

# LF 318

LF 318 solder paste is a halide-free, no clean pin testable Pb-free solder paste formulated to have excellent humidity resistance and a broad process window, both for reflow and printing. This product has a high tack-force to resist component movement during high-speed placement and long printer abandon times. LF 318 shows excellent solderability over a wide range of reflow profiles in both air and nitrogen across a wide range of surface finishes including Ni/Au, Immersion Sn, Immersion Ag and OSP copper. LF318 is available in standard SAC alloys as well as the high reliability 90iSC alloy designed for applications where resistance to issues caused by thermal cycling is required, such as in automotive and aerospace environments.

## FEATURES AND BENEFITS

- Colourless residues for easy post-reflow inspection
- Soft, non-sticky, pin-testable residues allow easy in-circuit testing
- Suitable for fine pitch, high speed stencil printing up to at least 150mm<sup>s</sup><sup>-1</sup>
- Halide-free flux classification: ROL0 to IPC/J-STD-004
- Good environmental resistance with excellent coalescence after 72 hours exposure to 27°C, 80% RH, reducing process variation due to environmental factors
- Extended tack performance and printer open time reducing wastage
- Effective over a wide range of reflow profiles in air or nitrogen

## TYPICAL PROPERTIES

### Solder Alloy/Powder:

The solder alloys used in LF 318 are RoHS and EICC compliant and are manufactured meeting IPC J-STD-006 and EN29453 for impurity levels. The solder powder is manufactured in a carefully controlled production process to a quality level that exceeds IPC J-STD-005 requirements for sphericity, size distribution and oxide levels.

90iSC solder paste contains a modified Pb-free solder alloy developed in a collaborative project for improved thermal reliability (compared with standard SAC alloys). It should not be used to solder to components or PCB finishes containing lead (Pb), as a low melting point alloy (initial melting point 98°C) will form.

Code	Alloy Composition	Melting Point (°C)
<b>96SC/SAC387</b>	Sn95.5Ag3.8Cu0.7	217
<b>97SC/SAC305</b>	Sn96.5Ag3Cu0.5	217
<b>90iSC*</b>	Sn90.85Ag3.8Cu0.7Bi3.0Sb1.5Ni0.15	205-218
Powder Description	Particle Size Distribution (µm)	IPC Equivalent (J-STD 005A)
<b>AGS</b>	45-25	Type 3
<b>DAP</b>	38-20	Type 4

\*Proprietary high reliability alloy

Minimum order requirements may apply to certain alloys and powder sizes. For availability contact your local Customer Service Department.

### Solder Paste:

The properties of a solder paste depend in part on the metal content, the solder alloy and the solder powder particle size range. In general terms, increasing metal content reduces the tendency to slump and reduces the tackiness of the solder paste while the solder balling performance improves. The metal content (by weight) of lead-free solder pastes are often somewhat lower than tin/lead solder pastes for similar applications due to the lower density of lead-free alloys.

Property	96SC, 97SC, 90iSC		96SC, 97SC
<b>Particle Size</b>	AGS		DAP
<b>Metal content (%)</b>	88.5	84	88.5
<b>Application method</b>	Printing	Dispensing	Printing
<b>Brookfield viscosity (cP)</b>	765,000	750,000	885,000
<b>Malcom viscosity (Pa.s)</b>	196	71	196
<b>Thixotropic Index (Ti)</b>	0.54	0.57	0.45
<b>Slump, J-STD-005 (mm) 150°C, 15 minutes</b>			
<b>0.33 x 2.03 mm pads</b>	0.25	-	0.25
<b>0.63 x 2.03 mm pads</b>	0.41	-	0.41
<b>Tack:</b>			
<b>Initial tack force (g/mm<sup>2</sup>)</b>	2.0	-	2.0
<b>Useful open time (hours)</b>	>24	-	>24

NOT FOR PRODUCT SPECIFICATIONS

THE TECHNICAL INFORMATION CONTAINED HEREIN IS INTENDED FOR REFERENCE ONLY. PLEASE CONTACT YOUR NEAREST HARIMA LOCATION FOR ASSISTANCE AND RECOMMENDATIONS ON SPECIFICATIONS FOR THIS PRODUCT

## DIRECTIONS FOR USE

### Printing:

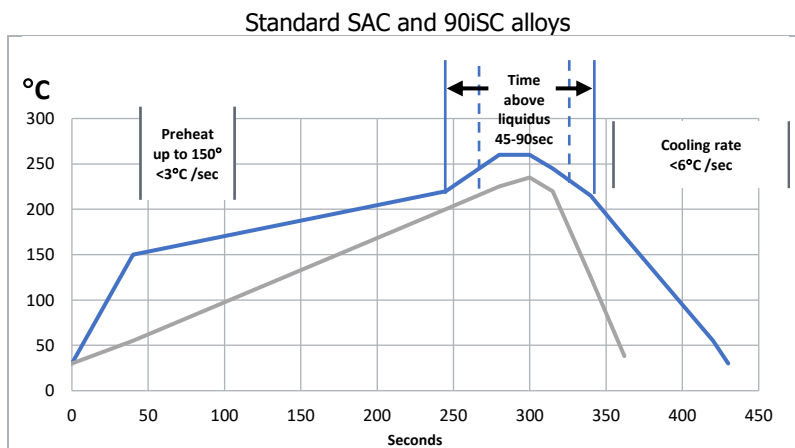
LF 318 can be reliably printed between 25 and 150 mms<sup>-1</sup> using electroformed or laser-cut stencils with a metal blade squeegee (preferably 60°). This is due to a unique rheology which ensures that the higher shear rate viscosity is relatively low, and the thixotropic index is high enough to ensure excellent definition and slump resistance, while maintaining good roll and drop off behaviour. Acceptable first prints have been achieved at 0.4mm pitch after printer down times of 4 hours without requiring a knead cycle. Unlike some pastes, high squeegee pressures are not required, making LF 318 particularly useful for second side printing processes.

### Dispensing:

A dispense grade of LF 318 (84% metal) is available. This can be dispensed using pneumatic (time pressure) dispense systems. It is recommended that the smallest needle used is a 23 gauge with a minimum internal diameter of 0.33mm.

### Reflow:

LF 318 can be reflowed using any standard heating methods including IR, convection, hot belt, vapour phase and laser soldering. Whilst LF 318 can be reflowed under nitrogen this is not essential. LF 318 is not particularly sensitive to reflow profile type. No single reflow profile is deemed suitable for all processes and applications, but the following example profiles have given good results in practice.



Preheat ramp up to 150°C	<math><3^{\circ}\text{C}</math>
Soak zone 150-200°C	60-180s
200°C to peak	<math><3^{\circ}\text{C}</math>
Time above liquidus	40-90s
Minimum peak temperature	$\geq 235^{\circ}\text{C}$
Time at peak temperature	<math><40\text{s}</math>
Cooling rate	<math><6^{\circ}\text{C}/\text{s}</math>
Time to peak from ambient	<math><8\text{ mins}</math>
Nitrogen (if required)	$\leq 1500\text{ppm O}_2$

### Cleaning:

The residues from LF 318 solder pastes may be left on the PCB in many applications since they do not pose a hazard to long term reliability. Should there be a specific requirement for residue removal, this may be achieved using conventional cleaning processes based on solvents such as MCF 800. For stencil cleaning, needle cleaning and cleaning board/misprints MSC 01 solvent cleaner is recommended.

## RELIABILITY PROPERTIES

### Solder Paste Medium:

LF 318 contains a stable resin system and low odour, high boiling range solvents. LF 318 is classified as Type ROL0 to IPC/J-STD-004 standard.

Test	Specification	Test Method	Results
<b>Copper Plate Corrosion</b>	IPC/J-STD-004A	2.6.15C	Pass
	JIS-Z-3197	8.4.1	Pass
<b>Copper Mirror Corrosion</b>	IPC/J-STD-004A	2.3.32D	Pass
<b>Chlorides &amp; Bromides</b>	IPC/J-STD-004A	2.3.33	Pass
	IPC/J-STD-004A	2.6.3.7	Pass
<b>Surface Insulation Resistance (SIR) (without cleaning)</b>	JIS-Z-3197	8.5.3	Pass
	Bellcore TR-NWT-000078	13.1.4	Pass
	Telcordia GR-78-Core	13.1.3	Pass
<b>Electromigration (ECM) (without cleaning)</b>	Bellcore TR-NWT-000078	13.1.5	Pass
	Telcordia GR-78-Core	13.1.4	Pass
<b>Flux Activity Classification (without cleaning)</b>	IPC/J-STD-004A		ROL0

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**STORAGE AND SHELF LIFE****Storage:**

LF 318 solder pastes should be stored at 0 to 10°C in tightly sealed in the original container (NB cartridges should be stored tip down to prevent the formation of air pockets). The paste should be removed from cold storage a minimum of 8 hours before use. Do not use forced heating methods to bring solder paste up to temperature.

LF 318 solder paste has been formulated to reduce separation on storage to a minimum, but should it occur gentle stirring for 15 seconds will return the product to its correct rheological performance.

**Shelf Life:**

A minimum shelf life of 6 months can be expected. Air shipment is recommended to minimize the time the containers are exposed to higher temperatures.

**GENERAL INFORMATION**

**For safe handling information on this product consult the relevant Safety Data Sheet (SDS)**

**Disclaimer**

The information provided in this Technical Data Sheet (TDS) including the recommendations for use and application of the product are based on our knowledge and experience of the product as at the date of this TDS. The product can have a variety of different applications as well as differing application and working conditions in your environment that are beyond our control. HARIMA is, therefore, not liable for the suitability of our product for the production processes and conditions in respect of which you use them, as well as the intended applications and results. We strongly recommend that you carry out your own prior trials to confirm such suitability of our product. Any liability in respect of the information in the Technical Data Sheet or any other written or oral recommendation(s) regarding the concerned product is excluded, except if otherwise explicitly agreed and except in relation to death or personal injury caused by our negligence and any liability under any applicable mandatory product liability law.

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