

What are the different optimal soldering temperatures for soldering with tin/lead solder and lead-free solder?

As a general rule of thumb, the optimal soldering temperature should be high enough so that when making a solder connection, the solder is approximately 50°C above its melting point. The set temperature for a soldering station should be an additional 70°C to 100°C higher to provide a heat reserve for the quick thermal recovery of the tip after the solder connection is made. The performance of the soldering station used and the type of solder used will determine the optimal soldering temperature. For example, let's look at the melting points of common solders: Tin/Lead (Sn63/Pb37) - 183°C SAC 305 (Sn/Ag3.0/Cu0.5) - 220°C SNI100 (Sn) - 232°C. Now let's add the 50°C we need for making a good soldering connection: Tin/Lead: 183°C + 50°C = 233°C SAC 305: 220°C + 50°C = 270°C SNI100: 232°C + 50°C = 282°C. We now need to consider the type of soldering station we are using. If we are using a Hakko 936 Soldering Station which has very good performance, we should add approximately 100°C as the heat reserve for quick thermal recovery. The resulting temperature settings are: Tin/Lead: 233°C + 100°C = 333°C SAC 305: 270°C + 100°C = 370°C SNI100: 282°C + 100°C = 382°C. As you can see, switching from tin/lead solder to lead-free solder requires a higher optimal temperature setting. But before you raise your set temperature, you must consider the setting you are currently using, and the performance of the soldering station. Most Hakko soldering stations are typically set at about 399°C (750°F). Considering that, the optimal temperature setting does not need to be adjusted when changing from tin/lead solder to lead free solder. Now let's look at the optimal temperature settings if we were using a high performance soldering station such as the Hakko FX-951 Soldering Station. Because of the performance of this soldering station and the thermal recovery performance of the composite tips, we only need to add 70°C as the heat reserve for quick thermal recovery. The resulting temperature settings are: Tin/Lead: 233°C + 70°C = 303°C SAC 305: 270°C + 70°C = 340°C SNI100: 282°C + 70°C = 352°C. Again, considering that most Hakko soldering stations are typically set at about 399°C (750°F), we do not need to raise the set temperature. In fact, we can use a lower set temperature which will help extend the service life of the soldering iron tip and reduces the risk of damage to the PCB and components.

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