WS888 Water Soluble Solder Paste
Lead-Free Sn100C or SAC Alloy

■ ORH1 Per IPC-J-STD-004
■ Non-Hygroscopic
■ Delayed Cleaning

INTRODUCTION

WS888 water washable solder paste is designed to meet the requirements for reliable solder joints in PCB assemblies. WS888 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 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
- Enhanced tack performance and printer open time
- Very cleanable paste residues with hot DI water (120°-140°F)

PRODUCT INFORMATION

Alloys:	• SN100C – MP=227°C • SAC305 – MP=217°C • Compatible with most lead-free alloys
Applications:	• Automatic / Manual Printing • Automatic / Manual Dispensing
Powder Size:	• Type-3 and Type-4 standard • Type-5 available upon request
Packaging:	• 500gram jars or cartridges standard • Enclosed print head systems. • Other packaging upon request
Repair Flux:	• 10CC and 30CC syringes • Larger package sizes upon request

PRINTING

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

High quality stencils are recommended for optimal print performance. 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 FCT Solder for process-specific stencil design recommendations. www.fctsolder.com

PRINTER OPERATION

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

Solder Paste Bead Size:	• 2cm (~0.75") on startup • Add when bead < 1.4 cm (~0.5") 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
Squeegee:	• Metal, Slic™ blade preferred • 60 degrees from horizontal
Speed:	• 25 to 150 mm/sec. (1 to 6 in/sec) Adjust printer for a pull or print-on-demand process
Pressure:	• 0.18-0.27 Kg/cm (squeegee length) Apply only enough pressure to achieve a clean top-side wipe of the stencil surface after each squeegee pass
Underside Wipe:	• A quality stencil should exceed >10 prints/wipe
Stencil life / Environment:	• >8 hours • 70°-77°F & 45%-60%RH • 75˚F & 45%RH Optimal

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 **WS888**, refrigerate between 5°C~10°C, (41°F~50°F). At this range the shelf life will exceed 6 months.
- **WS888** 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 **WS888** 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.
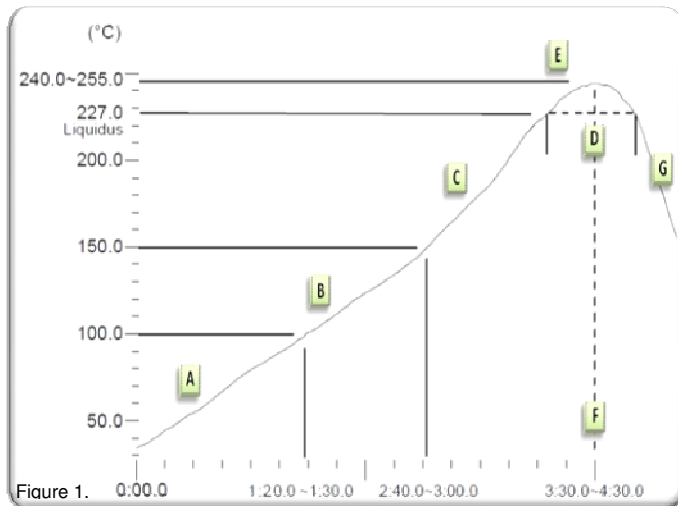
REFLOW PROFILE

Figure 1.

*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 WS888 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.fctsolder.com

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 FCT Solder'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.

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
Brookfield viscosity Type 3	700,000
Brookfield viscosity Type 4	750,000
Slump	Pass
Solder Ball	Pass
Wetting	Pass

Bellcore Test	Result
SIR	Pass – Cleaned
Electromigration	Pass - Cleaned

STANDARD LINEAR PROFILE GUIDELINES

A linear ramp-style profile (Figure 1) is recommended with **WS888**; 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