NC676 No-Clean Tin-Lead Solder Paste

Introduction

NC676 solder paste is no-clean tin-lead solder paste with pin-testable flux residue. NC676 has excellent shelf and stencil life, and responds well to pauses in printing. It prints well through fine pitch and small area ratio apertures. NC676 shows excellent wetting, very low solder balling and graping, and has low voiding potential. It is also halide and halogen free and contains no intentionally added halogens (zero halogen).

Attributes

- Clear, pin-testable flux residue.
- Stencil life longer than 8 hours.
- Excellent printing after pauses of up to 4 hours.
- Prints well through fine pitch and small area ratio apertures.
- Ideal reflow performance with excellent wetting, very low solder balling and graping, and low potential for voiding.
- Halide and halogen free (zero halogen) which may improve long term reliability.

Solder Alloy	Solder Powder Size Availability (IPC J-STD-005)	Melting Range (°C)
Sn63/Pb37	Type 3 or 4	183
Sn62/Pb36/Ag2	Type 3	179
Anti-tombstoning mixtures	Type 3 or 4	Range depends on the mixture

- Other sizes of solder powder are available upon request.
- The size range for the solder powder types are as follows:
  - Type 3 (25-45 µm >80%). Mesh -325/+500
  - Type 4 (20-38 µm >80%). Mesh -400/+635
  - Type 5 (15-25 µm >80%). Mesh -500/+800

Solder Paste Packaging	Net Weight (grams)
Jars	250, 500
Cartridges	500 or 600 (6 oz), 700 (8 oz), 1300 (12 oz)
Syringes	30, 100
Enclosed print systems	800

Compatible Products

NC120, NC160, NC165 liquid fluxes.
NC676 gel flux.

Storage and Handling

- Shelf life is 9 months when stored at 0 to 10 °C (32 to 50 °F).

- Accidental warming of solder paste above 29 °C (85 °F) for a period of time can cause detrimental effects.
- Warm the solder paste to room temperature before use. Do not force warming by heating the solder paste. Keep the solder paste sealed while warming. Warming typically takes 3 to 4 hours when the solder paste is sitting at room temperature. Warming overnight is acceptable.
- Once the solder paste container is opened then the solder paste should be kept at room temperature until completely used. Unused solder paste should be kept sealed in the original container. If the remaining solder paste will not be used within a few days, then the solder paste can be sealed and stored in a cooler until needed.
- Solder paste used in the print process should not be added to a container with fresh solder paste. This will change the rheology of the fresh solder paste. Solder paste used on the printer can be stored in a separate container at room temperature. Used solder paste can be reused but print and reflow characteristics will degrade over time.
- After printing, the solder paste should be reflowed within a normal processing time. The maximum allowable time between print and reflow is 8 hours.

Print Parameter	Preferred	Acceptable
Solder paste bead size	1.5 to 2.0 cm (0.60 to 0.80 in)	1.0 to 2.5 cm (0.40 to 1.0 in)
Squeegee blade	Fine grain stainless steel. 60° from horizontal. 45° from horizontal for pin in paste.	Any type of stainless steel
Stencils	Fine grain (2-5 µm) or ultra-fine grain (1-2 µm) stainless steel	All types of commercially available stencils
Print speed	30 to 100 mm/sec (1.2 to 4.0 in/sec)	20 to 200 mm/sec (0.8 to 8.0 in/sec)
Pressure / blade length (increase with increasing speed)	0.18 to 0.27 kg/cm (1.0 to 1.5 lbs/in)	0.18 to 0.54 kg/cm (1.0 to 3.0 lbs/in)
Separation speed	1.0 to 5.0 mm/sec	0.5 to 10.0 mm/sec
Underside stencil cleaning	Wet / vacuum / vacuum cycle every 1-5 prints	Other cleaning cycles every 1 to 20 prints depending upon technology
Stencil life	8 hours at 18-29 °C (65-85 °F) and 10-70% RH.	Stencil life may be shorter outside of the preferred conditions.

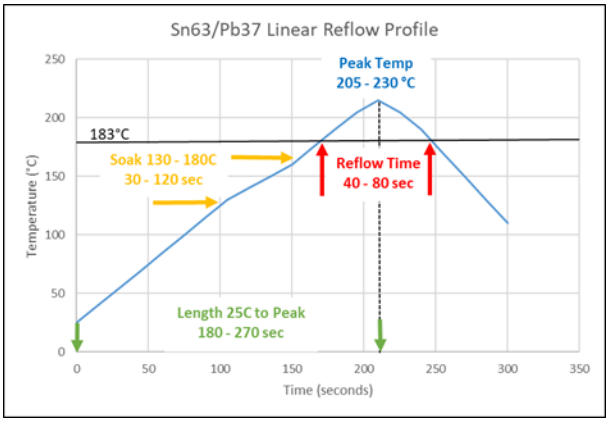
- Blade pressure should be set as low as possible to clean off the stencil. Higher blade pressures will increase stencil and blade wear, and can lead to “scooping” and other print defects.
- Underside stencil cleaning is best accomplished with commercial cleaners and high quality wipe materials. Nano-coated stencils can be used to reduce the frequency of underside cleaning.

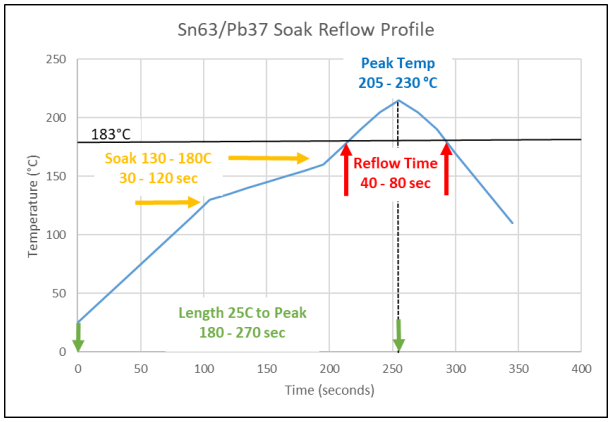
Reflow Parameter	Preferred	Acceptable
Profile length (25 °C to peak)	3.5 to 4.0 min (210 to 240 sec)	3.0 to 4.5 min (180 to 270 sec)
Heating ramp rate (20 second window)	1.0 to 2.0 °C/sec	1.0 to 3.0 °C/sec
Preheat / soak time (130 - 180 °C)	60 to 90 sec	30 to 120 sec

Peak temperature	210 to 220 °C for Sn63/Pb37 alloys	205 to 230 °C for Sn63/Pb37 alloys
Reflow time (time above liquidus)	50 to 70 sec	40 to 80 sec
Cooling ramp rate (20 second window)	3.0 to 6.0 °C/sec	1.0 to 6.0 °C/sec

- Reflow time should be calculated based on the liquidus point of the alloy used: Sn63/Pb37 = 183°C, Sn62/Pb36/Ag2 = 179°C.

An example reflow profile graph is shown below. This is a good starting point but can be modified to fit the product and process. Contact FCT Assembly for assistance with reflow profiling.





Cleaning

Raw solder paste can be removed from the stencil, squeegee blades, and circuit boards using a variety of commercial cleaners. Isopropyl alcohol (IPA) can also be used.

After reflow, no-clean solder paste residues are designed to be "safe" and do not need to be removed from the circuit board. If removal of the flux residues is desired, then a commercial cleaning agent should be used. Several common cleaning agents have been tested and found to be effective. Please contact your cleaning chemical supplier for details.

Safety

Wear chemically resistant gloves when handling solder paste. Avoid breathing fumes, especially during reflow of the solder paste. Follow the guidelines detailed in the Safety Data Sheet (SDS).

J-STD-004 Flux Standard	Test Method	Result
J-STD-004 classification	J-STD-004 methods	ROL0
Halide ion content (Br^-, Cl^-, F^-, I^-)	IPC 2.3.28.1	0.0 % wt
Halogen content (Br and Cl)	EN 14582, IPC 2.3.28.1	0.0 % wt
Halide by silver chromate	IPC 2.3.33	No halides detected
Fluoride by spot test	IPC 2.3.35.1	None detected

Copper mirror	IPC 2.3.32	Low activity
Copper corrosion	IPC 2.6.15	No corrosion
Surface Insulation Resistance (SIR)	IPC 2.6.3.7	Pass > 1.00E+10 ohms
Electro Chemical Migration (ECM)	IPC 2.6.14.1	Pass, increase of 0.1 Log_{10} ohms
J-STD-005 Solder Paste Standard	**Test Method**	**Result**
Viscosity - Brookfield	IPC 2.4.34	550 - 650 Kcps typical
Slump - frosted glass	IPC 2.4.35	Pass
Solder balling - frosted glass	IPC 2.4.43	Preferred
Wetting - copper	IPC 2.4.45	Pass