Indium8.9HF with SnSb

Pb-Free Solder Paste

Introduction

Indium8.9HF is an air reflow, no-clean solder paste specifically formulated to accommodate the higher processing temperatures required by the SnAgCu, SnAg, and other alloy systems favored by the electronics industry to replace conventional Pb-bearing solders. **Indium8.9HF** offers unprecedented stencil print transfer efficiency to work in the broadest range of processes. It is one of our lowest voiding pastes.

Alloys

Indium Corporation manufactures low-oxide spherical powder composed of a variety of Pb-free alloys that cover a broad range of melting temperatures. This document covers Type 4 and Type 4.5 powders as standard offerings with SnSb alloys, but other powder types are also available. The metal percent is the weight percent of the solder powder in the solder paste and is dependent upon the powder type and application.

Standard Product Specifications

Alloy	Metal Load
SnSb5	88.5% (Type 4)
SnSb10	
SnSb8.5	88.25% (Type 4.5)

Compatible Products

- Rework Flux: TACFlux® 089HF, TACFlux® 020B
- Cored Wire: CW-807
- Wave Flux: WF-9945, WF-9958

Note: Other products may be applicable. Please consult one of Indium Corporation's Technical Support Engineers.

Features

- Halogen-free per EN14582 test method
- Low BGA, CSP, QFN voiding
- One of our most stable pastes
- High transfer efficiency through small apertures (≤ 0.66AR)
- Eliminates hot and cold slump
- High oxidation resistance
- Wets well to oxidized BGA and pad surfaces
- Excellent soldering performance under high temperature and long reflow processes
- Clear, probe testable flux residue
- Compatible with SnPb alloys

Storage and Handling Procedures

Refrigerated storage will prolong the shelf life of solder paste. Solder paste packaged in cartridges should be stored tip down.

Storage Conditions (unopened containers)	Shelf Life
<10°C	12 months
<25°C	30 days max

Solder paste should be allowed to reach ambient working temperature prior to use. Generally, paste should be removed from refrigeration at least two hours before use. Actual time to reach thermal equilibrium will vary with container size. Paste temperature should be verified before use. Jars and cartridges should be labeled with date and time of opening.

Packaging

Indium8.9HF is currently available in 500g jars or 600g cartridges. Packaging for enclosed print head systems is also readily available. Alternate packaging options may be available upon request.

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BELLCORE AND J-STD TESTS & RESULTS

Test	Result
J-STD-004 (IPC-TM-650)	
• Flux Type (per J-STD-004A)	ROLO
• Flux Induced Corrosion (Copper Mirror)	Type L
• Presence of Halide Oxygen Bomb Followed by Ion Chromatography	<100ppm
• SIR	Pass

Test	Result
J-STD-005 (IPC-TM-650)	
• Typical Solder Paste Viscosity Malcom (10 rpm)	1700 poise
• Slump Test	Pass
• Solder Ball Test	Pass
• Typical Tackiness	35 grams
• Wetting Test	Pass
BELLCORE GR-78	
• SIR	Pass
• Electromigration	Pass

All information is for reference only. Not to be used as incoming product specifications.

Form No. 99366 (A4) R0

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Indium8.9HF Pb-Free Solder Paste with SnSb

Printing

Stencil Design:

Electroformed and laser cut/electropolished stencils produce the best printing characteristics among stencil types. Stencil aperture design is a crucial step in optimizing the print process. The following are a few general recommendations:

- Discrete components — A 10–20% reduction of stencil aperture has significantly reduced or eliminated the occurrence of mid-chip solder beads. The "home plate" design is a common method for achieving this reduction.
- Fine pitch components — A surface area reduction is recommended for apertures of 20 mil pitch and finer. This reduction will help minimize solder balling and bridging that can lead to electrical shorts. The amount of reduction necessary is process dependent (5–15% is common).
- For optimum transfer efficiency and release of the solder paste from the stencil apertures, industry standard aperture and aspect ratios should be adhered to.

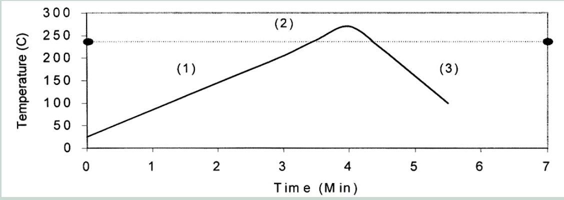
Printer Operation	
Solder Paste Bead Size	~20-25mm in diameter
Print Speed	25-150mm/second
Squeegee Pressure	0.018-0.027Kg/mm of blade length
Underside Stencil Wipe	Start at once per every 5 prints and decrease frequency until optimum value is reached
Squeegee Type/Angle	Metal with appropriate length / ~45 degrees
Separation Speed	5-20mm/second or per equipment manufacturer's specifications
Solder Paste Stencil Life	Up to 60 hours (at 30-60% RH and 22-28°C)

Cleaning

Indium8.9HF is designed for no-clean applications, however the flux can be removed if necessary by using a commercially available flux residue remover.

Stencil Cleaning is best performed using isopropyl alcohol (IPA) as a solvent. Most commercially available non-water-based stencil cleaners work well.

Reflow Profile



Heating Stage:
1) A linear ramp rate allows gradual evaporation of volatiles and prevents defects such as solder balling/beading and bridging as a result of hot slump. It also prevents unnecessary depletion of fluxing capacity when using higher temperature alloys.

Liquidus Stage:
2) A peak temperature well above the liquidus of the solder alloy is needed to form a quality solder joint and achieve acceptable wetting due to the formation of an intermetallic layer. If the peak temperature is excessive, or the time above liquidus is excessive, flux charring, excessive intermetallic fomation and damage to the board and components can occur.

Cooling Stage:
3) This stage refers to the temperature range from the peak temperature to approximately 50°C below the liquidus temperature where the cooling rate has negligible effect. A rapid cool down is desired to form a fine grain structure . Slow cooling will form a large grain structure, which typically exhibit poor fatigue resistance.

Note: All parameters are for reference only. Modifications may be required to fit process and design.			
Reflow Profile Details	Parameters		Comments
	SnSb Alloys		
Ramp Profile (Average Ambient to Peak) - Not the Same as Maximum Rising Slope	0.5→1°C/Second Recommended	0.5→2.5°C/Second Acceptable	To minimize solder balling beading, hot slump
Soak Zone Profile (Optional)	30→90 Seconds Recommended	30→120 Seconds Acceptable	May minimize BGA/CSP voiding
	160→180°C/Recommended	150→200°C/Acceptable	
Time Above Liquidus (TAL) Total Time & Temperature	45→60 Seconds Recommended	30→100 Seconds Acceptable	Needed for good wetting/reliable solder joint
	Liquidus +20→+30°C/Recommended	Liquidus +15→+40°C/Acceptable	
Cooling Rate	-2→-6°C/Second Recommended	-0.5→-6°C/Second Acceptable	Rapid cooling promotes fine grain structure
Peak Temperature in Air	260°C		As measured with thermocouple
Reflow Atmosphere	N_2 Preferred for these higher melting alloys		

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