

# ALPHA<sup>®</sup> SACX<sup>®</sup> PLUS 0307S, 0300S, 0807S, 0800S and SnCX PLUS 07S, 00S

Lead Free Selective Solder and Rework Alloy for Longer Nozzle Life

## DESCRIPTION

The ALPHA SACX Plus 0807S, 0307S, and SnCX Plus 07S alloys have been specifically designed for assemblers who are experiencing accelerated nozzle degradation in the selective soldering process when using certain low or no silver lead-free alloys. Accelerated nozzle wear has been found to be attributed primarily to a combination of the variability in nozzle material quality and the presence of a certain antioxidant micro-additive found in some Pb-free solder alloys. Alpha has removed this additive from the ALPHA SACX Plus 0807S, 0307S, and SnCX Plus 07S alloys and found this to have a positive impact on the rate of nozzle wear. All other performance parameters (processing, solderability, reliability, etc...) of ALPHA SACX Plus 0807S, 0307S, and SnCX Plus 07S remain the same as the original alloys.

READ ENTIRE TECHNICAL DATA SHEET BEFORE USING THIS PRODUCT

## FEATURES & BENEFITS

### Features

- **RELIABILITY:** Comparable to higher Ag alloys (i.e., SAC305) in thermal fatigue resistance, lap shear, and pin pull performance.
- **YIELD:** Comparable to SAC305, superior performance for hole fill and SMT related defects compared to Ag free alloys like Sn99.3/Cu0.7.
- **COPPER EROSION:** Low erosion during long rework exposure times.
- **IMPROVED NOZZLE LIFE:** Extended nozzle life compared to standard lead-free alloys.

### Benefits

- Lowers Total Cost of Ownership due to the lower material cost, high yields, and low dross generation.
- Excellent mechanical reliability.
- Gives very good hole fill and drainage due to the lower surface tension attributed to Ag.
- Reduces erosion of copper plating during rework improving assembly reliability.
- Delivers good performance across a range of flux technologies.

Alpha's proprietary Vaculoy® process is a highly effective method for removing included oxides from solder. This is extremely important because included oxides generate excessive drossing and increase the viscosity of the solder. Solder with higher viscosity can result in increased soldering defects (i.e., solder bridging).

### APPLICATION GUIDELINES

ALPHA SACX Plus S alloys are designed for selective soldering and reworking of both through hole and surface mount components in a lead-free process. The alloys are suited to single side and relatively complex, dual sided mixed technology boards. A solder pot temperature of 280 to 310 °C (536 to 590 °F) is recommended with a contact time 2.5 to 5 seconds. Lead-free reclaim services including dedicated lead-free containers is also available, please consult your local sales office.

### TECHNICAL DATA

Complies with all requirements of RoHS Directive (Article 4.1 of the European Directive 2011/65/EU). Alloy specification for Maximum Lead (Pb) Content = 0.07% for all alloys. An Ultra-Low Lead (ULL) version of the alloys is also available which contains a maximum of 0.05% Pb. All alloy properties remain the same for the ULL series.

Material Property	Units	Vaculoy SACX Plus 0807	Vaculoy SACX Plus 0307	Vaculoy SnCX Plus 07
Solidus	°Celsius	216	217	227
Liquidus	°Celsius	225	228	229
Hardness	HV	16.4	14.1	9.4
Density	g/cc	7.4	7.33	7.30
Specific Heat Capacity	J/kg °C	0.23	0.17	0.198
Tensile Strength	MPa	30.7	29.5	42
Elongation at failure (%)	%	21	21.8	33.1
Thermal Expansion Coefficient	(30-100 °C)/°C x 10 <sup>-6</sup>	19.5	17.9	23.8
	(100-180 °C)/°C x 10 <sup>-6</sup>	20.2	23	24.3
Lead Content	%	Max 0.07		

## MANAGEMENT OF COPPER LEVELS IN THE SOLDER BATH

Copper should be controlled in the solder bath between 0.7% and 1.0%.

Management of the copper level in the solder bath is critical to ensure low defects in the soldering process. There is a tendency for the copper levels within a high tin bearing alloy solder bath to increase due to copper dissolution from the PCB. This effect increases based on the level of exposed copper on the assembly, as in the case of boards using OSP pad finishes.

Studies have shown a typical leaching rate of 0.01% Cu per 1000 boards. As each process is unique, this rate should be viewed as a guideline only.

It is recommended that the copper is controlled at between 0.7% and max 1.0% for SACX Plus S alloys. If the copper levels are higher than 1.0% then this will increase the liquidus temperature which in turn may mean that the solder bath temperature must be increased to maintain the process yields.

The copper levels in the bath can be controlled by means of adding the appropriate SACX Plus or SnCX Plus 00S alloy to the solder pot. It may be the case that equilibrium can be attained by continuing with SACX Plus or SnCX Plus 00S additions as the only means of solder top up, however, each process is unique, and we would recommend regular analysis of the solder bath so that good control of copper can be maintained.

This analysis service is available from Alpha. Please contact your local sales office for details.

## RECOMMENDED ACTION LEVELS FOR SOLDER BATH IMPURITIES

Please find below a list of recommended action levels for solder impurities. For information on specific action plans to bring your solder bath back to an acceptable condition please contact your local sales office.

Element	Action Levels %	Notes
Sn	<b>BAL</b>	No Action level.
Pb	<b>0.10</b>	RoHS Directive 2011/65/EU states a maximum Lead content of 0.1%
As	<b>0.03</b>	Levels greater than 0.03% can cause de-wetting.
Cu	<b>1.0</b>	SACX Plus 0307S is tolerant to copper levels up to 1.0%; SACX Plus 0300S copper free should be added to maintain copper levels. Levels above 1.0% may cause more bridging.
Bi	<b>0.20</b>	Lead Free alloys are tolerant to Bi up to 1.0%, however, if levels above 0.20% are detected this indicates some contamination issues that should be investigated
Zn	<b>0.003</b>	Levels greater than 0.003% may cause increased bridging and icicling, as well as increased crossing rates in the solder bath.

Element	Action Levels %	Notes
Fe	<b>0.02</b>	Greater than 0.02% Iron can be an indicator of pot erosion and may cause gritty joints and the formation of FeSn <sub>2</sub> IMC needles that can cause bridging.
Ag	<b>0.5 and 1.0</b>	Silver levels of 4% are used in some SAC alloys, however, if the levels rise above 1% for SACX Plus and 0.5% for SnCX Plus, then some investigations should be held to establish the cause.
Sb	<b>0.20</b>	Lead Free alloys are tolerant to Sb up to 1.0%, however if levels above 0.20% are detected this indicates some contamination issues that should be investigated
Ni	<b>0.05</b>	Levels greater than 0.05% may start to slow wetting and may reduce hole fill. Evaluate soldering performance if levels exceed 0.05%. Locate and eliminate source of high Ni levels.
Cd	<b>0.003</b>	RoHS Directive 2011/65/EU states a maximum Cadmium content of 0.01%. Levels of 0.003% may cause higher level of bridging and icicling.
Al	<b>0.002</b>	Levels greater than 0.002% may cause higher levels of bridging and icicling and a greater level of surface oxidation in the solder bath.

#### AVAILABILITY

ALPHA SACX Plus and SnCX Plus S alloys are available in 1kg (2.2lb) bar and solid wire.

#### 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](http://MacDermidAlpha.com/assembly-solutions/knowledge-base).**

**CONTACT INFORMATION**

**To confirm this document is the most recent version, please contact [Assembly@MacDermidAlpha.com](mailto: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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