

PMD (UK) LTD PROCESS DATA

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ISSUE 3
PREV 2

NICKEL 3000

INTRODUCTION

The Nickel 3000 process has been developed to produce fully bright, levelled, very ductile nickel deposits. The process can be used for rack or barrel plating. Because of its high ductility it may be used as an undercoat for gold on electronic connectors which may have to withstand deforming operations after plating.

BENEFITS

- Excellent ductility
- Wide current density range
- Suitable for rack and barrel
- Easy to maintain

SOLUTION MAKE-UP

The Nickel 3000 process is supplied as a purified Base Solution (rack or barrel), to which is added the Nickel 3000 carrier (20 ml/l) and Brightener (1.0 ml/l). It is recommended that the Brightener is added in 0.25 ml/l increments over a period of 4 - 5 hours while the solution is being worked in.

Nickel base solution	as supplied
Nickel 3000 Carrier	20ml/L
Nickel 3000 brightener	1ml/L
Nickel 3000 Wetter (air)	1ml/L
or (mechanical)	1ml/L

OPERATING DATA

	<u>Rack</u>	<u>Barrel</u>
Nickel	60 - 70 g/L	60 - 70 g/L
Nickel Chloride	50 - 60 g/L	140 - 160 g/L
Boric Acid	40 - 45 g/L	40 - 45 g/L
pH	4.2 - 4.5.	
Temperature	50 - 60 deg C.	
Cathode CD	0.2 - 5.0 A/dm ² (2-50ASF) depending on application.	
Anode CD	1 - 4 A/dm ² . (10-40 ASF)	
Agitation	Air or cathode or solution movement	
Anodes	Depolarised or carbon containing nickel. Alternatively, 'S' Nickel in titanium baskets. Polypropylene or Terylene woven anode bags which have been thoroughly leached in hot water should be used.	
Deposition Rate	1 micron/minute at 5 A/dm ² . (50 ASF)	

EQUIPMENT

Tanks (Small Volumes)	Moulded polythene or polypropylene. Welded PVC or polypropylene.
Tanks (Large Volumes)	Steel or GRP lined with PVC, polypropylene or hard rubber.
Heating	PTFE or titanium clad electric immersion heaters.
Filtration	Continuous filtration recommended.
Extraction	Recommended.

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INSTALLATION

It is essential that the tanks to be used for Nickel 3000 are thoroughly cleaned and leached before any product is introduced.

If in any doubt as to the cleaning procedure please contact PMD (UK) Limited Technical Department.

1. Add Nickel base solution to tank.
2. Add Nickel 3000 Carrier, Brightener and relevant wetter as required.
3. Heat to operating temperature.
4. Electrolyse for 4 hours at 1-2 ASD (10-20 ASF)

MAINTENANCE AND CONTROL

The solution should be analysed regularly and replenished as necessary.

The Nickel 3000 Carrier and Brightener should be added on an ampere hour basis:-

Nickel 3000 Carrier	75 - 125 ml/1000 amp. hours
Nickel 3000 Brightener	75 - 125 ml/1000 amp. hours

pH should be kept within the range 4.2 - 4.5 with additions of sulphuric acid (10% v/v) to lower or sodium hydroxide (100 g/l) to increase. During use the pH will increase slowly.

Notes

Current Density	for barrel plating 0.1 - 1.0 A/dm ² is recommended, and for rack plating 2.0 - 5.0 A/dm ² . For the high current densities in rack plating vigorous air agitation is essential.
3000 Carrier	deficiency of carrier will be shown by dullness in high current density areas.
3000 Brightener	hazy deposits in the medium current densities are caused by lack of brightener. The 3000 Brightener should be added in 0.1 ml/l increments to improve the deposit.
Wetting Agents	For air agitated baths Nickel 3000 Wetter (air) is recommended to be added at 1ml/L. For mechanically agitated baths Nickel 3000 Wetter (mechanical) is recommended to be added at 1ml/L.

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ANALYSIS METHODS

1. Chloride

Reagents

0.1N silver nitrate (standard volumetric solution)
Sodium hydrogen carbonate
20% w/v potassium chromate solution

ANALYSIS METHODS CONT

Method

1. Cool a sample of the solution to room temp.
2. Pipette a 5.0ml aliquot into a 250ml conical flask.
3. Add 100ml DI water.
4. Add 2gm sodium hydrogen carbonate and stir until dissolved.
5. Add 2-3 drops 20% potassium chromate solution.
6. Titrate with 0.1N silver nitrate to an orange end point.
7. Record titre = t mls.

Calculation

$t \times 2.378 = \text{g/L nickel chloride}$

Replenishment

For every 1g/L required add 1g/L nickel chloride.

2. Nickel

This analysis method should be carried out after any additions of nickel chloride have been made.

Reagents

0.2N EDTA (Standard volumetric solution)
Ammonia solution
Murexide indicator

Method

1. Cool a sample of the solution to room temperature.
2. Pipette a 2.0ml aliquot into a 250ml conical flask.
3. Add 100ml DI water.
4. Add 10ml ammonia solution.
5. Add a pinch of murexide indicator.
6. Titrate to a purple end point with 0.2N EDTA.
7. Record titre = t mls.

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ANALYSIS METHODS CONT

Calculation

$t \times 2.935 = \text{g/L Nickel}$

Replenishment

For every 1g/L nickel required add 4.48g/L of nickel sulphate 6H₂O.

3. Boric acid

Reagents

0.1N sodium hydroxide (standard volumetric solution)

Buffer solution (Dissolve 60g/L sodium citrate in 100ml DI water. Add 600ml glycerol. Dissolve 2gm phenolphthalein in 10ml methanol and add to the mix. Make up to 1 litre with DI water).

Method

1. Cool a sample of the solution to room temperature.
2. Pipette a 1.0ml aliquot into a 250ml conical flask.
3. Add 25ml of buffer solution.
4. Titrate slowly with 0.1N sodium hydroxide to the first permanent pink end point.
5. Record titre = t mls.

Calculation

$t \times 6.184 = \text{g/L boric acid}$

Replenishment

For every 1g/L low add 1g/L boric acid

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:-

Product Name

Product Number

Nickel Base Solution (Barrel)	547006
Nickel Base Solution (Rack)	547007
Nickel 3000 Carrier (25L)	544012
Nickel 3000 Carrier (5L)	544030
Nickel 3000 Brightener (5Kg)	544013
Nickel 3000 Brightener (30Kg)	544018
Nickel 3000 Wetter (Air) (5Kg)	544017
Nickel 3000 Wetter (Air) (30Kg)	544031
Nickel 3000 Wetter (Mechanical) (30Kg)	544020
Nickel 3000 Wetter (Mechanical) (5Kg)	544021

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