TECHNICAL DATA SHEET

CATEGORY: **WATER SOLUBLE SOLDER PASTE**
NAME: **WS 353**
ALLOY: **SAC (Tin-Silver-Copper)**

FEATURES

- EXCELLENT WETTING
- BROAD PRINT PROCESS WINDOW
- EASILY CLEANED RESIDUES
- LENGTHY STENCIL LIFE & TACK TIME
- ELIMINATES/REDUCES VOIDING UNDER BGAs
- LOW FOAMING DURING WASH

DESCRIPTION

WS353 water soluble solder paste has been developed in response to electronics manufacturers demand for an all-purpose, reliably consistent water-soluble solder paste. WS353 offers extended stencil life and tack time, robust environmental tolerance and printing characteristics, excellent activity, a broad cleaning process window, and compatibility with both tin-lead and lead-free solder alloys.

WS353 can be used in fine pitch printing applications and has proven effective in the assembly of 0201 components. WS353 provides consistent printing characteristics and slump resistance during high-speed printing. The excellent activity of WS353 makes it a suitable choice when soldering to standard or difficult-to-wet parts, including lead-free alloys and finishes. In addition, WS353 has proven to substantially reduce voiding under micro-BGAs. The residues of WS353 may be cleaned easily in straight water, with the result being exceptional electrical reliability. In addition, WS353 is designed to not foam during washing, even in high-pressure wash systems.

STANDARD PASTE COMPOSITION

Application Method	IPC Powder Type	Metal Load
Standard Stencil Printing	3	88.5%
Fine Pitch Stencil Printing	5	88%
Ultra-Fine Pitch Stencil Printing	5	87.5%
Dispensing syringes	3	84%
Note: These are typical starting guidelines. To achieve optimal performance, actual metal load and particle size may vary per process, application, and environment.		

HANDLING

- WS 353 has a refrigerated shelf life of 6 months at 4°C/40°F or below.
- Allow the solder paste to completely warm naturally to ambient temperature (8 hours is recommended) prior to breaking seal for use. Do not force warm.
- Mix the product lightly and thoroughly for 1 to 2 minutes to ensure even distribution of any separated material resulting from storage.
- Do not store new and used paste in the same container.
- Re-seal any opened containers while not in use.

PRINTER SETUP

Below are some suggested starting parameters for your screen printer. Adjustments will vary between equipment, application and facility environment.

SNAP-OFF DISTANCE	**ON CONTACT (0.00”)**	SQUEEGEE PRESSURE	**1-1.7 LBS/IN. OF BLADE**
PCB SEPARATION DISTANCE	**.030-.100”**	PCB SEPARATION SPEED	**SLOW - MEDIUM**

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PASTE APPLICATION

- Apply sufficient paste to the stencil to allow a smooth, even roll during the print cycle. A bead diameter of 1/2 to 5/8 inch is normally sufficient to begin.
- Apply small amounts of fresh solder paste to the stencil at frequent, controlled intervals to maintain paste chemistry and workable properties.
- Cleaning of your stencil will vary according to the application. A dry wipe during printing is recommended as needed to yield excellent print results. Never use Isopropyl Alcohol or a blend using Isopropyl Alcohol to wipe the stencil. This practice will negatively affect print life.
- WS 353 provides the necessary tack time/force for today's high-speed placement equipment. Ensuring proper support of PCBs during assembly and handling will enhance product performance and reliability.

REFLOW DATA

See attached Reflow Profile Supplement.

PASTE TECH-TIPS

PROBLEM	POTENTIAL CAUSE
BRIDGING:	EXCESS SOLDER DEPOSITION, PAD/COMPONENT SOLDERABILITY OR ALLIGNMENT PROBLEM
LEACHING:	EXCESSIVE REFLOW TIME OR TEMPERATURE
SOLDER BALLS:	LOW PREHEAT TEMPERATURE, EXCESSIVE HEAT RAMP-UP, OXIDIZED PASTE, EXCESS PASTE
TOMBSTONING:	EXCESSIVE HEAT RATE, COMPONENT TO PAD SIZE MISMATCH, PASTE REGISTRATION
WHITE RESIDUE:	SOLDER PASTE OXIDATION, EXCESSIVE TIME AT TEMPERATURE
DISCOLORED JOINT:	PASTE OXIDATION, BOARD/COMPONENT CONTAMINATION, EXCESSIVE SOAK TIME
BEADING:	EXCESS SOLDER PASTE, COMPONENT PLACEMENT

CLEANING

WS 353 can be cleaned easily with normal tap water. Deionized water is recommended for the final rinse. A temperature of 100° - 150°F is sufficient for removing residues. An in-line or other pressurized spray cleaning system is suggested, but is not required.

SAFETY

- Use with adequate ventilation and proper personal protective equipment.
- Refer to the accompanying **M**aterial **S**afety **D**ata **S**heet for any specific emergency information.
- Do not dispose of any lead-containing materials in non-approved containers.

PRODUCT TESTING RESULTS

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NAME: **WS 353**

Surface Insulation Resistance Testing- Two Week Delayed Cleaning

General References: Surface Insulation Resistance (SIR) test for solder paste was carried out according to J-STD-004 and IPC-TM-650 method 2.6.3.3.

Procedure

IPC-B-24 coupons were cleaned according to IPC-TM-650 §5.2.3. Solder paste was stencil printed onto the coupons and reflowed in convection oven using standard AIM thermo-profile WS-J for water-soluble paste. ***After reflow, the coupons were left for 2 weeks at ambient conditions before cleaning under tap water at 55-58°C for 120 seconds.*** The coupons were then dried for 30 minutes at room temperature before testing.

Pass Fail Criteria and Data Evaluation

#	Reference	Property	Pass-Fail Criteria	Result
1	IPC-TM-650 §5.5.1	Quality of control coupons	>1E9 Ω at 96 and 168 h	PASS
2	J-STD-004 §3.2.4.5.1	SIR of test coupons	>1E8 Ω at 96 and 168 h	PASS
3	IPC-TM-650 §5.5.2	Post-test visual inspection	No dendrite growth or corrosion	PASS

Conclusions

The results of the qualification tests indicate that the AIM WS 353 solder paste complies with the requirements of IPC TM-650, Method 2.6.3.3 for Surface Insulation Resistance (SIR) with two weeks between reflow and cleaning.

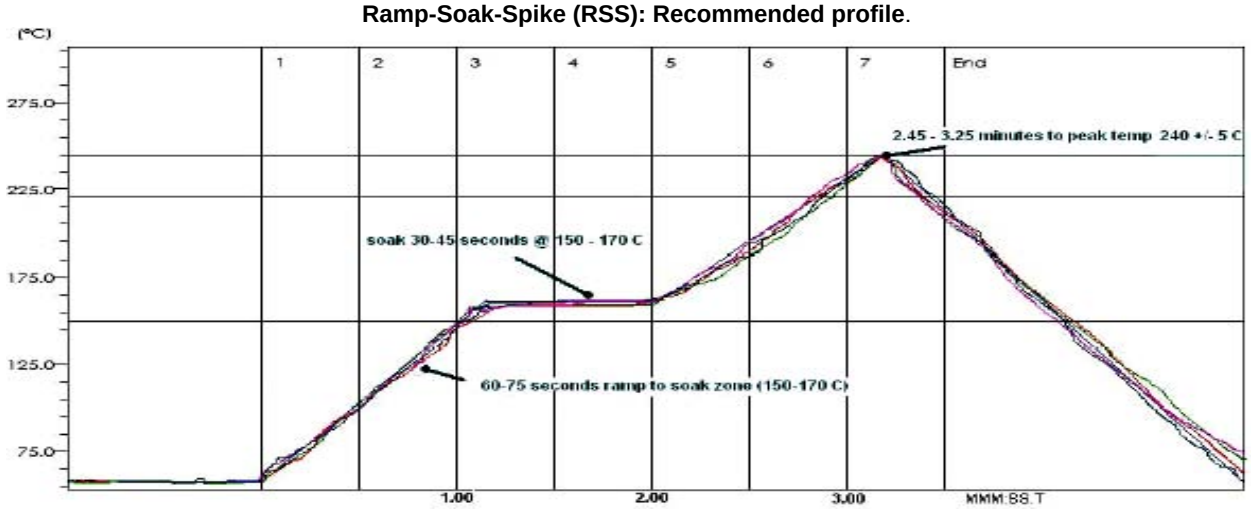
Test Data

Control		Initial	24 hours	96 hours	168 hours
#1	A	1.00E+14	3.77E+10	2.48E+10	2.14E+10
	B	1.10E+14	4.38E+10	2.72E+10	2.27E+10
	C	1.10E+14	4.24E+10	2.60E+10	2.14E+10
	D	1.00E+14	4.01E+10	2.52E+10	2.16E+10
#2	A	1.10E+14	4.13E+10	2.55E+10	2.15E+10
	B	1.00E+14	4.39E+10	2.66E+10	2.23E+10
	C	1.00E+14	4.13E+10	2.49E+10	2.05E+10
	D	1.10E+14	4.23E+10	2.56E+10	2.13E+10
#3	A	1.00E+14	3.95E+10	2.60E+10	2.21E+10
	B	1.01E+12	4.29E+10	2.63E+10	2.23E+10
	C	1.00E+14	4.32E+10	2.51E+10	2.07E+10
	D	1.00E+14	4.55E+10	2.68E+10	2.24E+10
WS 353 (2 weeks standing before cleaning)					
#1	A	2.34E+12	7.98E+08	2.41E+09	3.87E+09
	B	1.97E+12	6.06E+08	2.30E+09	3.64E+09
	C	1.65E+12	6.50E+08	2.50E+09	3.75E+09
	D	2.96E+12	6.81E+08	2.35E+09	3.73E+09
#2	A	2.34E+12	6.40E+08	2.05E+09	3.34E+09
	B	1.04E+12	4.46E+08	1.91E+09	3.15E+09
	C	2.18E+12	3.79E+08	1.56E+09	2.73E+09
	D	1.25E+12	4.73E+08	1.69E+09	3.01E+09
#3	A	4.79E+12	8.38E+08	2.46E+09	3.81E+09
	B	4.19E+12	5.28E+08	2.04E+09	3.26E+09
	C	5.24E+10	5.78E+08	2.09E+09	3.34E+09
	D	4.93E+10	6.51E+08	2.21E+09	3.63E+09

REFLOW PROFILE SUPPLEMENT

ALLOY: **Sn/Ag/Cu**

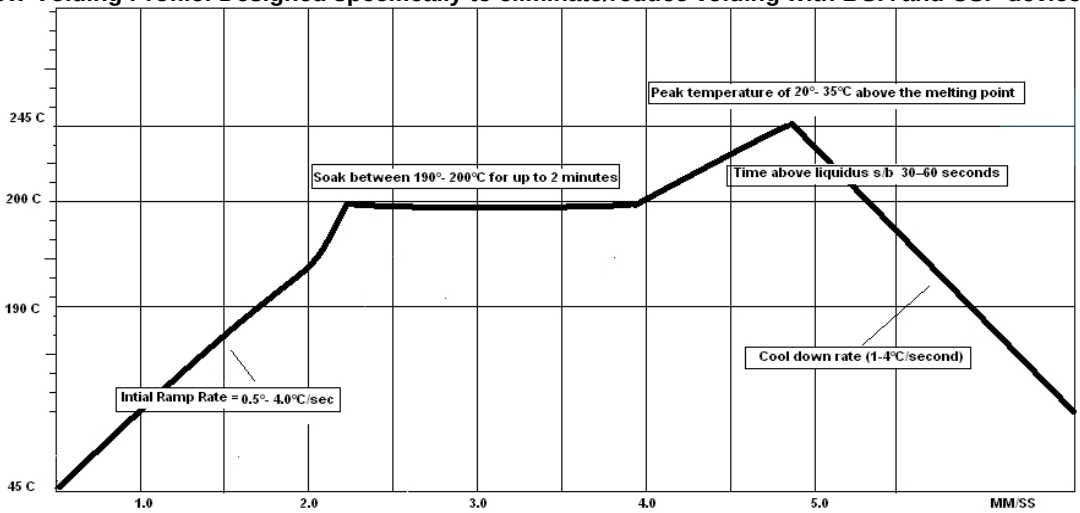
Ramp-Soak-Spike (RSS): Recommended profile.



RSS Profile Guidelines

- The typical initial rate of rise for the RSS profile is 1.4 to 1.8°C/second.
- Ramp up to 150°C and then soak the assembly for 30 to 60 seconds.
- The soak zone should be controlled between 150 -170°C.
- Proceed to spike immediately once the PCB has reached thermal stability.
- Peak temperature is 240ºC ± 5ºC.
- Time above liquidus is 45 ± 15 seconds.
- The total profile length should be between 2 ¾ - 3 ½ minutes from ambient to peak temperature.
- Cool down should be controlled within 4°C/second.

Low-Voiding Profile: Designed specifically to eliminate/reduce voiding with BGA and CSP devices



Profile Guidelines

- The initial rate of rise is 0.5 to 4°C/second.
- Ramp up to 190°C and then soak the assembly between 190 to 200°C for up to 120 seconds.
- Proceed to spike immediately after exiting the soak zone.
- Peak temperature is 238 to 253ºC.
- Time above liquidus is 30 to 60 seconds.
- The total profile length should be between 4 ½ - 5 minutes from ambient to peak temperature.
- Cool down should be controlled within 4°C/second.