AMP Micro No-Clean Pb-Free Solder Paste

Introduction

AMP Micro is an ultra-fine feature, no-clean and Pb-free solder paste formulated to combat the print and reflow challenges associated with miniaturization in PCB assemblies. This solder paste is designed for use with Type 6 and 7 solder powders, to achieve excellent printability needed for the industry's smallest packages including 01005 and 008004 Imperial component sizes. This solder paste is specially formulated for excellent coalescence in convection reflow with an air atmosphere.

Attributes

- Formulated to achieve excellent printability through ultra-fine apertures needed to accommodate high density, small pitch PCB designs.
- Air reflow is ideal for Type 6 solder powders, but nitrogen may be used for Type 7 powders.
- Enables complete coalescence in convection air at fine deposits down to 4 mils (102 µm).
- Best in class voiding performance.
- Long lasting stencil life ≥ 6 hours.
- High tack that is stable over 48 hours, ensuring component holding force over time.
- Clear, pin-testable flux residue which is halide and halogen-free, improving long term reliability.

Solder Alloy	Solder Powder Size Availability (IPC J-STD-005B)	Melting Range (°C)
SAC305	Type 6 or 7	217 - 220
SN100CV* (Sn/1.5Bi/0.7Cu/Ni/Ge)	Type 6 or 7	221 - 225
LF-C2* (Sn/3.5Ag/3Bi/1Cu)	Type 6 or 7	205 - 213

- *Alloy from Nihon Superior.

Solder Paste Packaging	Net Weight (grams)
Jars	250
Syringes	20 (10 cc), 90 (30 cc)

- Other packaging may be available upon request.

Compatible Products

NC120, NC160, NC165 liquid fluxes.
AMP Micro 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).

- Shelf life is ~30 days when stored at "room temperature" between 18 and 29 °C (65 to 85 °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 8 hours.

Process Parameters

The print and reflow process parameters shown below are simply guidelines. The optimal parameters may be different based upon your equipment, circuit boards, components, and process.

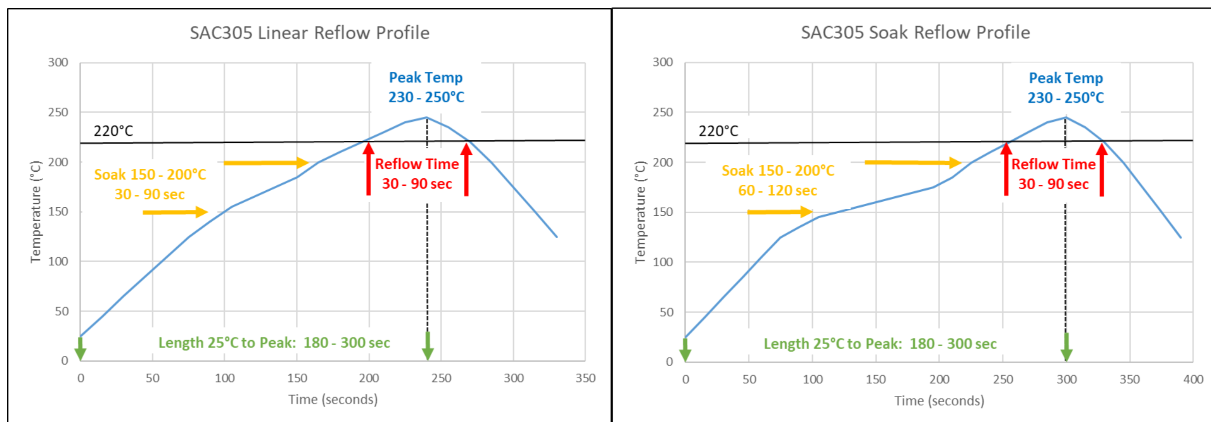
Print Parameter	Guideline	Notes
Solder paste bead size	1.0 to 2.5 cm (0.40 to 1.0 in)	Add solder paste regularly to maintain the bead size.
Squeegee blade	Stainless steel. 60° from horizontal. 45° for pin in paste.	Other blade angles and materials are usable.
Stencils	Fine grain laser cut stainless steel	All types of commercially available stencils are usable.
Print speed	20 to 100 mm/sec (0.8 to 4.0 in/sec)	Increased speeds may require higher blade pressures.
Pressure / blade length (increase with increasing speed)	0.25 to 0.50 kg/cm (1.4 to 2.8 lbs/in)	Set to the minimum required to scrape the stencil clean.
Separation speed	3.0 to 10.0 mm/sec	Higher separation speeds may improve solder paste release.
Blade lift height / Dwell height	10 to 20 mm	Reducing dwell height may improve paste curtaining.
Underside stencil cleaning	Wet / vacuum / vacuum cycle every 1-20 prints	Clean more frequently to reduce the risk of bridging.
Stencil life	6 hours at 18-29 °C (65-85 °F) and 30-70% RH.	Stencil life may be shorter outside of these conditions.

- 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	Guideline	Notes
Profile length (25 °C to peak)	3.0 to 5.0 min (180 to 300 sec)	Profile length is dependent upon the PCBA and process.

Heating ramp rate	1.0 to 3.0 °C/sec	Lower ramp rates tend to equalize reflow temperatures.
Preheat / soak time (150 - 200 °C)	30 to 120 sec	Linear profiles are a good starting place but may not work for all PCBAs.
Peak temperature	230 to 250 °C for SAC alloys	15 to 30 °C above liquidus for other solder alloys.
Reflow time (time above liquidus)	30 to 90 sec	Time above the liquidus point of the solder alloy used.
Cooling ramp rate	1.0 to 6.0 °C/sec	Higher cooling rates may refine the grain structure.

Examples of reflow profile graphs are shown below.



Cleaning

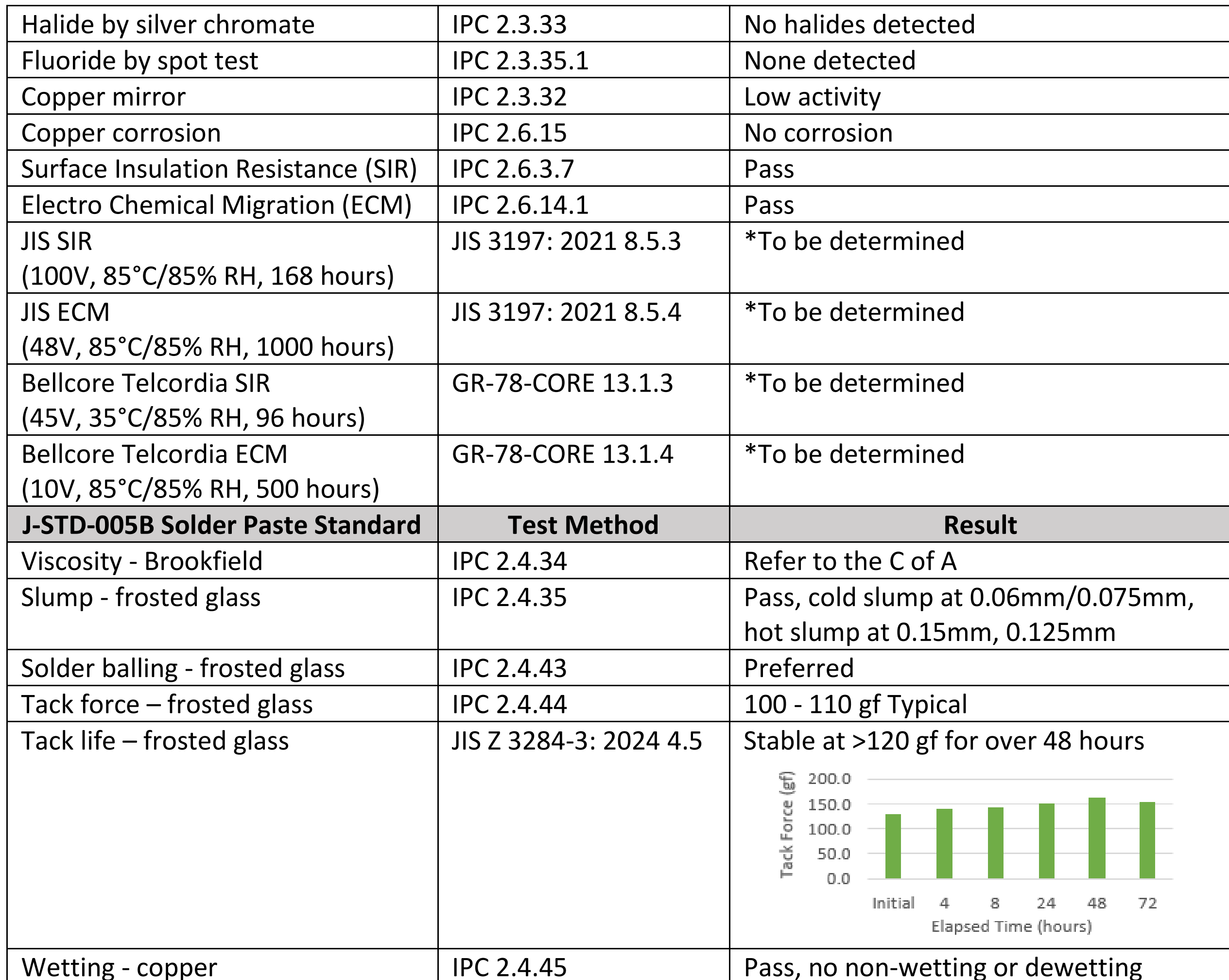
Raw solder paste can be removed from the stencil, squeegee blades, and circuit boards using a variety of commercial cleaners. Isopropyl alcohol (IPA) can also be used.

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 chemical cleaning 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-004D 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% wt of solids
Halogen content (Br and Cl)	EN 14582, IPC 2.3.28.1	0% wt of solids



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
JIS SIR (100V, 85°C/85% RH, 168 hours)	JIS 3197: 2021 8.5.3	*To be determined
JIS ECM (48V, 85°C/85% RH, 1000 hours)	JIS 3197: 2021 8.5.4	*To be determined
Bellcore Telcordia SIR (45V, 35°C/85% RH, 96 hours)	GR-78-CORE 13.1.3	*To be determined
Bellcore Telcordia ECM (10V, 85°C/85% RH, 500 hours)	GR-78-CORE 13.1.4	*To be determined
J-STD-005B 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, cold slump at 0.06mm/0.075mm, hot slump at 0.15mm, 0.125mm
Solder balling - frosted glass	IPC 2.4.43	Preferred
Tack force – frosted glass	IPC 2.4.44	100 - 110 gf Typical
Tack life – frosted glass	JIS Z 3284-3: 2024 4.5	Stable at >120 gf for over 48 hours
Wetting - copper	IPC 2.4.45	Pass, no non-wetting or dewetting

*These values are yet to be determined.

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