Indium9.0A
Pb-Free Solder Paste

Introduction
Indium9.0A 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. Indium9.0A offers unprecedented stencil print transfer efficiency to work in the broadest range of processes. In addition, the high oxidation resistance of Indium9.0A virtually eliminates incomplete coalescence (graping) of small deposits.

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 SAC305 and SAC387 alloys. 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 offerings are detailed in the following table.

Standard Product Specifications

<table>
<thead>
<tr>
<th>Alloy</th>
<th>Metal Lead</th>
<th>Type 3 (%)</th>
<th>Type 4 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>95.5Sn/3.8Ag/0.7Cu (SAC387)</td>
<td>89.0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>96.5Sn/3.0Ag/0.5Cu (SAC305)</td>
<td>88.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>98.5Sn/1.0Ag/0.5Cu (SAC105)</td>
<td>88.5%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>99Sn/0.3Ag/0.7Cu (SAC0307)</td>
<td>88.5%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Packaging
Indium9.0A 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. Solder paste packaged in cartridges should be stored tip down.

BELLCORE AND J-STD TESTS & RESULTS

<table>
<thead>
<tr>
<th>Test</th>
<th>Result</th>
<th>Test</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Flux Type (per J-STD-004A)</td>
<td>Type L</td>
<td>• Typical Solder Paste Viscosity Malcom (10 rpm) Type 3</td>
<td>1850 poise</td>
</tr>
<tr>
<td>• Flux Induced Corrosion (Copper Mirror)</td>
<td>Pass</td>
<td>• Slump Test</td>
<td>Pass</td>
</tr>
<tr>
<td>• Presence of Halide Silver Chromate Fluoride Spot Test</td>
<td>Pass</td>
<td>• Solder Ball Test</td>
<td>Pass</td>
</tr>
<tr>
<td>• Ion Chromatography</td>
<td>Pass</td>
<td>• Typical Tackiness</td>
<td>Pass</td>
</tr>
<tr>
<td>• SIR</td>
<td></td>
<td>• Wetting Test</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BELLCORE GR-78</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• SIR</td>
<td>Pass</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Electromigration</td>
<td>Pass</td>
</tr>
</tbody>
</table>

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

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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.

<table>
<thead>
<tr>
<th>Printer Operation</th>
<th>Solder Paste Bead Size</th>
<th>~20-25mm in diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Print Speed</td>
<td>50-100mm/second</td>
<td></td>
</tr>
<tr>
<td>Squeegee Pressure</td>
<td>0.018-0.027Kg/mm of blade length</td>
<td></td>
</tr>
<tr>
<td>Underside Stencil Wipe</td>
<td>Start at once per every 5 prints and decrease frequency until optimum value is reached</td>
<td></td>
</tr>
<tr>
<td>Squeegee Type/ Angle</td>
<td>Metal with appropriate length / ~45 degrees</td>
<td></td>
</tr>
<tr>
<td>Separation Speed</td>
<td>5-20mm/second or per equipment manufacturer’s specifications</td>
<td></td>
</tr>
<tr>
<td>Solder Paste Stencil Life</td>
<td>&gt;8 hrs. (at 30-60% RH and 22-28°C)</td>
<td></td>
</tr>
</tbody>
</table>

Cleaning

Indium9.0A 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

Recommended Profile:

The stated profile recommendations apply to most Pb-free alloys in the SnAgCu (SAC) alloy system, including SAC305 (96.5Sn/3.0Ag/0.5Cu). This can be used as a general guideline in establishing a reflow profile when using Indium9.0A solder paste. Deviations from these recommendations are acceptable, and may be necessary, based on specific process requirements, including board size, thickness, and density. Start with the linear profile, then move to the optional soak profile if needed. The flat soak portion of the linear profile (linear shoulder) may also be eliminated.

<table>
<thead>
<tr>
<th>Reflow Profile Details</th>
<th>SAC305 Parameters</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ramp Profile (Average Ambient to Peak) - Not the Same as Maximum Rising Slope</td>
<td>0.5–1°C/Second</td>
<td>0.5–2.5°C/Second</td>
</tr>
<tr>
<td>Soak Zone Profile (Optional)</td>
<td>30–90 Seconds</td>
<td>30–120 Seconds</td>
</tr>
<tr>
<td>Peak Temperature</td>
<td>160–180°C</td>
<td>150–200°C</td>
</tr>
<tr>
<td>Cooling Ramp Rate</td>
<td>2–6°C/Second</td>
<td>0.5–6°C/Second</td>
</tr>
<tr>
<td>Reflow Atmosphere</td>
<td>Air or N₂</td>
<td>N₂ preferred for small components</td>
</tr>
</tbody>
</table>

Note: All parameters are for reference only. Modifications may be required to fit process and design.

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