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Simplifying Surface Finishing®

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COLSID K-250

TECHNICAL DATA
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COLSID K-250

PROCESS FOR NON-AMMONIATED BRIGHT CHLORIDE ZINC PLATING

COLSID K-250	is an economical brightener process for depositing brilliant, level, ductile zinc deposits in acid chloride zinc plating electrolytes.
COLSID K-250	baths contain no ammonium salts, completely eliminating waste problems from this source.
COLSID K-250	additives have excellent bath solubility compared to competitive systems.
COLSID K-250	baths readily plate substrates such as malleable iron castings, heat treated, and carbonitrided steels.
COLSID K-250	operates at higher temperatures than competitive systems.
COLSID K-250	operates with a minimal amount of foam and can be used with air agitation and evaporative recovery systems.
COLSID K-250	deposits readily accept blue-bright and yellow passivate 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)
COLSID K-250 WETTER:	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)

SOLUTION MAKEUP

	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
COLSID K-250 WETTER:	4 liters	4 gallons
COLSID K-250 BRIGHTENER:	0.1 liters	1 pint

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 COLSID K-250 WETTER; mix well. Dilute the COLSID K-250 BRIGHTENER 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	

EQUIPMENT

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.

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 COLSID K-250 solutions should be plastisol, polyethylene, hard rubber, or similarly coated to provide adequate protection from corrosion.

Agitation:	unlike many competitive systems, COLSID K-250 does not foam excessively and both mechanical and air agitation can be used.
Ventilation:	the spray from COLSID K-250 solutions (not fumes) is inherently corrosive. The use 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.

MAINTENANCE ADDITIONS

COLSID K-250 BRIGHTENER, a readily dispersible water-based brightener, is added to the bath at the rate of one gallon per 15,000 - 20,000 ampere hours of operation.

OR

COLSID NA-II-O, a highly concentrated solvent-containing brightener, is added to the bath at the rate of one gallon per 25,000 - 30,000 ampere hours of operation.

COLSID K-250 WETTER 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 COLSID K-250 WETTER 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 COLSID K-250 WETTER is to add it along with COLSID K-250 BRIGHTENER additions, as follows:

<u>LOW DRAGOUT/LOW IRON CONTAMINATION (Most Rack Baths)</u>
add 1-gallon K-250 WETTER with each 4 - 5-gallon COLSID K-250 BRIGHTENER

<u>MEDIUM DRAGOUT (Most Barrel Baths)</u>
add 1-gallon K-250 WETTER with each 1-gallon COLSID K-250 BRIGHTENER

<u>HIGH DRAGOUT/HIGH IRON CONTAMINATION (Some Barrel Baths)</u>
add 2 gallons K-250 WETTER with each 1-gallon COLSID K-250 BRIGHTENER

Maintenance of COLSID K-250 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.

TYPICAL CYCLE

PRE-PLATE TREATMENT
A standard cleaning and pickling cycle are recommended, as follows:

1. HOT ALKALINE SOAK CLEAN
2. HOT ALKALINE ELECTROCLEANER (ANODIC OR PERIODIC REVERSE)
3. RINSE

4. 30 - 50% MURIATIC ACID PICKLE WITH 1 - 2% COLUMBIA PICKLE PAL
5. RINSE
6. ACID ZINC PLATE

POST-PLATE TREATMENT
COLSID K-250 deposits are whiter and brighter than many competitive systems and provide surfaces that are highly receptive to most conventional blue-bright and yellow passivate dips.

ANALYTICAL PROCEDURE

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 Passivate 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 Solution 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 grams CP. 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 grams CP. 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% CP. 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 Passivate Indicator	Dissolve 10 gm. sodium passivate in 100 mL distilled water.
Mannitol	A.CS. Grade

HANDLING & STORAGE

Columbia Chemical recommends referring to the specific product Safety Data Sheets for safety, handling, and storage precautions.

NON-WARRANTY

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