



Etching Kit includes:

E3 Etch/Eform™ electronic controller

Stainless Steel pan

2 electrodes (aluminum wire)

Copper Sulfate*

4 Foam Spacers (to suspend the copper in the pan)

1 Copper square, 1 copper blank

Ready to use images-printed on E3 Etch laser paper

*Copper Sulfate: Keep this away from children and pets as it is hazardous to ingest. Avoid contact with skin and eyes, wear rubber gloves and eye protection as it can be an irritant. The solution can be re-used and stored in liquid form (strain with coffee filter to remove debris). The amount used in kit can be reused and replenished by adding water. No need to dispose of it. To etch silver use a Silver Nitrate solution instead of copper sulfate (silver nitrate is not included in kit). For Electroforming, see enclosed instructions for supplies and steps.

Supplies Needed for Etching:

Packing Tape

600 grit sand paper

Rubbing alcohol

Cotton swabs

Water- use distilled if you have hard water

Resist method to create design for image:

- A) Black laser toner image printed on E3 Etch paper (or use pre-printed designs included in kit)
 - Household iron
 - Wooden board for ironing
 - Press cloth (old pillowcase works well)
- B) Oil based paint marker or Fingernail polish
- C) E3 UV-30 resist (see our website for more information)

Steps for E3 Etching

Choose a resist method to apply a design to your metal. In addition to the methods described here, you can mask the metal with tape or stickers or use permanent rubber stamp inks. The metal will etch wherever the metal is exposed.

1. For all methods, prepare the copper blank by sanding it with 600 grit paper. This will give the metal some “tooth” to help the resist to adhere. After sanding, clean the surface with rubbing alcohol using a cotton swab. Dry the piece, and avoid touching the surface. **Remember to peel the protective plastic coating off of the copper before sanding!**



2. For the direct toner transfer method (A): Print a black and white design into E3 Etch laser paper using a toner based laser copier. Choose a design with strong lines and crisp details. The black areas of the design will act as a resist in the etching solution. Cut the design to fit your copper blank. Hint: If the image has text, print the image in reverse so that the orientation of the text will appear correctly on the copper.

- To Transfer the image to the copper, place the copper on a wooden board and place the image face down on the copper. Use a press cloth to cover the paper being careful not to displace. Press the piece with an iron set on high heat (cotton or linen setting); press with firm pressure for about 1-2 minutes. Cover the entire surface to evenly heat. Check the piece to make sure the paper is adhered. The paper should be flat with no ripples where the ink is if heated and pressed properly. You can press longer to make sure it is properly heated for the transfer.



- After the piece cools for a few minutes, place the piece in a dish of water and let it soak for about 10 minutes. Carefully remove the paper backing by rolling the paper fibers off with your fingers. Re-dip the piece in water to moisten if needed. Dry the piece off with a cloth or towel. If sections of the design did not transfer, use a paint pen to color in the areas. Nail polish also works very well as a resist. If your transfer didn't work, you can always sand the piece and start again.



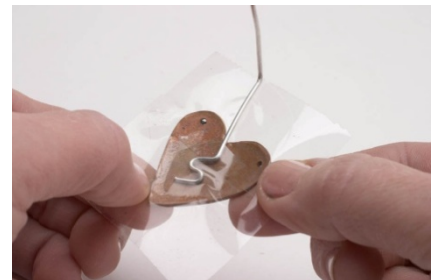
- Resist option (B): Designs can be created free hand by using an oil based paint marker instead of a transfer, or you can combine the two methods to create your design. For the most durable resist method use (C): E3 UV-30 resist kit (this resist does not flake off during etching and produces pristine results). See our website for more information.



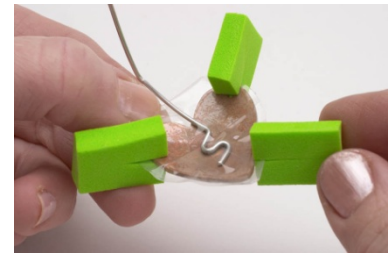
- To prepare your copper for etching, paint around the edges of the piece with the oil paint pen, fingernail polish or fold tape over to mask the edge. Apply a piece of tape covering just part of the piece on the back side as shown. Part of the copper is left exposed in this step to allow you to add the electrode wire described in the next step.



- Bend one of the aluminum wires enclosed in the kit into a 90 degree angle or "L" shape at about the middle of the wire. This wire will serve as an electrode to conduct the electricity (see the bend at the right in this photo). Make a few short bends at the end of the wire (zigzag or "s" shape" as shown). Position the zigzag end onto the exposed part of the copper. The metals must touch to properly conduct, so make sure you are placing the wire below the tape that was applied in step 6. Place a second piece of tape over the wire to hold it in place and to insure good contact. The tape will also protect the copper from the etching solution. Fold the edges of the tape over or trim close to the edge. At this stage the entire back and sides of the copper should be taped or masked off. If you are using copper strips to conduct the electricity, wrap tape around the strip leaving just the top and bottom exposed so that the solution will not "eat" the copper away. With aluminum wire this is not necessary.



8. Mix the etching solution. (To etch on silver, use silver nitrate solution, see website source.) Keep the supplies away from children and pets as it is hazardous to ingest. For copper and brass, mix and dissolve 4 heaping teaspoons (24 grams) of the copper sulfate powder in 12 oz (350ml) distilled water in the stainless pan. It helps to do this in advance to give the crystals time to dissolve. It is not critical that the amounts are precise; you may use more or less water. Hint: use distilled water if you have hard water, as hard water interferes with the etching process. Attach the foam spacers around the shape to be etched to suspend it level with the bottom of the pan. Make sure the foam does not cover any part of the copper you wish to etch. Attach to folded pieces of tape to aid you as a place to affix the spacers without disturbing your design.



9. Attach the black clip to the pan and the red clip to the exposed end of the electrode wire. The first photo shows the orientation of the clips and piece just as it is about to be set down in the bottom of the pan (9A). Set the piece down so the spacers touch the bottom of the pan (9B).



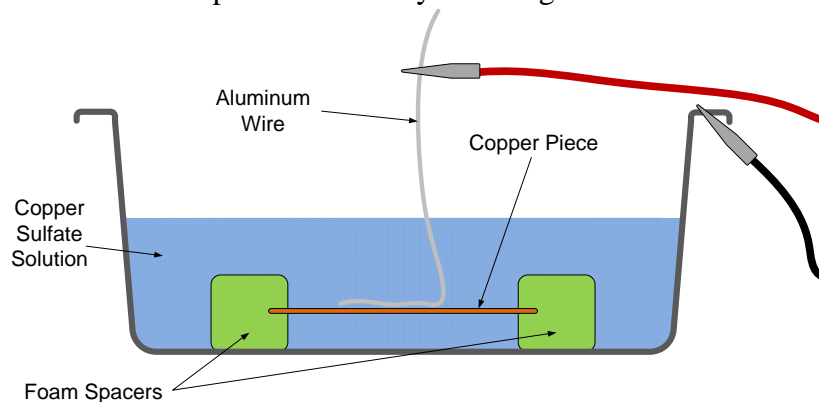
9A



9B

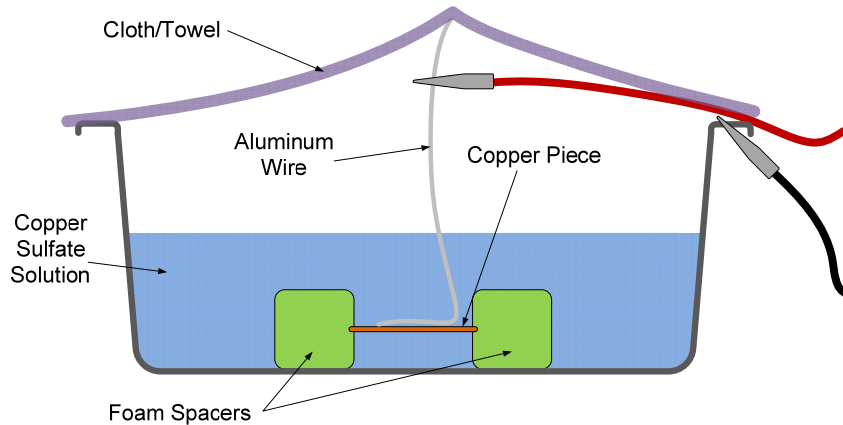
Submerge the copper piece with the design FACE DOWN*, the spacers will keep the copper from touching the bottom of the pan during etching. **The spacers need to sit on the bottom of the pan so that there is about 1/2 inch (1.5cm) distance between the bottom of the pan and the copper, the piece of copper should be level and should not float or move (9C).**

*Etching is achieved as an electric current and solution work together to transfer the copper from the piece, plating it directly to the bottom of the pan. This is why the design faces the bottom of the pan.



9C NOTE: The copper piece is fully immersed in the Copper Sulfate solution and is held $\frac{1}{4}$ to $\frac{1}{2}$ inch above the bottom of the stainless steel pan by the foam spacers.

10. Etching Small metal pieces-Sometimes the piece will attempt to float instead of sitting on the bottom, especially if the piece is small. Simply drape a dishcloth, light weight booklet or similar item over the top of the pan and cables pushing down on the aluminum wire which will weight and hold the piece down as it etches.

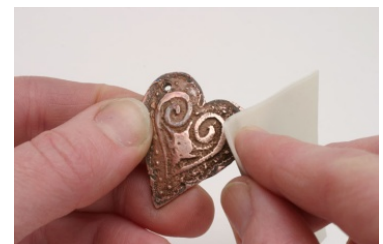


NOTE: Very small copper pieces may tend to float; this can be solved by draping a cloth or small towel over the pan. The cloth/towel will push down on the tip of the aluminum wire holding the copper piece down.

12. Set the E3 controller on ETCH. Turn the power on, the green light will indicate that the power is on. The red light will indicate that the clips are properly attached. If the red light does not appear, check to make sure that plastic or tape not interfering with the copper and wire contacts. Wait 2 hours for the etching to occur, leaving the piece undisturbed. Resist the urge to “check” the progress too frequently, as moving the piece may disturb the resist paint or toner. If using UV resist you can check it often without worry of the resist flaking off. For a deeper etch you can leave it for an additional 1- 2 hours or longer. Stop etching when the desired depth is obtained. Turn the power off and unclip the wire. Rinse the piece off and dry it after etching. Remove the toner with acetone using a cotton swab.



13. Finish the metal as desired. Add patina to darken recessed areas. Use a polishing pad to remove the patina from the raised areas of the design. Etched metal can be used for finished pieces and to make texture plates for clay or printing. Bronze and copper metal clays can also be etched using the E3 Etch controller with copper sulfate.



How to Etch on .999 and Sterling Silver See more information: www.sherrihaab.com/etch

The controller can be used to etch on silver in the same fashion as etching on copper and brass. The difference being that you need to use silver nitrate as an electrolyte instead of copper sulfate. Silver nitrate is a chemical compound available in powder form or in a pre-mixed solution. You will only need a small amount to etch with. After each use it can be filtered and re-used for future etching projects. Silver nitrate is light and air sensitive, so keep the mixed solution in a closed container in a dark cupboard. Use a dedicated pan for silver nitrate; see our sources for where to order more stainless pans.

A few words of caution: It will stain your skin black, and so it is mandatory to wear gloves and to be careful about handling the powder. Even a small crystal will stain your fingers. Avoid contact with skin and eyes, wear rubber gloves and eye and respiratory protection as it can be an irritant. Mark the solution well as it is poisonous to ingest. Follow all of the safety guidelines from the supplier, making sure to keep out of reach from children and pets.

Silver etches about 3-4 times faster than copper. As sterling etches you will see a small amount of dark residue form during the etching process. This is the copper extracted from the sterling. These small amounts of copper dissolve into the solution and over time you may notice the solution turning blue in color. As the solution becomes more saturated or weaker, it may be time to mix a fresh batch to etch with. After each etching session, filter the solution through a coffee filter and store in a marked bottle for storage.

Prepare your silver piece for etching

Follow the same steps as for preparing copper pieces for etching. You can etch on sheet metal or fired metal clay. Use a Sharpie oil based paint pen to apply designs on beads or irregular surfaces.

Technique for etching on a tube or bead shape

To etch on a bead, suspend the bead from a bent aluminum wire so that it holds the piece level with the etching surface face down. You can suspend the wire between wooden chopsticks as shown instead of using foam spacers. Make sure the bead is placed in the solution at a level to etch only where you want to remove silver. Remember to keep the piece close to the bottom of the pan but not touching!



Mixing the silver nitrate solution

For the silver etching solution, you can mix your own (10gr. Powdered silver nitrate with ½ liter of distilled water). Please refer to our sources for more information on etching silver. Remember to wear gloves and follow safety precautions. Set the E3 Etch controller to ETCH to begin etching. The etching will take 30 minutes to 2 hours or more depending on how deep you want the finished relief pattern to be.

Finishing

Rinse off the metal and etching wire under water, remembering to wear gloves. Finish the silver as desired.

In addition to copper, brass and silver etching you can etch on copper and bronze metal clay. Follow the directions for etching with copper sulfate to etch copper and bronze clay. To etch on silver clay, use silver nitrate as directed for silver. E3 etch can also be used for electroforming and electroplating using the appropriate electrolyte solution and supplies that are applicable for the metal being used. Techniques and supplies vary depending on the process.