

Product Data Sheet

Indium5.1 Pb-Free Solder Paste



Features

- Wide reflow process window
- Clear residue
- Low voiding
- Industry leading response-to-pause performance
- Outstanding print characteristics and long stencil life
- Excellent wetting to Pb-Free PCB metallizations

Introduction

Indium5.1 is an air reflow, no-clean solder paste specifically formulated to accommodate the higher processing temperatures required by the Sn/Ag/Cu, Sn/Ag, and other Pb-Free alloy systems favored by the electronics industry to replace conventional Pb-bearing solders. This product formulation offers consistent, repeatable printing performance combined with long stencil and tack times to handle the rigors of today's high-speed as well as high-mix surface mount lines. In addition to consistent printing and reflow requirements, this paste offers superb wetting to Pb-Free metallizations in combination with clear residue and low voiding on microvia.

Alloys

Indium Corporation manufactures low-oxide spherical powder composed of a variety of Pb-Free alloys that cover a broad range of melting temperatures. The metal load required is application dependent and will vary with alloy density and mesh size. Type 3 (-325/+500 mesh) powder is standard, but other powder sizes are available. See Standard Product Specifications section for details on metal load and particle size.

Standard Product Specifications

Alloy	Metal Load
SAC (Sn/Ag/Cu)	89% Indium Type 3 88.25% Indium Type 4

Packaging

Standard packaging for stencil printing applications includes 500g jars and 600g Semco cartridges. Packaging for enclosed print head systems is also readily available. For dispensing applications, 10cc and 30cc syringes are standard. Other packaging options may be available upon request.

Storage and Handling Procedures

Refrigerated storage will prolong the shelf life of solder paste. The shelf life of **Indium5.1** is 6 months when stored at <5°C*. Solder paste packaged in syringes and cartridges should be stored tip down.

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.

Material Safety Data Sheets

The MSDS for this product can be found online at <http://www.indium.com/techlibrary/msds.php>

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BELLCORE AND J-STD TESTS & RESULTS

Test	Result	Test	Result
J-STD-004A* (IPC-TM-650)		J-STD-005 (IPC-TM-650)	
•Flux Type (per J-STD-004A)	ROL1	•Typical Solder Paste Viscosity	
•Flux Induced Corrosion (Copper Mirror)	L	SAC387 (Sn95.5/Ag3.8/Cu0.7, Type 3, 89%)	
•Presence of Halide		SAC305 (Sn96.5/Ag3/Cu0.5, Type 3, 89%)	
Silver Chromate	Pass	Malcom (10 rpm),	2200 poise
Fluoride Spot Test	Pass	•Slump Test	Pass
Quantitative Halide Content	<5000ppm	•Solder Ball Test	Pass
•Post Reflow Flux Residue (ICA Test)	37%	•Typical Tackiness	48 grams
•SIR	Pass	•Wetting Test	Pass
		BELLCORE GR-78	
		•SIR	Pass
		•Electromigration	Pass

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

*J-STD-004A has replaced J-STD-004 and is more stringent in its requirements.

Form No. 97901 R7

www.indium.com askus@indium.com

ASIA: Singapore: +65 6268 8678
 CHINA: Suzhou, Shenzhen, Liuzhou: +86 (0)512 628 34900
 EUROPE: Milton Keynes, Torino: +44 (0) 1908 580400
 USA: Utica, Clinton, Chicago: +1 315 853 4900



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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 adequate release of solder paste from stencil apertures, a minimum aspect ratio of 1.5 is required. The aspect ratio is defined as the width of the aperture divided by the thickness of the stencil.

Printer Operation:

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

- Solder Paste Bead Size: 20-25mm diameter
- Print Speed: 25-100mm/sec
- Squeegee Pressure: 0.018-0.027kg/mm of blade length
- Underside Stencil Wipe: Once every 10-25 prints
- Solder Paste Stencil Life: >8 hrs. @ 30-60% RH & 22°-28°C

Cleaning

Indium5.1 is designed for no-clean applications, however the flux can be removed if necessary by using a commercially available flux residue remover.

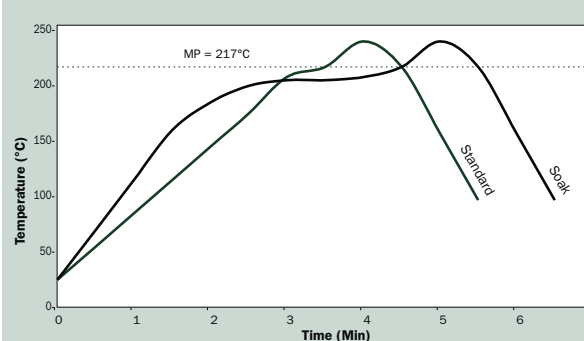
Stencil Cleaning is best performed using isopropyl alcohol (IPA) as a solvent. Most commercially available stencil cleaners work well.

Compatible Products

- Rework Flux: TACFlux 20B

Reflow

Recommended Profile:



The stated profile recommendations apply to most Pb-Free alloys in the Sn/Ag/Cu (SAC) alloy system, including SAC 305 (96.5Sn/3.0Ag/0.5Cu). This can be used as a general guideline in establishing a reflow profile when using **Indium5.1** Solder Paste. Deviations from these recommendations are acceptable, and may be necessary, based on specific process requirements, including board size, thickness & density.

Heating Stage:

The use of a linear ramp rate or ramp-to-spike (RTS) type profile assists in minimizing the greatest overall number of defects associated with the reflow process. If the ramp rate is too fast, it can cause solder balling, solder beading, and aggravated hot slump which can lead to bridging. The ramp rate in the preheat stage of the profile can range from 0.5°-2.5°C/second (0.5°-1°C/second is ideal). A short soak of 20-30 seconds just below the melting point of the solder alloy can help minimize tombstoning when using a RTS type profile.

If necessary, a ramp-soak-spike (RSS) profile can be implemented to minimize voiding on BGA and CSP type packages. A soak zone between 200°-210°C for up to 2 minutes is acceptable.

Liquidus Stage:

To achieve acceptable wetting and form a quality solder joint, the acceptable temperature range above the melting point of the solder alloy is 12°-50°C (15°-30°C is ideal). The acceptable range for time above liquidus (TAL) is 30-100 seconds (45-60 seconds is ideal). 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°C-6.0°C/second (2.0°-6.0°C/second is ideal).

This product data sheet is provided for general information only. It is not intended, and shall not be construed, to warrant or guarantee the performance of the

products described which are sold subject exclusively to written warranties and limitations thereon included in product packaging and invoices.

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