

ALPHA[®] SnCX 100, SnCX 100T

LEAD-FREE SOLDER AND TOP-UP ALLOY

DESCRIPTION

ALPHA SnCX 100 is a zero silver lead-free alloy suitable for use in most wave, selective solder and HASL (Hot Air Solder Leveling) applications. **ALPHA SnCX 100** delivers fast soldering, low drossing and low copper dissolution as compared to silver-bearing alloys.

The **ALPHA SnCX 100T** variant is used as a replenishment alloy in solder baths with elevated copper levels. As with all Alpha Metals bar solder, Alpha's proprietary **Vaculoy[®]** manufacturing process is used to remove certain impurities, particularly oxides. The product is further enhanced with the addition of other elements designed to further improve alloy physical and mechanical properties, reduce drossing, increase wetting speed and force and improve joint reliability.

FEATURES & BENEFITS

Features:

- Bright and smooth solder fillet appearance with no surface cracks
- Excellent production yields. Outperforms Sn99.3Cu0.7 based materials
- Suitable in wave and hand soldering applications
- Suitable for both horizontal & vertical HASL process with flat and uniform coating
- Low dross generation delivered by Vaculoy process in conjunction with the addition of a dross reducing agent
- Low copper dissolution rate

Benefits:

- Lowers Total Cost of Ownership due to the lower material cost
- Compatible with various surface finishes
- Delivers good performance across different soldering processes
- Good solderability due to the fast wetting speed

The 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).

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APPLICATION

ALPHA SnCX 100 is suitable for wave soldering, selective soldering, lead tinning, HASL and reworking both through hole and surface mount components in a lead-free process. It is suited to single side and relatively complex, dual sided mixed technology boards. A solder pot temperature of 260 - 270° C (500 – 518° F) is recommended with a contact time 2.3 – 3.5 seconds. For suitable wave solder fluxes, please refer to our website.

Lead free Reclaim services including dedicated lead free containers are 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 = **0.05%**.

Material Property	Units	SnCX 100
Solidus	Celsius	227
Liquidus	Celsius	229
Hardness	HV	11.1
Density	g/cc	7.40
Specific Heat Capacity	@100 °C	0.198 J/g/°C
Thermal Expansion Coefficient	(30 - 100 °C) µm/m°C	25.3
	(100 - 180 °C) µm/m°C	26.6
Tensile Stress	MPa	39.6
Tensile Strain	%	6.3
Yield Stress	MPa	34.2
Elongation	%	46.8
Copper Content	%	0.65 +/- 0.05
Nickel Content	%	0.05 +/- 0.01
Germanium Content	%	≤ 0.01

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RECOMMENDED WAVE SOLDER PROCESS SETTINGS

Wave Configuration	Process Parameter	Suggested Process Settings
Single Wave	Pot Temperature, °C	260 - 270
	Conveyor Speed, m/min	1.0 - 1.5
	Contact Time, sec	2.3 – 3.5
	Wave Height	1/2 to 2/3 of board thickness
	Dross Removal	Once per 8 hour run time
	Copper Check	Every 8,000 boards until 40,000
Dual Wave	Pot Temperature, °C	260 - 270
	Conveyor Speed, m/min	1.0 - 1.5
	Contact Time, sec	3.0 - 4.5
	Wave Height	1/2 to 2/3 of board thickness
	Dross Removal	Once per 8 hour run time
HASL (Vertical Coating)	Solder Temperature, °C	260 – 270
	Total Contact Time – Top, sec	2.5
	Total Contact Time – Bottom, sec	5
	Air Pressure – Front, psi	38
	Air Pressure – Back, psi	40
	Knife Gap, mm	11
	Knife Offset, mm	5
	Knife Temperature, °C	295 – 310
	Insertion Speed, cm/sec	40
	Withdrawal Speed, cm/sec	70

Note: Parameter setting recommendations are for reference purpose. Setting could vary depending on equipment type & board design.

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MANAGEMENT OF COPPER LEVELS IN THE SOLDER BATH

Copper should be controlled in the solder bath between 0.4% and 0.85%

Management of the copper level in the wave solder bath is critical to ensure low defects in the soldering process. There is a tendency for the copper levels of the SnCX 100 solder alloy to increase due to the leaching effect of the solder wave on the board and components. This effect is at its most severe when using an OSP Copper finish on the PCB.

It is recommended that the copper is controlled at between 0.4% and max 0.85% for the SnCX 100 solder alloy. If the copper levels are higher than 0.85% then this will increase the liquidous temperature which in turn may mean that the solder bath temperature has to be increased to maintain the process yields.

The copper levels in the bath can be controlled by means of adding **SnCX 100T** to the wave solder pot. It may be the case that equilibrium can be attained by continuing with **SnCX 100T** 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**, contact your local sales office for details.

RECOMMENDED ACTION LEVELS FOR WAVE SOLDER IMPURITIES

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

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RECOMMENDED ACTION LEVELS FOR WAVE SOLDER IMPURITIES

Element	ActionLevel	Notes
Sn	BAL	No Action level.
Pb	0.07	RoHS Directive 2011/65/EU states a maximum Lead content of 0.1%.
As	0.03	Levels greater than 0.03% can cause de-wetting.
Cu	< 0.40 > 0.85	SnCX 100 is tolerant to copper levels up to 0.85%, SnCX 100T copper corrective alloy should be added to maintain copper levels. Levels above 0.85% may cause more bridging.
Ni	< 0.01 > 0.10	Levels greater than 0.04% may start to slow the wetting speed and could affect the hole fill performance. If process performance is OK then levels up to 0.05% are OK.
Ge	< 0.002 > 0.10	Decreasing effect when Ge level is below 0.002%. No problem when Ge is well kept between 0.004% to 0.01%. If level more than 0.10% may indicate contamination issue that should be investigated.
Bi	0.20	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	0.003	Levels greater than 0.003% may cause higher levels of bridging and icicling and a greater level of surface oxidation in the solder bath.
Fe	0.02	Greater than 0.02% Iron can be an indicator of pot erosion and may cause gritty joint formation and the formation of FeSn ₂ IMC needles that can cause bridging.
Ag	0.50	Silver levels of 4% are used in some SAC alloys, however if the levels in SnCX 100 rise above 0.5% then some investigations should be held to establish the cause. Solderability should not be affected.
Sb	0.20	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.
Cd	0.003	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	0.002	Levels greater than 0.002% may cause higher levels of bridging and icicling and a greater level of surface oxidation in the solder bath.
Au	0.10	At levels above 0.1% there may be some problems with joint strength.

SAFETY

Please refer to SDS for advice on all proper handling and safety instructions. The most current version is available at www.alphaassembly.com.

STORAGE

Store the solder bar in a cool, dry and non-corrosive environment. Wrap up the solder bar when not in use to reduce exposure to environment.

AVAILABILITY

ALPHA SnCX 100 is available in 1kg (2.2lb) Bar, Chunks, Feeder Ingots and Autofeed Wire.

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CONTACT INFORMATION

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

North America 300 Atrium Drive Somerset, NJ 08873, USA 800.367.5460	Europe Unit 2, Genesis Business Park Albert Drive Woking, Surrey, GU21 5RW, UK 01483.758400	Asia 8/F., Paul Y. Centre 51 Hung To Road Kwun Tong, Kowloon, Hong Kong 852.3190.3100
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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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