AMP Wash Water-Soluble Pb-Free Solder Paste

Introduction

AMP Wash solder paste is part of the AMP One series of ultra-low voiding solder pastes. AMP Wash is a Pb-free water-soluble solder paste which performs excellently in SMT print and reflow applications. It has been developed to provide ultra-low voiding in solder joints, and the flux residues are easy to remove using de-ionized water. When coupled with SN100CV or LF-C2 alloys, AMP Wash provides a high reliability solution for harsh environments.

Attributes

- Ultra-low voiding performance.
- Flux residues are easy to remove using DI water.
- Excellent print and reflow characteristics.

Solder Alloy	Solder Powder Size Availability (IPC J-STD-005B)	Melting Range (°C)
SAC305	Type 4, 5	217 - 220
SN100C* (Sn/0.7Cu/Ni/Ge)	Type 4, 5	227
SN100CV* (Sn/1.5Bi/0.7Cu/Ni/Ge)	Type 4, 5	221 - 225
LF-C2* (Sn/3.5Ag/3Bi/1Cu)	Type 4, 5	205 - 213
Anti-tombstoning mixtures	Type 4, 5	Range depends on the mixture

- Other sizes of solder powder are available upon request.
- *Alloy from Nihon Superior.

Solder Paste Packaging	Net Weight (grams)
Jars	500
Cartridges	500-600 (6 oz), 700 (8 oz), 1200-1300 (12 oz)
Syringes	30 (10 cc), 100 (30 cc)

- Other packaging may be available upon request.

Compatible Products

150N, 152N, 159HF liquid fluxes.
AMP Wash 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 9 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 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.

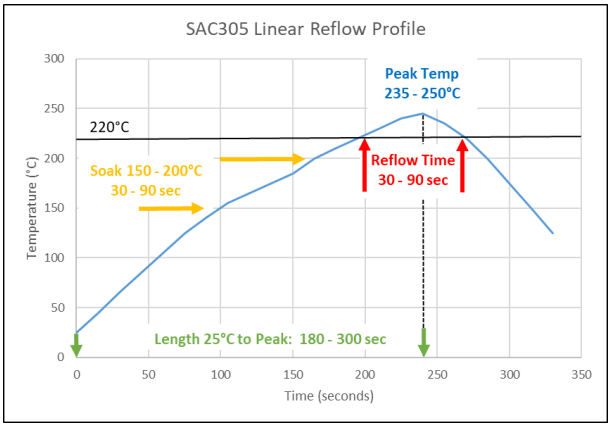
Print Parameter	Guideline	Notes
Solder paste bead size	1.0 to 2.5 cm (0.40 to 1.0 in)	Add solder paste regularly to maintain the bead size.
Squeegee blade	Stainless steel. 60° from horizontal. 45° for pin in paste.	Other blade angles and materials are usable.
Stencils	Fine grain laser cut stainless steel	All types of commercially available stencils are usable.
Print speed	20 to 200 mm/sec (0.8 to 8.0 in/sec)	Increased speeds may require higher blade pressures.
Pressure / blade length (increase with increasing speed)	0.18 to 0.54 kg/cm (1.0 to 3.0 lbs/in)	Set to the minimum required to scrape the stencil clean.
Separation speed	0.5 to 10.0 mm/sec	Higher separation speeds > 3.0 mm/sec may improve solder paste release.
Underside stencil cleaning	Wet / vacuum / vacuum cycle every 1-20 prints	Clean more frequently to reduce the risk of bridging.
Stencil life	8 hours at 18-29 °C (65-85 °F) and 30-70% RH.	Stencil life may be shorter outside of these conditions.

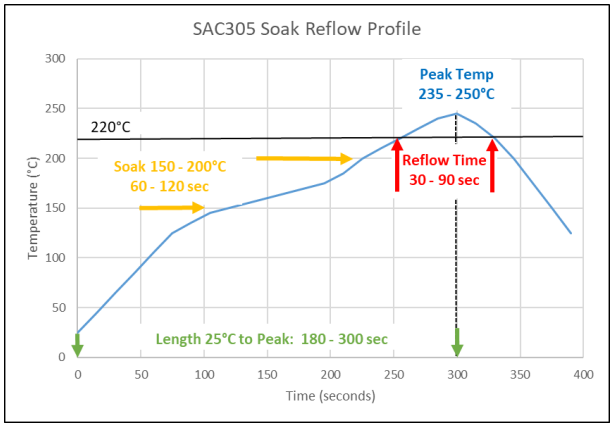
- Higher blade pressures will increase stencil and blade wear and can lead to “scooping” and other print defects.
- Underside stencil cleaning is best accomplished with commercial cleaners and high-quality wipe materials. Nano-coated stencils can be used to reduce the frequency of underside cleaning.

Reflow Parameter	Guideline	Notes

Profile length (25 °C to peak)	3.0 to 5.0 min (180 to 300 sec)	Longer profiles (slower conveyor speeds) are recommended for thermally challenging PCBAs.
Heating ramp rate	1.0 to 3.0 °C/sec	Lower ramp rates equalize reflow temperatures especially for thermally challenging PCBAs.
Preheat / soak time (150 - 200 °C)	30 to 120 sec	Longer soak times of 75-120 sec may reduce voiding potential, especially in warm & humid environments.
Peak temperature	235 to 250 °C for SAC alloys 15 to 30 °C above liquidus for other solder alloys.	Higher peak temperatures (240-250 °C) may reduce voiding potential.
Reflow time (time above liquidus)	30 to 90 sec	Longer reflow times of 60-90 sec may reduce voiding potential.
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.

AMP Wash flux residues are corrosive and must be removed using a suitable wash process. It is recommended to remove AMP Wash flux residues within 8 hours after soldering using D.I. water heated to 100 - 160 °F in standard washing equipment. It is possible to wash away AMP Wash flux residues after multiple heat cycles followed by a 72-hour hold time. This may require washing with higher temperature (> 120 °F) and longer wash time, or using commercial cleaning chemicals.

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-004C Flux Standard	Test Method	Result
J-STD-004C classification	J-STD-004C methods	ORH1
Halide ion content (Br^-, Cl^-, F^-, I^-)	IPC 2.3.28.1	2.3 to 2.7% wt of solids
Halogen content (Br and Cl)	EN 14582, IPC 2.3.28.1	7.8 to 8.2% wt of solids
Halide by silver chromate	IPC 2.3.33	Halides detected
Fluoride by spot test	IPC 2.3.35.1	None detected
Copper mirror	IPC 2.3.32	High activity
Copper corrosion	IPC 2.6.15	Corrosion present
Surface Insulation Resistance (SIR)	IPC 2.6.3.7	Pass > 6.8E+08 ohms
Electro Chemical Migration (ECM)	IPC 2.6.14.1	Pass, increase in resistance
J-STD-005A 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	Preferred
Wetting - copper	IPC 2.4.45	Pass