

# ALPHA<sup>®</sup> VACULOY<sup>®</sup> Sn99.3Cu0.7

## Lead-Free Solder Alloy

### DESCRIPTION

**ALPHA Vaculoy Sn99.3Cu0.7** solder alloy is suitable for use in most wave and selective solder processes. As with all Alpha bar solder, Alpha's proprietary Vaculoy alloying process is used to remove certain impurities, particularly oxides. These alloys may also be made into both solid and cored wire for use in auto-feed and rework applications.

READ ENTIRE TECHNICAL DATA SHEET BEFORE USING THIS PRODUCT

### FEATURES & BENEFITS

#### Features:

- Bright and smooth solder fillet appearance with no surface cracks
- Excellent production yields
- Suitable in wave and hand soldering applications
- Low dross generation delivered by Vaculoy process in conjunction with the addition of a dross reducing agent

#### Benefits:

- Lowers Total Cost of Ownership due to the lower material cost
- Compatible with various surface finishes
- Delivers excellent performance across a wide range of flux technologies

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).

**PRODUCT INFORMATION**

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%. Sn99.3Cu0.7 is also available as an Ultra-Low Lead (ULL) version which contains a maximum of 0.05% Pb. All alloy properties remain the same for Sn99.3Cu0.7.

Material Properties	Sn99.3Cu0.7
Melting Point	227 °C / 441 °F
Density	7.42 g/cm <sup>3</sup>
TCE 30 to 100 °C (mm/m °C )	20.5
Specific Heat Capacity	0.214 J/g K
Thermal Conductivity (W/mK)	60.5
Electrical Resistivity (μΩ-cm)	11.99
Hardness (HV 0.2)	10.0
Tensile Strength (As cast)	33.8 MPa

Specification %			
Sn	Balance	As	0.03 max
Ag	0.10 max	Ni	0.01 max
Cu	0.7 +/- 0.1	Bi	0.10 max
Pb	0.07 max	Cd	0.002 max
Sb	0.10 max	Al	0.001 max
Zn	0.001 max	Au	0.05 max
Fe	0.02 max	In	0.05 max

Tolerance on solid wire diameters is +/- 0.05mm.

## APPLICATION GUIDELINES

ALPHA Vaculoy Sn99.3Cu0.7 solder alloy is suitable for wave and selective soldering applications for electronic assemblers interested in implementing a lead-free process. A solder pot temperature of  $>260\text{ }^{\circ}\text{C}$  is recommended. These alloys may also be used in wire form for use in solder pot auto-feed systems and a variety of rework applications.

Lead-free reclaim services, including dedicated lead-free containers, are also available. Please consult your local sales office.

## MANAGEMENT OF COPPER LEVEL IN THE SOLDER BATH

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 Sn99.3Cu0.7 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 0.6% and max 1.0% for the Sn99.3Cu0.7 solder alloy. If the copper levels are higher than 1.0% 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 adding Sn100 to the wave solder pot. It may be the case that equilibrium can be attained by continuing with Sn100 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, 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 on specific action plans to bring your solder bath back to an acceptable condition please contact your local sales office.

Element	Action Level	Notes
Sn	BAL	No Action level.
Pb	0.07	RoHS Directive EU/2015/863 states a maximum Lead content of 0.1%.
As	0.03	Levels greater than 0.03% can cause de-wetting.
Cu	1.00	Sn99.3Cu0.7 is tolerant to copper levels up to 1.0%, Sn100 copper-free should be added to maintain copper levels. Levels above 01.0% may cause more bridging.
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 icling 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 <sub>2</sub> IMC needles that can cause bridging.
Ag	0.50	If the levels in Sn99.3Cu0.7 rise above 0.50% some investigations should be held to establish the cause.
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.
Ni	0.05	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 ok.
Cd	0.003	RoHS Directive EU/2015/863 states a maximum Cadmium content of 0.01%. Levels of 0.003% may cause higher levels of bridging and icling.
Al	0.002	Levels greater than 0.002% may cause higher levels of bridging and icling 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.

**AVAILABILITY**

ALPHA Vaculoy Sn99.3Cu0.7 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](https://MacDermidAlpha.com/assembly-solutions/knowledge-base).**

**CONTACT INFORMATION**

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

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