



PROCIRC 9834

TIN PLATING PROCESS

INTRODUCTION

Procirc 9834 is a sulphate based tin plating process formulated to produce a dense fine grained pure tin deposits. It is primarily intended for use as an etch resist in printed circuit board manufacture, but it can also be used for barrel or rack plating.

BENEFITS

- Easy to maintain.
- Excellent throwing power down holes.
- Excellent solderability.
- Low tendency to Sn⁴⁺ formation.

SOLUTION MAKE -UP

Sulphuric acid, chem. pure, SG 1.84 100ml/L
Procirc 9830 Tin Salt 40g/L
Procirc 9834 Additive 40ml/L

OPERATING DATA

	Range	Optimum
Tin (g/L)	15 – 30	20
Sulphuric acid (g/L)	160 – 200	175
Cathode cd (A/dm ²)	1 – 2	1.5
Anode cd (A/dm ²)	<1.5	
Temperature (°C)	18 – 25	
Deposition rate	0.75µm/min at 1.5A/dm ²	
Extraction	Required	

EQUIPMENT

Tanks	Steel or GRP lined with PVC, polypropylene or hard rubber.
Heaters	PTFE immersion with thermostatic control
Cooling	PTFE coils (if necessary).
Filtration	Continuous recommended, all plastic construction pump, 1/3 activated carbon.
Agitation	Work movement (not air agitation).
Anodes	Pure tin to BS 1468.



INSTALLATION

1. Clean the process tank with water and leach overnight with warm sulphuric acid (5% v/v).
2. $\frac{3}{4}$ fill the tank with deionised water.
3. Add carefully with stirring the required volume of sulphuric acid.
4. Add the required weight of Procirc 9830 Tin Salt to the warm solution and stir to dissolve.
5. Allow the solution to cool to room temperature then add the Procirc 9834 Additive and stir.
6. Top up with deionised water to volume then stir thoroughly.

MAINTENANCE AND CONTROL

The stannous tin and sulphuric acid concentrations should be analysed regularly using the methods detailed in this Data Sheet.

The Procirc 9834 Additive is maintained at an addition rate of 400ml/1000 Ahr.

ANALYSIS METHODS

1. Stannous tin

Reagent

Concentrated hydrochloric acid.
Iodine indicator.
0.1N iodine.

Method

1. Pipette 5ml of the plating solution into a 500ml conical flask.
2. Add approximately 100ml deionised water.
3. Add 5ml concentrated hydrochloric acid.
4. Add a few drops iodine indicator.
5. Titrate with 0.1N iodine to a permanent blue end point.
6. Record $t = t$ mls.

Calculation

$$t \times 1.187 = \text{g/litre tin}$$

Replenishment

For every 1g/L tin low, add 1.8g/L Procirc 9830 Tin Salt.

2. Free acid

Reagents

1.0N sodium hydroxide.

Method

1. Pipette 10ml of the plating solution into a 500ml conical flask.
2. Add approximately 150ml deionised water.
3. Titrate with 1.0N sodium hydroxide mixing thoroughly during additions to a turbid end point.
4. Record titre = t ml.

Calculation

$t \times 4.9 = \text{g/L free acid.}$

Replenishment

For every 1g/L free acid low, add 0.5 ml/L sulphuric acid.

Trouble Shooting Guide for Procirc 9834

Problem	Possible cause	Possible correction
Dark colour in high current density areas (no sharp separation line)	Low content of metal Low temperature of the solution Low bath agitation Current density too high Low content of Additive	Increase metal content (15-30g/L) Increase temperature Increase agitation up to 0.8m/min Not above 2.0 A/dm ² Increase content of Additive in 5ml/L increments.
Dark and rough grain structure in high and medium current density areas (with sharp separation line)	Strong resist contamination	use carbon cartridges in the filter In extreme cases carbon treatment 6-10g/L.
No coverage in low current density areas	High content of Cl ⁻ >120mg/L High content of NO ₃ High content of metal High bath temperature Organic contamination	New make up Dummy plating Decrease content of metal (15-30g/L) Decrease temperature Carbon treatment



Problem	Possible cause	Possible correction
Poor thickness distribution	High content of metal Low content of acid Low content of Additive Poor anode contacts Poor cathode contacts	Normal content (15-30g/L) Increase content of acid 160-200g/L Increase Additive concentration in 5ml/L increments. Check the contacts Check the contacts
Gas evolution at the anodes	Passivated anodes (High anode current density) High metal and acid concentration Anode bag clogged	Check the anode surface (current density >2.0 A/dm ²) Dilute the electrolyte Check and clean or change the anode bags.
Etch voids at the corners	Poor grain structure, most likely due to resist contamination	Carbon filter.
Poor thickness / bright deposit near the photo-resist	Leaching of photo-resist during electroplating	Check the photo-resist process, especially the exposure time, the developer and the cleaning after development.

DISPOSAL

Dispose of in accordance with local authority requirements.

PRODUCT FAMILIES

The following products are referred to in this data sheet.

PRODUCT NAME	PRODUCT NUMBER
Procirc 9830 Tin Salt	983001
Procirc 9834	984007

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