

ELSOLD FLOWTIN[®] TC07

ELSOLD FLOWTIN[®] TC07 has been developed as new lead-free alloy in order to replace the conventional tin/lead alloys. Used in electronics production the alloy ELSOLD FLOWTIN[®] TC07 possesses substantial advantages over the standard lead-free alloy Sn99.3Cu0.7 (ELSOLD TC07).

The transition from conventional wave soldering using SnPb alloys to lead-free wave soldering with ELSOLD FLOWTIN[®] TC07 can easily be managed if a few rules are observed:

After discharging the SnPb solder all residues still remaining in the pot are scooped as far as possible. Since not all of the material might be removed the equipment should be rinsed one time with pure tin. Depending on its degree of contamination with impurities the “rinsing tin” is then either recycled or used for other purposes.

After the initial filling the solder is being homogenised by circulating the liquid solder in the equipment. An analysis is then carried out. Weekly analyses should be taken in the first 4 weeks in order to make sure that the process is stable. The contamination with lead and the accumulation of copper are the critical parameters to be closely monitored. After this initial period the frequency of analysis can be adapted or reduced to the normal level. Changing from lead-free solder to ELSOLD FLOWTIN[®] TC07 is considerably easier since the rinsing process is not required.

ELSOLD FLOWTIN[®] TC07 has a melting point of 227°C which requires a change of the soldering process. The recommended soldering temperature is 265°C. In order to get the required thermal energy into the printed circuit board the pre-heating of the board has to be adapted accordingly. Inert gas atmosphere is recommended but not mandatory for wave soldering. It is the preferred option in order to reduce soldering defects and to suppress oxidation.

A first field report from a user is now available:

Soldering equipment Seho Type 8136 PCS, solder volume 400 kg, without inert gas cover, frame transport speed: 1,1 m/min

Pre-heating: 119°C, measured on the top side of the board

Solder alloy: FLOWTIN[®] TC 07 ,

Bath temperature 265°C, single wave, contact time approx. 4 sec

No-Clean flux, class 2.2.3 (ORL0)

Double-sided boards, through-plated holes

Operation: single shift, 5 days/week

Activities:

The solder bath composition and impurities were monitored by continuous analysis.

The diagrams demonstrate how the composition of the solder bath changed with time. During the whole period of operation the copper concentration has practically not changed (see diagram) and remained stable at 0.7%. An accumulation of copper – as it is normal for standard lead-free alloys – could not be observed. The lead contamination (see diagram 2) of 0.01% remains also stable, which is an indication that the whole process is run lead-free.

Minor changes could be observed for the iron elements in the solder (see diagram 3): the cobalt content stabilised at around 0.025%, nickel oscillates within the bandwidth of the measuring error but remains stable.

All other impurities remained nearly unchanged over the whole period.

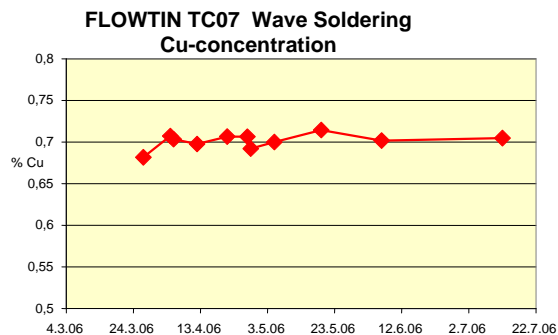


Diagram 1: Cu-concentration

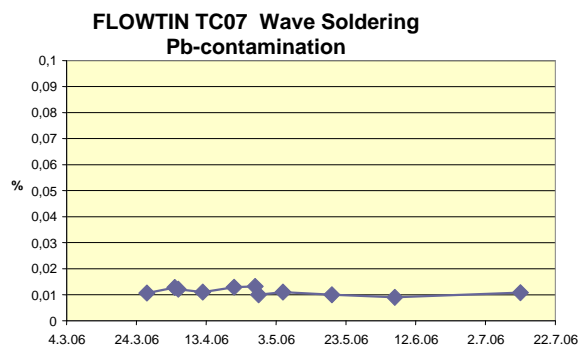


Diagram 2: Pb Contamination

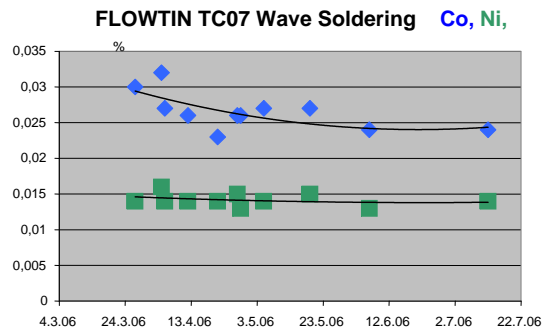


Diagram 3: Cobalt, Nickel

Soldering result: the defect rate remained the same, no deterioration was observed after the change. The solder joints are shiny and the surface shows the expected smooth structure.

Conclusion:

The results achieved up to now show how stable the wave-soldering process is with t ELSOLD FLOWTIN® TC07 . The solder bath composition does not change. The transition to a lead-free process was implemented without problem after having adapted the temperature profile.

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