

Soldering



Everything you always wanted to know about soldering but were afraid to ask.

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Topics



- ⌘ Copper
- ⌘ Solder
- ⌘ Fluxes
- ⌘ Irons
- ⌘ How to solder

Definition

- ⌘ A joining process wherein coalescence is produced by heating, generally below 800 deg. F, and by using a non-ferrous filler metal that has a melting point below that of the base metal.

Good things about Copper

- ⌘ Good conductor of electricity
- ⌘ Plentiful and cheap
- ⌘ It has the ability to fuse into or alloy with solder, under certain controlled conditions.

Bad things about Copper

- ⌘ Heat tends to make it brittle
- ⌘ It oxidizes rapidly forming an invisible film similar to rust on iron.
- ⌘ The application of heat accelerates this oxidation.

Solder

- ⌘ 60% Tin and 40% Lead. (60/40)
- ⌘ Sometimes 63/37 is used.
- ⌘ Becomes liquid at 360 degrees F.

Note:

- ⌘ Pure Lead melts at 621 deg.
- ⌘ Pure Tin melts at 450 deg.
- ⌘ 60/40 alloy melts at 360 deg.
- ⌘ Now you know the rest of the story!

Definition: Tinning (wetting)

- ⌘ When molten solder leaves a continuous, permanent film on the metal surface.

Definition: Flux

- ⌘ Soldering flux is a liquid, solid or gaseous material which, when heated, is capable of promoting or accelerating the wetting of metals with solder.

The Purpose of Flux

- ⌘ Is to remove and exclude oxides and other impurities from the joint being soldered.
- ⌘ Lowers the surface tension of molten solder so the solder will flow readily and adhere to the metal.
- ⌘ Flux is NOT a cleaning agent, it will just remove tarnishes and film and prevent re-oxidation when the copper is heated.

Note:

- ⌘ Soldering flux is often manufactured into the core of solder.
- ⌘ Acid Flux is used for plumbing, DO NOT USE!!
- ⌘ Use Rosin type of flux.

Types of Soldering Irons

- ⌘ Electrode Tip Resistance
- ⌘ Self Contained heating element

Soldering Iron Tip Types

- ⌘ Copper
- ⌘ Copper Alloys
- ⌘ Impregnated copper (Alum. Diffusion)
- ⌘ Metal clad copper tips (Iron, nickel, etc.)

Soldering Iron Tip Sizes and Shapes

- ⌘ There are various sizes and shapes available. The tip chosen will depend on the job at hand.

Care of your Soldering Iron

- ⌘ Keep soldering tip well tinned and clean
- ⌘ Clean it with a quick swipe on a wet sponge
- ⌘ Then tin the iron with fresh solder.
- ⌘ Always keep fresh solder on the iron when not in use.

So How Do I Solder?

- ⌘ You simultaneously heat the junction of the two metals involved to a temperature hot enough to melt solder and fuse with the solder.

So how do I know when it is hot enough?

⌘ By having the Iron heat up the work (the metals) and then have the work heat up the solder until it melts.

So what melts the solder?

⌘ **THE WORK!**

The other Secret?

- ⌘ To get good at soldering takes practice!

Solder Joints

- ⌘ Should look clean and shiny!
- ⌘ You should see the outline of the component under the solder, use enough solder but not too much.
- ⌘ DO NOT leave any flux in the joint.
- ⌘ Do not move the joint before the solder cools
- ⌘ A cold solder joint has a gray mushy appearance.