

WS161 Water Soluble Sn-Pb Solder Paste

Introduction

WS161 solder paste is a high activity water soluble Sn-Pb solder paste. WS161 shows excellent stencil life, ideal response to pauses in printing, excellent wetting, very low solder balling and graping, and has very low voiding potential. WS161 flux residues are easy to clean using D.I. water. WS161 is capable of reflow in standard Pb-free reflow profiles for mixed metallurgy applications, e.g. SAC305 BGAs reflowed with Sn-Pb solder paste.

Attributes

- Excellent stencil life and ideal response to pauses in printing.
- Ideal reflow performance with excellent wetting, very low solder balling and graping.
- Very low potential for voiding.
- Flux residues are easy to clean using D.I. water.
- Capable for use in Pb-free reflow profiles.

| Solder Alloy | Solder Powder Size Availability (IPC J-STD-005B) | Melting Range (°C) |
|---------------------------|--|------------------------------|
| Sn63/Pb37 | Type 3, 4, or 5 | 183 |
| Sn62/Pb36/Ag2 | Type 3, 4, or 5 | 179 |
| Anti-tombstoning mixtures | Type 3, 4, or 5 | Range depends on the mixture |

- Other sizes of solder powder are available upon request.

| Solder Paste Packaging | Net Weight (grams) |
|------------------------|---|
| Jars | 500 |
| Cartridges | 500-600 (6 oz), 700 (8 oz), 1200-1300 (12 oz) |
| Syringes | 30 (10 cc), 100 (30 cc) |

- Other packaging may be available upon request.

Compatible Products

150N, 152N, 159HF liquid fluxes.
WS161 gel flux.

Storage and Handling

Best practices for storage and handling of solder paste are listed below. Additional details can be found in the Solder paste storage and handling guide.

- Shelf life is 9 months when stored at 0 to 10 °C (32 to 50 °F).
- Warm the solder paste to room temperature (18 to 29 °C / 65 to 85 °F) before use. Do not force warming by heating the solder paste. Keep the solder paste sealed while warming, which typically takes 3 to 4 hours at room temperature. Warming overnight is acceptable.

- Ideally solder paste should be mixed before use to bring it to a normal working consistency. This can be done by hand-stirring in a jar, or using a knead cycle on the printer.
- Best practice is to keep the solder paste at room temperature until completely used. Remaining fresh solder paste should be sealed in the original container along with all inserts, lids, etc.
- If solder paste is removed from the printer and stored, it is recommended to store it in a separate container from the fresh solder paste. The container should be sealed with all inserts, lids, etc.
- Once solder paste is applied to the circuit board, the best practice is to reflow the solder paste as soon as possible. It is acceptable to reflow within approximately 4 hours.

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| Process Parameters |
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The print and reflow process parameters shown below are simply guidelines. The optimal parameters may be different based upon your equipment, circuit boards, components, and process.

| Print Parameter | Guideline | Notes |
|--|---|--|
| Solder paste bead size | 1.0 to 2.5 cm (0.40 to 1.0 in) | Add solder paste regularly to maintain the bead size. |
| Squeegee blade | Stainless steel. 60° from horizontal. 45° for pin in paste. | Other blade angles and materials are usable. |
| Stencils | Fine grain laser cut stainless steel | All types of commercially available stencils are usable. |
| Print speed | 20 to 200 mm/sec (0.8 to 8.0 in/sec) | Increased speeds may require higher blade pressures. |
| Pressure / blade length (increase with increasing speed) | 0.18 to 0.54 kg/cm (1.0 to 3.0 lbs/in) | Set to the minimum required to scrape the stencil clean. |
| Separation speed | 0.5 to 10.0 mm/sec | Higher separation speeds may improve solder paste release. |
| Underside stencil cleaning | Wet / vacuum / vacuum cycle every 1-20 prints | Clean more frequently to reduce the risk of bridging. |
| Stencil life | 8 hours at 18-29 °C (65-85 °F) and 30-70% RH. | Stencil life may be shorter outside of these conditions. |

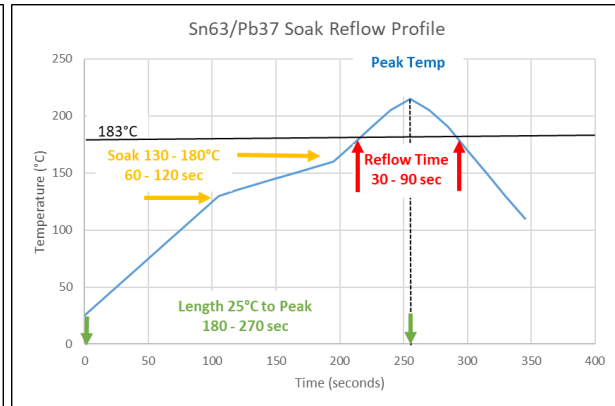
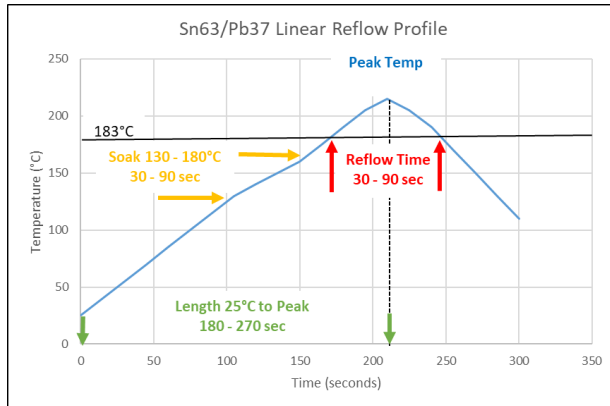
- Higher blade pressures will increase stencil and blade wear and can lead to “scooping” and other print defects.
- Underside stencil cleaning is best accomplished with commercial cleaners and high-quality wipe materials. Nano-coated stencils can be used to reduce the frequency of underside cleaning.

| Reflow Parameter | Guideline | Notes |
|-------------------------------------|---------------------------------|---|
| Profile length* (25 °C to peak) | 3.0 to 4.5 min (180 to 270 sec) | Profile length is dependent upon the PCBA and process. |
| Heating ramp rate | 1.0 to 3.0 °C/sec | Lower ramp rates tend to equalize reflow temperatures. |
| Preheat / soak time* (130 - 180 °C) | 30 to 120 sec | Linear profiles are a good starting place but may not work for all PCBAs. |

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|---------------------------------------|------------------------------------|---|
| Peak temperature* | 200 to 215 °C for Sn63/Pb37 alloys | 15 to 30 °C above liquidus for other solder alloys. |
| Reflow time* (time above liquidus) | 30 to 90 sec | Time above the liquidus point of the solder alloy used. |
| Cooling ramp rate | 1.0 to 6.0 °C/sec | Higher cooling rates may refine the grain structure. |

*Capable of reflow in Pb-free reflow profiles.

Examples of reflow profile graphs are shown below.



Cleaning

Raw solder paste can be removed from the stencil, squeegee blades, and circuit boards using a variety of commercial cleaners. Isopropyl alcohol (IPA) can also be used.

WS161 flux residues are corrosive and must be removed using a suitable wash process. It is recommended to remove WS161 flux residues within 4 hours after soldering using D.I. water heated to 100 - 180 °F in standard washing equipment. It is possible to wash away WS161 flux residues after multiple heat cycles followed by a 24 hour hold time, although this is not recommended.

Safety

Wear chemically resistant gloves when handling solder paste. Avoid breathing fumes, especially during reflow of the solder paste. Follow the guidelines detailed in the Safety Data Sheet (SDS).

| J-STD-004C Flux Standard | Test Method | Result |
|---|------------------------|--------------------------|
| J-STD-004C classification | J-STD-004C methods | ORH1 |
| Halide ion content (Br ⁻ , Cl ⁻ , F ⁻ , I ⁻) | IPC 2.3.28.1 | 1.4 to 1.6% wt |
| Halogen content (Br and Cl) | EN 14582, IPC 2.3.28.1 | 6.0 to 7.0% wt of solids |
| Halide by silver chromate | IPC 2.3.33 | Halides detected |
| Fluoride by spot test | IPC 2.3.35.1 | None detected |
| Copper mirror | IPC 2.3.32 | High activity |
| Copper corrosion | IPC 2.6.15 | Corrosion present |
| Surface Insulation Resistance (SIR) | IPC 2.6.3.7 | Pass > 5.00E+9 ohms |

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|---|--------------------|---------------------|
| Electro Chemical Migration (ECM) | IPC 2.6.14.1 | Pass, no migration |
| J-STD-005A Solder Paste Standard | Test Method | Result |
| Viscosity - Brookfield | IPC 2.4.34 | Refer to the C of A |
| Slump - frosted glass | IPC 2.4.35 | Pass |
| Solder balling - frosted glass | IPC 2.4.43 | Preferred |
| Wetting - copper | IPC 2.4.45 | Pass |

Limited Liability and Warranty Disclaimer

All information, statements, technical data, and recommendations contained in this Technical Data Sheet are based on testing we believe to be reliable. However, the accuracy or completeness thereof is not guaranteed. It is impossible for our lab to account for all manufacturing conditions and variables. Products are warranted to be free from defects at the time sold. To the full extent consistent with applicable law, the exclusive remedy of the user or buyer is to receive replacement product for any product defective at the time sold. FCT Assembly, Inc. makes NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Further, FCT Assembly, Inc. makes no other express, implied, or statutory warranties unless otherwise specified in writing and signed by officers of the corporation.