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EXTREME 110

CHLORIDE ZINC PLATING PROCESS
TECHNICAL DATA
05-02-03

EXTREME 110

PROCESS FOR BRIGHT CHLORIDE ZINC PLATING

EXTREME 110 is an economical brightener process for depositing brilliant, level, ductile zinc deposits in acid chloride zinc plating electrolytes.

EXTREME 110 additives have excellent bath solubility compared to competitive systems.

EXTREME 110 baths readily plate substrates such as malleable iron castings, heat treated, and carbonitrided steels.

EXTREME 110 operates at higher temperatures than competitive systems.

EXTREME 110 operates with a minimal amount of foam and can be used with air agitation and evaporative recovery systems.

EXTREME 110 deposits readily accept blue-bright and yellow chromate dips.

OPERATING PARAMETERS

	RACK	BARREL
Zinc Metal:	3 - 4.5 oz./gal. *(22 - 34 g/l)*	2.5 - 4 oz./gal. *(19 - 30 g/l)*
Chloride:	17 - 20 oz./gal. *(127 -150 g/l)*	16 - 18 oz./gal. *(120 - 135 g/l)*
Boric Acid *:	3 - 5 oz./gal. * *(22 - 34 g/l)*	2.5 - 4 oz./gal. * *(19 - 30 g/l)*
EXTREME CARRIER 110:	3 - 5% by volume	3 - 5% by volume
pH (Electrometric):	4.8 - 5.9	4.8 - 5.9
Temperature:	75 - 120º F. *(24 - 48º C.)*	70 - 120º F. *(21 - 48º C.)*

***** Ammonium Chloride may be substituted to reduce burning and improve the high current density burn-free range.

SOLUTION MAKE-UP

	100 LITERS	100 GALLONS
Zinc Chloride:	7.0 Kg.	58 pounds
Potassium Chloride:	20.7 Kg.	173 pounds
Boric Acid*****:	3.4 Kg. *****	28 pounds *****
EXTREME CARRIER 110	4 liters	4 gallons
EXTREME BRIGHTENER 100	0.1 liters	1 pint

***** Ammonium Chloride may be substituted to reduce burning and improve the high current density burn-free range.

The bath is made-up by dissolving zinc chloride, potassium chloride and boric acid***** in hot water (approximately two-thirds the *final volume*). After the salts are thoroughly dissolved, add the required amount of EXTREME CARRIER 110; mix well. Dilute the EXTREME BRIGHTENER 100 with equal parts water and add to the bath. Mix and dilute with water to the final volume. (Use a high grade of zinc chloride, with a maximum of 0.009% heavy metals.)

Make-up of the bath as above will yield an *optimum operating analysis* of:

Zinc Metal:	4.5 oz./gal.	*34 g/l*
Chloride Ion:	18.0	*135 g/l*
Boric Acid*****:	4.5 *	*34 g/l* *****
pH (Electrometric):	5.2	

***** Ammonium Chloride may be substituted to reduce burning and improve the high current density burn-free range.

MAINTENANCE ADDITIONS

EXTREME BRIGHTENER 100, a readily dispersible water-based brightener, is added to the bath at the rate of one gallon per 15,000 to 20,000 ampere hours of operation.

OR

EXTREME BRIGHTENER 111, a highly concentrated solvent-containing brightener, is added to the bath at the rate of one gallon per 25,000 to 30,000 ampere hours of operation.

EXTREME CARRIER 110 must be replaced in the plating bath as it is lost by drag-out and tied-up and removed by insoluble iron. To replace dragout losses, 2 gallons EXTREME CARRIER 110 should be added for every 100 pounds potassium chloride added; however, this does not account for losses caused by iron.

The most efficient and effective way to replace EXTREME CARRIER 110 is to add it along with EXTREME BRIGHTENER 100 additions, as follows:

LOW DRAGOUT/LOW IRON CONTAMINATION (Most Rack Baths)
add 1 gallon EXTREME CARRIER 110 with each 4 - 5 gallon EXTREME BRIGHTENER 100

MEDIUM DRAGOUT (Most Barrel Baths)
add 1 gallon EXTREME CARRIER 110 with each 1 gallon EXTREME BRIGHTENER 100

HIGH DRAGOUT/HIGH IRON CONTAMINATION (Some Barrel Baths)
add 2 gallons EXTREME CARRIER 110 with each 1 gallon EXTREME BRIGHTENER 100

Maintenance of EXTREME 110 additives should be checked by the use of periodic Hull cell evaluations.

pH of the bath should be maintained within operating limits by the addition of dilute hydrochloric acid. Care should be taken during pH adjustment as the pH changes quite rapidly with small additions. Hydrochloric acid should be diluted with equal parts water prior to adding to the bath to avoid localized precipitation of addition agents. The pH should be checked using a meter, not pH paper. Too high pH causes low current density dullness.

PLATING CHEMICAL ADDITIONS, EQUIPMENT & PROCEDURES

During operation, the only chemical maintenance additions normally required are KCl and boric acid***** for replenishment due to dragout losses. Low boric acid***** causes increased high current density burning. Low chloride causes loss of brightness, leveling, and covering power, in the low current density.

***** Ammonium Chloride may be substituted to reduce burning and improve the high current density burn-free range.

Zinc Metal is normally maintained by anodic dissolution during electrolysis. High grade zinc slab anodes of minimum 99.99% purity are recommended as an economical anode source. Anodes may be drilled and tapped or used in titanium anode baskets. No dissolution of anodes occurs during idle periods and anodes do not have to be removed from the bath during shutdowns. It is recommended to maintain as much anode area as possible to promote good current distribution. High dragout barrel operations may require supplemental additions of zinc chloride. Acid resistant anode bags of cotton, dynel, or polypropylene are optional but recommended for rack operation to reduce anode-caused roughness.

Filtration - continuous filtration through polypropylene filter tubes of approximately 15 microns is recommended for routine operation. When carbon treatment or other bath purification is necessary, 5 - 10 micron filter tubes should be substituted.

Equipment - all plating tanks, racks, carriers, etc., which come into contact with EXTREME 110 solutions should be plastisol, polyethylene, hard rubber, or similarly coated to provide adequate protection from corrosion.

Agitation - unlike many competitive systems, EXTREME 110 does not foam excessively and both mechanical and air agitation can be used.

Ventilation - the spray from EXTREME 110 solutions (not fumes) is inherently corrosive. The use of fiberglass, PVC, or polyethylene ventilation equipment and exhaust fans is recommended to prolong equipment life.

Cooling Coils - made from teflon are optimum, but titanium coils may be used as long as they are insulated from the electrical circuit. Lead or steel coils are not suitable.

Pre-Plate Treatment - a standard cleaning and pickling cycle is recommended, as follows:

1. Hot alkaline soak clean;
2. Hot alkaline electroclean (anodic or periodic reverse);
3. Rinses;
4. 30% to 50% muriatic acid pickle with 1% to 2% COLUMBIA PICKLE PAL;
5. Rinses;
6. Acid Zinc Plate

Post-Plate Treatment – EXTREME 110 deposits are whiter and brighter than many competitive systems and provide surfaces that are highly receptive to most conventional blue-bright and yellow chromate dips.

HANDLING AND STORAGE

EXTREME 110 additives can produce temporary irritation when they come into contact with the skin. Therefore, care should be taken to prevent accidental eye and skin contact. Rubber gloves, a rubber apron, and protective goggles should be worn when handling EXTREME 110 additives. In case of contact, immediately flush with copious amounts of water and scrub well with soap and water. EXTREME 110 additives are stable on standing and have a shelf life in excess of two years.

FREEZABILITY: As with most chemical products, it is preferable that freezing be avoided. However if freezing should occur during transportation or storage, directions for handling the products covered in this technical data sheet are as follows:

If EXTREME BRIGHTENER 100 freezes, heat to 115-125F/46-51C in a warm water bath. Thoroughly mix until precipitates are completely dissolved.

If EXTREME BRIGHTENER 111 freezes, warm to 95-105F/35-41C in a warm water bath. Thoroughly mix until precipitates are completely dissolved.

If EXTREME CARRIER 110 freezes, simply allow the container to completely thaw and bring to room temperature of 70-75F/ 21-24C. Thoroughly mix to bring back to original condition.

ANALYSIS OF EXTREME 110 BATHS

Analysis for Zinc Metal

1. Pipette 2 ml. bath sample into a 250 ml. Erlenmeyer flask and add 100 ml. distilled water;
2. Add 10 ml. ammonium hydroxide;
3. Add approximately 0.2 gm. Eriochrome Black T Indicator Mix;
4. Add 10 ml. 8% formaldehyde solution;
5. Titrate immediately with Standard EDTA Solution 0.0575 M to a blue endpoint.

FACTOR: (ml. Standard EDTA Solution 0.0575 M) · 0.25 = oz./gal. zinc metal

Analysis for Total Chloride

1. Pipette 10 ml. bath sample into a 250 ml. volumetric flask. Dilute to 250 ml. With distilled water and mix well.
2. Pipette 10 ml. of above dilute solution into a 500 ml. Erlenmeyer flask and add 100 ml. distilled water.
3. Add 5 ml. Sodium Chromate Indicator.
4. Titrate with Standard Silver Nitrate Solution 0.153 N to a reddish-brown endpoint. (The first permanent brown color is the endpoint.)

FACTOR: (ml. Standard Silver Nitrate Soln. 0.153 N) · 1.82 = oz./gal. Chloride

Analysis for Boric Acid

1. Pipette 5 ml. bath sample into a 250 ml. Erlenmeyer flask.
2. Add Mannitol to form a thick slurry.
3. Add 3 - 5 drops Bromcresol Purple Indicator Solution.
4. Titrate with Sodium Hydroxide Solution 0.1 N to a purple endpoint.

FACTOR: (ml. Sodium Hydroxide Solution 0.1N) · 0.16 = oz./gal. Boric Acid

PREPARATION OF ANALYTICAL REAGENTS

EDTA 0.0575 M - dissolve 21.6 gm. C.P. Di-sodium EDTA salt in distilled water; dilute to exactly one liter.

Silver Nitrate 0.153 N - add 6 ml. Nitric Acid to 26.0 gm. C.P. Silver Nitrate; dissolve in distilled water, dilute to exactly one liter.

Sodium Hydroxide 0.1 N - dissolve 4 gm. A.R. grade sodium hydroxide in distilled water; dilute to one liter in a volumetric flask. Standardize against known acid.

Formaldehyde 8% Solution - dilute 200 ml. 40% C.P. Formaldehyde to one liter with distilled water.

Eriochrome Black "T" Indicator Mix - grind together 1 part indicator and 100 parts sugar.

Bromcresol Purple Indicator Solution - dissolve 0.1 gm. Bromcresol purple solid dye in 18 ml. 0.1 N Sodium Hydroxide; dilute to 250 ml. with de-ionized water.

Sodium Chromate Indicator - dissolve 10 gm. sodium chromate in 100 ml. distilled water.

Mannitol A.C.S. Grade

NON-WARRANTY