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Steel Clay Guide

Instructions for Hadar's Clay™, Steel

This guide is written under the assumption that you are familiar with the Instruction Manual for Hadar's Clay™.



Preparation

Preparation is the same as Hadar's Clay™, copper and bronze (see Instruction Manual for Hadar's Clay™: <http://artinsilver.com/Manual-new.pdf>).

Storing the Clay

The powder clay should be stored in an airtight box in a dry area. Mixed clay should be stored in the refrigerator, wrapped in plastic food wrap in a sealed box. Before wrapping it, form it into a lump and coat it with olive oil.

It is best to mix only the amount that you are going to use within a day or two, since the clay itself may rust. If the clay rusts, it will feel somewhat grainy, and after rolling and drying it will look as if it were mixed with copper.



This piece rusted before firing, and although completely sintered after firing, it developed considerable pits.

Working with the Clay

Use as little water as possible. To smooth a surface, you can rub it with olive oil instead of water. When not working with a piece, leave it on the warming surface to protect it from moisture.

Tools

There is no need for separate tools. There is no cross-contamination between steel and other metal clays. Just clean the tools when switching from one clay to another.

Storing Dry Pieces

If pieces are not fired right away, it is recommended to coat them with olive oil and wrap them in plastic food wrap.



Firing

Firing is the same as for Hadar's Clay™, copper and bronze. The suggested firing temperature in the second phase is at least 1700°F (926°C) in a top-loading brick kiln, and 1780°F (971°C) in a front-loading fiber kiln. The sintering temperature has a wide range, and can be brought up to 2000°F (1093°C). If there is no sintering in your kiln at the suggested temperature, raise the hold temperature in the second phase by 50°F at a time, until sintering is achieved.

Firing steel with another clay in a single piece may compromise sintering.

The Lid: instead of a stainless steel lid use a sheet of fiber paper (shelf paper, available from glass fusing supplies in big rolls), 1/8" thick. It allows gasses and contaminants to escape, which is crucial to the sintering process. It is also cheaper than a lid and can be used several times.



The Box: the firing box will disintegrate after repeated firings. Considering the cost of the steel box, it may prove more economical to use stainless steel mixing bowls, which can be purchased for as little as \$1. These can be used for one firing only.



Shrinkage

Shrinkage is very close to that of copper clay (about 15% for flat pieces).



The circles were cut with the same cutter. The copper circle shrank a little more after drying. The copper and steel ended up about the same size after firing.

Finishing

After firing, the surface of non-textured steel is grainy. It can be buffed and left as is, or sanded to a very smooth finish. Start with sanding drums, 80 or 120 grit.

Rusting

The specific steel powder used in this product does not rust as readily as other steels. However, it is recommended to seal it as described below.

If rust is desirable, it can be achieved by exposing the metal to water over a few days (repeatedly dip in water and let dry in the air), or by using a rusting patina. The patina is available from hardware stores and craft supply stores, such as Michael's. After rusting, sealing is required, or the steel will keep rusting and eventually disintegrate.



Protecting from Corrosion

Oiling: Clean the piece with denatured alcohol (available from hardware stores). Rub the piece with machine oil or turbine oil. You can also use Birchwood Casey oil (available from Amazon and www.birchwoodcasey.com), or rust inhibitor spray (available from hardware stores).



Waxing :After the oil is dry, seal again with Carnauba Wax (available online and from auto supply stores), Renaissance Wax, or Sculpt Nouveau wax (available from www.sculptnouveau.com). In each case follow the manufacturer instructions.



Blue Patina

There are many ways to blue steel, and there is an ongoing debate as to which way is best. Suggested here are two processes for bluing. If performed prior to sealing, both contribute to the quality of sealing.

Hot Bluing (also called tempering)

Heat the piece with a torch. When the desired color appears, immediately dip in cold water. You can also heat the piece in a kiln up to about 600°F/315°C. For even color, bury the piece in alumina hydrate. The color is an oxide layer that provides some protection from further rusting, but sealing is still required.



This rock was held by the wire and heated gradually with a torch until it turned dark blue. After quenching it looked like hematite.

Cold Bluing

A blue patina can also be achieved by applying a little bit of Birchwood Casey Super Blue (available from Amazon and www.birchwoodcasey.com). After bluing, sealing should be done with oil and wax as described above.



Hot Bluing



Cold bluing



In actual life the blue color is more subtle than in photos.

Stainless Steel Clay

Stainless steel clay should be stored like bronze and copper clay. It is not likely to rust before firing. The firing instructions are the same as for copper, bronze and steel clay. The minimal sintering temperature (the hold temperature at the second phase) is 2200°F (1204°C).

Since stainless steel is not 100% immune to corrosion, it is recommended to seal it as described above under "Protecting from Corrosion."



Please note that contact of stainless steel with carbon at high temperature is most likely to compromise the steel's resistance to corrosion.

Protecting Your Kiln

Firing with carbon at high temperatures may cause the carbon to fall onto the kiln floor. To protect the floor, line it with the same kind of shelf paper that you use as a lid.



The shelf paper in the right-hand photo is covered with carbon and oxidized steel that sheds off the box.

You can clean the shelf paper and use it a few times before it disintegrates.