ACCU-LABS INC.

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A2LA Accredited ISO/IEC 17025:2005 Certificate # 2558.01

390 Lead-Free & Cadmium-Free Bright Mid-Phosphorus Electroless Nickel Plating System

The 390 System is specifically formulated to produce a lead-free and cadmium free bright nickel-phosphorus deposit at a consistent high rate of deposition. The 390 System meets Mil-26074B, AMS 2404B and AMS 2405 specifications.

The 390 System offers the following characteristics:

- Lead and Cadmium free deposits
- Excellent Stability
- Consistent Rate of Deposition
- Consistent Pit-Free Smooth Bright Deposits
- 1:1 Replenishment
- High Tolerance to Impurities
- RoHS, WEEE, & ELV Compliant

TYPICAL DEPOSIT PROPERTIES:

Phosphorus Content	5-8%
Melting Range	1620-1760° F
Density	8.1 grams per cubic centimeter
Hardness	52-56R as plated (66-68R @ 400°C)
Magnetic Properties	Slightly Magnetic
RCA Nitric Acid Test	Fails
Hydrochloric Acid Test	Passes (50% HCl, 3 min. R.T.)
Neutral Salt Spray	100 hours at 1 mil (ASTM B-117)
Electrical Resistance	35-80 micro-ohm/cm

BATH OPERATING DATA:

Solution Make-up Materials Required:

- 390-N (Nickel Component) 7% by volume
- 390-M (Makeup Component) 15% by volume
- DI water to operating volume balance
- 50% Ammonium Hydroxide for pH control

Accu-Labs 390 Make-up Procedure:

- Add DI water to properly cleaned and passivated tank (fill to half volume)
- Add required amount of 390-M
- Add required amount of 390-N
- Fill tank to working volume with DI water
- Mix thoroughly with solution and slight air agitation
- Heat to 190° F
- Analyze nickel content and adjust to 6.0 g/l
- Check pH and adjust to 4.70-5.10

Recommended Operating Parameters:

Component	Range	Optimum
Nickel Metal	5.10-6.30 g/l	6.0 g/l
Hypophosphite	27.0-33.0	30.0 g/l
pH	4.70-5.10	4.90
Temperature	185-205° F	190° F
Bath Loading Sq Ft/Gal	0.10-1.0	0.50

Note: pH can be adjusted upward with a 50% solution of ammonium hydroxide; if pH needs to be adjusted downward a solution of 10% sulfuric acid can be used. All additions should be made slowly, with agitation and preferably away from the work in the tank.

Typical Bath Performance:

- Plating Rate-Typically 0.8-0.9 mils/hour with all parameters at optimum (new bath)
- Solution Life (Metal Turnovers)
    - Steel 6-10
    - Aluminum 4-6
        - Individual applications and practices will affect bath life; contact your Accu-Labs Representative for options to increase bath life.

Bath Maintenance:

To ensure proper operation of the 390 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 390-N and 390-R are made based on the following replenishment guide for a 100-gallon bath:

Nickel %	Nickel Concentration	Additions 390-N	Additions 390-R
100	6.0 grams per liter	None	None
95	5.7 grams per liter	1.3 liters	1.3 liters
90	5.4 grams per liter	2.6 liters	2.6 liters
85	5.1 grams per liter	3.9 liters	3.9 liters
80	4.8 grams per liter	5.2 liters	5.2 liters
75	4.5 grams per liter	6.5 liters	6.5 liters

NICKEL METAL DETERMINATION:

Reagents:

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

Procedure:

- Add 10 ml bath sample to 100 ml DI water
- Add 10 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 EDTA x 0.339 = grams/liter nickel or
- Mls of 0.0575 EDTA x 5.65 = % nickel in bath

Handling Considerations:

When handling Accu-Labs 390 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. Read MSDS prior to use.

Notice of Disclaimer: