

Basic Guide for Working with Argentium Silver – The Essentials to Get Started Working with AS by Cynthia Eid

It is a Sterling alloy, and can be simply stamped sterling silver. AS Unicorn logo stamps are an option.

- 93.5% silver, 1.2% germanium, 6.3% copper
- Invented in 1990s by Peter Johns at Middlesex University in England

Tarnish Resistant and Firescale-Free

- Argentium Silver is highly tarnish resistant **IF** the appropriate finishing steps are taken:
 - *After finishing, heat the metal* to create germanium oxide, which prevents tarnish and firescale.
- No silver alloy is 100% tarnish-proof.
- The surface may discolor during annealing, soldering or fusing. Pickle cleans the surface.

Conductivity of Heat

Argentium Silver does not conduct heat the way in the same way as traditional sterling (SS) or copper. AS retains heat longer; the heat does not spread throughout a piece of AS like it does with SS or copper. The heat conductivity is similar to gold and to pewter alloys. This means that annealing and soldering need to be done differently than with traditional SS. Heat one area at a time; not all over. Less heat, and smaller flames, with smaller torch tips, are generally used, than with traditional SS.

Argentium Silver CAN be Fragile when Red-Hot Do not press to fit when soldering. It is ok to bind with wire or pins before soldering. Wait a bit to pick up, and to quench.

Annealing

- Use a heat-reflective soldering surface. My favorite is Solderite, but many prefer charcoal.
- Fluxing the entire surface is important with charcoal, since it creates an oxygen-free atmosphere. Use the flux as a temperature indicator. The metal is annealed when the flux is melted, but still bubbly (not as smooth as the flux is when solder is ready to melt).
- *Argentium silver glows a paler color* than traditional SS at “red-hot”---it is difficult to see, even when dark.
- Flux is not needed if not using charcoal, so I use a Sharpie as a temperature indicator when annealing. Scribble with black Sharpie (not another brand, and not an “Industrial” Sharpie) all over the silver. Heat until there is only a “ghost” of the marker remaining. The marker does not completely disappear.
- *Anneal in sequential areas*, if the metal is a larger than about 1” x 1” (2.5cm x 2.5cm) rather than trying to “heat the whole thing at once”, since Argentium Silver does not transmit heat like as SS.
- *Annealing occurs surprisingly quickly.* Do not over anneal (over-annealing makes a metal brittle.) Stop heating when the Sharpie marks are mostly faded. Annealing often takes less than a minute.

Quenching

AS cools more slowly than traditional SS. Here is what I do in order to know when it is safe to move or quench Argentium Sterling: I dip the tweezers into the quench water, and drip a drop of water onto the metal. If the water dances around on the metal in the form of a droplet, 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.

Air-cooling completely is also an option. The difference in hardness after air-cooling compared to quenching is very small. Quench in water before putting into the pickle; it is safer for your body, as well as for the metal.

Soldering

- *Flux the seam only (unless using charcoal).* Allowing oxygen access to the surface creates germanium oxide. If you use charcoal, it will be important to heat the metal off the charcoal later, for tarnish resistance.
- *Heat the areas next to the seam.* Do not heat the whole piece of metal at once, or try to have all the solder flow at once. For a long seam, start at one end, and work sequentially to the other end.
- *Do not press hot AS* to fit during soldering. (It may break.) Pin or bind seams to fit before soldering.
- If the solder has flowed through the seam, do not keep heating to try to melt the remainder of a solder pallion. Clean up the left-over solder after pickling. Incomplete melting of solder is a sign of heating too gently.
- Pickle and rinse to remove oxides.
- Liquid fluxes, such as Rio Grande’s My-T-Flux, Batterns, and Auflux work best for most people. Most paste fluxes can cause firescale on both AS and SS.
- Both pieces of metal need to reach the same temperature. The hot metal melts the solder. Put more torch heat on the larger piece of metal. If solder balls up, the flame is on the solder too much---direct the flame to the metals that you are joining.

Fusing

- When the metal fuses, the joint looks as if it has been soldered---we see a “fillet” of molten metal at the joint, just as with soldering.
- Do what is necessary for you to see the joint well when it flows.
 - I like to set things up so that the joint will be near my eye level. I do this by raising the soldering surface, or lowering the chair, or both.
 - I like to wear a magnifier so that I can see the joint well.
 - I like lots of light, but some people prefer to dim the lights.
- The surface of the silver often melts and looks liquid. Some people say it looks like mercury.
- It is fine to re-fuse after pickling and rinsing well, if the joint did not fuse well.
- For large pieces, heat an area at a time, rather than the whole piece at once.

Finishing

- File, sand, and polish completely, using the usual processes and tools.
- For the best tarnish resistance, if a tool could smear the prior metal onto the surface of the Argentium Silver (e.g. buffs and radial bristle discs), then keep separate tools for AS.
- Consider setting any stones after the next step: heating.

Heat to Increase the Tarnish Resistance

The higher the temperature, the more excited the Germanium atoms get, and the thicker the layer of germanium oxide that is formed. (Germanium oxide is invisible to the naked eye. GeO_2 prevents oxygen from passing through, thus preventing tarnish and firescale. Silver is one of the few metals that allows oxygen past the surface.)

- If stones have been set, then use any heat that is safe for the stones to encourage the creation of germanium oxide. If possible, heat at 250°F (120°C) for two hours, but even 100°F (40°C) for an hour is helpful. These temperatures do not usually cause discoloration.
- **Hardening** is not a requirement for AS, but it is an option that makes the metal sturdier, while increasing the tarnish resistance at the same time.
 - AS can be hardened from any working condition. Maximum hardness is achieved by hardening after annealing and quenching, but I don't do it. You can harden after tumbling.
 - AS can be hardened by heating for two hours at 580°F/290°C. Air cool afterwards.
 - If a kiln is not available, a toaster oven can be used for 3 hours at 425°F/220°C
 - The alloy will not appreciably lose its hardness if left in the oven an hour or so longer, but do not heat overnight.
 - Do not enclose the Argentium® Sterling when heat-hardening. Exposure to oxygen is needed to create the germanium oxide that prevents tarnish. I use an open pyrex dish.
 - The hardening process will not have any negative effect on fine silver, sterling silver, gold or copper alloys that are used in combination with Argentium® Sterling Silver.
 - Synthetic stones can be set before hardening.
 - Should the need arise, the alloy can be annealed and then re-hardened.
 - Pickle to remove any discoloration or oxides formed by heating.
 - Re-brighten the surface if necessary, by lightly repeating the final finishing step (lightly rouge, or use a rouge cloth, or re-tumble, or brass brush with soapy water,)

ADD THIOL to the surface for additional tarnish resistance

This chemical seems to bond with AS, to prevent tarnish. Thiol is in Argentium Silver Care Cloths, Goddards Long Shine Silver Cloth and polishes, and Tiffany mitts.

If difficulties arise, learn more. This is meant to help you get started, since most people learn a bit at a time.

- Read Cynthia Eid's more detailed handouts at www.cynthiaeid.com, under FAQ
- Download the overview article *Road Testing Argentium Silver* at www.cynthiaeid.com
- Detailed article: **Working with Argentium Silver: Tips and Procedures** at www.riogrande.com
- Purchase and watch Ronda Coryell's DVDs. Clips are available on YouTube.com
- Take a workshop from Cynthia Eid or Ronda Coryell
- Read and download info from www.argentiumsilver.com

Questions can be asked, and answers received:

- Join the Facebook group *Argentium Silver Network Page*
- Email info@argentiumsilver.com
- Join the Guild at www.argentiumguild.com