

- **Leaded vs Unleaded Solder** Leaded solder has been the preferred material for electronic manufacturing for decades due to its low cost, lower melting point, and ease of use. However, there has been heightened concerns about the health and environment effects of lead solder, particularly when used in electronics. *In 2006 the European Union banned certain hazardous substances in electronic products, including lead.* In the past two decades, the electronic manufacturing world has experienced a dynamic development of alternative soldering material centered on tin metal with **manufacturers switching to lead-free solder alternative in order to eradicate lead from electronic production.** But what's the right choice? Which is better for electronic manufacturing: lead or lead-free-solder?

- **Lead-Free vs. Leaded Solder**

- **Generally, leaded solder is composed of tin and lead. 60/40 solder is 60% Tin and 40 % lead**
The advantages of using leaded solder include: easier to bring to working temperature, 183 - degrees Celsius- or 360 deg F-- shock resistant, and fewer internal flaws in the structure after cooled. However, lead material is harmful to the body as it's readily absorbed.
- Lead-free solder has a higher melting point at 217°C /422F compared to 183°C/360 deg f for lead alloys. This makes lead-free solder more challenging to work with. The most common lead-free solder mix is tin-copper, which has a melting point of 217°C and mixes 99.3% tin with 0.7% copper. However, the main reason why manufacturers are shifting to the use of lead-free solder is to eradicate lead from electronic production and waste recycling processes.

- **Cost**

- Leaded solder is more cost-effective than lead-free solders because lead is much cheaper than alternative alloys. Lead is barely one-tenth the price of tin, making leaded solder easily affordable. Furthermore, some manufacturers replace tin with silver as their lead alternative in lead-free solders, making them even more expensive.

- **Environmental Concerns**

- Companies who value environmental conservation state that the main reason for embracing lead-free soldering is because of the poisonous nature of lead. Lead can indeed accumulate in the human body even from small prolonged exposures. Furthermore, lead can quickly enter your body through the skin, mouth, or nose. However, the amount of lead on solders is too insignificant to cause severe health problems.

- **Which Solder is Better?**

- Leaded solder is easier to use, has a lower melting point, is low cost, and causes fewer quality problems with the joints than lead-free solder, however; the continued efforts to take lead out of all electronic products in the United States means that leaded solder could be obsolete in the next 10 years in numerous commercial applications. Generally, it is more economical and effective to use lead solder because of its unique properties and benefits. There continues to be

some industries that use leaded solders because of these properties and benefits. The primary reason you should opt for lead-free solders, if you are able to, is if your government prohibits lead to be used in products, or if you are working to be an Environmental, Social, and Corporate Governance (ESG) company.

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- All sectors that use solder in large quantities are likely to shift to lead-free soldering soon if they have not done so yet. The paint and gasoline sectors have both gone lead-free. As manufacturers begin to shift away from leaded solder, make sure you are up to date on your training and learn more about lead-free and leaded soldering from industry experts with EPTAC. With high-level soldering courses, you can get hands-on experience from instructors who know the industry inside and out. Further your soldering education with online training courses from EPTAC.

Solder Paste Solder paste melts at 90deg c up to 400 c depending on type

Tools Required Tweezers,

Soldering Irons @ least 35W do not use 25W

Solder Sucker- to remove solder

Solder Braid – to remove solder with capillary action

Magnifier- lighted- headband

Microscope

Flush Mount wire cutter

Solder- solder paste depends on the job

Flux remover- typically you do not need to use Flux

Today we will examine the differences between soldering with Leaded 60/40 solder 60% tin, 40% lead
And Unleaded solder 99.3 percent tin and 0.7% copper

Diameter is .031

SD401/403/405

SOLDERING

Stations in the back row (3) tables setup for soldering with Unleaded solder. Take 5 resistors and solder them in place close together. Clip off the leads properly, meaning do not cut into the solder, but do not leave too much out or it can bend over and short out.

Tips cannot be used interchanged with one another . need to keep separate for proper soldering

Then solder 5 resistors with leaded solder in the front rows,

Take note of the looks of the solder. Unleaded solder is dull looking vs leaded solder is usually smooth and shiny.

Take a look at the soldering under a magnifier to see if you see any flaws.

Soldering smds o402

With solder paste

When done stop over to the reflow oven