carbon.**

*White Bronze clay should be fired tucked well into carbon: 1" below and 2" above. Coconut shell-based carbon does not produce a lot of ash; the ash can be removed and the carbon can be used again.*

Fill the box with a 1" layer of carbon. Cover the pieces with another 2" layer of carbon. Since the firing is long, it is best to fire overnight. The fiber blanket is such a good heat insulator that you may still find the carbon hot in the morning. This means that carbon continues to burn away even when the kiln has finished firing, and the pieces may eventually be exposed to air. This should be avoided at all costs. **If you fire overnight or don't intend to remove the pieces from the kiln while hot, be sure to cover them with a lot of carbon!**

The temperature range in which White Bronze will sinter without melting or deforming is narrower than that of bronze or copper clay. Moreover, actual temperatures may vary from kiln to kiln, as may the accuracy of the temperature shown on the controller. For both of those reasons, the following suggested temperatures are not absolute numbers, nor do you need to test your kiln with cones to find out what the temperature inside really is. Use these temperatures as a starting point to find the appropriate temperature for your kiln.

Shorter Schedule	Longer, Simplified Version
Ramp at full speed to: 500°F/260°C; no hold. Ramp at 400°F/222°C to: 1160°F/626°C (top loader kiln) 1250°F/676°C (front loader kiln) Hold for 3:00 hours.	Ramp at 400°F/222°C per hour to: 1160°F/626°C (top loader kiln) 1250°F/676°C (front loader kiln) Hold for 3:00 hours.*

Total firing time is 4:00 – 4:30 hours.

\*For instructions on programming the kiln, see page 4.

Because of the narrow sintering range noted above, White Bronze can quickly go from not sintering at all to melting or deforming. Therefore, **it is necessary to make test pieces before you begin firing actual pieces!**

## Test Pieces

Fire test pieces of different thicknesses: 3, 6 and 10 cards. Make as many pieces as you would normally fire in one batch. If the metal swells, curls, melts, or becomes textured at the suggested firing temperature, gradually lower the temperature by 10°F/5°C at a time until there is no distortion.

To test thick pieces, sand them with a very course sandpaper or drum. If the sintering was not complete, you will immediately see non-metallic material under the surface.

If pieces have not sintered at the suggested firing temperature, gradually raise the temperature by 10°F/5°C at a time.

Fully sintered pieces are hard, strong, and easy to sand. However, they are not flexible. **Do not try to bend them with pliers or to hammer them, or they will break!** Be sure to do all your bending before firing.

**Shrinkage.** As with Quick-fire Copper and Bronze; shrinkage is less than 10%.

**Finishing** is the same as with Quick-fire Copper and Bronze. White bronze is strong enough to survive heavy-duty finishing. White Bronze also reacts well to liver of sulfur and other patinas.



## Programming the Kiln (demonstrating the shorter schedule)

Press the left button of the controller until you reach a program that is not pre-set. If the left button doesn't bring you there, press the middle button. On some kilns it may be program 6 or 7. On my kiln it says: "User".

Press the left button again. The kiln will say: "Idle." Translation: "I am doing nothing. Tell me what to do step-by-step."

Press the left button again. (Translation: You are telling your kiln: "Start asking me questions.")

The kiln says: "Ra 1" (ramp 1).

Translation: "How quickly would you like me to reach the desired temperature the first time around?"

Your answer is "Full." Press the up and down arrows until you the controller displays: "Full".

Press the left button again. (Translation: You are asking your kiln: "What's your next question?")

The kiln says: "°F 1"

Translation: What is your desired temperature the first time around?

Using the up and down arrows answer: 500°F/260°C

Press the left button again.

The kiln asks: "HLd1" (hold 1). (Translation: "How long should I hold at that temperature?")

Your answer: "No hold." (To say this, press the up and down arrows until the display reads 00:00).

Press the left button again.

Now the kiln asks: "Ra 2" (ramp 2). (Translation: "How quickly would you like me to get to the desired temperature the second time round?")

Your answer is again: "400°F/222°C".

Press the left button again. The kiln says "°F 2".

Your answer: 1160°F/626°C (top loader kiln); 1250°F/676°C (front loader kiln)

The kiln asks: "HLd2" (hold 2)

Your answer: 3:00 hours

Press the left button again: The kiln says: **Start**.

Press the left button again. The kiln says: "**ON**".