ECOZINC – 200

ALKALINE CYANIDE-FREE ZINC PROCESS

ECOZINC 200 is an alkaline, non-cyanide, zinc plating process, suitable for use either by rack or barrel application achieving a bright finish.

ECOZINC 200 process produces exceptionally uniform thickness of Zinc derposit for wide geometrical components. The process contains no hazardus or chelating compounds and hence it is more ecologically friendly.

ECOZINC 200 deposits are coloumner in microstructure which absorbs thicker passivation layers and hence offer excellent corrosion resistance.

MAKE-UP QUANTITIES	(Rack or barrel)	OPTIMUM	
caustic soda	110 - 160 g/L	140 g/L	(lead- and iron-free)
zinc (metal)	7– 22 g/L	14 g/L	
sodium carbonate	10.0 g/L		
ECOZINC 200 Base	10 - 20 ml/L	10.0 ml/L	
ECOZINC 200 Brightener	0.5 – 2 ml/L	1.0 m/L	
ECOZINC 200 Purifier	1.5 – 3 ml /L	3.0 ml/L	

BATH MAKE-UP PROCEDURE

Caution must be taken with this procedure as there is a build up of heat. Use eye/face protection, gloves and protective clothing.

Clean and leach out the tank properly, making sure anodes are also clean. Fill the tank two thirds full with cold water, (de-ionised water is preferred). Add Sodium Hydroxide slowely (be aware of sputtering and exothermic reaction). Hang the Zinc ingots in MS cage and leave for dissolution till required Zinc metal level is achieved. This may be suitably done in a separate auxiallry tank which is act as a storage tank. Charge this solution in main tank and adjust volume and Sodium Hydroxide level. Install filteration . Add required amount of purifier and run the filtration for some time. Add Base and brightner and the bath is ready for operation.

EQUIPMENT

All equipment used in cyanide zinc plating systems may be used with ECOZINC 200.

Tank:: A regular mild steel tank may be used (a rubber lined mild steel tank is also suitable, provided the solution is not allowed to get too hot during make-up)

Anodes: Use zinc balls or slab zinc anodes (99.99% pure)

Anode baskets: steel baskets are recommended anode bags - nylon or polypropylene

Agitation: moving cathode rod agitation is recommended

Filtration: Highly recommended
use a 10 micron filter cartridge or cloth
filtration speed should be 1 to 2 tank turnovers per hour

Rectifier: barrel - up to 18 volts.
rack - up to 9 volts.

Temperature control: the ECOZINC 200 process is tolerant up to 45°C
it is highly recommended that the tank be equipped with both heating and cooling systems, to keep the temperature within prescribed limits

Extraction: beneficial but not essential

OPERATING PARAMETERS (Rack or Barrel)

Concentrations:	Range	Optimum
zinc (as Zn)	7 – 22 g/L	14 g/L
caustic soda	110 - 160 g/L	140 g/L
Average current densities:		
barrel	0.5 - 1 A/dm^2	
rack	1 - 2.5 A/dm^2	
Temperature:	20 - 45°C	30°C (optimum)

MAINTENANCE

ECOZINC 200 Brightener: 1.3 - 2 litres per 10000 Ah
(make additions at least every four hours)

ECOZINC 200 Base: consumption due mainly to drag out ans cleaners in compatibility
0.5 – 2.2 kg per 10000Ah in the pratice

ECOZINC PURIFIER: acts as a purifier and a low current density brightener
0.2 – 0.5 Lit per 10000Ah in the practice

Caustic soda: can be controlled by analysis

Zinc metal: can be controlled by soluble anode area.
(Note that during non-working periods, zinc in contact with the steel baskets is dissolved. Where there are extended periods of non-production, the zinc anodes should be removed from the tank).

Analysis of the Zinc Metal

Apparatus Needed

2 ml pipette
25 ml graduated cylinder
50 ml burette
250 ml Erlenmeyer flask

Reagents Needed

Xylenol-Orange indicator : mix 0.1 gm of Xylenol-Orange tetra sodium salt with 100 gms of AR grade sodium chloride.

Buffer solution - Dissolved 90 gms of Anhydrous sodium acetate in 500 ml of distilled water. Add 15 ml of AR grade, concentrated Acetic acid and dilute to 1 litire with water.

0.0575 M EDTA solution : Add sufficient distilled water to 21.4 gms of EDTA disodium dihydrate salt and 6 gms of sodium hydroxide to make 1 litre of solution.

Procedure

1. Pipette a 2 ml sample of plating bath into 250 ml flask , Add 50 ml water.
2. Add a pinch of Xylenol-Orange indicator mix/sufficient to produce a violet colour.
3. Add sufficient buffer solution, about 25 ml in produce a pH of approximately 5.5 and mix sample to dissolve any precipitate.
4. Titrate the solution with 0.0575 M EDTA solution to a yellow or gold end point.

Calculations

Ml of 0.0575M EDTA titrated x 1.9 = gm/ltr of zinc metal

Analysis of Sodium Hydroxide

Procedure

1. Pipette a 2 ml sample of plating bath into 250 ml flask , Add 50 ml water
2. Add few drops of Phenolpthalin Indicator
3. Titrate against 1 N Sulphuric Acid

Calculations :

Ml of 1 N Sulphuric Acid titrated * 20 = gms/lit Sodium Hroxide

TROUBLE SHOOTING

FAULTS	POSSIBLE CAUSES	POSSIBLE SOLUTIONS
Poor adhesion	- poor cleaning	- correct cleaning procedure
	- low bath temperature (<15°C)	- raise bath temperature
	- poor bath chemistry	- check analyses - make proper additions
	- very high brightener	- electrolyse - add 3 to 5 ml/l ECOZINC 200 Base
	- metallic impurities	- electrolyse - add 1 g/L Purifier
	- organic contamination	- carbon treat and filter
	- poor quality anodes (impurities)	- replace with pure zinc anodes
	- low purifier	- add purifier in 0,5ml/l increments

TROUBLE SHOOTING - Contd

dull at low current density	- low brightener	- add Brightener in increments of 0.25 mL/L
	- low caustic soda	- increase caustic level
	- metallic impurities	- electrolyse - add Purifier in 0,5 ml/l increments
	- low bath temperature (<15°C)	- bring to the correct temperature
	- high bath temperature (>45°C)	- bring to the correct temperature
	- high zinc level	- reduce zinc level
	- current too low	- increase current
	- current too high	- reduce current
High brightener consumption	- high temperature (>45°C)	- lower temperature
	- high drag-out	- check drag-in
	- organic contamination	- electrolyse
	- high anode current density	- increase anode area
rough zinc deposit	- suspended particles	- filter or use anode bags
	- low anode area	- increase anode area
	- current too high	- reduce current

TROUBLE SHOOTING - Contd

FAULTS	POSSIBLE CAUSES	POSSIBLE SOLUTIONS
zinc metal decreasing	- low anode area - polarized anodes - low caustic level	- increase anode area - increase anode area - increase caustic level
overall dullness - no brightener response	- organic impurities (grease, oil, etc.) - high suspended particle level - high ECOZINC 200 base or low Zinc level	- carbon treat and filter - filter - hold ECOZINC 200 base and increase Zinc level
delayed blistering	- low caustic level - low base - poor cleaning - organic impurity	- maintain at 140 g/L - add ECOZINC 200 Base incrementally up to a total of 10 ml/l - check pre-plate cycle - filter on carbon

WASTE TREATMENT

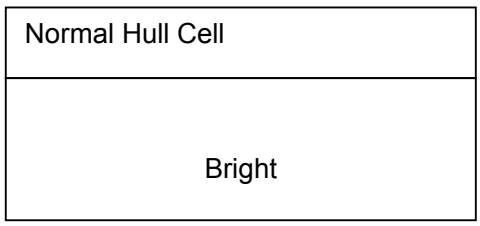
1 Mix vigorously, reduce the pH to 9.0 with dilute acid

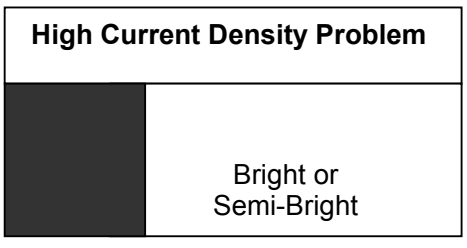
2 Filter out or clarify and decant off the precipitated zinc

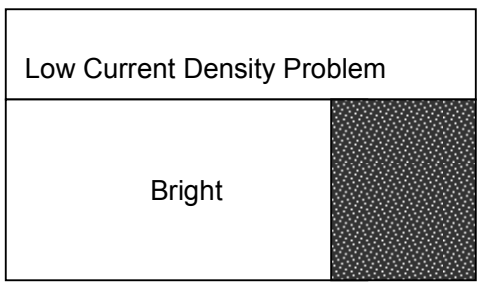
3 Adjust the pH of the filtrate according to local pollution control regulations before discharge

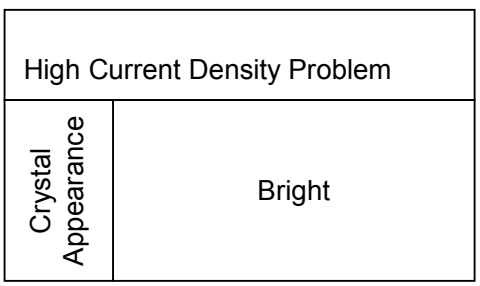
HULL CELL CONTROL

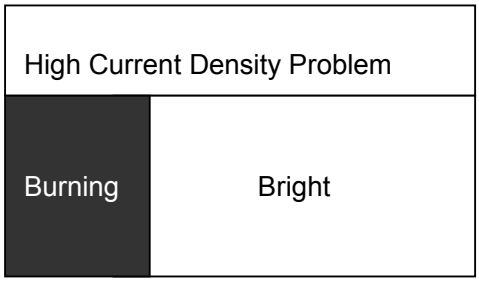
Hull Cell Panel Appearance:

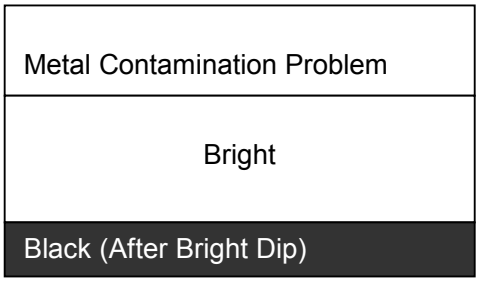


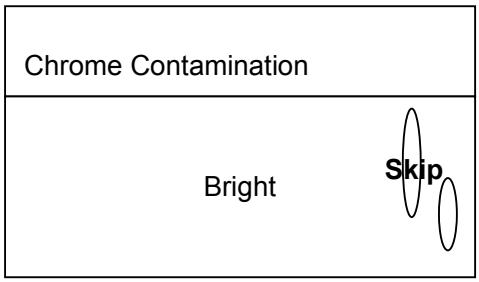







High Current Density Problem
Burning
Bright


Metal Contamination Problem
Bright
Black (After Bright Dip)


Chrome Contamination
Bright
Skip