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A2LA Accredited ISO/IEC 17025:2005 Certificate # 2558.01

381 High Speed Bright Low-Phosphorus Electroless Nickel Plating System

The 381 System is specifically formulated to produce an extremely bright nickel-phosphorus deposit at a consistent high rate of deposition. The 381 System is recommended for applications requiring a highly decorative finish and excellent wear resistance.

The 381 System offers the following characteristics:

- Exceptional Stability
- High Rate of Deposition
- Consistent Deposit Brightness
- High Tolerance to Contaminants
- Low Operating Cost

DEPOSIT PROPERTIES:

Phosphorus Content	4%-6% Typical Weight Percentage
Melting Point	1830°F
Density	8.5 Grams per Cubic Centimeter
Hardness	1050-1100 HK100
Magnetic Properties	Magnetic
Nitric Acid Test	Fails
Hydrochloric Acid Test	Passes
Neutral Salt Spray	100 hours to first corrosion

BATH OPERATING DATA:

Solution Make-up Materials Required:

- 381-N (Nickel Component) 7% by volume
- 381-M (Make-up Component) 15% by volume
- DI water to operating volume
- 50% Ammonium Hydroxide Solution to bring pH to recommended range

Accu-Labs 381 Make-up Procedure:

- Add DI water to properly cleaned and passivated tank (fill to half volume)
- Add required amount of 381-M
- Add required amount of 381-N
- Fill tank to ~99% of working volume 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
Sodium Hypophosphite	25.0-30.0	27.5 g/l
pH	4.70-5.10	4.90
Temperature	180-200° F	190° F
Bath Loading Sq Ft/Gal	0.10-1.00	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.

Typical Bath Performance:

- Plating Rate-Typically 1.0 mils/hour with all parameters at optimum (new bath)
- Solution Life (Metal Turnovers)
 - Steel 8-10
 - Aluminum
 - Ammonium Hydroxide pH adjust 5-7
 - Potassium Carbonate pH adjust 7-9
 - With Alkaline Strike prior to plate 8-10

Bath Maintenance:

To ensure proper operation of the 381 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 381-N and 381-R are made based on the following replenishment guide (per 100 gal of bath):

Nickel %	Nickel Concentration	Additions 381-N	Additions 381-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 (split additions)	5.2 liters (split additions)
75	4.5 grams per liter	6.5 liters (split additions)	6.5 liters (split additions)

NICKEL METAL DETERMINATION:

Reagents:

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

Procedure:

- Add 10 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 EDTA x 0.339 = grams/liter nickel or
- Mls of 0.0575 EDTA x 5.650 = bath % nickel

Handling Considerations:

When handling Accu-Labs 381 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.

Notice of Disclaimer:

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