

The Conditions of Lead-free Hand Soldering

Preface

The damage of lead

Lead, at certain contact degrees, is a poisonous substance to animals, including humans. It damages the nervous system and causes brain disorders. Excessive lead also causes blood disorders in mammals. Like the element mercury, another heavy metal, lead is a neurotoxin that accumulates both in soft tissues and the bones. Lead poisoning has been documented from ancient Rome, ancient Greece, and ancient China.

Origin of lead-free soldering

Due to the requirement of environmental protection, especially [ISO14000](#) launched, many countries began to legislate to forbid leaded material in solder.

EU: RoHS law: apply from 2006.07.01, restrict the material of electronic products.

USA: TRI law: restrict to use lead

As time goes by, I think more relevant laws will be launched. Under such situation, lead-free solder was produced, the main contents of lead-free solder are Sn, Ag & Cu.

Leaded Solder V.S. Lead-free Solder

1. Different Composition

The main composition of lead solder wire is Sn & Pb; lead-free solder wire is Sn, Ag & Cu.

2. Melting Point & Soldering Temperature

Solder Wire	Melting Point	Soldering Temperature
63% Sn / 37% Pb	183°C	350°C
96.5% Sn/3.0% Ag/0.5%Cu	220°C	390°C

Influence of Lead-free Solder

(Take [936 soldering station](#) as the example)

Solder Wire	Melting Point	Soldering Temperature	Soldering Speed
63% Sn / 37% Pb	183°C	350°C	4s each
96.5% Sn/3.0% Ag/0.5%Cu	220°C	390°C	6s each

The Problems

1. The soldered dots are oxidized seriously, affects the conduct performance;
2. Soldered dots are easy to drop;
3. Soldered dots are lackluster;
4. The productivity decreases;
5. As the temperature raised, the [soldering tip](#)'s life become shorter;
6. The production cost increases.

The Solutions

Simply raising the temperature of a soldering iron because of the high melting point may result in faster oxidation and erosion. The problems with lead-free solder can be solved by using products which offer special characteristics.

HAKKO's Solution

Soldering Iron: HAKKO FM-203, HAKKO FM-206, HAKKO FX-838, [HAKKO FX-888D](#), HAKKO FX-950, [HAKKO FX-951](#), HAKKO FM-2026

Increases the power of soldering iron

Accurate temperature control and excellent thermal recovery rate

Metcal's Solution

Representative Products: MX500, SP200

Increase the power of soldering station, from 60W to 100W

Improve the thermal performance of soldering iron

Weller's Solution

Representative Products: WS81, WSD81

Increase the power from 50W to 80W

Improve the thermal performance of soldering iron: change the thermal material, replace common metal to precious metal.

The users don't need to pay extra money to buy more expensive soldering tips.

Argument

When using the soldering station, is it necessary to use nitrogen protection and preheat the soldering station?

The *replacement soldering tips* are the essential items of *hand soldering*, to buy quality soldering tips at low cost, please contact us.

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