ZINC ALLOY PLATING PROCESSES

NOVALYTE HNZN

A new chloride based zinc-nickel plating system gives 10-18% nickel in the deposit. The deposit is bright with high ductility and meets the new automotive standards for high nickel content. The process uses a mixed salt bath comprising of sodium or potassium chloride and ammonium chloride. Its salt concentration is low so the plating solution remains clear at ambient temperatures. The process is economical and simple to maintain and can be applied in both barrel and rack applications. Click Here for more info

NOVALYTE HNZN
High Nickel Zinc-Nickel Alloy Plating Process

INTRODUCTION:

Novalyte HNZN is a chloride based, high nickel zinc-nickel alloy plating process, to give 10 - 17% nickel in the deposit. The deposit from Novalyte HNZN meets the new automotive specifications requiring a high nickel alloy deposit to plate fasteners.

The process is economical, simple and easy to run for both rack and barrel operation.

PROCESS FEATURES:

- Novalyte HNZN is a chloride based Zinc-Nickel Alloy plating process to give 10ñ17% which can use sodium or potassium chloride salts. However, the use of sodium chloride is preferred due to the economic factor.
- Unlike some ammonia free zinc-nickel plating systems, Novalyte HNZN process uses a weak nickel complexor at low concentrations to avoid problems in the waste treatment.
- The plating solution stays clear at ambient temperature, therefore no need to keep it hot during shut downs.
- Fewer expenses on filtration, since the solution stays clear at a wide temperature range.
- Does not require frequent sludge cleaning from the plating tank, and therefore less maintenance is required.
- Additives have high cloud points and are very stable. The main source of their depletion is through drag-in and drag-out.
- Unlike some other commercially available acid zinc-nickel plating systems, Novalyte HNZN uses lesser number of additives making the process simple and economical.
- No apparent sedimentation at the tank bottom.
- The process can be used in both, mixed salt or single salt electrolytes

OPERATING PARAMETERS:

Solution Composition:

Mixed Salt Bath:

Constituent	**Conc. (Range)**	**Optimum**
Zinc, metal	3.0 - 4.0 oz./gal.	3.5 oz./gal. (26.25 gms/lit)
Nickel, metal	3.0 - 4.0 oz./gal.	3.5 oz./gal. (26.25 gms/lit)
Sodium Chloride	20 - 24 oz./gal.	22 oz./gal. (165 gms/lit)
Ammonium Chloride	6 - 10 oz./gal.	8 oz./gal. (60.0 gms/lit)
Novalyte HNZN-Car	2.5 – 3.5%	2.5%
Novalyte HNZN-BR	0.2 - 0.3%	0.25%
Novalyte HNZN-Complexor	0.5 - 1.0%	0.75%
Novalyte HNZN-Make up Add.	0.5 - 1.0 (w/v) %	0.75 (w/v)%

Single Salt Bath:

Constituent	Conc. (Range)	Optimum
Zinc, metal	3.0 - 4.0 oz./gal.	3.5 oz./gal. (26.25 gms/lit)
Nickel, metal	3.0 - 4.0 oz./gal.	3.5 oz./gal. (26.25 gms/lit)
Potassium Chloride	20 - 30 oz./gal.	25 oz./gal. (187.5 gms/lit)
Novalyte HNZN-Carrier	8-10 oz./gal.	9 oz./gal. (67.5 gms/lit)
Novalyte HNZN-Replenisher	2 - 3%	2.5%
Novalyte HNZN-Complexor	0.3 - 0.4%	0.25%
Novalyte HNZN-Make up Add.	1 - 2%	1.5%

OPERATION CONDITIONS:

Zinc/Nickel Ratio	0.8 - 1.2	1.0
PH	5 - 5.5	5.3
Temperature	80 - 110F	95 - 100℉
Cathode Current Density	5 - 30 ASF	
Anode Current Density	10 - 40 ASF	
Anodes*	Zinc and Nickel	

*(Zinc and Nickel anodes can be made by using zinc balls and nickel chips in titanium baskets and hanged either on the same bus bar or separate bus bars. Non-sulfurized nickel chips should be used as nickel anodes. Initially use Ni:Zn anode ratio at 2:1 and adjust later based on the changes in bath chemistry.)

** Condition the new electrolyte by plating scrap parts prior to the regular plating.

THE PROCESS ADDITIVES:

Novalyte HNZN-Car:

Novalyte HNZN-Car maintains the leveling grain refinement and smoothness of the deposit. It also helps extending the high current density range. Replenish Novalyte HNZN-Car @ I gal/ 12,000 Amp-hr.

Novalyte HNZN-Complexor:

Novalyte HNZN-Complexor keeps the metal ions in solution form and control the deposition of throw relatively evenly at all current densities. If a Hull Cell panel shows some grayness at low current area, that is an indication of low Novalyte HNZN-Complexor when rest of the solution chemistry is in the range. Addition of Novalyte HNZN-Complexor also improves the clarity of the electrolyte solution. The addition rate of Novalyte HNZN-Complexor shall depend on a number of factors, including the extent of drag-in and drag-out, temperature of the bath, concentration of metal ions and quality of the water. However, the usage is generally equivalent to Novalyte HNZN-Car.

Novalyte HNZN-BR

Novalyte HNZN-BR is the primary brightener and needs to be replenished @ 1 gal/ 16,000 Amp-hr. Higher quantities of Novalyte HNZN-BR may induce some brittleness and therefore should be avoided. A hazy looking Hull Cell panel is the indication of low Novalyte HNZN-BR.

Novalyte HNZN-BFS

Novalyte HNZN-BFS is a buffering salt that maintains the pH in the range of 5.0 ñ 5.5. This additive is mainly used for potassium chloride based zinc-nickel plating baths. Besides maintaining pH the Novalyte HNZN-BFS also helps improving the high and low current plating ranges. Initially Novalyte HNZN-BFS is added at 9 oz/gal, and later replenished based on drag-in and drag-out ratios along with some consumption due to the anode oxidation of some of the components. Novalyte HNZN-BFS is available in powder form but can also be provided in a concentrated solution form to be replenished by automatic feeder pumps. As a rule of thumb, for every one gallon consumption of Novalyte HNZN-Car, 2 oz. of Novalyte HNZN-BFS should be added. However, this amount may be adjusted based on the plating experience.

SOLUTION MAINTENANCE:

Solution Analysis:

A routine analysis for the following components should be done at least once per 8-hour shift;

- Zinc
- Nickel
- Total Chloride
- Hull cell test for additives

(Analytical procedures for the above can be requested from the Aldoa Company labs)

pH:

pH of the bath is adjusted with, either 50% Hydrochloric Acid or Aqua Ammonia Solution. A lower pH will result in high nickel content and a higher pH may decrease throw at low current areas and also result in cloudy deposits.

Temperature:

For an optimum concentration of nickel in the alloy deposit (12 ñ 16%), plating in the optimum range of temperature is important. At higher temperature, nickel content in the deposit increases whereas the lower temperature gives lower nickel in the deposit.

Agitation:

A mild agitation is needed to give a uniform and balanced deposit over the entire surface of a part. Absence of proper agitation may result in a rough and burnt deposit at high current areas and poor throw in the low current density regions. Agitation may be achieved by barrel rotation, solution circulation and rack movements.

Filtration:

Continuous filtration is needed to avoid any roughness of plated deposit. Also any dissolved iron, which gets precipitated at the working pH range, should be continuously filtered to avoid roughness in the deposit.

Equipment:

- Tanks - Tanks to contain the plating solution may be constructed of mild steel lined with PVS, Koroseal or Polyethylene. Polypropylene tanks are also suitable for this application.
- Anode Baskets - The baskets to contain the zinc balls or nickel rounds should be constructed of commercially pure titanium. Baskets and anode bar contact points should be kept clean to maintain proper current flow. (Important: Keep voltage lower than 9V to avoid decomposition of Titanium baskets)
- Miscellaneous - Cooling, heating and filtration equipment and piping should be resistant to chloride solution.

NON-WARRANTY:

Due to numerous factors affecting results, all Aldoa products are offered to purchasers with no guarantee, expressed or implied, as to the results obtained or the effects derived from such use. Aldoa guarantees only as to formulated quality upon shipment from our plant.

NOVALYTE COZ

A two-part system, which allows simple control of both the alloy composition and brightener, levels in an alkaline zinc-cobalt alloy bath. The deposit is bright over a wide current density range. The deposit readily accepts black and other conventional chromate coating for additional corrosion protection.

NOVALYTE 421-ZDL-FE

Is a two-part system zinc-iron alloy process, which features easy maintenance. The alloy deposit is bright over a wide current density range. The deposit responds to clear, iridescent, and black chromate conversion coatings. Standard salt spray tests have shown that the iridescent and silver-free black chromates offer more than 300 hours resistance before the appearance of white products of corrosion. The deposit itself will afford an additional 400-700 hours of protection against red rust.

NOVALYTE ZCO

A mildly acidic (pH 5.0 – 6.0) two-part zinc-cobalt system which utilizes a chloride based electrolyte. The deposit is bright, ductile, and highly leveled and contains 0.5 – 0.8% cobalt. The deposit readily accepts chromate conversion coatings for additional corrosion protection.

NOVALYTE ZNA

A two-part system which provides a zinc-nickel deposit (10 –14% nickel) from a virtually neutral electrolyte in either barrel or rack applications. The deposit is bright and ductile over a current density range of 1 – 95 ASF. In combination with the appropriate Aldoa chromate, the deposit can protect steel surfaces against red rust for more than 2000 hours in standard salt spray testing.

NOVALYTE AZN

Novalyte AZN is an alkaline non-cyanide zinc-nickel alloy plating process, which gives 10 – 14% Nickel in the alloy deposit. The deposit has a superior corrosion protection compared with the alloy deposits with only 4 – 7% nickel.

Novalyte AZN process is simple to maintain because it has only two additives in addition to the nickel complex. The deposit out of the bath is bright, which can easily accept different types of post-treatments.