

# WS889 Water Soluble Solder Paste

## Lead-Free Sn100C or SAC Alloy

- ORH1 Per IPC-J-STD-004
- Non-Hygroscopic
- Slump Resistant
- Low Voiding

### INTRODUCTION

WS889 water washable solder paste is designed to meet the requirements for reliable solder joints in PCB assemblies. WS889 displays previously unseen levels of repeatability and consistency even in a wide range of temperatures (65°-85°F) and relative humidity (25% - 65% RH). Residues are clear and can be cleaned using warm water.

### ATTRIBUTES

- Excellent wetting characteristics on all surface finishes, including osp, Ni/Au, Ni/Pd/Au, Sn/Ag
- Excellent volume transfer efficiency
- High resistance to slump and dry-out, even in extreme humidity conditions 70°-77°F & 45%-65%RH
- High speed stencil printing up to 150mm/sec
- Excellent low-voiding performance that exceeds IPC Class III requirement
- Clear Residue
- Very cleanable paste residues with hot DI water (120°-140°F)

### PRODUCT INFORMATION

<b>Alloys:</b>	<ul style="list-style-type: none"> <li>• SN100C – MP=227°C</li> <li>• SAC305 – MP=217°C</li> <li>• Compatible with most lead-free alloys</li> </ul>
<b>Applications:</b>	<ul style="list-style-type: none"> <li>• Automatic / Manual Printing</li> <li>• Automatic / Manual Dispensing</li> </ul>
<b>Powder Size:</b>	<ul style="list-style-type: none"> <li>• Type-3 and Type-4 standard</li> <li>• Type-5 available upon request</li> </ul>
<b>Packaging:</b>	<ul style="list-style-type: none"> <li>• 500gram jars or cartridges standard</li> <li>• Enclosed print head systems.</li> <li>• Other packaging upon request</li> </ul>
<b>Repair Flux:</b>	<ul style="list-style-type: none"> <li>• 10CC and 30CC syringes</li> <li>• Larger package sizes upon request</li> </ul>

### PRINTING

Stencil aperture design and stencil quality are major factors in achieving excellent print consistency with any solder paste.

UltraSlic™ (SAR ≥ 0.45) and Slic™ (SAR ≥ 0.55) stencils from Fine Line Stencil are recommended for optimal print performance, and can be custom designed to minimize rework and improve the yields of any process. Some general stencil aperture design guidelines follow:

- **Fine pitch components (≤ 0.020")**  
A 0.001" reduction (L & W) to minimize bridging and create proper gasketing between the stencil and SMT pad
- **Discrete components**  
A 0.002" reduction (L & W) for water washable and a 0.002" reduction (L & W), with "U-shaped" home-plates, for no clean to minimize mid-chip solder beads.

Contact Fine Line Stencil at 719-579-8055 for process-specific stencil design recommendations.  
[www.finelinestencil.com](http://www.finelinestencil.com)

### PRINTER OPERATION

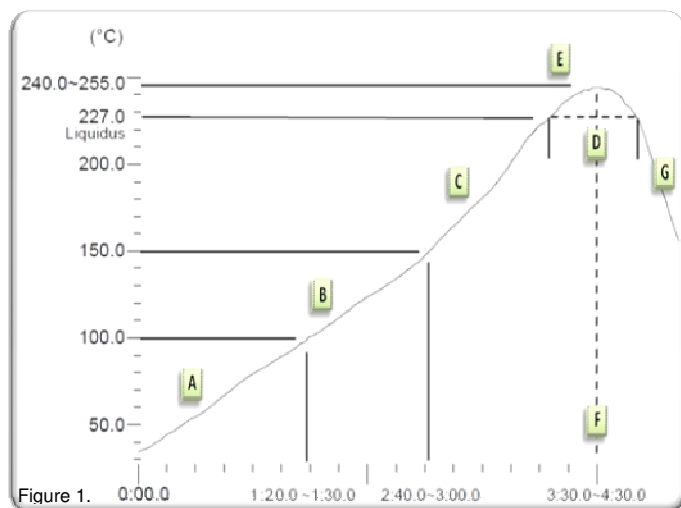
The following are general recommendations for stencil printer optimization. Further adjustments may be necessary based on specific process requirements.

<b>Solder Paste Bead Size:</b>	<ul style="list-style-type: none"> <li>• 2cm (~0.75") on startup</li> <li>• Add when bead &lt; 1.4 cm (~0.5")</li> </ul> Maintaining a minimal controlled volume of solder paste on the stencil at all times will ensure paste consistency as well as print process repeatability and reliability
<b>Squeegee:</b>	<ul style="list-style-type: none"> <li>• Metal, Slic™ blade preferred</li> <li>• 60 degrees from horizontal</li> </ul>
<b>Speed:</b>	<ul style="list-style-type: none"> <li>• 25 to 150 mm/sec. (1 to 6 in/sec)</li> </ul> Adjust printer for a pull or print-on-demand process
<b>Pressure:</b>	<ul style="list-style-type: none"> <li>• 0.18-0.27 Kg/cm (squeegee length)</li> </ul> Apply only enough pressure to achieve a clean top-side wipe of the stencil surface after each squeegee pass
<b>Underside Wipe:</b>	<ul style="list-style-type: none"> <li>• Slic™ and Ultraslic™ stencils should exceed &gt;10 prints/wipe</li> </ul>
<b>Stencil life / Environment:</b>	<ul style="list-style-type: none"> <li>• &gt;8 hours</li> <li>• 70°-77°F &amp; 45%-60%RH</li> <li>• 75°F &amp; 45%RH Optimal</li> </ul>

### STORAGE AND HANDLING

- Cartridges should be stored tip down.
- Paste can be stored up to two weeks at room temperature.
- To prolong shelf life of **WS889**, refrigerate between 5°C~10°C, (41°F~50°F). At this range the shelf life will exceed 9 months.
- **WS889** should not be allowed to freeze.
- When refrigerated, solder paste must be allowed to warm up to room temperature.
- Paste must be ≥22°C, (~66°F) prior to applying to stencil for processing.
- Working range of **WS889** is between 22-32°C, (~66°F – 89.5°F).
- First-In-First-Out (FIFO) inventory management practices should be used with all solder pastes.



**REFLOW PROFILE**

**HEATING**

A linear ramp of 0.7°C to 2.0°C C/second is suggested to gradually remove the solvents and other volatile components in the solder paste. This also helps in minimizing solder balls, beading and bridging from hot slump.

A linear ramp also helps minimize depletion of flux activity which can occur with excessive temperature, extended preheat times, and at very high reflow temperatures.

A profile with a soak between 200-210°C for less than 20 seconds can be used to reduce void formation on BGA and CSP devices. (Request FCTA's profile guide to void reduction).

While a linear profile typically does not produce tombstoning, a short 10-20 second dwell prior to transitioning into the liquidus point of the solder, and minimizing the ΔT between soak and liquid temperatures will help minimize tombstoning if experienced.

**STANDARD LINEAR PROFILE GUIDELINES**

A linear ramp-style profile (Figure 1) is recommended with **WS889**; however, it will also perform well in ramp-soak profiles. Some general guidelines for a standard linear profile:

Standard Linear Profile	
Ramp Rate	• 0.7°C ~ 2.0°C Per Second Typical
Time Above Liquidus (TAL)	• Target 50~55 Seconds Nominal • 45~75 Second Process Window
Peak Temperature	• 245°C Nominal for Sn100C • 242°C~255°C Process Window
Profile Length	• 3½ ~ 4 ½ Minutes Max • From 45°C to Profile Peak
Cool Down	• 3.0°C ~ 4.0°C Per Second Typical

\*See FCT Assembly's "Linear Profile Process Guide" for SN100C.

**COOLING**

A cooling rate of 2°C-3°C per second is typical for most lead free applications. These parameters should be utilized to insure a fine grain solder structure and minimal IMC layer.

**CLEANING**

Post reflow residues from WS889 must be removed. It is suggested that the residues are removed as soon after reflow as possible; however, effective cleaning can be accomplished up to 3 days after reflow, allowing time for secondary processing.

**MATERIAL SAFETY DATA SHEETS**

Material Safety Data Sheets (MSDS) are available upon request, and online at [www.fctassembly.com](http://www.fctassembly.com)

**TEST RESULTS8**

J-STD-004 (IPC Tm-650) Test	Result
Flux Type (per J-STD-004)	ORH1
Fluoride test	Zero
Ion Chromatography	Halide Present
SIR	Pass - Cleaned
J-STD-005 (IPC-TM-650) Test	Result
viscosity Type 3	650,000
y Type 3	
rookfield viscosity Type 4	700,000
Pass	
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