

Kester SAC305

High Silver Alloy for Wave and Selective Soldering

Product Description

SAC305 alloy is a lead-free alloy suitable for use as a replacement for the Sn63Pb37 alloy. The replenishment alloys are sometimes used to stabilize and reduce the copper content in the wave solder bath, although, this requirement will depend on process conditions.

Performance Characteristics:

- Yield – Best-in-class yield, outperforms all SnCu-based materials
- Wetting speed - fast wetting, in back-to-back tests 0.65 s compared to 1.00 s, for SnCu-based materials
- Dross generation - Low dross generation
- Excellent solderability due to fast wetting speed
- Very good drainage - has lower levels of bridging compared to SnCu alloys
- Delivers excellent performance across a wide range of flux technologies

RoHS Compliance

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%. SAC alloy is also available in Ultra Low Lead (ULL) version which contains a maximum of 0.05% Pb.

| Specification % | | | |
|-----------------|-----------|----|-----------|
| Sn | Balance | As | 0.03 max |
| Ag | 3.0 ± 0.2 | Ni | 0.01 max |
| Cu | 0.5 ± 0.1 | Bi | 0.10 max |
| Pb | 0.07 max | Cd | 0.001 max |
| Sb | 0.10 max | Al | 0.001 max |
| Zn | 0.001 max | In | 0.05 max |
| Fe | 0.02 max | | |

All figures are in % for impurity limits per alloy in relation to J-STD-006C.

Material Characteristics

| Characteristic | Data |
|--|----------------------------------|
| | SAC305 |
| Melting Point | 217 to 219 °C (423 to 426 °F) |
| Density | 7.37 g/cm ³ |
| TCE (Range 20 to 100 °C) micrometers / M / °C | 21.9 |
| Specific Heat Capacity | 0.232 J/g K |
| Hardness | 14.1 HV |

Application

SAC305 is suitable for lead-free wave and selective soldering. A solder pot temperature of 255 to 265 °C (491 to 509 °F) is recommended for wave soldering application. If used for selective soldering, a solder pot temperature of 280 to 320 °C (536 to 608 °F) is recommended. N₂ environment (<1000ppm O₂) can be considered for further oxidation reduction.

For suitable solder fluxes, please see our selector guide. Lead-free Reclaim Services including dedicated lead-free containers are also available. Please consult your local sales office.

Availability

Kester SAC305 is available in 1 kg (2.2 lb) & 20Kg (44 lb) bars. Most products are shipped strapped and palletized or packed in corrugated cardboard box. Inspect shipment to make ensure there is no apparent significant damage to shipping materials.

Process Considerations / Recommendations

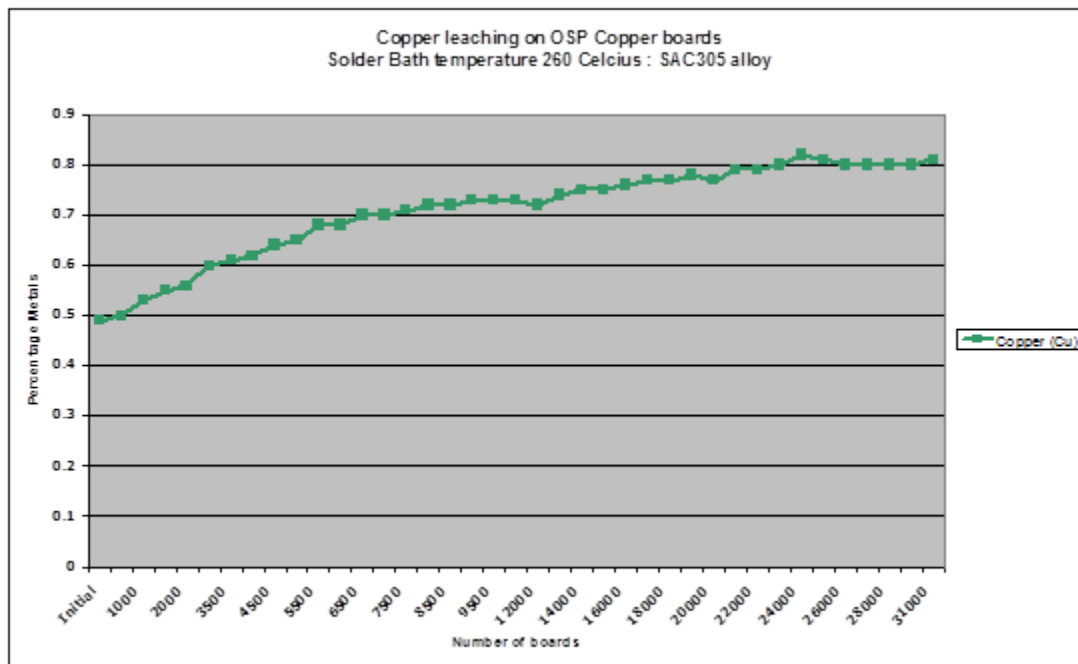
| Wave Configuration | Process Parameter | Suggested Process Settings |
|--------------------|-------------------|------------------------------------|
| Single Wave | Pot Temperature | 255 to 265 °C (491 to 509 °F) |
| | Conveyor Speed | 1.0 to 1.5 m/min (3.3 to 5 ft/min) |
| | Contact Time | 2.3 to 2.8 s |
| | 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 |

| Wave Configuration | Process Parameter | Suggested Process Settings |
|--------------------|-------------------|------------------------------------|
| Dual Wave | Pot Temperature | 255 to 265 °C (491 to 509 °F) |
| | Conveyor Speed | 1.0 to 1.5 m/min (3.3 to 5 ft/min) |
| | Contact Time | 3.0 to 3.5 s |
| | Wave Height | 1/2 to 2/3 of board thickness |
| | Dross Removal | Once per 8 hour run time |

These are general guidelines which have proven to yield excellent results. However, depending upon your equipment, components and circuit boards, your optimal settings may be different. To optimize your process, it is recommended to perform a design experiment, optimizing the most important variables (i.e., amount of flux applied, conveyor speed, topside preheat temperature, solder pot temperature, board orientation, etc.).

Management of Copper Levels 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 SAC305 materials 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. A typical copper level increase is shown on the chart below:



This shows an average leaching rate of 0.01% Cu per 1,000 boards. Each process is unique, and this is an indication only of the leaching rate (based on actual data).

It is recommended that the copper is controlled at between 0.5% and max 0.95% for SAC305 alloy. 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 relevant replenishment alloy to the wave solder pot. It may be the case that equilibrium can be attained by continuing with replenishment alloy additions as the only means of solder top up. However, each process is unique, and we recommend regular analysis of the solder bath so that good control of copper can be maintained.

Kester offers solder pot analysis services. Contact your local 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.

Aluminum*: As little as 0.005% may increase dross rate without affecting joint formation.

Arsenic: Above 0.03% can cause dewetting.

Bismuth: Levels of 1.0% are added to some wave-solder alloys to improve wetting, joint cosmetics and thermal fatigue resistance. At this level care should be taken over lead contamination as there is some evidence that this may increase the chances of fillet lifting. Lead at <0.1% (RoHS) should not cause any problems.

Cadmium*: At levels of 0.002% joint formation will be noticeably affected. At 0.005% there will be a high incidence of bridging and icling, together with a reduction in joint strength.

Copper: Copper levels will increase in many cases due to pick up from board surfaces. This causes the liquidus of the bath material to increase slightly. Generally, systems are tolerant to levels up to 0.95% Cu, but in some cases, it may be necessary to increase bath temperatures by a few degrees, or to correct the bath composition at an earlier stage.

Gold: At levels of 0.1% and quite often less, the solder becomes sluggish and dull joints are formed.

Iron: 0.02% of iron can make joint formation gritty.

Lead: The current RoHS directive (restriction of certain hazardous substances) states a maximum of 0.1% Pb in the solder joints. The lead contamination level should be kept below this level to comply with legislation. If this level is exceeded, please consult with your local Customer Technical Service Engineer for advice on how to rectify this problem.

Silver: Silver is used as an alloying element in lead-free solders that enhances wetting speed and thermal fatigue resistance.

Zinc*: The presence of zinc can cause dulling and create bridging and icicling. 0.005% can also cause lack of adhesion and grittiness.

***Note:** The effects of Al, Cd and Zn are cumulative. If more than one element is present, the following lower maxima are suggested: 0.0005%, 0.002% and 0.001%.

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](#).



Storage and Warranty Period

Storage must be in a dry, non-corrosive environment between 10 to 40 °C (50 to 104 °F). The surface may lose its shine and appear a dull shade of grey. This is a surface phenomenon and is not detrimental to product functionality. Solder bar has a limited warranty period determined by the alloy used in the bar. For alloys containing more than 70% lead, the warranty period is 2 years from the date of manufacture. Other alloys have a warranty period of 3 years from the date of manufacture.

Health and Safety

This product, during handling or use, may be hazardous to your health or the environment. Read the Safety Data Sheet and warning label before using this product. Safety Data Sheets are available at [link](#).

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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