

## Annealing Argentium Silver - By Cynthia Eid

### Application of Torch Heat

Argentium Silver retains the heat where the torch has been, rather than dissipating and transmitting the heat, the way SS and copper alloys do. It is nearly always best to anneal in sequential areas, rather than trying to “heat the whole thing”. For instance, when annealing a large piece of metal, or a long piece of thick wire, work one area at a time, then an adjacent area, then another, etc. sequentially. Do not try to get the whole piece of metal hot at one time, unless it is a small piece (for example, a 1 1/2 cm square that is 24 ga/. 5 mm thick).

### How To Know When The Argentium Silver Has Reached Annealing Temperature

With most metals, we usually heat the metal until it glows a soft, dull red. However, this is best done in a dark room, which we do not always have available. Also, the glow of Argentium Silver is VERY soft, and difficult to see, even in pitch-black darkness. Since over-annealing causes large crystals to form in the metal, producing brittleness, I have experimented to find other ways to know that Argentium Silver has reached annealing temperature.

- **Method A** Here is the method I use with Solderite, or other non-charcoal soldering boards:
  1. Scribble all over the surface with black Sharpie permanent marker (not another brand, and not the industrial marker with red lettering--- each ink burns at a different temperature).
  2. Heat until there is only a “ghost” of the marker remaining. The mark does not completely disappear. Sometimes, it seems like it gets dark again, after I saw it fade.  
When that happens, I try to ignore that, knowing that I DID see the marker fade.
- **Method B** Charcoal creates an oxygen-reducing atmosphere, so the exposed surface of the AS should be coated with flux to be sure that no firescale is created. Yellow liquid fluxes, such as Rio Grande’s My-T-Flux and Batters, and Auflux work best for me. Paste fluxes can cause firescale on both AS and SS, so I do not recommend them.
  - How to apply liquid flux so that the entire surface is covered:
    - Clean the metal. A greasy surface repels liquid. Metal that has been heated and pickled is clean. Putting a metal in the pickle without annealing or soldering will not remove grease, because pickle only removes oxides. Heat burns up grease and finger oils. Other ways to clean the surface include: scrub with a scotch brite pad; scrub with pumice and water; scrub with a brass brush and detergent. Metal is grease-free if water “sheets off” the surface, rather than beading up.
    - Apply the flux with a brush or sprayer, and then heat the flux gently, with a soft flame, to dry it to a white powder. If this there are bare areas after the flux dries, lightly dab more flux on the bare areas, and gently heat again. Don’t let the brush be *too* wet, or it can liquefy all the dried flux. Ideally, the metal is hot enough that the flux dries immediately upon touching the metal. Very brief applications of heat alternating with dabs of flux works best. If the metal discolors, that indicates that you are overheating. Continue to alternate between applying flux and heat until the metal has a white coating.
  - Heat the metal, remembering that AS does not transmit heat like SS or copper alloys. Heat one area at a time, unless it is a small piece of metal. When the flux is fluid, but bubbly and sticky, the silver is annealed. If the flux gets smooth and clear, it has gone a bit past annealing temperature.

### Annealing A Coil Of Thin Wire

Thin wire can be tricky to anneal, since it can be difficult to get all the wire evenly heated to annealing temperature. Thin Argentium Silver wire in a coil can easily fuse together if annealed with a torch. Thin traditional sterling silver wire may melt in areas. Here are two other methods:

- **Kiln Method:** If you have access to a kiln, set the temperature to the annealing temperature (1050°F/565°C for AS). I like to use a dab of flux to let me know that the metal has reached annealing temperature. When the flux is liquid, but still bubbly, it is at annealing temperature. When flux is smooth and clear, it is above annealing temperature (at soldering temp.)
- **Torch Method:** A low-tech way to anneal wire without a kiln is to put the wire inside of a steel container and heat the container with a torch until the container glows red. I have used the containers that mints and candies often come in, as well as a tuna can (I use a can opener that leaves smooth edges, rather than sharp edges.) Before using a container for annealing, I turn on the vent, and heat it to glowing red, to be sure it is made of a material that can withstand the heat, and to burn off any coatings.

### Quenching Argentium Silver (and Traditional Sterling)

Though it is a common practice amongst many jewelers and silversmiths to quench the object in water immediately after soldering or annealing, I have developed a different routine, based on my teaching and personal studio experiences. My observation has been that quenching silver alloys too soon can lead to warpage or cracking. Since coming to this conclusion--- that it is good to wait a bit before quenching---I have learned that all silver alloys should be quenched at black heat, rather than red heat. If we are working in a darkened room, black heat is when there is no red glow to the metal. But how do we determine black heat when we are working in a lit environment?

Here is what I do in order to know when it is safe to move or quench any sterling silver alloy—including Argentium Sterling: I dip tweezers or finger into the quench water, and drip a little water onto the metal. If the water dances around the metal in the form of droplets, then the metal is too hot to move or quench. If the water sizzles when it touches the silver, then it is cool enough to quench.

I developed this habit years ago, before AS was developed, after seeing problems from SS being quenched when too hot. This temperature-gauging system is especially important when working with Argentium Sterling. AS cools more slowly than traditional SS because AS contains the element germanium, which is a semi conductor--- therefore your work stays hot longer than usual, and may be hotter than you realized when it was quenched. Taking a few moments to clean up the work area is usually enough time for the metal to cool to black heat. Having a way to be sure that the silver jewelry I’m working on is cool enough to quench has been a help to my students and me.

Remember that the back of a flat sheet of AS is likely to discolor, but it is only the surface. Pickle will remove it. After a few more annealings, the surface will be depleted of copper, which is what is darkening---just as with traditional SS.