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ALKALINE ZINC NICKEL ALLOY

INTRODUCTION:

ACCU-LABS 955 is an alkaline non-cyanide Zinc-Nickel plating process. When properly post-treated the Zinc-Nickel alloy deposit provides more than 1000 hours of corrosion protection (to Red rust) in a neutral salt-spray fog test.

The **ACCU-LABS 955** process will produce a bright ductile deposit containing 10-14% of Nickel. The deposit readily accepts the Chromate Conversion Coating.

SOLUTION COMPOSITION:

CONSTITUENTS	OPTIMUM OZ/GAL	OPTIMUM G/L
Zinc metal	1oz. /gal	7.5
Nickel metal	0.14oz/gal	1.05
Caustic Soda	12oz/gal	90
Sodium Carbonate	2oz/gal	15
Zinc/Nickel ratio		7:1
ACCU-LABS 955-C (Carrier)	2.5%	
ACCU-LABS 955-N (Ni-Complex)	4%	
ACCU-LABS 955-B (Brightener)	0.5%-1.0%	
ACCU-LABS 955-P (Water Cond.)	30 g/l (used on makeup only)	

OPERATING CONDITIONS RANGE (OZ/GL)

Zinc metal	0.75 – 1.25
Nickel metal	0.12 – 0.21
Caustic Soda	10 - 20
Zinc/Nickel ratio	6 – 8
Temperature	65-80°F.
Cathode current density	20 – 60 ASF
Agitation	No special agitation required other than the Barrel rotation or rack movement.
Anodes	Nickel or nickel plated steel anodes

SOLUTION MAKE-UP:

The electrolyte should be prepared in a clean storage tank equipped with a mechanical mixer. If such tanks are not available, the solution can be prepared in the thoroughly cleaned plating tank equipped with a mechanical mixer.

SOLUTION MAKE-UP USING DRY CONSTITUENTS:

The electrolyte may also be prepared by the following procedure:

1. Fill the tank with water to one-fifth the final volume.
2. Carefully add the required amount of caustic soda and agitate until the material is completely dissolved.
3. Prepare water slurry of the required amount of Zinc oxide, using one gallon of water for each pound of Zinc oxide. Complete wetting out of the Zinc oxide must be affected before adding the slurry.
4. Carefully add the slurry of Zinc oxide to the Caustic solution, preferably in to the vortex of the agitated solution. The solution will appear to be milky initially but will become clear with continued mixing. With the agitator in the operation, add sufficient amount of water to bring the volume to four-fifth of the final volume. Keep agitating the solution, add required quantities of **ACCU-LABS 955-P (makeup only)**, **ACCU-LABS 955-N**, **ACCU-LABS 955-C**, and **ACCU-LABS 955-B**. Add water to bring the volume up to the mark.

NOTE:

- Solution should be clear with a minimum of insolubles. The amount of sludge will vary depending on the grade of Zinc oxide and Caustic soda used, as well as the quality of water.
- Grades of Zinc oxide with small particle size (0.12 +/- 0.02 microns) and 99.5 – 99.9% purity are recommended.
- Allow the solution to cool down to the operating temperature range before making addition of the additives.
- It is important to realize that additions of caustic soda to the water during the preparation of the plating bath will cause the temperature to rise and some caustic spray will evolve during the operation. For this reason the solution operator must be adequately protected with suitable protection equipment including mask, eye-goggles and gloves.

OPERATION AND CONTROL:

Dummy the fresh solution at 4 – 6 ASF for 5 – 6 hours. Analyze it for Zinc, Nickel and Caustic and run a Hull Cell test prior to the start of regular plating. The following parameters need to be carefully controlled for the proper operation of the bath.

ZINC METAL CONCENTRATION:

It is important to keep the Zinc content in the operating range for a quality deposit. Drag out of the plating solution has a marked effect on zinc metal content and should be considered in cases of decreasing zinc metal concentration. Zinc may be replenished by adding the zinc concentrate ACCU-LABS ZX or by galvanic dissolution in a tank or weir that is external to the plating bath. High purity zinc anodes, 99.99% Zn, are dissolved in steel baskets in 5 – 10% by volume of the plating solution. This concentrated zinc solution is poured back in to the plating tank at a rate to maintain the desired zinc concentration.

ZINC/NICKEL RATIO:

The Zinc/Nickel ratio in the plating bath is important for the proper composition of the Zinc-Nickel alloy deposit. A ratio of 6-8, shall furnish a deposit with 10-14% Nickel. Nickel is replenished in the plating bath by adding ACCU-LABS 955-N, Nickel complex.

SODIUM HYDROXIDE:

Concentrations lower than 10 oz/gal of sodium hydroxide result in lower conductivity of the plating solution; conversely a concentration of caustic soda higher than 20 oz/gal result in a relatively duller deposit. Adequate concentration of caustic soda in the bath should be maintained at all times to promote proper solution conductivity and an acceptable deposit quality.

CATHODE CURRENT DENSITY:

A wide range of cathode current densities can be used i.e. 20-60 ASF, in the zinc-nickel alloy plating. The plating speed of this bath is slightly lower than the conventional alkaline zinc-plating bath on account of lower metal concentration.

TEMPERATURE:

Temperatures below 70°F will lower the permissible high current densities and therefore affect the plating speed. It will also decrease the Nickel content in the alloy deposit at the lower current in the deposit.

VOLTAGE:

A direct current source with voltage control over the upper two-thirds of the output is recommended.

EQUIPMENT**TANKS:**

Plating tanks of steel lined with Koroseal, polypropylene, polyethylene or PVC type lining are recommended to prevent stray current problems. Before making up the ACCU-LABS 955 solution, the tank should be leached for 24 hours with solution of 1 oz/gal Caustic soda.

COILS:

Heating and cooling may be constructed of plain steel. Exchangers made of stainless steel, titanium or Teflon is highly recommended. Lead or copper equipment must be avoided.

VENTILATION:

A suitable ventilation system is recommended to expel the caustic mist from the plating tank.

FILTRATION:

Filtration is required to remove any particulate matter. Filtration equipment should be constructed of plain iron. Brass, Copper or Bronze fittings should be avoided in the circulation system. For all applications, 1 to 2 solution volume turnovers per hour is recommended.

RACKS:

Plating racks must be coated with a suitable material, inert to the plating solution. Racks should be examined periodically to ensure coating integrity.

CLEANING AND PREPARATION OF BASIS METALS:

The cleaning and preparation of basis metal in any of electro-deposition process is of paramount importance in obtaining deposits with good adhesion and ductility. Low carbon steel surfaces, when properly prepared, can be plated normally without difficulty. On the other hand high carbon steel surfaces with attendant oxide and heat treatment scales pose problems unless properly cleaned.

Automatic plating machines are usually not designed to include acid pickling station with enough total immersion time capable of thoroughly removing the scale from the heat-treated parts. The use of proper inhibitors is highly recommended for both Muriatic acid and sulfuric acid pickling solutions to minimize over pickling of heavily scaled or rusted parts.

CAUTION: Always wear proper personal protective gear including eye protection when working with or around chemicals; read MSDS of the aforementioned products prior to use.

NON-WARRANTY:

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