

# ACCU-LABS INC.

4831 S. Whipple Avenue  
Chicago IL 60632  
Phone: 773.523.3100 Fax: 773.523.4008  
[www.accu-labs.com](http://www.accu-labs.com)

**A2LA Accredited ISO/IEC 17025:2005 Certificate # 2558.01**

## 397 High-Phosphorus Electroless Nickel Plating System

The 397 System is specifically formulated to produce a semi-bright to bright nickel-phosphorus deposits at a consistent rate of deposition. The 397 System is recommended for applications requiring minimum deposit porosity for severe corrosive environments. The 397 system is designed to be replenished at a 2:1 ratio with Liquid Nickel Sulfate (LNS) for economy of operation.

The 397 System offers the following characteristics:

- Exceptional Stability
- High Corrosion Resistance
- Consistent Rate of Deposition
- Good Ductility, Compressively Stressed
- Low Operating Cost

### DEPOSIT PROPERTIES:

Phosphorus Content	10%-13% Typical Weight Percentage
Melting Point	1620°F
Density	7.85 Grams per Cubic Centimeter
Hardness	480-540 HK <sub>100</sub>
Magnetic Properties	Non-Magnetic
Nitric Acid Test	Passes
Hydrochloric Acid Test	Passes
Neutral Salt Spray	Up to 1000 hours *(see optimization note)

### BATH OPERATING DATA:

#### Solution Make-up Materials Required:

- Liquid Nickel Sulfate (Electroless Nickel Grade) 4.5% by volume
- 397-M (Make-up Component) 15% by volume
- DI water to operating volume
- 50% Ammonium Hydroxide Solution to raise pH to recommended range for steel substrates
- Potassium Carbonate Solution to raise pH to recommended range for aluminum substrates

# Accu-LABS INC.

4831 S. Whipple Avenue  
Chicago IL 60632  
Phone: 773.523.3100 Fax: 773.523.4008  
[www.accu-labs.com](http://www.accu-labs.com)

## A2LA Accredited ISO/IEC 17025:2005 Certificate # 2558.01

### Accu-Labs 397 Make-up Procedure:

- Add DI water to properly cleaned and passivated tank (fill to half volume)
- Add required amount of 397-M
- Add required amount of Liquid Nickel Sulfate
- Fill tank to ~99% of working volume DI water
- Mix thoroughly with solution filtration and slight to moderate air agitation
- Heat to 190°F & analyze nickel content and adjust to 6.0 g/l
- Check pH and adjust to 4.90 \*(see optimum corrosion protection guidelines below)

### Recommended Operating Parameters:

Component	Range	Optimum	* Optimum Corrosion Protection
Nickel Metal	5.10-6.30 g/l	6.0 g/l	6.0 g/l Monitor & check every two hours minimum
Sodium Hypophosphite	27.0-36.0 g/l (submit periodic samples to Accu-Labs)	30.0 g/l	30-33.0 g/l (submit periodic samples to Accu-Labs)
pH (use properly calibrated meter)	4.50-5.10	4.90	<b>4.3 – 4.7 Monitor &amp; maintain consistently</b>
Temperature	185-195° F	190° F	190°F (adjust upward as bath ages if necessary)
Bath Loading Sq Ft/Gal	0.10-1.0	0.50	0.40-0.80

**Note:** pH can be adjusted upward with a 50% solution of ammonium hydroxide. Potassium carbonate is preferable when plating on aluminum. If pH needs to be adjusted downward a solution of 10% sulfuric acid can be used. **pH may require upward adjustment as bath ages; your application may vary.**

### Typical Bath Performance:

- Plating Rate-Typically 0.40 mils/hour with parameters at optimum for corrosion resistance

**Bath Maintenance:** To ensure proper operation of the 397 system, the solution chemistry should be maintained using the aforementioned operating parameters. This is accomplished by measuring and monitoring the nickel metal concentration. Upon determination of the nickel metal concentration, additions of both Liquid Nickel Sulfate and 397-R are made based on the following replenishment guide for a 100 gallon bath:

Nickel %	Nickel Concentration	Additions LNS	Additions 397-R
100	6.0 grams per liter	None	None
95	5.7 grams per liter	835 mls	1670 mls
90	5.4 grams per liter	1670 mls	3340 mls
85	5.1 grams per liter	2.5 liters	5.0 liters
80	4.8 grams per liter	3.3 liters	6.6 liters
75	4.5 grams per liter	4.1 liters	8.2 liters

# Accu-LABS INC.

4831 S. Whipple Avenue  
Chicago IL 60632  
Phone: 773.523.3100 Fax: 773.523.4008

[www.accu-labs.com](http://www.accu-labs.com)

**A2LA Accredited ISO/IEC 17025:2005 Certificate # 2558.01**

## **NICKEL METAL DETERMINATION:**

### **Reagents:**

- 0.0575M EDTA
- 50% Ammonium Hydroxide
- Murexide Indicator

### **Procedure:**

- Add 5 ml of cooled bath sample to 50 ml DI water
- Add 5 ml ammonium hydroxide solution
- Add 0.2 grams murexide indicator
- Titrate with EDTA from pale yellow to purple (violet) end point
- Record number of mls of EDTA titrated

### **Calculation:**

- Mls of 0.0575 x 0.339 = grams/liter nickel (17.7 mls of titrated EDTA = 6.0 g/l nickel metal)
- Mls of 0.0575 x 5.654 = % nickel metal in solution (17.7 mls of titrated EDTA = 100%)

## **Handling Considerations:**

When handling Accu-Labs 397 components proper precautions should be observed. Do not take internally and avoid contact to skin and eyes. Wear clean chemical resistant gear, goggles, gloves, apron, footwear, and face shield. Refer to MSDS prior to using.

**Notice of Disclaimer:** The recommendations contained within this technical data are made in good faith and are based on our technical background and experience. However, since the conditions of use are beyond our control, this knowledge is given on the express terms and agreement that Accu-Labs, Inc. will not be held liable to any person in contract, tort (including negligence), strict liability, or otherwise any claims, damages, or losses whatsoever. Nothing herein shall be deemed a testimonial to use any product or process in infringement of any existing patent rights and no guarantees, expressed or implied, are made regarding information, product, processes, recommendations, description and safety notations contained herein.