

NI-STAR RHS

ELECTROLESS NICKEL

INTRODUCTION

Ni-Star RHS is a medium phosphorus electroless nickel process that yields a bright alloy at a consistently high rate of deposition while maintaining excellent solution stability. This process does not contain lead or cadmium and meets the requirements of the *End-of-Vehicle Life Directive*.

BENEFITS

- Lead and Cadmium free
- Long solution life
- Fast plating speed
- Consistent deposit brightness
- High tolerance to contaminants
- Tolerant to wide operating conditions
- Reduced staining tendency

SOLUTION MAKE -UP

Ni-Star RHS Part 1	60ml/L
Ni-Star RHS Part 2	150ml/L

It is essential that the tanks to be used for NI-STAR RHS Electroless Nickel are thoroughly cleaned and leached before any chemistry is introduced.

Contact PMD Technical Department for appropriate procedure.

1. Half fill the clean empty tank with DI water.
2. Add the required volume of NI-STAR RHS Part 1.
3. Add the required volume of NI-STAR RHS Part 2
4. Make up to the operating volume with DI water.
5. Mix thoroughly.
6. Heat solution to operating temperature.

OPERATING DATA

Nickel (g/L)	4.8 – 6.3 Optimum 6.0
Hypophosphite (g/L)	30 – 38 Optimum 35
pH	4.6 – 5.2 Optimum 4.9
Temperature (°C)	82 – 94 Optimum 88
Plating rate (µm/Hr)	16 - 27
Bath loading (dm ² /L)	0.1 – 1.0
Extraction	Essential
Agitation	Solution movement

EQUIPMENT

Tanks	316L stainless steel with anodic protection, polypropylene.
Heaters	Stainless steel, PTFE. Thermostatic control should maintain the temperature to +/-1°C
Filtration	Continuous through 10µm filter

MAINTENANCE AND CONTROL

The solution should be analysed regularly and maintained at the optimum concentrations detailed under OPERATING DATA.

The bath should be maintained between 85% and 105% of initial activity. This is accomplished by measuring and monitoring the nickel metal concentration via a standard EDTA titration.

Upon determination of the nickel metal concentration, additions of both Ni-Star RHS Parts 1 and 3 are made in a 1:1 ratio based on the following replenishment guide.

% Activity	Nickel Concentration g/L	NI-STAR RHS PART 1	NI-STAR RHS PART 3
100	6.0	0	0
95	5.7	3ml/L	3ml/L
90	5.3	7ml/L	7ml/L
85	5.1	9ml/L	9ml/L
80	4.8	12ml/L	12ml/L
75	4.5	12ml/L	12ml/L

It is not recommended to make an add greater than 20% at any one time. If the solution is severely depleted make several small adds while plating and slowly increase solution activity to operating range. Large additions (>20%) at one time may lead to an over stabilised condition. This may result in skip plating, and/or complete cessation of plating.



pH should be maintained at 4.9, and the replenishment chemistry is formulated to provide consistent pH. However, the occasional adjustment with a 50% solution of ammonia may be necessary.

ANALYSIS METHODS

1. Nickel Concentration

Reagents

0.1M EDTA (standard volumetric solution).
50% ammonia solution.
Murexide indicator.

Method

1. Take a cooled sample of solution and pipette 5.0 ml into a 250 ml conical flask.
2. Add 10 ml of DI water.
3. Add 7 ml of 50% ammonia solution.
4. Add a small quantity (tip of spatula) of Murexide indicator. The solution will turn yellow.
5. Titrate to a purple end point with 0.1M EDTA solution.
6. Record titre = t ml.

Calculation

$t \times 1.174 = \text{g/L nickel.}$

Replenishment

For every 1g/L nickel required add 10ml/L Ni-star RHS Part 1.

2. Hypophosphite Concentration

Reagents

0.1N iodine (standard volumetric solution).
Concentrated hydrochloric acid.
0.1N sodium thiosulphate (standard volumetric solution).
Iodine indicator.

Method

1. Take a cooled sample of solution and pipette 5.0 ml into an iodine flask.
2. Add with shaking, 12 ml of hydrochloric acid.
3. Cool the sample.
4. Add 50.0 ml of standardised 0.1N iodine solution and stopper the flask.
5. Leave in a cool dark place for 30 minutes.
6. Titrate with 0.1 N sodium thiosulphate to a pale straw colour



7. Add a few drops of iodine indicator and continue titration to a clear end point.
8. Record titre = t mls.

Calculation

$(50 - t) \times 1.06 = \text{g/L sodium hypophosphite.}$

Replenishment

For every 1g/L required add 2.2ml/L Ni-star RHS Part 3.

EQUIPMENT MAINTENANCE

Good housekeeping in electroless nickel plating is essential. All electroless nickel processes are sensitive to contamination such as metals, sulphur compounds and particulate matter such as dust. Great care should be taken to avoid contamination.

It is good practice to pump the solution out through the filter each day and wash the tank out. Once a week (or more often if required) carry out the full stripping procedure as described below.

When not in use the solution should be covered to reduce evaporation losses and contamination.

STRIPPING PROCEDURE

When preparing brand new equipment fill the tank with fresh 50% v/v nitric acid and pump round the system for a minimum of 8 hours. This passivates stainless steel and leaches out soluble organics from plastic equipment. This should be followed by a thorough washing as indicated below.

Used tanks should be stripped regularly as follows;

1. Transfer the solution to spare tank.
2. Remove and clean filter bags.
3. Rinse and pump water round the equipment.
4. Fill the tank with 50% nitric acid.
5. Circulate the acid to ensure that all surfaces are contacted.
6. Leave overnight to strip nickel deposits which may have built up.
7. Pump acid to storage or effluent.
8. Wash out tank and circulate water round system thoroughly.
9. Drain tank.
10. Fill tank with deionised water and circulate.
11. Drain tank.

12. Fit new filter.
13. Return nickel solution to tank, make up to volume with deionised water and analyse.

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
NI-STAR RHS PART 1	557051
NI-STAR RHS PART 2	557060
NI-STAR RHS PART 3	555040

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