

# PROCIRC 981

## TIN LEAD PLATING PROCESS

### INTRODUCTION

Procirc 981 is a fluoborate based tin/lead plating process formulated to produce fine-grained, 63/37 tin/lead deposit over a wide range of current densities. It is primarily intended for printed circuit board plating, but can also be used for barrel plating.

### BENEFITS

Wide current density range – 15 to 40 A/sq.ft. depending on metal concentration.

Consistent 63/37, tin/lead ( $\pm 1\%$ ).

Single addition agent for maintenance.

Excellent throwing power down holes.

### SOLUTION MAKE-UP

Procirc 981 tin/lead plating process is supplied ready for use as

Procirc 9811 Electrolyte, Ready to Use. (987003)

Clean the process tank with water and leach the tank by filling with warm dilute fluoboric acid (2 – 3%) for a minimum of 8 hours. Pump the acid through all filters, pumps and pipework.

Discard the leaching solution into the effluent treatment plant, rinse out with tap water and finally deionised water and pour in the Procirc Tin/Lead Plating Process 981.

## ISSUE 3

### OPERATING DATA

	<u>Range</u>	<u>Optimum</u>
Stannous Tin	22 - 30 g/l	25 g/l
Lead	9 - 12 g/l	10 g/l
Fluoboric Acid	80 - 100 g/l	100 g/l
Temperature	20 - 25 Deg C	22 Deg C
Cathode C.D.	10 - 40 A/ft <sup>2</sup>	15 - 20 A/ft <sup>2</sup>
Anode C.D.	25 A/ft <sup>2</sup> max.	
Agitation	Cathode movement, 10-20 strokes/minute to promote solution flow through holes.	
Filtration	Continuous filtration recommended.	
Plating Rate	1 micron/minute at 15 A/sq.ft.	

### EQUIPMENT

Tanks (Small Volumes)	Moulded polythene or polypropylene. Welded polypropylene or PVC.
Tanks (Large Volumes)	Steel or GRP lined with PVC, polypropylene or hard rubber.
Heating	Only required if temperature of solution falls below 20 deg C. Use PTFE immersion heaters with thermostatic control.
Filtration	All plastic filter pumps and filter should be used.
Agitation	Cathode moving gear.
Anodes	60/40 or eutectic tin/lead anodes with polypropylene or terylene anode bags.

## ISSUE 3

### **PROCESS SEQUENCE** (For print and etch, pattern plate).

1. Soak clean in Procirc Cleaner SP264 or 903.
2. Rinse (mains water is suitable if it does not have a high sulphate or chloride content.)
3. Microetch in Procirc Microetch 921 or SP263.
4. Rinse.
5. Acid dip in 10% sulphuric acid for 1 minute.
- 5a. Pattern plate at this stage with Procirc 971M Acid Copper if required.
6. Rinse thoroughly to remove all traces of sulphate carry over.
7. Acid dip in 10% fluoboric acid for 2 minutes.
8. Plate in Procirc 981.
9. Rinse. Inadequate rinsing after plating can result in a white surface film on the fused coating.
10. Rinse.
11. Rinse in deionised water.

### **MAINTENANCE AND CONTROL**

The stannous tin, lead and fluoboric acid concentrations should be analysed regularly using the methods detailed in the Data Sheet. Any adjustments necessary should be made using only:-

PMD Tin Concentrate	3.3 ml/l = 1 g/l Tin
PMD Lead Concentrate	2 ml/l = 1 g/l Lead
PMD Fluoboric Acid	1.4 ml/l = 1 g/l Fluoboric Acid

Regular additions of Procirc 981 TK Addition Agent should be made to maintain throwing power and deposit quality. A typical addition rate is 250 ml/1000 ampere hours. Deficiency of addition agent will cause high current density burning/treeing and thin deposits in through plated holes.

The approximate concentration of the addition agent can be established by Hull Cell testing:-

Current	1 amp
Test Panel	Copper flashed brass or copper laminate.
Time	5 minutes.
Temperature	22 Deg C
Agitation	Gentle solution movement.

1 ml/l additions of Addition Agent should be made until uniform, smooth deposits are obtained.

### **ANALYSIS METHODS**

## Determination of Stannous Tin

### Reagents

0.05 M potassium iodate. Standardised  
Concentrated hydrochloric acid.  
Marble chips.

### Procedure

1. Measure 25 ml of concentrated hydrochloric acid into a 250 ml Erlenmeyer flask.
2. Pipette 10.0 ml of the plating solution into the flask putting the tip of the pipette below the level of the acid.
3. Add a marble chip and titrate rapidly with 0.05 M potassium iodate until the appearance of the first yellow coloration.

### Calculation

ml titre of 0.05 M potassium iodate x 1.78 = g/l stannous tin.

## Determination of Lead

### Reagents

Hydrogen Peroxide 100 vol  
0.1M EDTA Standardised  
0.1M Zinc Sulphate Standardised  
Triethanolamine 20% v/v  
Ammonia/Ammonium-Chloride Buffer Solution. Dissolve 54 g NH<sub>4</sub>Cl in 350 ml NH<sub>4</sub>OH. Make up to 1 litre with deionised water  
Erichrome Black T Indicator

### Procedure

1. Transfer a 5.00 ml aliquot of plating solution to a 250 ml conical flask and dilute to 100 mls with DI water. Mix well.
2. Add 1 ml of Hydrogen Peroxide. Mix well.
3. Transfer 10.00 ml of 0.1M EDTA from a burette into the flask and mix well.
4. Add 5 ml of 20% Triethanolamine followed by 20 ml of Ammonium Chloride buffer.
5. Add a pinch of Eriochrome Black T Indicator and titrate with standardised 0.1M Zinc Sulphate solution to a purple end point.

### Record Titre as A.

### Standardisation of Zinc Sulphate

1. Transfer 10.00 mls of 0.1M EDTA into a Conical Flask via a burette. Dilute to 100 mls with DI water.
2. Add 20 mls of Ammonium Chloride buffer solution and a pinch of Eriochrome Black T Indicator.
3. Titrate with 0.1M Zinc Sulphate to a purple end point.

### Record as Titre B.

### Calculation

$$\left(1 - \frac{A}{B}\right) \times 41.44 = \text{g/l lead}$$

### Determination of Free Fluoboric Acid

### Reagents

1.0 N sodium hydroxide

Standardised

## **ANALYSIS METHODS CONTD**

### Procedure

1. Pipette a 5 ml sample of plating solution into a 250 ml conical flask.

2. Titrate with 1.0 N Sodium hydroxide to the first permanent turbidity.

3. Record titre = t mls

#### Calculation

$(t \times 8.8) - (1.1 \times \text{g/l Stannous Tin}) = \text{g/l Free Fluoboric Acid}$

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#### **DISPOSAL**

Dispose of in accordance with local authority requirements.

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#### **PRODUCT FAMILIES**

The following products or product families are referred to in this data sheet:-

<u>Product Name</u>	<u>Product Number</u>
Procirc 9811 Electrolyte,Ready to Use	987003
Procirc 981 TK Addition Agent	987015
Procirc SP264 Acid Cleaner	907004
Procirc 903 Acid Cleaner	907003
Procirc 921 Microetch	923001
Procirc SP263 Microetch	923003
Procirc 971M Acid Copper Additive (25 Lts)	977010
Procirc 971M Acid Copper Additive (5 Lts)	977012
PMD Tin Concentrate	577005
PMD Lead Concentrate	577006
PMD Fluoboric Acid Concentrate	577007

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