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ZINCOLO – 160

Technical data sheet

ZINCOLO – 160 is a two component brightener system for use in high volume rack and barrel chloride zinc plating operation. The brightner system is water soluble type brightening agents.

ZINCOLO - 160 is the latest development in chloride zinc plating from Marshal Laboratories. It offers the maximum benefits to the user and displays special properties otherwise unobtainable in both rack and barrel operations. Besides producing bright level zinc deposits, the ZINCOLO - 160 process exhibit the following outstanding features and benefits

FEATURES

BENEFITS

No oil out

Wider temperature range and simplified Brightener control virtually eliminate Imbalance and expensive oil out.

Improved yellow chromate adhesion

Bath components will not interfere with chromate zinc bond ;adhesion greatly enhanced without aging oil chromating done on zinc line

Improved iron control; highly resistant to iron built up

Use of hydrogen peroxide greatly reduced or Eliminated precipitated iron sludge readily Filterable, much less servicing of filters and Tanks

Plates over wide current density ranges

Plate complex shapes and lengths with both high and low current density areas on rack and in barrels

High Temperature operation in excess of 45 C

Eliminate hot weather down time and or need for external cooling when processing heavy loads

Low temperature operation below 16 C

Increased production ,bright level deposits At start up or on cold days, no heating Requirements.

Low foam operation

Minimal foam permits higher air agitation With resultant brightener deposits and Oxidation of iron; no bubble bath to overflow and corrode equipment.

Excellent ductility

Improved production capability; tendency for flaking or blistering reduced or eliminated when higher thickness

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The non foaming ZINCOLO 150H process utilizes two liquid materials for bath make up and replenishment ; ZINCOLO 150H- M and R

Operating Conditions

Concentration :

1. Zinc Metal	23-38g/l
2. Total Chloride	150-280g/l
3. Boric acid	23-36 g/l
4. ZINCOLO 160 - M	30.0-40.0g/l
5. ZINCOLO 160 - R	0.4-1.2 ml/l
6. Replenishment test	Determined by plating cell
7. Temperature	21-38 C
8. Anode current density	1-3 A/ dm
9. Cathode Current density	0.1-5 A/dm
Voltage	4 –9(barrel)
10.PH(electrometric)	4.6 –5.0
11.Filtration	Continues
12.Agitation	Air agitation is recommended If air agitation is not available, Solution agitation is good.
13.Anodes	Pure zinc (99.9% zinc Special High Grade
14. Anodes/Cathode Ratio	2:1

MAKE –UP

Bath Make-up, for rack and Barrel

	1 Liter	100 liters
ZINCOLO 160 - A	100ml	10.0lts
ZINCOLO 160 MB	225 gms	22.5 kgs
ZINCOLO 160- M	40 ml	4.0 Lit
ZINCOLO –160 -R	0.4 - 1.0 ml	40-100 ml
Water to make	1 Lts	100 lts

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Prior to making up a ZINCOLO - 160 zinc plating bath, the processing tank must be cleaned and rinsed thoroughly. In addition, the tank should be leached for a minimum of 24 hours

Anodes encrusting which may result in anode polarization and subsequent roughness of zinc electroplate can occur, especially in rack plating operation. The usual cause is boric acid concentration in excess 30 g/l.

This is evident when pH is above 5.2 Lowering the boric acid level to 27 to 28 g/l and keeping the pH

At 4.6 to 4.8 will usually eliminate the problem. In addition, roughness can develop on parts with

Complex configurations. Maintaining the proper pH and boric acid ranges can help eliminate this problem.

In make-up 100 liters of operating solutions . Add components in the order given .

1. Add 50 liters of warm water, 54 °C to the 100 liters tank.
2. Add 22.5 Kgs of ZINCOLO – 160 MB salt with stirring
3. Add 10 ;liters of ZINCOLO 160 A and stir until dissolved.
4. Check the pH of the solution with a pH meter, or paper. Adjust if necessary to 4.8 to 5.00 with technical grade hydrochloric acid to lower the pH or potassium hydroxide to raise the pH.
5. Add 4 liters of ZINCOLO -160 -M and 100 ml of ZINCOLO – 160-R with stirring .
6. Add sufficient water to bring solution to final operating volume .
7. Recheck the pH and adjust as above if necessary . the plating bath is now ready to use .
8. Optimum pH is 4.8 During normal plating maintain pH within the recommended operating range of 4.6 to 5.0 by frequently adding technical grade hydrochloric acid to lower pH .Never Use hydrochloric acid that is green in colour ; green; colour indicates metallic contamination . For adjustment to raise pH use potassium hydroxide. When measuring pH , use a pH meter. During idle periods or shutdowns adjust pH to 4.8 to 5.0. Do not allow the solution to remain idle at a pH above 5.0 as this can result in anode polarization.

Rinsing

Rinsing after plating in ZINCOLO-160 must be thorough and the last rinse tank should be clear at all times. After removal from the plating bath, allow the solution to drain from the parts above the plating tank or in a recovery tank reducing operating costs.

Replenishment

Periodic analysis for zinc metal, total chloride and boric acid should be performed as outlined under “CONTROL”.

The major factors that determine brightener consumption are drag-in of rinse water, drag-out of plating solution, temperature, and load size. Based on

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actual heavy production usage, ZINCOLO -160 M and R consumption should range 100 to 150 ml for 1000 amp. Hrs,. However, additions of R is best determined by plating cell test and visual observation of the work. There may be a tendency to add an excessive amount of ZINCOLO – 160-R to the plating bath based upon plating cell tests made without agitation. Part of the brilliance of the deposit obtained in production, is due to agitation of the bath. Therefore, it is advisable to agitate the test cell solution during test plating. Additions of ZINCOLO - 160 M for every 1 to 5 parts of ZINCOLO – 160 -R replenished based on operating experience and drag-out.

Note : Drag-out of ZINCOLO 160 is greater in barrel plating operations than in rack plating operations. Therefore, barrel plating lines require a higher ratio of A to B replenishment.

Temperature

Optimum temperature is 24 °C. Recommended operating temperature range is 21 °C to 38 °C. The bath is designed to plate at near 100% efficiency within the recommended range. If the bath is operated above 38 °C brightener consumption will increase; however, deposits will be bright and level. The bath will operate at lower temperatures and produce bright level deposits, however, plating efficiency decreased at lower temperatures.

Agitation

Air agitation and solution circulation are highly recommended. Solution circulation may be achieved in large plating tanks in automatic lines by plating the intake and discharge at the filtration system at opposite ends of the tanks, counter-current to the work flow.

Low pressure air (oil-less) should be used and the blower intake should be equipped with a filter to remove particles to ensure that only clean air enters the solution. Do not place blower air intake in an area where it may pick up acid fumes or other contaminants.

EQUIPMENTS

Filtration

Bath barrel and rack plating installations require continuous filtration to remove iron sludge contamination from the plating bath (see “CONTROL”). The filtration system should have sufficient capacity to filter the plating solution two times per hour. All filter parts that come in contact with the plating solution should be non-metallic; do not use stainless steel or iron. Do not use cellulose in any form as a filtering medium.

NOTE : Periodic use of a light carbon pack on the filter is recommended (at least once per month).

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Anodes

Flat-top, ball, oval or slab anodes may be used. Anodes should be pure zinc, ASIM Standard Specification B6 Special High Grade (99.99%).

It is most desirable to use anode bags for rack plating. The suitable material for anode bags is polypropylene. Do not use cellulose based materials. If roughness on plated shelf areas is noted, in most cases, anodes should be bagged as a primary step in eliminating the difficulty. Anode bags should also be cleaned periodically. Shelf roughness may also be due to incorrect anode current density, high boric acid content (above 30 g/l) or high pH (above 4.6 to 4.8) or burning from empty rack tips.

Cover bus bars with clear vinyl or Plastisol tape except at points or anode hook contact to minimize corrosion and possible solution contamination. Bus bars must be elevated and not submerged in the solution. Bus bars can be nickel plated to resist corrosion.

Racks

Plating racks must be coated with suitable materials which will not contaminated the bath. The usual type rack coating used for zinc plating solutions such as PVC or plastisol is satisfactory.

Tanks

Planting tanks of steel lined with PVC, koroseal ,poly propylene or polyethylene are recommend. Rubber lined tanks are not suitable to use with chloride Zinc solution. Before making up ZINCOLO 150Hoperating solution the tank must be cleaned and rinsed thoroughly .

1. Prepare a leaching solution consisting of 3% by volume technical grade hydrochloric acid and 97% water. If possible heat to 49 C to accelerate the leaching process..
2. Add 75 ml of ZINCOLO 160 A for each 100 litres of leaching solution.
3. Fill plating tank to the top of the tank and let solution stand for 24 hours.
4. Drain tank and rinse thoroughly with water.

If fiber-glass tanks are used, leaching must be most thorough. In addition, the tank or lining manufacturer should warrant that no mold release was used in the tank construction or specify the mold release and methods of removing any impregnation from the fiber- glass.

Heating and cooling

If heating and /or cooling is desired, coil should be made of Teflon or titanium isolated from the direct current circuit. Grounded quartz immersion heaters may also be used. Cooling coils made of Teflon or Titanium isolated from the direct current circuit.

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Power Source

A 6 volts power source is required for rack and a 12 volts power source is required for barrel plating. Rectifiers must have a low ripple (5% maximum) . Ensure that the current for plating tank is measured with reliable meter. Stray alternating currents, current interruptions and excessive ripple in the power source must be avoided.

Control

The major contaminant in all chloride zinc plating baths is iron. This contamination is normally controlled In process by the use of air agitation along with solution filtration.

Analyze the bath frequently so that it remains in chemical balance and will not require large addition of chemicals at any one time to restore solution balance. Always analyze the zinc and chloride content before adding the brighteners. After making the correction of B measure the pH and adjust to the operating range with the technical grade a hydrochloric acid to lower the pH or with potassium hydroxide to raise the pH.

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 litre with water.

0.0575 M EDTA solution : Add sufficient distilled water to 21.4 gms of EDTA disodium di-hydrate 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.

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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

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

Analysis for Total Chloride

Apparatus Needed

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

Reagents Needed

Buffer solution - dissolve 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 liter with water.

Chromate solution - dissolve 20 grams of either potassium chromate or sodium chromate in 1 liter of distilled water.

0.153 N silver nitrate solution (AgNO_3) to 25.95 gms. Of silver nitrate add sufficient distilled water to make 1 liter of solution. Store in brown glass bottle.

Procedure

1. Pipette 1 ml of sample of the operating solution into a 250 ml Flask. Add 50 ml distilled water.
2. Add 25 ml of buffer solution,
3. Add 5 ml of chromate solution to give solution a yellow colour.
4. Titrate with 0.153 N silver nitrate solution until permanent reddish brown coloration forms on the white silver chloride precipitate.

Calculation

MI of 0.153 N AgNO_3 solution titrated x 5.4 = grams/ltr total chloride.

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Analysis for Boric Acid

Apparatus Needed

2 ml pipette
50 ml burette
100 ml beaker
Glass stirring rod

Reagents Needed

0.1 N Sodium Hydroxide (NaOH) - to 4.0 gms of AR grade sodium hydroxide add sufficient de-ionized or distilled water to make 1 liter of solution. Standardize against a sulphuric acid of a known normality.

Mannitol - AR grade

Bromcresol purple indicator solution - dissolve 0.1 gm of Bromcresol purple solid dye in 18 ml of 0.01 N sodium hydroxide and dilute to 250 ml with deionized or distilled water.

Procedure

1. Pipette 2 ml sample of the operating solution into a 100 ml beaker,
2. Add sufficient Mannitol to form a thick slurry.
3. Add several drops of Bromcresol purple indicator solution and titrate with stirring with 0.1 N sodium hydroxide solution to a purple endpoint.

Calculation

ml of 0.1 N NaOH solution titrated $\times$ 3.08 = gm/litre of boric acid.

Replenishment

The total boric acid content of the operating solution should be 23 to 34 gm/litre. Replenish bath to maintain optimum boric acid content.

Waste Treatment

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The ZINCOLO 160 operating solution contains zinc metal and chloride and is acidic in nature. It should be neutralized to a pH of 7.5 to 8.0 prior to disposal into a sewage system.

Precautionary information

Hazards : ZINCOLO 160-M and ZINCOLO 160- R and plating solution may cause burns Or skin irritation. Special care should be used when handling .

First Aid : In case contact of the plating solution or brighteners with eyes, flush with clean cool water for 15 minutes and get immediate medical attention. In case of skin contact, flush affected area with large amount of clean cool water and wash with soap and water. If inhaled, remove to fresh air. Give artificial respiration and oxygen if needed. In case of ingestion drink large quantity of water. Get medical attention in all cases. Remove contaminated clothing and wash before reuse.

Handling information : Avoid breathing vapors. Do not take internally when handling, wear protective clothing, chemical safety goggles, respirator and rubber gloves. Exhaust ventilation is recommended to remove mist or fumes that may be generated during make up and operation.

Keep containers tightly closed, store indoors in a cool dry area, wash thoroughly after handling. Do not reuse containers, wash before disposal.

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