

Common Causes of Soldering Tip Failure

There are many factors that influence soldering iron and tip life. Tip life will depend on proper maintenance, cleaning, temperature, tip configuration, and the jobs being done. Get the best performance from your iron and maximize tip life by avoiding the situations that cause and contribute to tip failure.

Use the correct voltage

Make sure you have the correct voltage in your electrical line for your iron and the correct plug configuration. Most irons are designed to handle a slightly varying supply voltages but a line supplying a consistently high voltage will cause the iron to run hot and reduce tip life.

Adjust the soldering temperature to the solder

The higher the tip temperature, the faster oxidation forms. Soldering at temperatures over 875° F causes your iron tip to oxidize twice as fast as soldering at 700° F. Adjust your soldering temperature to the minimum temperature needed to melt your solder and have it flow smoothly for you. Using an iron that works with or has a rheostat can help you to dial in that best working temperature for the solder you are using.

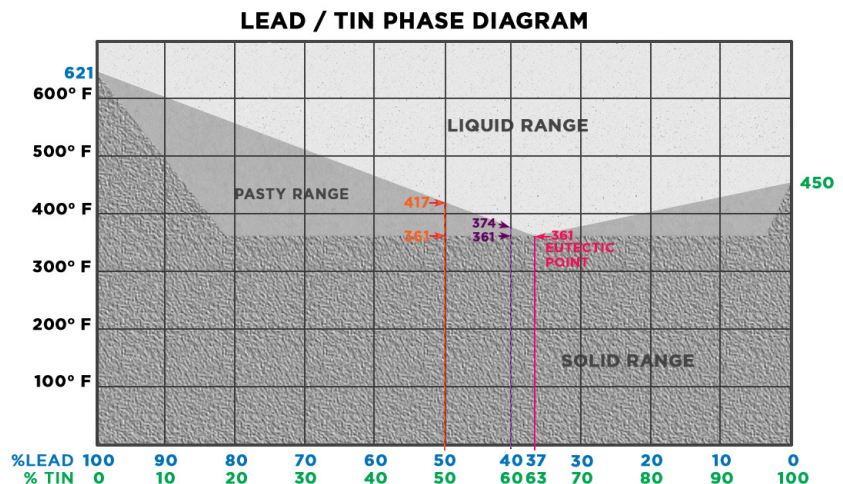
Alloy	Tin %	Lead %	Solid at (°F)	Liquid at (°F)	Pasty Range (°F)
50/50	50	50	361°	417°	56°
60/40	60	40	361°	374°	13°
63/37	63	37	361°	361°	0°

50/50 Solder: This is composed of 50% tin and 50% lead. This solder melts at 417° F, (higher than 60/40) but below that remains partially liquid until it cools to 361° F and solidifies giving it a pasty range of 56° F. This solder traditionally was used for lead came projects where a flatter solder joint is desired. It can be difficult to get a smooth beaded seam because it starts to solidify sooner, that is at a higher temperature.

60/40 Solder: Composed of 60% tin and 40% lead, this solder completely melts at 374° F, but doesn't become completely solid until it cools to 361° F. This means it has a "pasty range" or "working range" of 13 degrees. This solder stays liquid longer so tends to form higher and rounder solder seams making it a preferred choice for copper foil projects.

63/37 Solder: This solder is 63% tin and 37% lead. It becomes liquid at 361° F, and solid at 361° F, giving it a pasty or working range of 0 degrees. This solder is called an eutectic alloy which means at 361° F, you can go instantly from solid to liquid to solid just by applying or removing the heat source that is at 361° F or higher.

Lead-Free Solder: Depending on the specific mix of metals, lead free will produce differing liquid, solid, and pasty range temperatures. Check with the solder manufacturer for these specifics.



Avoid temperature cycling

Keeping the tip clean is important but constantly wiping it on a wet sponge can cause early tip failure. Wiping causes the tip temperature to drastically rise and fall and the different metal layers in the tip to repeatedly expand and contract. This cycling leads to metal fatigue and ultimately tip collapse. The more frequently you wipe the tip, the more you stress it. There are brass wool coils that are used like a sponge to wipe the tip off on as you solder and will not cool the tip.

Let the iron do the melting

Pushing the solder into the tip to force it to melt or rubbing the tip against the joint to force heat in will wear the tip faster. Allow the iron to heat to the soldering temperature; when you just touch the solder to the tip, the solder melts.

Re-tin using higher tin content solder

The lower the tin content of the solder, the more difficult it is to keep the tip from losing its protective coating of solder (dewetting). Keep a roll of large diameter 63/37 on hand to periodically flush and re-tin your iron tip with 60/40 as the next best choice.

Match the diameter of the solder to the tip size

Using small diameter solders may not keep the tip flooded with solder while in use and cause the tip to oxidize and wear faster. Use large diameter solder, which is what is typically sold in stained glass stores, or periodically flood and tin the tip using large diameter 63/37 solder as suggested above.

Choose a quality solder

Impurities in the metals used to make the solder will collect on the iron tip as you work. This causes the tip to work less efficiently, degrades the surface, and requires more frequent cleaning. Using a quality solder will go a long way to keeping your tip working properly.

Choose the right flux

The more active the flux, the faster oxidation forms on the tip thus requiring more frequent tip cleaning. Using a flux with the lowest activity possible will help reduce oxidation and corrosion and maximize tip life. Paste flux tends to be more aggressive and active than a gel flux or water soluble liquid flux.

Limit the use of a tinning block

A “tinning block” (sal-ammoniac block) is sometime used to clean a very dirty or blackened tip. Care should be taken as the block is abrasive and excessive use can wear away the iron cladding, exposing the copper core and make the tip unusable. You can try brass wool or a soft brass brush as an alternative.

See our [Soldering Iron and Tip Care Guide](#) for maintaining your soldering equipment.



**inland**
building what we'd like to own
Inland Craft Products, Co.
32052 Edward Drive
Madison Heights MI 48071
www.inlandcraft.com

