

ALPHA[®] NCP-390 Solder Paste

No-Clean, Lead-Free Solder Paste Zero-Halogen, Low Voids, Fine Feature, Excellent Pin Test Performance

DESCRIPTION

ALPHA NCP-390 is a lead-free, Zero-halogen no-clean solder paste designed for applications where residue with excellent pin testing property and ability to pass JIS Copper Corrosion test are required.

This product is also designed to enable consistent fine pitch printing capability, down to 180µm circle printed with 100 µm (4 mil) thick stencil. Its excellent print volume deposit repeatability also provides value by reducing defects associated with print process variability. Additionally, **ALPHA NCP-390** achieves IPC7095 Class III voiding performance.

ALPHA NCP-390 is also available as a dispensing or dipping solder paste for low voiding applications

READ ENTIRE TECHNICAL DATA SHEET BEFORE USING THIS PRODUCT

FEATURES AND BENEFITS

- **Long Stencil Life:** consistent performance for at least 8 hours of continuous printing without addition of new paste
- **Long, High Tack Force Life:** ensures high pick-and-place yields, good self-alignment
- **Wide Reflow Profile Window:** allows best quality solderability of complicated, high density PWB assemblies in both air and nitrogen reflow, using ramp and soak profiles, as high as 175 to 185 °C
- **Reduced Random Solder Ball Levels:** minimizes rework and increases first time yield
- **Excellent Coalescence and Wetting Performance:** coalesced 180µm circle deposit, even at high soak profile environment
- **Excellent Solder Joint and Flux Residue Cosmetics:** after reflow soldering, even using long/high thermal soaking, without charring or burning
- **Excellent Voiding Performance:** Meets IPC7095 Class III Classification
- **Halogen Content:** Zero Halogen, no halogen intentionally added
- **Residue:** Excellent Pin Testing property and Pass JIS Copper Corrosion Test
- **Safe and Environmentally Friendly:** Materials comply with RoHS and Halogen-free requirements (see table below), as well as TOSCA & EINECS

PRODUCT INFORMATION

<u>Alloys:</u>	SAC305 (96.5%Sn/3.0%Ag/0.5%Cu) MAXREL™ (90.95%Sn/3.8%Ag/0.7%Cu/1.4%Sb/0.15%Ni/3%Bi) 90Sn10Sb / 95Sn5Sb For other alloys, contact your local Sales Office
<u>Powder Size:</u>	Type 3 (25 to 45 µm per IPC J-STD-005) Type 4 (20 to 38 µm per IPC J-STD-005) Type 5 (15 to 25 µm per IPC J-STD-005) - available upon request Type 6 (5 to 15 µm per IPC J-STD-005) - available upon request Type 7 (2 to 11 µm) available upon request for printing, dispensing and dipping application
<u>Packaging Sizes:</u>	500 gram jars, 30 cc syringe, 6" & 12" cartridges
<u>Flux Gel:</u>	Flux gel is available in 10 and 30 cc syringes for rework applications
<u>Lead Free:</u>	Complies with RoHS Directive 2002/95/EC.

APPLICATION

Formulated for both standard and fine pitch stencil printing, at print speeds of between 25 mm/sec (1"/sec) and 150 mm/sec (6"/sec), with stencil thickness of 0.100 mm (0.004") to 0.150 mm (0.006"), particularly when used in conjunction with ALPHA Stencils. Blade pressures should be 0.21 to 0.36 kg/cm of blade (1.25 to 1.5 lb/inch), depending upon the print speed. The higher the print speed employed, the higher the blade pressure that is required. The reflow process window will give high soldering yield with good cosmetics and minimized rework.

For dispensing application through 20 to 24 gauge needles using T3 or T4 solder paste, it is recommend to use time pressure dispense equipment.

For dipping application, solder paste depth and dipping time is dependent on size and diameter of solder ball/bump.

If application help is needed, we welcome customer to enquire with our technical support team.

HALOGEN STATUS

ALPHA NCP-390 is a Zero Halogen product and passes the standards listed in the Table below:

Halogen Standards			
Standard	Requirement	Test Method	Status
JEITA ET-7304 Definition of Halogen Free Soldering Materials	< 1000 ppm Br, Cl, F in solder material solids	TM EN 14582 Solids extraction per IPC TM 2.3.34	Pass
IEC 612249-2-21	Post Soldering Residues contain < 900 ppm each or total of < 1500 ppm Br or Cl from flame retardant source		Pass
JEDEC A Guideline for Defining "Low Halogen" Electronics	Post soldering residues contain < 1000 ppm Br or Cl from flame retardant source		Pass
Zero Halogen: No Halogenated compounds have been intentionally added to this product			

TECHNICAL DATA

Category	Results	Procedures/Remarks
Chemical Properties		
Flux Classification	ROL0	IPC J-STD-004B
Halide Content	Halide free (by titration).	IPC J-STD-004B
Fluoride Spot Test	Pass, No Fluoride present	JIS-Z-3197-1999 8.1.4.2.4
Halogen Test	Pass, Zero Halogen - No halogen intentionally added	EN14582, by oxygen bomb combustion, non-detectable (ND) at < 50 ppm
Ag Chromate Test	Pass, No Halide present	IPC J-STD-004B
		JIS-Z-3197-1999 8.1.4.2.3

Category	Results	Procedures/Remarks
Copper Mirror Test	Pass, Low activity, no breakthrough	IPC J-STD-004B
		JIS-Z-3197-1999 8.4.2
Copper Corrosion Test	Pass, Low activity (No evidence of Corrosion)	IPC J-STD-004B
		JIS-Z-3197-1999 8.4.1
Electrical Properties		
Water Extract Resistivity	13,400 ohm-cm	JIS-Z-3197-1999 8.1.1
SIR (7 days, 40 °C/90%RH, 10 V bias)	Pass, $\geq 10^8$ ohms for 7 days down to 100 μ m spacing	IPC J-STD-004B TM 2.6.3.7
SIR (7days, 85 °C/85% RH)	Pass, $\geq 10^8$ ohms for 7 days down to 100 μ m spacing	IPC J-STD-004A TM-650 2.6.3.3
Electromigration (Bellcore 500 hrs @ 65 °C/85%RH 10V)	Pass, final > initial/10	Bellcore GR78-CORE
JIS Electromigration (1000 hours @ 85 °C/85%RH 48V)	Pass	JIS-Z-3197-1999 8.5.4
Physical Properties		
Color	Clear, Colorless Flux Residue	
Tack Life	Pass, > 100 gf over 24 hours at 25 °C and 50% Relative Humidity	JIS Z 3284:1994, Annex 9
	Pass, Change of <1 g/mm ² over 24 hours at 25 °C and 50 % Relative Humidity	IPC J-STD-005 TM-650 2.4.44
Tack Force at 32 °C/35%RH, measured after 0, 1, 2, 3 & 4 hours print duration	> 100gf	JIS Z-3284-1994, Annex 9
Viscosity	88.8% metal load, Type 4 designated M17 for printing Viscosity (Typical) 1700 poise	Malcom Spiral Viscometer at 10 RPM Malcom; J-STD-005
	89% metal load, Type 4 designated M20 for printing Viscosity (Typical) 2000 poise	
	75 to 85% metal loading for dispensing and dipping application. (Typical) 400 to 800 poise	

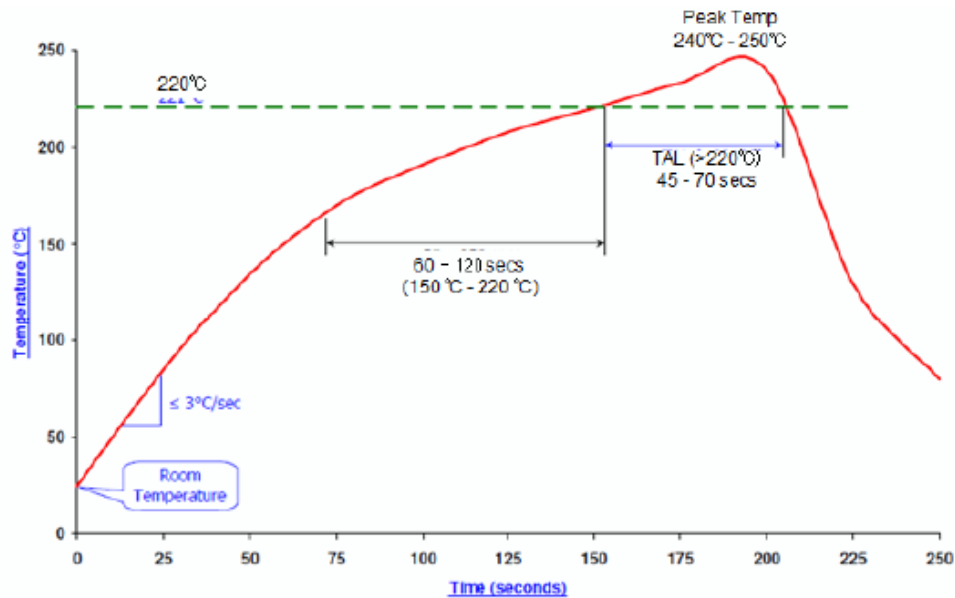
Category	Results	Procedures/Remarks
	88 to 89% metal load, Type 5 designated M21 for printing Viscosity (Typical) 2100 poise	
Coalescence Test	Able to reflow at < 200 μ m Cu pad circle size	Internal
Solder Ball	Preferred	IPC TM-650 2.4.43
Wetting Time	Pass 0.34 second	Rhesca Test, Test Time
Spread	80%	JIS-Z-3197-1999 8.3.1.1
Cold Slump (25 °C /50% RH)	Pass, no bridging at 0.10 mm gap & above	IPC J-STD-005A
	Pass, no bridging at 0.20 mm gap & above	JIS Z 3284:1994 Annex 7
Hot Slump (150 °C/10 min)	Pass, no bridging at 0.25 mm gap & above	IPC J-STD-005A
	Pass, no bridging at 0.30 mm gap & above	JIS Z 3284:1994 Annex 8
Dryness Test (Talc)	Pass	JIS-Z-3197-1999 8.5.1

PROCESSING GUIDELINES

Storage and Handling	Printing	Reflow (See Fig. 1)	Cleaning
<ol style="list-style-type: none"> 1. Refrigerate to guarantee stability @ 0 to 10 °C (32 to 50 °F). When stored under these conditions, the shelf life of ALPHA NCP-390 is 6 months for Type 3 to 5 powder size. Shelf life for Type 7 powder is 2 months. 2. Paste can be stored for 2 weeks at room temperature up to 25 °C (77 °F) prior to use 3. When refrigerated, warm up paste container to room temperature for up to 4 hours. Paste must be 19 °C (66 °F) before processing. 4. Verify paste temperature with a thermometer to ensure paste is at 19 °C (66 °F) or greater before setting up of printer. 5. Paste can be manually stirred before use. A rotating/Centrifugal force mixing operation is not required. If a rotating/centrifugal force mixing is used, 30 to 60 seconds at 300 RPM is adequate. 6. Do not remove worked paste from stencil and mix with unused paste in jar. This will alter the rheology of unused paste. 7. These are starting recommendations and all process settings should be reviewed independently. 	<p>STENCIL: Recommend ALPHA CUT™, ALPHA NICKEL- CUT™, ALPHA TETRABOND™, or ALPHA FORM stencils @ 0.100 to 0.150 mm (4 to 6 mil) thick for 0.4 to 0.5 mm (0.016" or 0.020") pitch. Stencil design is subject to many process variables. Contact your local Sales Office for advice.</p> <p>SQUEEGEE: Metal (recommended)</p> <p>PRESSURE: 0.21 to 0.36 kg/cm of blade (1.25 to 2.0 lb/inch)</p> <p>SPEED: 25 to 150 mm per second (1 to 6 inches per second).</p> <p>PASTE ROLL: 1.5 to 2.0 cm diameter and make additions when roll reaches 1cm (0.4") diameter (min). Max roll size will depend upon blade.</p> <p>STENCIL RELEASE SPEED: 1 to 5 mm/sec.</p> <p>LIFT HEIGHT: 8 to 14mm (0.31 to 0.55")</p>	<p>ATMOSPHERE: Clean-dry air or nitrogen atmosphere.</p> <p>PROFILE (SAC Alloys): Straight Ramp: 0.7 °C/sec & 1.3 °C/sec ramp profiles, 45 to 60 TAL, Peak Temperature 240 to 250 °C. Soak: 155 to 175 °C, 60 to 100 sec soak profiles have been determined to give optimal results. If required, good results are also achievable with high soak temperature profiles of 175 to 185 °C for 60s. Typical peak temperature is 240 to 250 °C.</p> <p><u>Note 1:</u> Keeping the peak temperature below 245 °C may reduce the number and size of BGA and QFN voids.</p> <p><u>Note 2:</u> Refer to component and board supplier data for thermal properties at elevated temperatures. Lower peak temperatures require longer TAL for improved joint cosmetics.</p>	<p>ALPHA NCP-390 residue is designed to remain on the board after reflow. If reflowed residue cleaning is required, Vigon A201 (in line cleaning), Vigon A 250 (Batch Cleaning) or Vigon US (Ultrasonic Cleaning) are recommended. Vigon is a registered trademark of Zestron</p> <p>Misprints and stencil cleaning may be done with IPA, ALPHA SM-110E, ALPHA SM-</p>

REFLOW PROFILES

Fig 1: ALPHA NCP-390 SAC305 Typical Reflow Profile

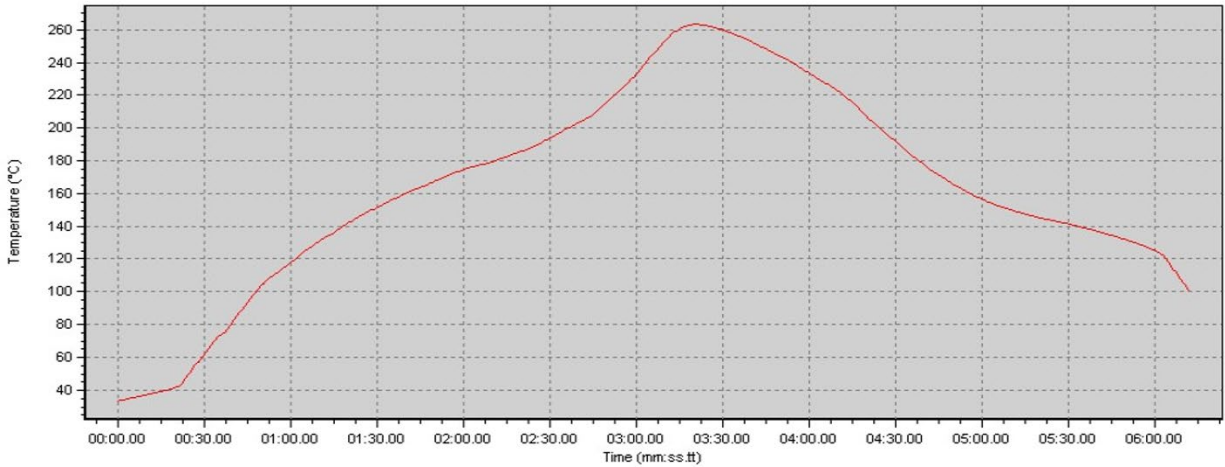


Note: This is just an illustration. Graph not strictly to scale

General Reflow Profile Reference Guidelines (SAC Alloys)		
Parameter	Guideline	Additional Information
Atmosphere	Air or N ₂	
SAC305, SAC405, SACX Plus™ 0807	217 to 225 °C Melting Range	
SACX Plus™ 0307	217 to 227 °C Melting Range	
Setting Zone*	Optimal Dwell Period	Extended window
40 to 225 °C	2:30 to 4:30 min.	< 5:00 min.
150 to 220 °C	1:00 to 2:00 min	< 2:30 min.
120 to 225 °C	1:25 to 3:00 min.	< 3:30 min.
TAL (220 °C)	45 to 90 sec.	Not Recommended
Peak temperature	240 to 250 °C	Compatible with most common surface finishes. (ENTEK HT, ENTEK OM, Alpha Star, ENIG, SACX HASL)
Joint cool down rate from 170 °C	< 3 °C/second	Recommended to prevent surface cracking issues.

* Above recommendations are for SAC305. For alternative alloys, please follow the liquidus temperature of the respective alloy.

ALPHA NCP-390 90Sn10Sb Typical Reflow Profile (Reference)



Setting Zone*	Optimal Dwell Period	Extended window
40 to 245 °C	2:30 to 4:30 min.	< 5:00 min.
150 to 240 °C	1:00 to 2:00 min	< 2:30 min.
120 to 245 °C	2.00 to 4:00 min.	< 5:30 min.
TAL (245 °C)	45 to 80 sec.	Not Recommended
Peak temperature	260 to 270 °C	
Joint cool down rate from 170 °C	< 3 °C/second	Recommended to prevent surface cracking issues.

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.**

STORAGE

ALPHA NCP-390 should be stored in a refrigerator upon receipt at 0 to 10 °C (32 to 50 °F). ALPHA NCP-390 should be permitted to reach room temperature before unsealing its package prior to use (see handling procedures). This will prevent moisture condensation build up in the solder paste.

CONTACT INFORMATION

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

www.macdermidalpha.com

<p>North America 3950 Johns Creek Ct, Suite 300 Suwanee, GA 30024 USA 908.791.2300</p>	<p>Europe Unit 2, Genesis Business Park Albert Drive Woking, Surrey, GU21 5RW, UK 44.01483.758400</p>	<p>Asia 14 Joo Koon Crescent, Singapore 629014 65.6430.0700</p>
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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

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