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TECHNICAL BULLETIN

ALPHA® OM-350 Solder Paste

No Clean, Lead-Free

DESCRIPTION

ALPHA OM-350 is a lead-free, no-clean solder paste suitable for fine feature printing and reflow using most demanding soak reflow profiles in air and nitrogen atmospheres. The outstanding reflow process window of **ALPHA OM-350** delivers good soldering on OSP-Cu, Immersion Ag, Immersion Sn, ENIG and Lead-Free HASL surface finishes. **ALPHA OM-350**'s compliance with ROL0 IPC and IPC Class III voiding classifications ensures maximum long-term product reliability. Compliance to environmental standards, including RoHS, allows global application of **ALPHA OM-350**.

READ ENTIRE TECHNICAL DATA SHEET BEFORE USING THIS PRODUCT

FEATURES & BENEFITS

- **Excellent Pin-in-Paste (Paste-in-Hole) Performance:** demonstrated both for printing, dispensing (or pin transfer) SMT applications.
- **Long Stencil Life:** consistent performance for at least 6 hours of continuous printing without addition of new paste. 24 hour SMT production ability achieved from 20 °C up to 32 °C (68 to 90 °F) harsh environments.
- **Stable Paste Viscosity:** allows wide storage and handling window at temperatures up to 30 °C for 21 days, and up to 25 °C for one month.
- **High Tack Force:** ensures high pick-and-place yields, good self-alignment and a low tomb-stoning Defect rate.
- **Wide Reflow Profile Window:** allows best quality solderability of complicated, high-density PWB assemblies in both air and nitrogen reflow, using straight ramp or soak profiles up to 200 °C.
- **Robust Solderability:** proven to handle difficult wetting requirements of critical lead-free components, such as CSP and QFN…etc. on a variety of lead-free board finishes, OSP-Cu, Immersion Ag, immersion Sn, ENIG & LF HASL.
- **Reduced Random Solder Ball Levels:** minimizes rework and increases first time yield.
- **Voiding Performance:** meets highest IPC classification of Class III for important ball grid array components.
- **Excellent Solder Joint and Flux Residue Cosmetics:** after reflow soldering even using long/high thermal soaking without charring or burning.

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- **First-rate Reliability Properties:** excess variety of industry and customer standards, halide free material graded ROL0 according to IPC classification.
- **Safe and Environmentally Friendly:** materials comply with RoHS requirement, as well as TSCA & EINECS. No toxic material used in the paste.

PHYSICAL PROPERTIES

Alloys:	SAC305, SACX® Plus 0307, Innolot, 5Sn92.5Pb2.5Ag Also available in other Sn-Ag-Cu alloys upon request
Powder Size:	Type 3, Type 4, Type 5
Residue:	Approximately 5% by weight
Packaging Sizes:	500 gram jars (standard package), 500/1000g cartridges also available

TECHNICAL DATA

Category	Results	Procedures/Remarks
Chemical Properties		
Activity Level	ROL-0 = J-STD Classification	IPC J-STD-004
Halide Content	Halide free (by titration & IC)	IPC J-STD-004
Ag Chromate Test	PASS	IPC J-STD-004
Copper Mirror Test	PASS	IPC J-STD-004
Copper Corrosion Test	PASS	IPC J-STD-004
	PASS	JIS Z 3197:1986
Talc Test	PASS	JIS Z 3197
Electrical Properties		
IPC SIR (168 hrs @ 85 °C/85% RH)	PASS, 1.8 x 10^{10} ohms	IPC J-STD-004 {Pass ≥ 1 x 10^{8} ohm min}
Bellcore SIR (96 hrs @ 35 °C/85%RH)	PASS, 1.9 x 10^{12} ohms	Bellcore GR78-CORE {Pass ≥ 1 x 10^{11} ohm min}
IPC/Bellcore Electromigration (Bellcore 96 hrs @ 5 °C/85%RH 10V 500 hrs)	PASS, Initial = 7.8 x 10^{8} ohms Final = 8.2 x 10^{9} ohms	Bellcore GR78-CORE {Pass = final > initial/10)

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Category	Results	Procedures/Remarks
JIS Electromigration (1000 hrs @ 5 °C/85%RH 48V 1000 hrs)	Final Reading > 1.0 X 10^{10} ohms; No migration after 1000 hrs PASS	JIS Z 3197:1999
HP ECM Test (28 days @ 50 °C/90%RH 5V)	PASS on Cu/ImmAg/ImmSn finish No migration after 28 days	Hewlett-Packard EL-EN861-00 {Pass ≥ 1 x 10^{8} ohm min}
Physical Properties		
Color	Clear, Colorless Flux Residue	
Tack Force vs. Humidity (t=8 Hrs)	**Pass,** <10% change Over 100 gf after 24 hours when stored at 25±2 °C and 50±10% R.H.	JIS Z 3284 Annex 9
Viscosity	88.8% metal designated M16 for Type 5 89.0% metal designated M16 for Type 4	Malcom Spiral Viscometer; JIS Z 3284 Annex 6
Solder Ball	**Acceptable** (SAC305 alloy) Tested after 4 hours storage @ 25%, 50% and 85% RH.	IPC TM-650 2.4.43/JIS Z 3284 Annex 11
Stencil Life	> 6 hours	25 °C (77 °F)
Spread	> 80 %	JIS Z 3197:1999 8.3.1.1
Hot Slump	**PASS**	IPC J-STD-005 (10 min 150 °C)
	PASS No bridge for 0.2mm space	JIS Z 3284:1994 Annex 8

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REFLOW PROFILES

The following are the general guidelines for initial SMT process set-up using well maintained equipment and properly handled materials. Some deviations from the guidelines may occur for specific combinations of PWB assemblies and SMT equipment.

A. PRINTING

Parameter	Guideline	Additional Information
Stencil Design	Pad/wall area ratio >0.55 to achieve consistently good paste deposits. Laser cut or Electroform stencils.	References minimum circle sizes for various stencil thickness: 330µm (~13 mil) circle w/ 0.15mm (6 mil) stencil 280µm (~11 mil) circle w/ 0.12mm (5 mil) stencil 225µm (9 mil) circle w / 0.10mm (4 mil) stencil
Squeegee	Metal squeegee	
Down Stop (MPM printer only)	1.9 to 2.2 mm (0.07 to 0.09 in.)	MPM specific setting.
Printing Pressure	0.15 to 0.40kg/cm (0.84 to 2.2 lb/in)	Pressure to be optimized for specific assembly
Printing Speed	25 to 100 mm/second (1 to 4 in/second)	Fast printing is recommended
Separation Speed	1 to 20 mm/second (0.04 to 0.8 in/second)	Fast release is recommended (separation speed should be set up under microscope inspection of deposit)
Squeegee Lift & Dwell Height	10 to 15 mm (0.4 to 0.6 in) recommended	Please refer to the details below
Working Temperature	20 to 32 °C (68 to 90 °F)	
Paste Volume to Add	Paste volume should be kept just below the squeegee assembly clearance	Minimize paste sticking to the squeegee holder which increases maintenance and degrades the paste

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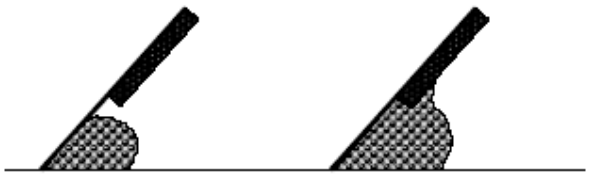
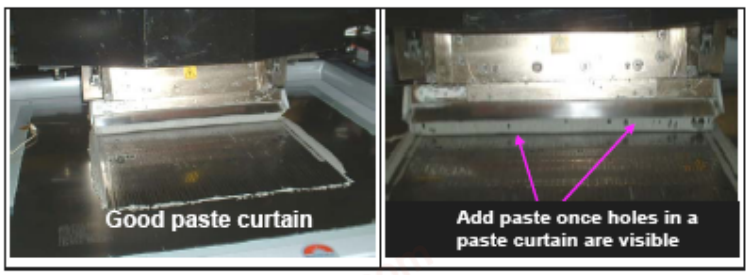


Solder Paste Roll < Clearance Paste Roll Diameter > Clearance

Certain squeegee designs require that the maximum amount of paste is limited to avoid "stick to squeegee" phenomenon.



Paste should be added when incomplete paste curtain is formed between squeegee and stencil using 10 to 15 mm squeegee dewell/lifting height.

B. REFLOW

Parameter	Guideline	Additional Information
Atmosphere	Air or N_2	Laboratory paste performance is typically verified in air. Successful production verification both in air and N_2.
SnAgCu alloy melting points	SAC305: 217 to 220 °C SAC405: 217 to 225 °C SAC387: 217 to 220 °C SAC359/396: 217 °C SACX Plus 0307: 217 to 227 °C	Use for reflow above liquidus setting

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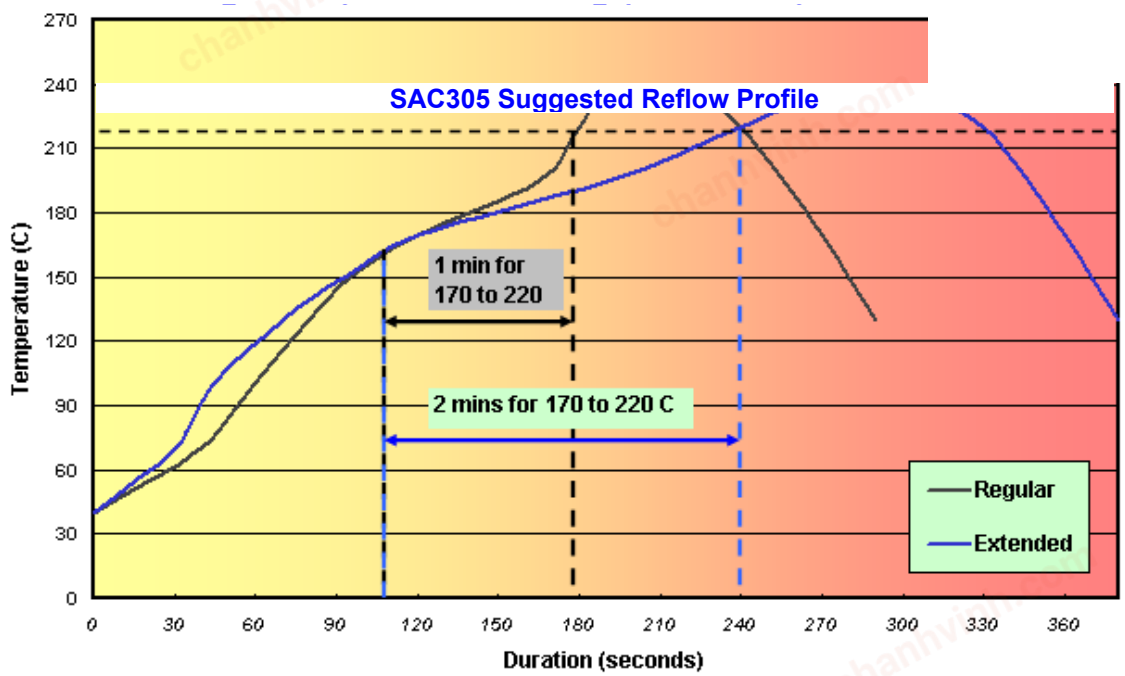
Profile General Guideline (Typical for SAC305 Plus)		
Setting Zone	Dwell Period	Extended Window (provided that there is no concern of component & PWB damage)
40 to 220 °C	<4 min	<4 min
130 to 220 °C	<2 min to 30 sec	<3 min
170 to 220 °C	<1 min to 30 sec	<2 min
Above 220 °C	45 to 90 sec	
Peak temp	<240 °C for OSP finish	No limit to other surface finishes
Joint cool down rate from 170 °C	>3 to 8 °C	Recommended to prevent surface cracking issues

Reflow Profile of ALPHA OM-350 L-F Solder Paste



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C. CLEANING

Parameter	Guideline	Additional Information
Stencil & Misprint Cleaning	• IPA • Bioact SC-10, Bioact SC-10E, Bioact SC-10E Plus, • Bioact EC7-MT1 • ALPHA SM-110, ALPHA SM-110E	Available from Alpha
Removing Reflow Residues	• Hydrex LF (Petroferm) • ALPHA BC-2400 and BC-2200 • Aquanox A4520 and A4630 (Kyzen) • WS2104/2107/WS1942/WS1863 • ATRON® AC 205 (ZESTRON)	Aqueous Cleaning
	• Bioact EC7-M • ALPHA BC-3300 • VIGON® A 200 (Zestron)	Ultrasonic Semi-aqueous Cleaning
	• Bioact SC-10, Bioact SC-10E, Bioact SC-10E Plus • ALPHA SM-110, ALPHA SM-110E	Manual

Please consult with Alpha Technical support for detail application conditions for cleaning.

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.



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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.**

STORAGE

Condition	Period	More Information
Refrigeration @ 0 to 10 °C (32 to 50 °F)	6 months	
Room temperature (25 °C)	1 month	Data stable up to 1 month
30 °C	3 weeks	Data stable up to 1 month

- When refrigerated, warm-up the sealed paste container to room temperature for up to 4 hours in order to prevent moisture penetration into the paste.
- Printing can be performed at temperatures up to 32 °C (90 °F).
- Do not remove worked paste from stencil and mix with unused paste in jar. This will alter the rheology of unused paste.
- These are starting recommendations and all process settings should be reviewed independently.

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

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