PRODUCT DATA SHEET

SiPaste® C312HF

Solder Paste

Introduction

Indium Corporation's **SiPaste® C312HF** is a cleanable solder paste formulated for fine-aperture printing applications. This material exhibits optimum transfer efficiency with consistent printing stability after continuous use, a long stencil life of at least 4 hours without dry-out, and a benign, non-corrosive residue which can remain post-reflow without cleaning; this residue can, however, be easily cleaned with semi-aqueous or saponifier technology, if desired.

Features

- Exceptional transfer efficiency on sub 80-micron apertures
- Optimized powder formulation and flux vehicle
- Long stencil life
- Minimal stencil cleaning needed during printing
- Outstanding slump resistance
- Good response-to-pause
- Wide reflow profile window
- Excellent wetting capability
- Superior fine-pitch soldering ability
- Low-voiding
- Halogen-free

Alloys

Indium Corporation manufactures low-oxide spherical powder composed of a variety of Pb-free alloys that cover a broad range of melting temperatures. Type 3 and Type 4 powders are standard offerings with SnAgCu, SnAg, and SnSb Pb-free alloy systems. Type 5, Type 6, and Type 7 powders are offered for more complicated designs with small passive components such as 008004. 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 (Type 5, Type 6, Type 7, Type 8
96.5Sn/3.0Ag/0.5Cu (SAC305)	87–89%
99.3Sn/0.7Cu	

Storage and Handling

Storage Conditions (unopened containers)	Shelf Life
0–10°C	6 months

Solder paste should be allowed to reach ambient working temperature prior to use. Generally, paste should be removed from refrigeration at least 2 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.

Bellcore and J-STD Tests and Results

Test	Result
J-STD-004 (IPC-TM-650)	
Flux Type Classification	ROL0
Halide Content	<900ppm Cl <900ppm Br <1,500ppm Total
SIR	Pass
Wetting Test	Pass
Electromigration	Pass

Test	Result
J-STD-005 (IPC-TM-650)	
Typical Solder Paste Viscosity (SAC Alloy, T7)	1,400–2,100 poise
Typical Tackiness	200gF
Slump Test	Pass
Solder Ball Test	Pass
Wetting Test	Pass

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

From One Engineer To Another®

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Packaging

SiPaste® C312HF is currently available in 250g and 500g jars or 600g cartridges. Alternate packaging options may be available upon request.

Printing

Stencil Design:

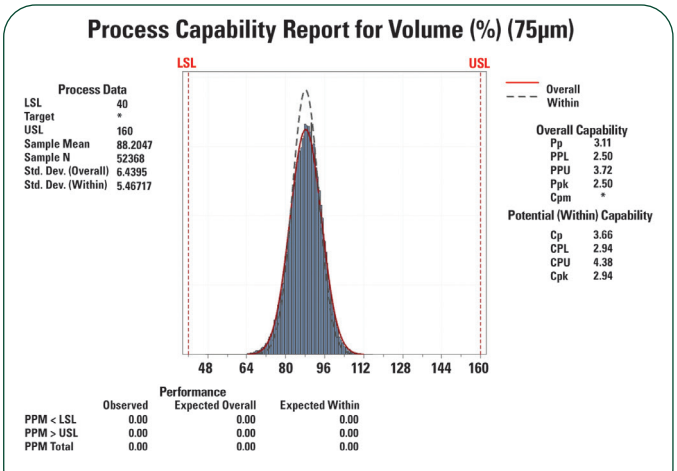
Electroformed and laser cut/electropolished stencils produce the best printing characteristics among stencil types. Stencil aperture design is a crucial step in optimizing the print process. The following are a few general recommendations:

- 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 20mil 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.

Recommended Printer Operation

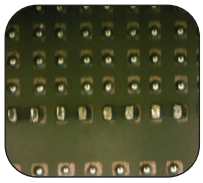
The following are general recommendations for stencil printer optimization. Adjustments may be necessary based on specific process requirement:

Solder Paste Bead Size	20–40mm in diameter
Print Speed	20–30mm/second
Squeegee Pressure	0.018–0.027kg/mm of blade length
Underside Stencil Wipe	Start at once per every 6 prints, then decrease frequency until an optimum value is determined
Solder Paste Stencil Life	>8 hours @ 60% RH and 22–28°C)



The actual process spread is represented by 6 sigma.

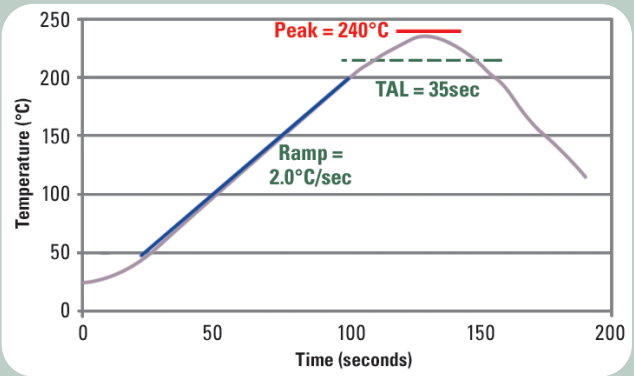
Wetting



SiPaste® C312HF exhibits excellent wetting under nitrogen reflow atmosphere. The solder joints are shiny and smooth, including those for ultrafine-pitch components. **SiPaste® C312HF** has low-voiding performance, including those for BGAs and CSPs.

Reflow

Recommended Profile:



SiPaste® C312HF should be reflowed using a linear profile in a nitrogen atmosphere. The stated profile recommendations can be used as a general guideline in establishing a reflow profile for **SiPaste® C312HF** with SnAgCu, SnAg, and SnSb alloy systems.

Heating Stage:

A linear ramp rate of 0.5–2.0°C/second allows gradual evaporation of volatile flux constituents and helps minimize defects such as solder balling and/or beading and bridging resulting from hot slump. It also prevents unnecessary depletion of fluxing capacity when a high peak temperature and extended time above liquidus is used.

Liquidus Stage:

SiPaste® C312HF can accommodate a peak temperature range from 235–260°C. The actual peak temperature is determined by the board size, complexity, and component limitations. The time above liquidus (TAL) should be 30–90 seconds. A peak temperature and TAL above these recommendations can result in excessive intermetallic formation that can decrease solder joint reliability.

Cooling Stage:

A rapid cool down is desired to form a fine-grain structure. Slow cooling will form a large-grain structure, which typically exhibits poor fatigue resistance. The acceptable cooling range is 0.5–6.0°C/second (2–6°C/second is ideal).

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Cleaning

Residue Removal: SiPaste® C312HF residue can be easily removed by using water with mixture of saponifier or semi-aqueous cleaners, and most commercially available flux residue removers. This material is formulated to leave an easily cleanable, benign residue after reflow. The optimal spray pressure and temperature are a function of board size, complexity, and the efficiency of the cleaning equipment and should be optimized accordingly. We recommend cleaning the flux residue 12 hours (or sooner) after reflow for optimal test performance. Electrical testing should be completed after the flux residue is removed. For a recommendation of appropriate cleaning solutions, please contact one of Indium Corporation's Technical Support Engineers.

Stencil Cleaning: This is best performed using an automated stencil cleaning system for both stencil and misprint cleaning to remove extraneous solder particles. Most commercially available stencil cleaners and isopropyl alcohol are acceptable.

Technical Support

Indium Corporation's internationally experienced engineers provide in-depth technical assistance to our customers. Thoroughly knowledgeable in all facets of Materials Science as it applies to the electronics and semiconductor sectors, Technical Support Engineers provide expert advice in solder preforms, wire, ribbon, and paste. Indium Corporation's Technical Support Engineers provide rapid response to all technical inquiries.

Safety Data Sheets

Please refer to the SDS document within the product shipment, or contact our local team to receive a copy.

All of Indium Corporation's solder paste and preform manufacturing facilities are IATF 16949:2016 certified.
Indium Corporation is an ISO 9001:2015 registered company.

Contact our engineers: **askus@indium.com**
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