**Product Data Sheet**

**Indium8.9HF with SnSb Pb-Free Solder Paste**

**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

**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**

<table>
<thead>
<tr>
<th>Alloy</th>
<th>Metal Load</th>
</tr>
</thead>
<tbody>
<tr>
<td>SnSb5</td>
<td>88.5% (Type 4)</td>
</tr>
<tr>
<td>SnSb10</td>
<td>88.25% (Type 4.5)</td>
</tr>
</tbody>
</table>

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

**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.

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

**Test Result**
- Flux Type (per J-STD-004A) ROL0
- Flux Induced Corrosion (Copper Mirror) Type L
- Presence of Halide Oxygen Bomb Followed by Ion Chromatography <100ppm Pass
- SIR Pass

**BELLCORE AND J-STD TESTS & RESULTS**

**Test**
- J-STD-004 (IPC-TM-650)
  - Flux Type (per J-STD-004A)
  - Flux Induced Corrosion (Copper Mirror)
  - Presence of Halide Oxygen Bomb Followed by Ion Chromatography
  - SIR

**Result**
- ROL0
- Type L
- <100ppm Pass

**Test**
- J-STD-005 (IPC-TM-650)
  - Typical Solder Paste Viscosity Malcom (10 rpm)
  - Slump Test
  - Solder Ball Test
  - Typical Tackiness
  - Wetting Test

**Result**
- 1700 poise
- Pass
- Pass
- 35 grams
- Pass

**BELLCORE GR-78**
- SIR
- Electromigration

- Pass
- Pass

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

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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.

<table>
<thead>
<tr>
<th>Printer Operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solder Paste Bead Size</td>
</tr>
<tr>
<td>Print Speed</td>
</tr>
<tr>
<td>Squeegee Pressure</td>
</tr>
<tr>
<td>Underside Stencil Wipe</td>
</tr>
<tr>
<td>Squeegee Type/ Angle</td>
</tr>
<tr>
<td>Separation Speed</td>
</tr>
<tr>
<td>Solder Paste Stencil Life</td>
</tr>
</tbody>
</table>

Table: Reflow Profile Details

<table>
<thead>
<tr>
<th>Ramping Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>SnSb Alloys</td>
</tr>
<tr>
<td>Ramp Profile (Average Ambient to Peak) - Not the Same as Maximum Rising Slope</td>
</tr>
<tr>
<td>To minimize solder balling/beading, hot slump</td>
</tr>
<tr>
<td>Soak Zone Profile (Optional)</td>
</tr>
<tr>
<td>160→180°C/Recommended, 150→200°C/Acceptable</td>
</tr>
<tr>
<td>May minimize BGA/CSP voiding</td>
</tr>
<tr>
<td>Time Above Liquidus (TAL) Total Time &amp; Temperature</td>
</tr>
<tr>
<td>150°C/Recommended, 150→165°C/Acceptable</td>
</tr>
<tr>
<td>Needed for good wetting/reliable solder joint</td>
</tr>
<tr>
<td>Cooling Rate</td>
</tr>
<tr>
<td>Rapid cooling promotes fine grain structure</td>
</tr>
<tr>
<td>Peak Temperature in Air</td>
</tr>
<tr>
<td>As measured with thermocouple</td>
</tr>
<tr>
<td>Reflow Atmosphere</td>
</tr>
</tbody>
</table>

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 formation 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.