# PLATING SHEEN CHEM (INDIA) PVT. LTD.

*EXCELLENCE IN METAL FINISHING* *www.pcichemicals.com*

## ZINCOSHEEN 772 Process

**ZINCOSHEEN 772** process is a two part highly versatile, chloride type, Acid Zinc Plating Process , manufactured for the first time in India with the most modern techniques and formulations, which outdates all the existing Acid Chloride Zinc Brightners in the market.. It does not oil- out as other brightner systems, and works at wider temperature range from below $16^0$ C to more than $60^0$C,hence, no cooling coils required even at heavy loads, and the bath never gets imbalanced because of Brightner and never requires an extra addition of Maintenance Brightner at any point.

**ZINCOSHEEN 772** process provides excellent and quick Brightness as compared to others and is totally trouble free while plating the parts. It provides scratch free, high degree of extra Levelling, Ductility, imparting high lustrous finish and will plate directly on carbonitrided and malleable Iron.. Has an exceptional, high speed deposition rate, covering LCD areas uniformily. It gives Exceptional low current density brightness an ideal process for barrel zinc plating. The grains deposited are so fine that it gives a lustrous glaze at all times. Deposits are very active and very suitable for subsequent post treatment. Chromate Conversion Coatings on this finish gives an extra adhesion and decorative colours.

**ZINCOSHEEN 772** has lower power consumption due to lower operating voltage and is specially formulated to deliver high tolerance to impurities in the plating process, like, Iron, etc. ZINCOSHEEN 772 has a low consumption and low foam and recommended for both Vat and Barrel even with heavy loads. This process works very well even with low Boric and low Chloride levels.

### WORKING CONDITIONS

(For make up of a New Bath)

| | |
|---|---|
| **ZINCOBRITE AZ 780 A** | : 80 – 125 ml./ ltr. |
| **ZINCOBRITE AZ 780 B** | : 200 – 250 gms/ ltr. |
| OR | |
| ZINC METAL | : 25 – 35 gms/lt |
| TOTAL CHLORIDE | : 120 – 150 gms/ltr |
| BORIC ACID | : 30 – 40 gms/ltr |

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PLATING SHEEN CHEM (INDIA) P. LTD

# *ZINCOSHEEN 772*

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|---|---|
| **BRIGHTNER 772 'R'** | : 0.3 – 0.6 cc/ ltr. |
| **MAINTENANCE 772 'M'** | : 20 - 30 cc/lt. |
| **TEMPERATURE** | : 20 – 40$^{O}$C |
| **FILTERATION** | : CONTINOUS WITH ACTIVATED CARBON. |
| **pH** | : 4.8 - 5.5 |
| **VOLTAGE** | : 6.0 (For Vat)<br>12.0 (For Barrel) |

## MAINTENANCE

**ZINCOSHEEN 772 R BRIGHTNER** produces excellent brightened, leveled and lustrous Zinc deposits at fairly wide current densities, and should be strictly maintained within the specified limit.772 R also imparts high tolerance to impurities. The consumption of ZINCOSHEEN 772 R is within the range of 75 – 150 cc/KAH. The additions should be frequent and small.

**ZINCOSHEEN 772 M CARRIER ADDITIVE** gives extra ductile and stress free deposits in combination with 772 R Brightner. It enhances the brightening and imparts extra high degree of leveling of Zinc deposits. 772 M also imparts proper chrome receptivity. The consumption of ZINCOSHEEN 772 M is within the range of 75 – 125 cc/KAH.

For getting consistent results, 772 R and 772 M should be added at regular intervals preferably through a dosing pump fitted with an ampere meter. The addition of brightners should be added on the basis of ampere-hours passed.

**ZINCOBRITE AZ 780 A** is the source of Zinc Metal. It is normally added during the make up of the bath. If the periodic analysis indicate low concentration of Zinc Metal, 780 A should be added. Addition of 10 ml/ltr of ZINCOBRITE AZ 780 A will increase approx. 3.0 gm/ltr. of Zinc in the solution.

**ZINCOBRITE AZ 780 B** is the source of chloride and boric acid and is added for the make up and periodic maintenance. ZINCOBRITE AZ 780 B increases the conductivity, ductility and throwing power of the bath. Addition of 10 gm/ltr of 780 B increases chloride by 4 gm/lt and Boric Acid by 1 gm/ltr.

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## SOLUTION PREPARATION :

The storage tank should be used in preparing a new ZINCOSHEEN 772 Plating Solution. The storage tank, if newly lined with rubber or synthetic materials, should be first leached with a solution containing 2 % by volume Hydrochloric Acid. The solution should be heated to 50 - 65$^{O}$ C and maintained at that temperature for at least 8 hours with occasional stirring. The tank should then be emptied and rinsed thoroughly before use.

To prepare the solution :

1. Heat water in storage tank to 60 - 70$^{O}$ C and maintain (about 2/3 full).
2. Dissolve the required amount of constituents (780 B and then 780 A). Stir thoroughly.
5. Add 1gm/l activated carbon powder (1200 I.V.) and 0.1 gm/ltr of pure zinc dust and stir for 30 - 60 minutes..
6. Allow solution to settle for 3 - 4 hours or preferably overnight.
7. Filter into clean plating tank.
8. Add required quantity of 772 M and then 772 R.
9. Dilute to final volume and heat to operating temperature.
10. Adjust the pH to 4.8 – 5.5 with CP grade Hcl to lower the pH and KOH to raise the pH.
11. Circulate for 20 minutes and start plating

## TEMPERATURE

The temperature of the ZINCOSHEEN 772 solution should be maintained at between 20 - 40$^{O}$C.The use of automatic temperature control is recommended to assist in maintaining constant operating conditions. Do not operate this solution below 20$^{O}$ C or crystallization of salts may occur. Equipment requirements should be considered, e.g. tank linings and air agitation lines, when operating at higher temperatures.

## pH

The pH of the ZINCOSHEEN 772 solution should be determined regularly and maintained within the range 4.8 - 5.5. Adjust the pH to 4.8 – 5.5 with CP grade Hcl to lower the pH and KOH to raise the pH.

## EQUIPMENT

### Plating Tanks :

Rubber or PVC Lined steel, composition, ceramic or glass tanks which have been approved for use with PCI ZINC Processes should be used. Lead-lined, stainless steel, wood or pitch-lined plating tanks are not approved.

### Pumps and Fittings

Construction materials of pumps, fittings, circulation lines and all associated equipment such as filters and heat exchangers should be used.

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## Filtration

Circulation of the plating solution through a filter at a rate sufficient to turn the tank volume over at least once every two hours is recommended for mechanically agitated solutions. Air agitated solutions are preferably turned over at least once per hour. The filter may be of any type which will keep the solution free from suspended dirt or foreign particles. Return lines should be of non-metallic materials, or if they are metallic they should be suitably lined so as to prevent any bi-polarity in the electrical circuit. They should be so positioned in the tank that direct impingement of the solution stream on the work is avoided. Circulating lines must be so arranged that a recirculating slurry feed tank can be used. No solution should be returned directly to the plating tank after an addition to the filter without first ascertaining by recirculation that the solution is perfectly clear. The slurry tank used for this purpose must be placed above the level of the pump.

## Agitation

### Air

For air agitation, a blower of sufficient capacity to provide filtered oil-free air should be used. "Compressed" air should definitely not be used. The blower should be large enough to provide air at a pressure of one pound per square inch for each 18 inches of solution depth and a volume capacity of one cubic foot per minute for each linear foot of immersed perforated pipe. If the blower is mounted below the level of the plating solution, an anti-siphon device should be installed at the uppermost portion of the header pipes.. Metallic pipe, in any form, is not approved.

### Mechanical

Agitation is strongly recommended. Slow oscillatory agitation of 3 - 8 ft per minute is sufficient in still tank operation. Ordinary chain speeds in automatic operations are usually satisfactory.

## TITRATION & 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.

### Analysis of Zinc Metal

Pipette 2 ml of the plating solution into 250 ml Erlenmeyer flask. Add a pinch of Xylenol-Orange Indicator, mix sufficient to produce a violet colour.

**Reagents needed** :
Xylenol- Orange indicator mix-mix 0.1 gms of Xylenol- orange tetra sodium salt with 100 gms of A.R. grade sodium chloride.

**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 ltr with water.

0.0575 M EDTA solution. Add sufficient deionised or distilled water to 2.14 gms of EDTA disodium dehydrated salt and 6 gms of sodium hydroxide to make 1 ltr. of solution.

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**Procedure:**
Pipette 2 ml of the plating solution into 250 ml Erlenmeyer flask. Add a pinch of Xylenol-Orange Indicator, mix sufficient to produce a violet colour
Add a sufficient buffer solution, about 25ml, to produce a pH of approx. 5.5 and mix sample to dissolve and precipitate.
Titrate immediately with 0.0575 M EDTA solution to a yellow or gold end point.

**Calculation :**
ml of 0.0575 M EDTA titrated x 1.9 = gm/ltr of Zinc Metal

## Analysis of Total Chloride

**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 litre with water.

**Chromatic solution** : Dissolve 20 gms of either potassium chromate or sodium chromate in 1000 ml of distilled water.
0.153 N Silver nitrate solution ($AgNO_3$)- to 25.95 gms of silver nitrate, add sufficient deionised water to make 1 ltr. solution.

**Procedure** :
Pipette a 1 ml sample of Zincosheen 772 operating solution into a 250 ml Erlenmeyer flask.
Add 25 ml of Buffer solution.
Add 5 ml of Chromate solution to give the solution a yellow colour.
Titrate with 0.153 N Silver Nitrate solution until a permanent reddish colouration forms on the white silver chloride precipitate.
**Calculation** :
Ml of 0.153 N $AgNO_3$ solution titrated x 5.4 = gm/ltr total chloride.

## Analysis of Boric acid

**Reagents Needed**:
0.1 N Sodium Hydroxide- To 4.0 gms of AR grade sodium hydroxide add sufficient distilled water to make 1 ltr of solution. Standardize against a sulphuric acid of a known normality.
0.2 Mannitol A.R. Grade
Bromocresol purple indicator solution- Dissolve 0.1 gm of Bromocresol purple solid dye in 18 ml of 0.01N sodium hydroxide and dilute to 250 ml with distilled water.

**Procedure:**
Pipette a 1 ml sample of the ZINCOSHEEN 772 solution into 250 ml Erlenmeyer flask.
Add sufficient Mannitol to form athick slurry.
Add several drops of Bromocresol purple indicator solution and titrate with 0.1 N sodium hydroxide solution from yellow to a purple end point.
**Calculation** :
Ml of 0.1 NaOH solution titrated x 6.18 = gm/ltr. of Boric Acid.

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# ZINCOSHEEN 772

## CONVERSION OF EXISTING SOLUTIONS

Most acid Zinc Plating solutions can be satisfactorily converted to the ZINCOSHEEN 772 process. The levels of Zinc ions should be replenished and adjusted by ZINCOBRITE 780 A and B.The conversion should be carried out by removing the organic contaminants by purification treatment with Hydrogen Peroxide and Activated Carbon. Then the level of Brightner and Carriers be adjusted after consulting the PCI team.

## SAFETY AND PRECAUTIONS :

ZINCOSHEEN 772 process may be corrosive to skin and may cause irritation to eyes. Ingestion may cause stomach distress. This product is a chemical for Surface Treatment and only for Industrial Use. Don't use for other purpose. Wear suitable Personal Protective Equipment.

- Use only in well ventilated areas. INSTALL EYE WASHER AND SAFETY SHOWER IN HANDLING PLACE.
- Keep the containers tightly closed in a cool and well ventilated place.
- If contact with skin/eyes, rinse immediately with plenty of water and seek medical advice immediately, if inhaled and swallowed.

NOTES :

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*Manufactured by* :

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**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.<br><br>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. |
| **Problem** | **Possible Cause** | **Corrective Action** |
| Deposit staining or black after chromating | Copper contamination (5 to 10 ppm) and/or Cadmium contamination (10 to 20 ppm) | Electrolyze solution at two to five asf for eight to 12 hr.<br><br>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 |
| **Problem** | **Possible Cause** | **Corrective Action** |
| White staining | Poor rinsing and/or high brightener | Improve rinsing<br><br>Add 0.5 fl/oz of hydrochloric acid to the first rinse after the plating tank<br><br>Reduce brightener additions |

| Problem | Possible Cause | Corrective Action |
|---|---|---|
| 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 |

| Problem | Possible Cause | Corrective Action |
|---|---|---|
| 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. |
| **Problem** | **Possible Cause** | **Corrective Action** |
| | 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 |

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| | 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. |
| **Problem** | **Possible Cause** | **Corrective Action** |
| 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. |
| **Problem** | **Possible Cause** | **Corrective Action** |
| | Iron | Treat with hydrogen peroxide. |

| | | |
|---|---|---|
| | contamination | 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 |

For Further Information , contact :

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