NC722 Low Melting No-Clean Lead-Free Solder Paste

Introduction

NC722 solder paste is a low melting no-clean lead-free solder paste with pin-testable flux residue formulated for use with tin-bismuth alloys. NC722 is an excellent choice for applications which require reflow temperatures below that of standard lead-free alloys. NC722 is also halide and halogen free (zero halogens).

Attributes

- Low melting lead-free solder paste based on tin/bismuth alloys.
- Clear, pin-testable flux residue.
- Halide and halogen free. No intentionally added halogens (Zero halogens).

Solder Alloy	Solder Powder Size Availability (IPC J-STD-005)	Melting Range (°C)
Sn42/Bi58	Type 3	138°C
Sn42/Bi57/Ag1	Type 3	138 - 140°C

- 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.
NC26 gel flux.

Storage and Handling

Best practices for storage and handling of solder paste are listed below. Additional details can be found in the Solder paste storage and handling guide.

- Shelf life is 6 months when stored at 0 to 10 °C (32 to 50 °F).
- Warm the solder paste to room temperature (18 to 29 °C / 65 to 85 °F) before use. Do not force warming by heating the solder paste. Keep the solder paste sealed while warming, which typically takes 3 to 4 hours at room temperature. Warming overnight is acceptable.

- Ideally solder paste should be mixed before use to bring it to a normal working consistency. This can be done by hand-stirring in a jar, or using a knead cycle on the printer.
- Best practice is to keep the solder paste at room temperature until completely used. Remaining fresh solder paste should be sealed in the original container along with all inserts, lids, etc.
- If solder paste is removed from the printer and stored, it is recommended to store it in a separate container from the fresh solder paste. The container should be sealed with all inserts, lids, etc.
- Once solder paste is applied to the circuit board, the best practice is to reflow the solder paste as soon as possible. It is acceptable to reflow within approximately 4 hours.

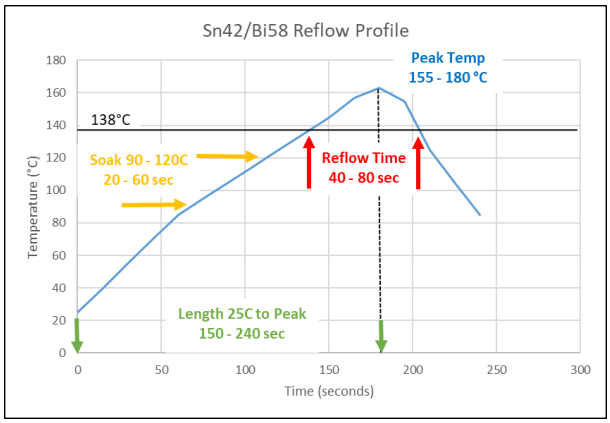
Print Parameter	Preferred	Acceptable
Solder paste bead size	1.5 to 2.0 cm (0.60 to 0.80 in)	1.0 to 2.5 cm (0.40 to 1.0 in)
Squeegee blade	Fine grain stainless steel. 60° from horizontal. 45° from horizontal for pin in paste.	Any type of stainless steel
Stencils	Fine grain (2-5 µm) or ultra-fine grain (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	4 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)	2.5 to 3.5 min (150 to 210 sec)	2.5 to 4.0 min (150 to 240 sec)
Heating ramp rate (20 second window)	1.0 to 2.0 °C/sec	1.0 to 3.0 °C/sec
Preheat / soak time (90 - 120 °C)	20 to 40 sec	20 to 60 sec
Peak temperature	155 to 175 °C	155 to 180 °C
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: Sn42/Bi58 = 138°C, Sn42/Bi57/Ag1 = 140°C.

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



Sn/Bi alloys should not be mixed with lead (Pb) bearing metals. If Pb is mixed with Sn and Bi, then a very low melting (approx. 95 °C) intermetallic compound can form. This very low melting Sn/Bi/Pb compound may cause solder joint failure due to heating during operation of the electronics.

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-004B Flux Standard	Test Method	Result
J-STD-004B classification	J-STD-004B 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
Electro Chemical Migration (ECM)	IPC 2.6.14.1	Pass
J-STD-005 Solder Paste Standard	**Test Method**	**Result**
Viscosity - Brookfield	IPC 2.4.34	Refer to the C of A
Slump - frosted glass	IPC 2.4.35	Pass
Solder balling - frosted glass	IPC 2.4.43	Acceptable
Wetting - copper	IPC 2.4.45	Pass
Tack force	IPC 2.4.44	30 gram force typical