Product Data Sheet

Indium3.1 AF Pb-Free Water-Soluble Solder Paste

Features

- Consistent fine-pitch printing performance with high transfer efficiency from stencil apertures
- Superior fine-pitch soldering ability
- Wide reflow profile window
- Excellent response-to-pause printing performance
- Outstanding slump resistance
- Low voiding
- Minimal foaming during the cleaning process
- Excellent wetting

Introduction

Indium3.1AF is an air or nitrogen reflow, water-soluble solder paste specifically formulated to accommodate the higher processing temperatures required by the SnAgCu and SnAg Pb-free alloy systems. This product formulation offers consistent, repeatable printing performance combined with a long stencil life and sufficient tack strength to handle the challenges of today's high-speed as well as high-mix surface mount lines. In addition to consistent printing and reflow requirements, this solder paste offers superb wetting to the various Pb-free metallizations and has exceptional low voiding performance on fine-pitch components, including BGAs and CSPs.

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 powder is the standard offering along with SAC305 & SAC387 alloys. The metal % is the weight ratio of the solder powder to the flux/vehicle and is tailored to Type 3 powder as well as the application.

Standard Product Specifications

Alloy	Metal Load
96.5Sn/3.0Ag/0.5Cu (SAC305)	87.5 – 88.5%
99.3Sn/0.7Cu	

Packaging

Indium3.1AF 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.

Storage and Handling Procedures

Refrigerated storage will prolong the shelf life of solder paste. The shelf life of **Indium3.1AF** is no less than 6 months when stored at < -10°C. The solder paste can be exposed to ambient temperatures (25°C) for up to 7 days during transit. Solder paste packaged in cartridges and syringes should be stored tip down.

When refrigerated, solder paste should be allowed to reach ambient working temperatures 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 the container size, and the solder paste temperature should be verified before use. Jars and cartridges should be labeled with the date and time of opening. It is not recommended to remove worked paste from the stencil and mix it with the unused paste in the jar because this may alter the rheology of the unused paste.

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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)	ORH1	• Typical Solder Paste Viscosity SAC305 (Sn96.5/Ag3/Cu0.5, Type 3, 88.5%)	
• Flux Induced Corrosion	M	Malcom (10 rpm)	2300 poise
• Presence of Halide		• Typical Tackiness	40g
Silver Chromate	Pass	• Slump Test	Pass
Fluoride Spot Test	Pass	• Solder Ball Test	Pass
• Quantitative Halide Content	<5000 ppm		
• SIR (cleaned)	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 stingent in its requirements.*

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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 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:

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

- Solder Paste Bead Size: 20–40mm diameter
- Print Speed: 12–150mm/sec
- Squeegee Pressure: 0.018–0.027kg/mm of blade length
- Underside Stencil Wipe: Start at once every 5 prints, then decrease frequency until an optimum value is determined.
- Solder Paste Stencil Life: >8 hrs. <60% RH & 22–28°C

Cleaning

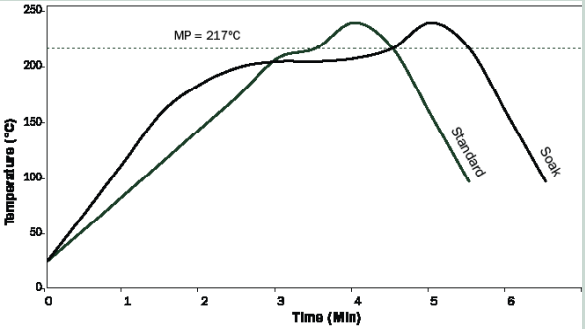
Indium3.1AF flux residue is easily cleanable with water at no less than 60 psi and 55°C. This can be used as a general guideline in establishing a cleaning process when using the **Indium3.1AF**. Deviations from these recommendations are acceptable, and may be necessary, based upon specific process requirements, including board size, thickness, and complexity.

Compatible Products

- Rework Flux: **TACFlux® 025**
- Flux Pen: **FP-300**
- Cored Wire: **CW-301**
- Wave Flux: **1010**

Reflow

Recommended Profile:



The stated profile recommendations apply to most Pb-free alloys in the SnAgCu (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 **Indium3.1AF** solder paste. Deviations from these recommendations are acceptable, and may be necessary, based on specific process requirements, including board size, thickness & density.

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. A profile with a soak between 200°–210°C for up to 2 minutes can be implemented to reduce void formation on BGA & CSP type devices. A short soak of 20–30 seconds just below the melting point of the solder can help minimize tombstoning.

Liquidus Stage:

A peak temperature of 12° to 43°C above the melting point of the solder alloy is recommended to achieve acceptable wetting and form a quality solder joint. 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 (1–4°C/second) is desired to form a fine grain structure. Slow cooling will form a large grain structure, which typically exhibits poor fatigue resistance.

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