

Silver Soldering for Wire and Chain

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Silver Soldering is the process of joining two or more pieces of metal together by the use of an alloy called solder. The **flow point** of the solder should be lower than the **melting point** of the metal(s) being joined.

*Melting Point - The point at which the metal, under heat, begins to lose its structural integrity, i.e.: the crystalline structure begins to break down.

*Flow Point - The point at which the metal becomes liquid.

This handout is written specifically for soldering wire and chain. The principle is the same as that for general silver soldering for jewelry, but some specific techniques are emphasized.

Steps for Successful Soldering

1. **Fitting** - The pieces to be soldered must fit together closely in a tight, even joint. When held together up to a light, little or no light should be visible through the crack. If fitting is done properly, this will result in a solder joint that is:

*Stronger

*Nicer looking

*Easier to solder

2. **Cleaning** - Solder will **NOT** flow on dirty metal. The metal must be free of grease, oils (including finger oils), dirt, oxides, buffing compound, etc. Ideally, the wire should be cleaned prior to making the jump rings - and if kept clean, should not require additional cleaning before soldering. If the rings need to be cleaned, slip a fine file between the ends of the wire and move back and forth until clean.

3. **Fluxing** - Flux is a mixture of mostly borax and water. It protects the surface of the metal from oxidation during the heating process. **Flux must be used wherever solder is to flow.** Flux is also an indicator of temperature. The flux becomes glassy at approximately 1200° F. Flux should be "pasty" in consistency. If needed, add distilled or purified drinking water - but **do not** use tap water - the mineral content is too high and the flux will not keep the metal clean.

4. **Heating the Metal** - The pieces of metal being joined should reach the flow point of the solder **at the same time**. Because the wire or chain is typically small and delicate, use a small tip on the torch (a #1 or #2) and turn it down very low. The technique that usually works well when soldering on wire or chain is to pick solder. Cut a SMALL portion of solder, place it on the firebrick and heat it with a torch until it melts and rolls into a ball. Immediately stab it with a solder pick and remove the pick from the flame so the solder stays in a ball on the tip of the solder pick. Using the "brushy" part of the flame, heat the areas adjacent to the joint. Once the flux becomes "glassy", center - in on the solder joint by moving the flame closer (approximately 1" from the light blue cone) and heating directly on the joint in addition to continuing to heat the surrounding metal. Move the solder pick with the solder near the joint. Occasionally touch it to the joint. It may flow right away or it may stay in a ball but transfer to the jump ring. Heat until the solder flows. Once the solder flows, REMOVE THE FLAME. If the solder flowed only on one side of the jump ring, reheat and drag the molten solder into the joint area. Solder will flow toward heat.

Another technique for large jump rings is to place a small portion of solder under the joint of the ring on a firebrick. Heat the ring and when it "sits down" the solder has flowed.

5. **Pickling** - Pickle is a chemical bath used to clean the oxides and flux from the metal after soldering. Once the metal has cooled after soldering, gently place the piece in the acid. Small pieces may be placed in a small plastic strainer or basket in the pickling acid. Pickle will work at room temperature, but works faster when warmed. Never allow the pickle to boil. When mixing new pickling acid, always

add acid to water! Baking soda will neutralize spills and should be kept nearby. Pickle can be stored in

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glass or plastic - but never metal.

Steel or iron of any sort should **never** come into contact with the pickle. Pickle is an acid and when used to clean sterling or karat golds, etches some of the copper molecules, which go into solution. If a steel item is used in the pickle, it creates a galvanic process that deposits copper on any metal pieces in the acid. The thickness of the copper coating depends on the amount of copper in solution at the time. When the steel is removed, the pickle is "de-activated" and will no longer cause a plating reaction. In short: **If a magnet will stick to it, don't put it in the pickle.** This includes: tweezers, binding wire, cotter pins, pliers, "T"-pins, pin stems, springs (in spring rings), etc.

Solder

There are 5 grades of jeweler's silver solder. The differences in the alloys affect the melting point, the flow point, the color, and the working properties of the solder.

Name	Ag	Cu	Zn	Cd	Flow Pt. F°		
"IT"	80	16	4		1490		
Hard	76	21	3		1425		#75
Medium		70	20	10	1390		#70
Easy (Soft)	60	25	15		1325		#65
Extra Easy	50	15	15	20	1270		

Solder Hints

- *Solder should be labeled by grade. If there are no markings, it is almost impossible to distinguish one from another or from sterling wire.
- *Over heating solder can result in "boiling" -- and in solder pits.
- *Each time a solder is flowed, its melting point is slightly raised (approximately 25°F). This can aid in multiple joint construction.
- ***It is better to solder five times than to solder once with too much solder!**
- *Lead Solder should **never** be used in the same working area as silver or gold. These solders will create pits in gold, silver, copper or brass when heated above 500° F.

The Torch

Many torches are available for jewelry making. In class, we use acetylene/ air. Acetylene gas has the advantage of forming a clean, quick-heating flame, which can be used for large or small soldering purposes. There are several tips available in a range of sizes.

Torch Hints

- *Hold the torch in your **left** hand (for right-handed people) and the solder pick or tweezers in your right hand.
- *When soldering -- watch the **metal** -- **not** the fire!
- ***Never** light a torch unless you understand how it works.
- *Nothing combustible is allowed on the solder table.
- *To ease strain on the regulator, bleed the torch hose at the end of the workday. Re-close the valve after bleeding the hose.
- *Tie back long hair (or anything else which will catch on fire.)

A Final Note: When possible -- finish the metal (sand and polish) before soldering.