TECHNICAL BULLETIN

alpha
ASSEMBLY SOLUTIONS™

ALPHA® CVP-520

LOW MELTING POINT, NO-CLEAN, LEAD-FREE ZERO HALOGEN SOLDER PASTE

DESCRIPTION

ALPHA CVP-520 is designed to enable low temperature surface mount assembly technology. The lead-free alloy in **ALPHA CVP-520** has a melting point below 140°C, and has been successfully used with peak reflow profiles between 155°C and 190°C. The flux residue from **ALPHA CVP-520** is clear, colorless, and provides excellent electrical resistivity, exceeding industry standards.

This product enables the elimination of an extra wave or selective wave soldering process when temperature sensitive through hole components are used in an assembly. Eliminating a wave soldering or selective soldering step can significantly lower the cost of producing an electronic assembly, increase daily throughput, eliminate the need for managing bar solder and wave soldering flux supplies and eliminate the need for pallets. The carefully selected Sn/Bi/Ag alloy in **ALPHA CVP-520** was selected to give the lowest melting point, lowest pasty range during melting and re-solidification, along with a very fine grain structure, offering maximum resistance to thermal cycle based fatigue. The alloy also yields very low voiding BGA solder joints, even when a traditional SAC alloy sphere is used.

The use of **ALPHA Exactalloy®** performs may enable the elimination of selective wave soldering by providing additional solder volume when needed.

All components used with **ALPHA CVP-520** must be lead-free to eliminate the formation of tin/lead/bismuth intermetallic which has a melting point under 100ºC.

FEATURES & BENEFITS

- Enables elimination of a second or third reflow cycle when temperature sensitive components or connectors are used.
- Reduces energy consumption in reflow ovens versus standard lead free alloys.
- Reduces reflow process cycle time.
- Delivers 8 Hour stencil life.
- Potential eliminations of bar solder, wave soldering flux and energy costs associated with wave soldering.
- Compatible with all commonly used lead free surface finishes (Entek HT; Alpha Star Immersion Silver, Immersion Tin, Ni/Au, SACX HASL, etc.)
- Excellent resistance to random solder balling minimizing rework and increasing first time yield.
- Low temperature reflow profiles may enable the use of less expensive printed circuit board substrates, when appropriate.
- Meets highest IPC 7095 voiding performance (Class III).
- Provides excellent electrical reliability properties.
- Zero halogen (no halogen intentionally added) and halide-free material.
- Compatible with either nitrogen or air reflow.

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PRODUCT INFORMATION

Formulated for both standard and fine pitch stencil printing, at print speeds of between 40mm/sec (1.5"/sec) and 100mm/sec (4"/sec), with stencil thickness of 0.100mm (0.004") to 0.150mm (0.006"), particularly when used in conjunction with ALPHA Stencils. Blade pressures should be 0.18-0.27 kg/cm of blade (1.0 -1.5 Ibs/inch), depending upon the print speed. The higher the print speed employed, the higher the blade pressure that is required to prevent smearing on the stencil. Examples of successful reflow profiles are outlined below. Generally, peak temperatures of 155°C to 190°C have proven effective.

Alloys:	42%Sn/57.6%Bi/0.4%Ag (Alpha holds the appreciate license to supply this alloy into the United States, UK, Germany and/or Korea, as covered by the following patents (US Patents 5,569,433; Korea Patent 400121; German Patent 69521762.3; Great Britain Patent 0711629) 42%Sn/57%Bi/1.0%Ag, available upon request
Powder Size:	Type 3, (25-45µm per IPC J-STD-005); for printing applications Type 4, (20-38µm per IPC J-STD-005); for dispense applications
Residues:	Approximately 5% by (w/w)
Packaging Sizes:	500gram jars, 6" & 12" cartridges
Flux Gel:	**CVP-520** Flux Gel is available in 10cc and 30cc syringes for rework applications.
Lead Free:	Complies with RoHS Directive 2002/95/EC.

SAFETY

While the **CVP-520** flux system is not considered toxic, its use in typical reflow will generate a small amount of reaction and decomposition vapors. These vapors should be adequately exhausted from the work area. Consult the SDS for all safety information. The most recent version of the SDS is available from AlphaAssembly.com.

STORAGE

CVP-520 should be stored in a refrigerator upon receipt at 0 to 10°C (32 to 50°F). **CVP-520** should be permitted to reach room temperature before unsealing its package prior to use (see handling procedures on page 3). This will prevent moisture condensation build up in the solder paste.

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TECHNICAL DATA

CVP-520 TECHNICAL DATA		
CATEGORY	**RESULTS**	**PROCEDURES/REMARKS**
CHEMICAL PROPERTIES		
Activity Level	ROL0 = J-STD Classification	IPC J-STD-004
Halide Content	Halide free (by titration). Passes Ag Chromate Test	IPC J-STD-004
Halogen Content	Pass, Zero Halogen - No halogen intentionally added	EN14582, by oxygen bomb combustion, Non detectable (ND) at < 50 ppm
Copper Mirror Test	Pass	IPC J-STD-004
Copper Corrosion Test	Pass, (No Evidence of Corrosion)	IPC J-STD-004
	Pass, (No evidence of corrosion)	JIS Z 3197 -1999 8.4.1
ELECTRICAL PROPERTIES		
SIR (IPC 7 days @ 85°C/85%RH)	Pass	IPC J-STD-004 {Pass = 1 x 10^8 ohm min}
SIR (Bellcore 96 hrs@ 5°C/85%RH)	Pass	Bellcore GR78-CORE {Pass = $1x10^{11}$ ohm min}
Electromigration (JIS Z 3197 @ 85°C/85%RH 48V DC 1000 hrs)	Final Reading > 10^{10} ohms No Migration After 1000 hrs =Pass	JIS Z 3197 1999
PHYSICAL PROPERTIES (90-3 M 21 Viscosity - Malcolm viscometer @10 RPM, 25°C)		
Color	Clear, Colorless Flux Residue	
Tack Force vs. Humidity (t = 8 hours)	Pass - Change of <1g/mm^2 over 24 hours at 25% and 75 % RH	IPC J-STD-005
	Pass - Change of <10% when stored at 25±2°C and 50±10% RH	JIS Z3284 Annex 9
Viscosity	85.3% metal loading designated M11 for dispensing. 90% metal load designated M21 for printing. 86.5% metal load, Type 4 powder designated M10 for dispense. Viscosity (Typical) 1000 poise, 10 RPM	Malcom Spiral Viscometer; J-STD-005
Solderball	Acceptable	IPC J-STD-005
Stencil Life	>8 hours	@ 50%RH, 23°C (74 F)
Spread	>87%	JIS-Z-3197: 1999 8.3.1.1
Slump	Pass	Modified IPC J-STD-005 (10 min 100°C)
	Pass	JIS Z-3284-1994 Annex 8

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CVP-520 Processing Guidelines

STORAGE & HANDLING	PRINTING	REFLOW (See Figure #1)	CLEANING
Refrigerate to guarantee stability at 0-10°C, 32-50°F Shelf life of refrigerated paste is (6) months, Actual TBD Paste can be stored for 2 weeks at room temperature up to (25°C/77°F) prior to use When refrigerated, allow paste container to warm to room temperature for up to four hours. Paste must be ≥ (19°C/66°F) before processing. Verify paste temperature with a thermometer to ensure paste is (19°C/66°F) or greater before set-up. Printing can be performed at temperatures up to (29°C/84°F). Do not remove worked paste from stencil and mix with unused paste in jar. This will alter rheology of unused paste.	<u>STENCIL:</u> Recommended ALPHA CUT or ALPHA FORM stencils @ (0.100 - 0.150 mm), (4-6 mil) thick for (0.4-0.5mm) (0.016" or 0.020") pitch. Stencil design is subject to many process variables. Contact your local Alpha stencil site for advice. <u>SQUEEGEE</u>: Metal (recommended) <u>PRESSURE</u>: (0.18-0.27) kg/cm of squeegee length (1.0-1.5 lbs/inch). <u>SPEED:</u> 40 - 100mm per second 1.5 to 4 inches per second. <u>PASTE ROLL</u>: (1.5-2.0 cm) diameter and make additions when roll reaches 1-cm, (0.4") diameter (min). Max roll size will depend upon blade. Exceeding the maximum diameter may cause curtaining (sticking to the squeegee when it is lifted from the stencil).	<u>ATMOSPHERE:</u> Clean-dry air or nitrogen atmosphere. <u>PROFILE:</u> See Figure #1 Acceptable reflow / coalescence & IPC Class III voiding were obtained with the given profile Note: Refer to componenet and board supplier data for thermal properties at eleveated temperatures. Lower peak temperatures require longer TAL for improved joint cosmetics.	CVP-520 residue is designed to remain on the board after reflow. If reflowed residue cleaning is required, ALPHA BC-2200 aqueous cleaner is recommended. For solvent cleaning, agitation for 5 min in the following cleaners is recommended: - ALPHA SM-110E - Bioact^{TM} SC-10E - Kyzen Micronox MX2501 Misprints and stencil cleaning may be done with: - ALPHA SM-110E - ALPHA SM-440 - ALPHA BC-2200 - Bioact^{TM} SC-10E cleaners.
These are starting recommendations and all process settings should be reviewed independently. Working conditions: 19 - 29°C on the stencil.	<u>STENCIL RELEASE SPEED:</u> 3 - 10 mm (0.12 - 0.4 inches)/ sec. <u>Lift Height:</u> 8 - 14mm (0.31 - 0.55")		

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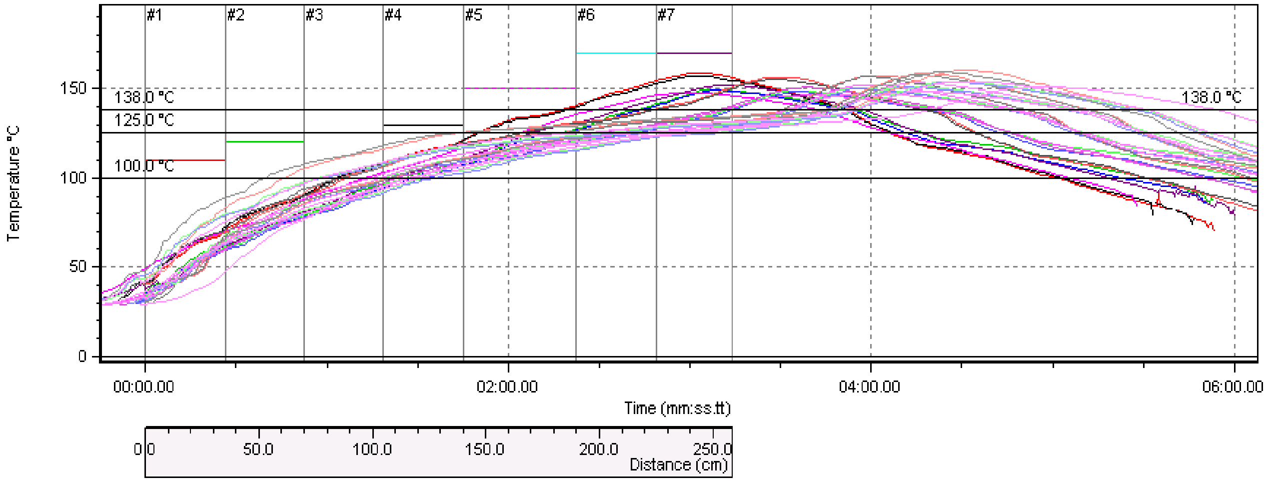
General Reflow Profile Guidelines	
Parameter	**Guideline**
Atmosphere	Air or N2
SnBiAg (42/57.6/0.4) alloy	138°C (near eutectic)
Setting Zone	**Optimal Dwell Period**
40°C to 138°C	2:10 - 4:00 minutes
125°C to 138°C	0:30 - 1:30 minutes
100°C to 138°C	1:15 - 2:00 minutes
TAL (138°C)	0:30 - 1:30 minutes
Peak temperature	155 °C - 180°C
Joint cool down rate from 170°C	3°C - 8°C/sec

Figure #1 – CVP-520 Reflow Profile Envelope



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CONTACT INFORMATION

To confirm this is the most recent issue, please contact Alpha Assembly Solutions

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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 directory assistance Chemtrec 1 - 800 - 424 - 9300.

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