

Accu-LABS INC.

4831 S. Whipple Avenue
Chicago IL 60632
Phone: 773.523.3100 Fax: 773.523.4008
www.accu-labs.com

A2LA Accredited ISO/IEC 17025:2005 Certificate # 2558.01

388

ALKALINE ELCTROLESS NICKEL PROCESS

The **Accu-Labs 388** electroless nickel system is specifically formulated to deposit a thin, uniform nickel/phosphorus coating onto zincated aluminum substrates and zinc die cast prior to plating in a conventional acid electroless nickel bath.

The use of **Accu-Labs 388** on aluminum allows the EN plater to utilize the full life of an acid electroless nickel bath without the worry of blistering or poor adhesion as the bath ages.

The **Accu-Labs 388** system has a high tolerance for zinc metal and deposits such thin coatings that it has a very long operating life. At elevated temperatures, the **Accu-Labs 388** system can be used to plate directly onto zinc die cast. Contact Accu-Labs for more information on this process. Users of this process find it adds only pennies to their total operating cost with many benefits:

- Plates at room temperature directly onto zincated aluminum substrates.
- Maximum stability
- High tolerance to contaminants
- Long bath life
- Easy to operate and maintain
- Eliminates blistering of acid EN deposits in older baths.
- Plates directly onto zinc die cast
- Economical

BATH COMPONENT PROPERTIES & OPERATING GUIDELINES

Solution Make-up

Accu-Labs 388-M	40% by volume
Accu-Labs 388-N	5% by volume
Deionized water	To operating volume

- 1.) Add deionized water to properly cleaned and passivated EN tank (fill to ½ capacity).
- 2.) Add required amount of **388-M** and **388-N**.
- 3.) Fill to working volume with deionized water.
- 4.) Mix thoroughly with solution and/or air agitation.
- 5.) Analyze nickel content and adjust to 6.0 g/l if necessary.
- 6.) Check pH and adjust* to 10.0 if necessary.

Operating Parameters

<u>Bath Parameter</u>	<u>Range</u>	<u>Optimum</u>
Nickel Metal	4.8-6.3 g/l	6.0 g/l
Hypophosphite	24.0-32.0 g/l	30.0 g/l
pH	9.50-10.50	10.00
Temperature	70-110°F	85°F
Bath Loading (sq. ft. /gal)	0.20-1.00	0.40
Immersion	3-15 minutes**	

*Increase pH with 50% ammonium hydroxide. Lower pH with solution of 1#/gal sulfamic acid.

**May vary depending on bath temperature, age, pH and type of aluminum processed.

MAINTENANCE AND REPLENISHMENT

To ensure proper operation of this EN system, the solution chemistry must be maintained between 80% and 100% of its initial activity. This is accomplished by measuring and monitoring the nickel metal concentration via a standard EDTA titration.

Upon determination of the nickel concentration, additions of both **388-N** and **388-R** are made based on the following replenishment guide.

100 GALLON TANK

% Activity	Ni (g/l)	388-N	388-R
100	6.0	0	0
95	5.7	950 mls	1900 mls
90	5.4	1.9 liters	3.8 liters
85	5.1	2.8 liters	5.6 liters
80	4.8	4.7 liters	9.4 liters
75	4.5	5.6 liters	11.2 liters

% Activity is determined by EDTA titration and is calculated as follows:

$$\begin{aligned} \text{mls } 0.1\text{M EDTA} \times .0975 &= \% \text{ Activity} \\ \text{mls } .0575\text{M EDTA} \times .0561 &= \% \text{ Activity} \end{aligned}$$

Bath Temperature

The recommended operating temperature is 85°F with a range of 70-110°F. Lower temperatures will yield slower rates and may lead to poor adhesion due to slow initiation and/or coverage. Special stabilizers in this bath allow its use at elevated temperatures for special applications (i.e. plating directly onto zinc die cast), however copious amounts of ammonia may be given off.

Bath pH

The **Accu-Labs 388** process is self pH regulating but may occasionally require adjustment. A 50% solution of ammonium hydroxide is used to raise the pH whereas a 1#/gal sulfamic acid solution is used to lower the pH. It is critical that pH is maintained above 9.0 with ammonium hydroxide. Solution stability is reduced dramatically if pH is allowed to drift below this point. This will result in equipment plate out and possible solution decomposition.

ANALYTICAL CONTROL

Sodium Hypophosphite Concentration:

Equipment

5 ml pipette
250 Erlenmeyer flask
50 ml graduated cylinder
50 ml pipette
50 ml burette

Reagents

0.1N Iodine solution
0.1N Sodium Thiosulfate solution
6N Hydrochloric Acid

Procedure

- 1.) Pipette 5.0 ml of cooled bath into a 250 ml Erlenmeyer flask.
- 2.) Add 30 mls of 6N hydrochloric acid.
- 3.) Pipette 50 mls of 0.1 N iodine into the flask.
- 4.) Shake flask well, rinse down sides with DI water, stopper and let stand in the dark for 60 minutes.
- 5.) Titrate with 0.1N sodium thiosulfate to a clear endpoint.

Calculation

$$\begin{aligned}\text{oz/gal hypophosphite} &= (50 - \text{mls } 0.1\text{N thiosulfate}) \times 0.141 \\ \text{gm/l hypophosphite} &= (50 - \text{mls } 0.1\text{N thiosulfate}) \times 1.06\end{aligned}$$

Nickel Metal Content:

Equipment

10 ml pipette
250 ml Erlenmeyer flask
50 ml burette

Reagents

0.1 or .0575 M EDTA Solution
AR grade ammonium hydroxide
1% murexide indicator

Procedure

- 1.) Pipette 10 mls of cooled bath sample into a 250 ml Erlenmeyer flask.
- 2.) Add 50 mls of deionized water.
- 3.) Add 10 mls of ammonium hydroxide (will form a blue amine complex).
- 4.) Add murexide indicator to form a straw color.
- 5.) Titrate with standard EDTA solution to a purple endpoint.

Calculation

$$\text{Grams/liter of Ni Metal} = \frac{(\text{mls } 0.1 \text{ M EDTA} \times 0.589)}{(\text{mls } 0.0575 \text{ M EDTA} \times 0.339)}$$

HANDLING: Always wear eye protection and personal protective gear when working with or handling this material. Read MSDS prior to use.

DISCLAIMER: *The data contained herein is based on information that Accu-Labs, Inc. believes to be reliable, but no expressed or implied warranty is made since conditions and use are beyond our control. Accu-Labs, Inc. and its agents disclaim all liability for any action taken or foregone on reliance upon such data.*