

Technical Bulletin

TSC PURALLOY SAC305 SOLDER ALLOY

DESCRIPTION

TSC PURALLOY SAC305 solder alloy is manufactured using a proprietary process which greatly reduces any dross inclusions and provides a highly pure, free flowing alloy which in turn reduces the risk of bridging and solder skips during wave and selective soldering. This lead-free silver bearing alloy has a very much proven superior performance record over many low silver and non-silver bearing lead free alloys. This material today continues to be the first choice of any company producing aerospace and high reliability electronic equipment.

TSC PURALLOY SAC305 solder alloy is available in 1 kg Bars, 3kg Ingots and Feed Wire. Chunks are also available to assist in new pot fills on request.

Product Features & Benefits

- Liquidus 220°C (428°F)
- Compatible with all Flux Types
- Excellent Wetting Speed
- Excellent Solderability and Spreading
- Reduced Bridging Versus Sn-Cu Alloys
- Complies with IPC J-STD-006

TYPICAL COMPOSITION

| Typical Alloy Composition | | |
|---------------------------|---------|---------|
| Sn: Balance | Ag: 3.0 | Cu: 0.5 |

MELTING TEMPERATURE RANGE

| Typical Melting Temperature | |
|-----------------------------|-------------------------|
| Solidus: 217°C (423°F) | Liquidus: 220°C (428°F) |

HANDLING & STORAGE

Indefinite shelf life applies to solid solder. For other product categories, refer to those specific TDSs. Consult SAC305 MSDS for additional handling procedures and precautions.

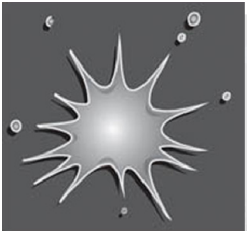
| Parameter | Time | Temperature |
|------------|------------|------------------|
| Shelf Life | Indefinite | Room Temperature |

FLUX COMPATIBILITY

SAC305 bar solder is compatible with all major brands of no-clean and water soluble electronic grade fluxes.

HEALTH & SAFETY

Use with adequate ventilation and proper personal protective equipment. Refer to the accompanying Safety Data Sheet for any specific emergency information. Do not dispose of any hazardous materials in non-approved containers.



SOLDER CONNECTION

Email: sales@solderconnection.co.uk | Tel: +44(0)1291 624 400

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TECHNICAL DATA

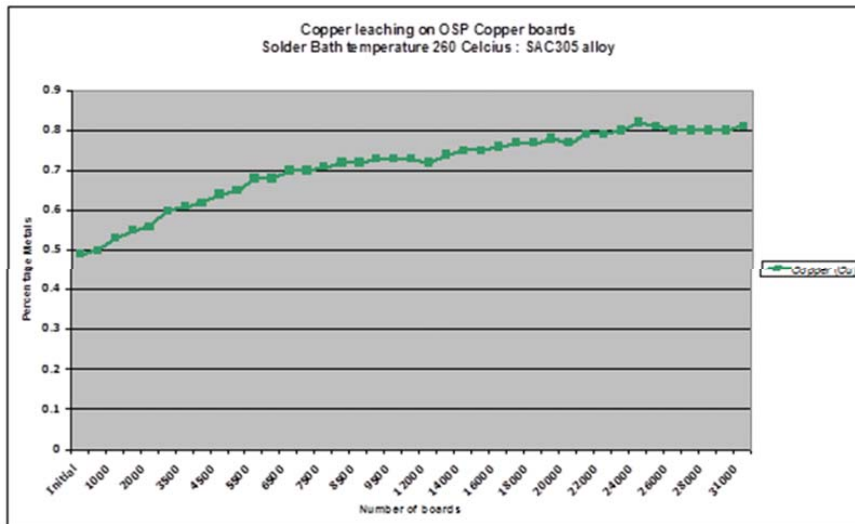
Complies with all requirements of RoHS Directive (Article 4.1 of the European Directive 2011/65/EU). Alloy specification for maximum Lead (Pb) Content = 0.07%. SAC alloy is also available in Ultra Low Lead (ULL) version which contains a maximum of 0.05% Pb. All alloy properties remain the same for SAC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

| Element | Specification % | |
|---------|-----------------|-----------|
| | SAC 305 | SAC 300 |
| Sn | Balance | Balance |
| Ag | 3.0 ± 0.2 | 3.0 ± 0.2 |
| Cu | 0.5 ± 0.1 | 0.05 max |
| Pb | 0.07 max | 0.07 max |
| Sb | 0.10 max | 0.10 max |
| Zn | 0.001 max | 0.001 max |
| Fe | 0.02 max | 0.02 max |
| As | 0.03 max | 0.03 max |
| Ni | 0.01 max | 0.01 max |
| Bi | 0.10 max | 0.10 max |
| Cd | 0.001 max | 0.001 max |
| Al | 0.001 max | 0.001 max |
| In | 0.05 max | 0.05 max |

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

COPPER LEVEL MANAGEMENT

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 SAC305/405 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:

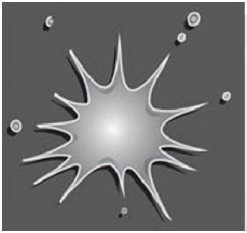


This shows an average leaching rate of **0.01% Cu per 1000 boards**. Each process is unique this is an indication only of the leaching rate (based on actual data).

It is recommended that the copper is controlled at between 0.5% and max 0.95% for SAC305/405 alloys. 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 means of adding **SAC300 (Sn97%/Ag3.0%Cu0%)** to the wave solder pot. It may be the case that equilibrium can be attained by continuing with SAC300 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.

Solder Analysis is a service offered by Solder Connection. If you require this service please contact one of our sales offices to request our guide and a quotation.



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RECOMMENDED ACTION LEVELS

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.

| | |
|------------|--|
| Aluminium* | As little as 0.005% may increase gross 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 icicing, 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 Alpha Assembly Solutions contacts 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 icicing. 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%

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