Prime Chemicals-Pakistan

Acid Bright Zinc Bath ZincoBright, PC-475

Introduction

- This low-acid acid zinc process produces mirror-bright, ductile and corrosion resistant zinc finishes on barrel- and jig articles of iron and steel.
- The additives of this process are highly concentrated, leading to a very low consumption of brightener and make-up solution.
- The brightness is uniform over the whole area of current density, without any dull deposit in the area of low current density and without any burning in the area of high current density. Even in the area of low current density the thickness of the zinc layer is hardly affected by the high brightness.

• *Altogether this process combines the positive features of a very low consumption and high brightness over the whole area of current density without compromise.*

Make-up (for 100 ltrs.)

4 – 10 kgs	Zinc Chloride (best 6 kgs)
19 – 22 kgs	Potassium chloride /Zinc conducting Salt (best 20 kgs)
2 – 3,5 kgs	Boric acid
3.5 – 4.0 ltrs.	Make-up Solution ZincoBright, PC-475M
0.05 – 0.06 ltrs.	Brightener ZincoBright, PC-475R

In case you are working with Ammonium chloride instead of Potassium chloride you need:

12 – 19 kgs	Ammonium chloride

Operating Conditions

Bath tempreature	15 – 40°C
pH-value	4.5 – 5.5
Cathodic current density	0.5 – 12 A/dm$_2$

Tanks

Hard rubber lined tanks of iron or plastic are suitable for this purpose. An article agitation is recommended for still baths. Moreover filtration facilities should be provided for - a continuous filtration is recommended.

Anodes

Anodes made of pure rolled zinc, 99,99 % are to be used, preferably in anode bags. The ratio anode surface - article surface should be approx. 1 : 1.

Standard values

Zinc	20 – 50 grms./ltr.
Chloride	110 – 170 grms./ltr.
Boric acid	20 – 35 grms./ltr.

For the initial make-up of an acid zinc bath it is recommendable to dissolve the salts in warm water - approx. 60 % of the final volume. Cold water can be used for addition of the rest water quantity. After adjustment of the pH-value the required quantity of make-up solution and brightener must be added. A thorough filtration after make-up avoids the deposition of rough layers.

Consumption per 10.000 Ah: **(at temperatures of 30 - 40°C)**

• Brightener ZincoBright PC-475R	2.5 – 3.5 ltrs.
• Make-up Solution ZincoBright PC-475M	3.5 – 4.0 ltrs.

(depending on the drag-out and degreasing level of the parts)

Consumption per 10.000 Ah: (at temperatures of **20 - 30°C**)

• Brightener ZincoBright, PC-475R	2.0 – 2.5 ltrs.
• Make-up Solution ZincoBright, PC-475M	2.5 – 3.0 ltrs.

(depending on the drag-out and degreasing level of the parts)

💧 *Special additives* 💧

To facilitate the plating at higher temperatures i.e. above **35°C** a special wetting agent PC-475S may be used. The use of PC-475S minimizes the effect of Temperature on quality.

Operating sequence

After a thorough degreasing and acid dipping the parts are zinc plated. Then the bright zinc plated articles are very well rinsed, passivated and possibly immersed and dried. This procedure will improve the corrosion resistance considerably.

General remarks

PC ZincoBright additives have a high temperature stability and therefore these bright zinc baths can still be operated well at very high temperatures.
This is why in most of the cases the cooling of the bath can be reduced to a minimum.
The consumption rates can be kept low if the bath is well operated. If, however, oil or dirt is brought into the electrolyte, this will result in an emulgation of part of the wetting

agent so that a higher quantity of make-up solution has to be added. The exact quantity has to be determined during hull cell tests.
Furthermore it is necessary to adjust the pH-value of the zinc bath in regular intervals by means of a NaOH- or HCl-solution.
Metal parts, especially those of copper or brass, fallen into the bath, are to remove immediately.

Safety Measures

- In order to ensure a safe handling of our product, please study the Safety Instruction in the resp. Material Safety Data Sheet before use.

The information herein is given to the best of our knowledge and for your advice. As the correct handling of our products and processes is beyond our control we must disclaim any liability with respect to the use of any material supplied by us. We only guarantee the quality of our products at the time of delivery. In case of problems during the application please contact us immediately.

Acid Zinc Troubleshooting Guide

Problem	**Possible Cause**	**Corrective Action**
Black spots on deposit before and/or after chromating. High-current-density areas darker after chromating.	Iron contamination (More than 100 ppm)	Check the bottom of the tank for parts that have fallen off racks or out of barrels. Treat with hydrogen peroxide. Add 0.25 to 0.5 pint of 30 to 35 pct hydrogen peroxide per 1,000 gal of solution volume. The hydrogen peroxide should be diluted at least 3:1 with water before addition to the tank. The precipitated ferric hydroxide is removed by filtration. If filtering is insufficient, the precipitated iron will again dissolve back into solution and the spots will reappear.
Deposit staining or black after chromating	Copper contamination (5 to 10 ppm) and/or Cadmium contamination (10 to 20 ppm)	Electrolyze solution at 0.2-0.5 A/dm^2 for eight to 12 hr. Zinc dust treat at one lb per 1,000 gal of solution and filter out zinc particles so as to redissolve the materials back into the bath
White staining	Poor rinsing and/or high brightener	Improve rinsing Add 0.5 fl/oz of hydrochloric acid to the first rinse after the plating tank Reduce brightener additions
No deposit in low-current-density areas	Chromium contamination (200 ppm)	Add one oz/gal sodium hydrosulfite per 100 gal of solution per 100 ppm of chromium to be removed Zinc dust treat at one lb per 1,000 gal of solution and filter out zinc particles so as not to redissolve the metals back into the bath Electrolyze solution at two to five asf for eight to 12 hr
	High brightener	Reduce brightener additions
Poor adhesion and/or blisters	Chromium contamination (10 to 20 ppm)	add one oz/gal sodium hydrosulfite per 100 gal of solution per 100 ppm of chromium to be removed
	Poor cleaning and/or rinsing	Improve cleaning, pickling and/or rinsing
	Organic contamination	Filter the solution through a carbon filter pack

	Low chloride	Analyze and adjust
	Low temperature	Check and adjust to recommended range
	High brightener	Reduce brightener additions
	Low wetter	Add in 0.5 pct by volume increments until optimum deposit is obtained.
Dull deposit in low-current-density areas (one to 20 asf)	High pH	Check the pH with a calibrated meter (do not rely on pH test strips) and lower with dilute hydrochloric acid.
	Low ammonia and/or chloride	Analyze and adjust to range
	Low brightener	Add in 0.5 pct by volume increments until optimum deposit is obtained.
	High temperature	Lower to recommended range.
	Iron contamination	Treat with hydrogen peroxide. Add 0.25 to 0.5 pint of 30 to 35 pct hydrogen peroxide per 1,000 gal of solution volume. The hydrogen peroxide should be diluted at least 3:1 with water before addition to the tank. The precipitated ferric hydroxide is removed by filtration.
Dark band in medium current density range(20 to 30 asf)	High pH	Check the pH with a calibrated meter (do not rely on pH test strips) and lower with dilute hydrochloric acid.
	Low ammonia and/or chloride	Analyze and adjust to range
Dull or poor coverage medium-current-density to low-current-density areas	Low ammonia and/or chloride	Analyze and adjust to range
	High pH	Check the pH with a calibrated meter (do not rely on pH test strips) and lower with dilute hydrochloric acid.
	Low wetter	Add in wetter 0.5 pct by volume increments until optimum deposit is obtained.
	Low brightener	Add in brightener 0.05 pct by volume increments until optimum deposit is obtained.
Dull deposit across the entire current density range	High temperature	Lower to recommended range
	Low brightener	Add in brightener 0.05 pct by volume increments until optimum deposit is obtained.
	Poor surface preparation	Improve cleaning, pickling and/or rinsing
	Excessive addition of hydrogen peroxide	Leave air agitation on during shutdowns to help dissipate excess peroxide.
		Add up to 100 ml of brightener per 100 gal of plating solution.
Bright, brittle deposit over 40 asf	High pH	Check the pH with a calibrated meter (do not rely on pH test strips) and lower with dilute hydrochloric acid.
	High brightener	Reduce brightener additions
	Lower wetter	Add in wetter 0.5 pct by volume increments until optimum desposit is obtained.
Pitted deposit in medium-current-density to low-current-density areas	High ammonia and/or	Analyze and adjust to range
	High brightener	Reduce brightener additions
	Low wetter	Add in wetter 0.5 pct by volume increments until optimum deposit is obtained.
	Trivalent chromium (150 - 200 ppm)	Remove with filtration

Streaky deposit	Poor cleaning and/or rinsing	Improve cleaning, pickling and/or rinsing
Soft, spongy or burnt deposit in high-current-density areas	Low zinc	Analyze and adjust to range
	Low ammonia and/or chloride	Analyze and adjust to range
	High pH	Check the pH with a calibrated meter (do not rely on pH test strips) and lower with dilute hydrochloric acid.
	Low wetter	Add in wetter 0.5 pct by volume increments until optimum deposit is achieved.
	Iron contamination	Treat with hydrogen peroxide. Add 0.25 to 0.5 pint of 30 to 35 pct hydrogen peroxide per 1,000 gal of solution volume. The hydrogen peroxide should be diluted at least 3:1 with water before addition to the tank. The precipitated ferric hydroxide is removed by filtration.
Rough deposit	Anode particles in solution	Filter the solution
		Check anode bags for tears and/or holes
	Poor cleaning and/or rinsing	Improve cleaning, pickling, and/or rinsing
	Low wetter	Add in wetter 0.5 pct by volume increments until optimum deposit is achieved.
	Trivalent chromium	Remove with filtration

Analysis

Sample Preparation

Take the sample at a homogeneously mixed position and let it cool down to room temperature. If dull, allow to settle and decant or filter.

Zinc
Reagents: 0.1 N EDTA (Titriplex III), buffer solution (100 g NaOH and 240 ml 98 % acetic acid per 1000 ml), indicator xylenol orange tetrasodium salt 1 % in KNO_3
Process: Pipette 5 ml bath solution into a 250 ml Erlenmeyer beaker, dilute with 100 ml demineralised water, add 20 ml buffer solution and a spatula tip of indicator. Titrate with 0.1 N EDTA from red to yellow.
Calculation: consumption in ml · 1.3074 = g/l zinc
Correction: Increase by 1 g/l = Addition of 2 g/l zinc chloride

Chloride
Reagents: 0.1 N silver nitrate solution, chloride indicator (5 g $K_2Cr_2O_7$ + 95 $NaHCO_3$) or 5 % potassium chromate solution
Process: Pipette 1 ml bath solution into a 250 ml Erlenmeyer beaker, dilute with 100 ml demineralised water, add indicator and titrate with 0.1 N silver nitrate from yellow to brown.
Calculation: consumption in ml · 3.545 = g/l chloride
Correction: Increase by 1 g/l = Addition of 2 g/l potassium chloride

Boric Acid
Reagents: 0.1 N NaOH, mannitol, EDTA sodium salt, 15 % NaOH
Process: Pipette 10 ml bath solution into a 250 ml Erlenmeyer beaker. After addition of 50 ml demineralised water and 2-4 g EDTA, adjust a pH of 7.9 with 15 % NaOH solution. Add 2 g mannitol to the **clear** solution and titrate with 0.1 N NaOH to a pH of 7.9.
Calculation: consumption in ml · 0.618 = g/l boric acid

Guarantee

Our guarantee extends to the continuous quality of our products as they leave our factory and not to their usage in the field. Our technical service will be pleased to answer any question you may have concerning operation and use of our products:
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