ALPHA® WS-609 SOLDER PASTE

ORH0 Per IPC-J-STD-004

DESCRIPTION

ALPHA WS-609 is a halide-free and halogen-free neutral pH water-soluble solder paste specifically designed for surface mount processes and other demanding electronics assembly applications where post-reflow water cleaning is used. **ALPHA WS-609**'s unique activator systems and water-soluble resin carrier are suitable to replace RMA solder Pastes.

READ ENTIRE TECHNICAL DATA SHEET BEFORE USING THIS PRODUCT

PRODUCT INFORMATION

Alloys:	63Sn37Pb, 95Sn5Sb, 62Sn36Pb2Ag, & 99.3Sn0.7Cu, SAC305
Powder Size:	Type 3, Type 4, Type 5 (for dispensing applications)
Packaging Sizes:	500 gram jars, 6 inch & 12 inch cartridges, and 10 cc and 30 cc dispense syringes
FluxGel:	ALPHA WS-609 Flux Gel is available in 10 cc and 30 cc syringes for rework

APPLICATION GUIDELINES

ALPHA WS-609 is designed for stencil printing. Stencil life is four hours while tack life exceeds six hours at 21 to 27 °C (70 to 80 °F) and 30 to 60% RH. Based on experience, for optimum printing performance, best to control the temperature and RH at 22 to 25 °C (71 to 77 °F) and 40 to 50% respectively. Higher temperature and humidity can affect viscosity which may negatively impact print performance. This extended tack feature enables placement of parts long after what is possible with previous formulations. Using the number three particle size configuration, ALPHA WS-609 is suitable for printing through stencil apertures as small as 9 mils in the smallest dimension.

ALPHA WS-609's activator system allows the flux to penetrate tarnished surfaces among the following metals:

Beryllium Copper	Gold	Solder (Pastes)
Brass	Lead	Terne (Plate)
Bronze	Nickel (Plate)	Tin (Hot Dip)
Cadmium (Plate)	Silver	Tin (Plate)
Copper	Solder (Hot Dip)	

Residue Removal

ALPHA WS-609 is a halide free flux system designed for complete water cleanability of flux residues after reflow. Water at 60 °C (140 °F) without saponifier is suitable to achieve excellent cleaning results. Spray pressure of 35 to 65 psi are sufficient to remove all residues. Residues should be thoroughly cleaned within 48 hours after reflow to avoid the risk of corrosion and assembly degradation.

Cleaning results using ALPHA WS-609 may exceed those achievable using traditional RMA materials. Ionic contamination readings as low as 2.0 µg/in are possible with this very cleanable flux.

TECHNICAL DATA

Physical Properties	Typical Values
Water Extract Resistivity	>100,000 ohm-cm; High RMA, Low RA Class
Halide Content	Halide-Free
Halogen Content	Halogen-Free
pH, Flux Residues	~6.8 Typical
SIR (ohms) 7 days	10^9, cleaned, 85 °C/85% RH
Wetting Balance	Faster than traditional RMA's
Carrier Resin	Completely Water-Soluble

VISCOMETRY

ALPHA WS-609 was developed exclusively using Spiral Viscometry. Nominal readings of 3,000 poise or 300 Pascal-Seconds characterize its rheology at 5 RPM. The absolute magnitude of the slope ranges from 0.4 to 0.58.

While Brookfield viscometry has never been used on this product, empirical correlation factors approximate its T-Bar 5 RPM equivalent readings at 1100K centipoise. Initial tack force and penetration for this rheology are:

Tack Force: > 2 g/mm2

Penetration: > 5 mils on 10 mil print

PROCESSING GUIDELINES

Printing

Nominal Squeegee speeds from 20 to 25 mm/second are suitable to begin printing. Roll diameter cross-section should be 1.25 to 1.50 cm. Stencil aspect ratio (width of smallest aperture divided by stencil thickness, W_a/T_s) can be 1.5. Placement of parts can follow as long after printing as four hours.

Storage & Handling

High ambient temperature should be avoided in the handling of ALPHA WS-609. It is shipped in a thermally controlled carton and should be stored refrigerated upon receipt. Storage temperatures of 0 to 10 °C (32 to 50 °F) are sufficient to maintain its nominal shelf-life of three months from the date of manufacture. ALPHA WS-609 should be allowed to achieve room temperature before unsealing its package. Refer to the General Solder Paste Handling Guidelines for further information.

The production environment should be 21 to 27 °C (70 to 80 °F) maximum and 30 to 60% RH. Clean-up of ALPHA WS-609 in the work area is best achieved with hot water or with isopropyl alcohol. Local environmental and disposal regulations should be observed.

REFLOW PROFILES

ALPHA WS-609 can be successfully reflowed in IR, convection, hot stage, hot bar, hot belt, or vapor phase systems.

For SAC:

A straight ramp-up profile is preferred for reflowing low to medium thermal mass assemblies.

- Ramp up from ambient temperature to peak temperature of 235 to 250 °C at 1 °C/second. Adjust ramp-up rate to minimize the differential of temperature (ΔT) and thermal shock to components
- Time above liquidus: 45 to 75 seconds
- Cool down at -1 to -3 °C/second

Pre-heat time may be required for reflowing high thermal mass assemblies to minimize the ΔT.

- Ramp up from ambient temperature to 120 °C at 1 to 2 °C/second
- Soak at 120 to 160 °C for 1 to 2 minutes
- Ramp up at 1 to 2 °C/second from 140 °C to peak temperature of 235 to 250 °C
- Time above liquidus: 45 to 75 seconds
- Cool down at -1 to -3 °C/second

For SnPb:

- Ramp-up from ambient temperature to peak temperature of 210 to 220 °C at 1 °C/second. Adjust ramp-up rate to minimize the differential of temperature (ΔT) and thermal shock to components.
- Time above liquidus: 45 to 75 seconds
- Cool down at -1 to -3 °C/second

Pre-heat time may be required for reflowing high thermal mass assemblies to minimize the ΔT.

- Ramp up from ambient temperature to 130 °C at 1 to 3 °C/second
- Soak at 130 to 180 °C for 100 to 150 seconds
- Ramp up to peak temperature of 210 to 220 °C
- Time above liquidus: 45 to 90 seconds
- Cool down at -2 to -5 °C/second

Total heating dwell time may be 2 to 4.5 minutes depending on thermal inertia and component sensitivity. Examples of straight ramp-up and soak reflow profiles using 63Sn/37Pb alloy are shown in Figure 1 for reference.

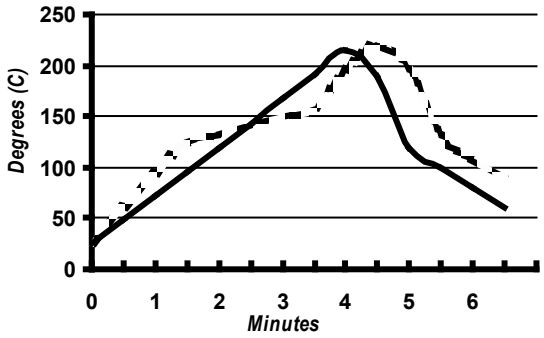

Figure 1

Note: These are profiles that were tested in the lab with acceptable reflow and coalescence performance, optimization to each board application should still be carried out by users to ensure best results.

RECYCLING SERVICES

We provide safe and efficient recycling services to help companies meet their environmental and legislative requirements and at the same time, maximize the value of their waste streams.

Our service collects solder dross, solder scrap, and various forms of solder paste waste. Please contact your local sales representative for recycling capabilities in your area or link here.

SAFETY & WARNING

It is recommended that the company/operator read and review the Safety Data Sheets for the appropriate health and safety warnings before use. **Safety Data Sheets are available at MacdermidAlpha.com/assembly-solutions/knowledge-base.**

CONTACT INFORMATION

To confirm this document is the most recent version, please contact Assembly@MacDermidAlpha.com

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Also read carefully warning and safety information on the Safety Data Sheet. This data sheet contains technical information required for safe and economical operation of this product. READ IT THOROUGHLY PRIOR TO PRODUCT USE. Emergency safety directory assistance: US 1 202 464 2554, Europe + 44 1235 239 670, Asia + 65 3158 1074, Brazil 0800 707 7022 and 0800 172 020, Mexico 01800 002 1400 and (55) 5559 1588