

# ALPHA<sup>®</sup> SNCX 100, SNCX 100T

## Lead-Free Solder and Top-Up Alloy

### DESCRIPTION

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

The **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<sup>®</sup> 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.

READ ENTIRE TECHNICAL DATA SHEET BEFORE USING THIS PRODUCT

### FEATURES & BENEFITS

#### Features:

- Bright and smooth solder fillet appearance with no surface crack
- 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 technologies
- 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).

**APPLICATION GUIDELINES**

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 to 270 °C (500 to 518 °F) is recommended with a contact time 2.3 to 3.5 seconds. For suitable wave solder fluxes, please refer to our website. Lead free Reclaim services including dedicated lead free containers is also available, please consult your local Alpha sales office.

**TECHNICAL DATA**

Complies with all requirements of RoHS Directive (Article 4.1 of the European Directive 2015/863/EU). Alloy specification for Maximum Lead (Pb) Content = 0.05%.

| Material Property             | Units                   | SnCX 100      |
|-------------------------------|-------------------------|---------------|
| Melting Temperature           | °C                      | ~ 227         |
| Hardness                      | HV                      | 11.1          |
| Density                       | g/cc                    | 7.40          |
| Specific Heat Capacity        | @100 °C                 | 0.198 J/g/ °C |
| Thermal Expansion Coefficient | (30 to 100 °C) µm/m °C  | 25.3          |
|                               | (100 to 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        |

**RECOMMENDED WAVE SOLDER PROCESSING SETTINGS**

| Wave Configuration  | Process Parameter                | Suggested Process Settings      |
|---|----------------------------------|---------------------------------|
| <b>Single Wave</b>  | Pot Temperature, °C              | 260 to 270                      |
|   | Conveyor Speed, m/min            | 1.0 to 1.5                      |
|   | Contact Time, sec                | 2.3 to 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 |
| <b>Dual Wave</b>  | Pot Temperature, °C              | 260 to 270                      |
|   | Conveyor Speed, m/min            | 1.0 to 1.5                      |
|   | Contact Time, sec                | 3.0 to 4.5                      |
|   | Wave Height                      | 1/2 to 2/3 of board thickness   |
|   | Dross Removal                    | Once per 8 hour run time        |
| <b>HASL</b><br>(Vertical Coating)   | Solder Temperature, °C           | 260 to 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 to 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. |                                  |                                 |

## MANAGEMENT OF COPPER LEVELS IN THE SOLDER BATH

**Copper should be controlled in the solder bath between 0.40% 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 0.40% 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 must 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 Alpha sales office.

| Element | Action Level     | Notes  |
|---------|------------------|--|
| Sn      | BAL              | No Action level.   |
| Pb      | 0.07             | RoHS Directive 2015/863/EU states a maximum Lead content of 0.10%.   |
| As      | 0.03             | Levels greater than 0.03% can cause de-wetting.  |
| Cu      | < 0.40<br>> 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<br>> 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 acceptable then levels up to 0.05% are fine. |

| Element | Action Level      | Notes  |
|---------|-------------------|--|
| Ge      | < 0.002<br>> 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 is more than 0.10% this may indicate a 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 icicing, as well as 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 <sub>2</sub> 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 0.50% 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 2015/863/EU states a maximum Cadmium content of 0.01%. Levels of 0.003% may cause higher levels of bridging and icicing.  |
| Al      | 0.002             | Levels greater than 0.002% may cause higher levels of bridging and icicing, as well as a greater level of surface oxidation in the solder bath.  |
| Au      | 0.10              | At levels above 0.10%, there may be some problems with joint strength.   |

## AVAILABILITY

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

**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.

**CONTACT INFORMATION**

To confirm this document is the most recent version, please contact  
**Assembly@MacDermidAlpha.com**  
[www.macdermidalpha.com](http://www.macdermidalpha.com)

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|---|--|---|
| <p><b>North America</b><br/>         109 Corporate Blvd.<br/>         South Plainfield, NJ 07080, USA<br/>         1.800.367.5460</p> | <p><b>Europe</b><br/>         Unit 2, Genesis Business Park<br/>         Albert Drive<br/>         Woking, Surrey, GU21 5RW, UK<br/>         44.01483.758400</p> | <p><b>Asia</b><br/>         8/F., Paul Y. Centre<br/>         51 Hung To Road<br/>         Kwun Tong, Kowloon, Hong Kong<br/>         852.3190.3100</p> |
|---|--|---|

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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