



PLATING SHEEN CHEM (INDIA) PVT. LTD.

EXCELLENCE IN METAL FINISHING

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MAXSHEEN 788

MAXSHEEN 788 process provides excellent and quick Brightness as compared to others and is totally trouble free while plating the parts. It provides ductile, scratch free, high degree of extra Levelling, imparting high lustrous finish in the Nickel Plating Process. Has an exceptional, high speed deposition rate, covering LCD areas uniformly. The grains deposited are so fine that it gives a White lustrous glaze at all times. Deposits are very active and suitable for subsequent plating. Chrome electroplates on this finish gives an extra decorative bluish colour.

MAXSHEEN 788 process has a high tolerance to impurities in the Nickel Plating Process, like Zinc, Copper, Iron, etc. **MAXSHEEN 788** is best suited as a top coat brightner in Duplex Plating System specially in Automatic and Semi Automatic Installation system. It has a low consumption and is recommended for both Vat and Barrel.

WORKING CONDITIONS

(For make up of New Bath)

PCI SHEENEX NICKEL SALT	: 300 - 400 gms./ ltr.
OR	
NICKEL SULPHATE	: 250 – 300 gms./ltr
NICKEL CHLORIDE	: 50 – 75 gms/ltr
BORIC ACID	: 40 – 50 gms.ltr
MAXSHEEN 788 BRIGHTNER	: 0.1 – 0.4 cc/ ltr.
ZODIAC 807 ADDITIVE	: 5 – 8 cc/ ltr.
CONSUMPTION 788	: 100cc – 150 cc/ KAH (for Vat)
807	: 150cc – 250 cc/ KAH (for Barrel)
TEMPERATURE	: 50°– 60°C
FILTRATION	: CONTINUOUS WITH ACTIVATED CARBON.
AIR AGITATION	: VIGOROUS
pH	: 4.5 - 4.8

CATHODE CURRENT DENSITY : 2.5 – 8.0 Amp/dm² (For Vat)
: 0.5 – 2.0 Amp/dm² (For Barrel)

ANODE CURRENT DENSITY : 1.0 – 3.0 Amp/dm² (For Vat)
: 0.5 – 2.0 Amp/dm² (For Barrel)

VOLTAGE : 4.0 – 12.0 (For Vat)
10.0 – 16.0 (For Barrel)

MAINTENANCE

MAXSHEEN 788 BRIGHTNER produces excellent brightened, leveled and lustrous Nickel deposits at fairly wide current densities, and should be strictly maintained within the specified limit. 788 also imparts high tolerance to impurities.

ZODIAC 807 CARRIER ADDITIVE gives extra ductile and stress free deposits in combination with 788 Brightner. It enhances the brightening and imparts extra high degree of leveling of Nickel deposits. 807 also imparts proper chrome receptivity.

For getting consistent results, 788 and 807 should be added at regular intervals preferably through a dosing pump fitted with an ampere meter. The addition of brighteners should be added on the basis of ampere-hours passed.

SOLUTION PREPARATION :

The storage tank should be used in preparing a new Nickel 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 and 0.2 % by volume ANTI PITTER 101. 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 nickel sulphate.
3. Add nickel chloride.
4. After material has all dissolved add enough nickel carbonate to raise pH to a value of at least 5.2. Stir thoroughly.
5. Add 2gm/l activated carbon powder (1200 I.V.) and stir for 30 - 60 minutes.
6. Allow solution to settle for 3 - 4 hours or preferably overnight.
7. Filter into clean plating tank and heat to 60^o C.
8. Add the necessary quantity of boric acid and agitate the solution until dissolved
9. Dilute to final volume and heat to operating temperature.
10. Adjust the pH to 3.5 with well diluted sulphuric acid.
11. At this point is advisable to "dummy" the solution by electrolysing at about 5.4 ASD for 12 hours. Use of agitation and filtration during this period is beneficial
12. Readjust the pH if necessary.
13. Add required amount of addition agents, such as brightner and carrier.
14. Circulate for 20 minutes and start plating

CONSTITUENTS

Nickel Sulphate :

The nickel content should be determined at least once a week and adjusted at regular intervals. Normally a concentration of 225 to 350 gm/l of nickel sulphate is specified because this provides a sufficiently high metal concentration for all purposes. If the plating job is particularly difficult (deep recesses, sharp corners, irregular shapes, etc.) or if the current concentration required is above 4.5 -6.5 amperes per litre, the nickel salts concentration should be carried at the higher level.

Nickel Chloride :

The nickel chloride content should be determined and corrected at the same frequency suggested for nickel sulphate and should be maintained within the limits specified. Low nickel chloride content will result in poor anode corrosion and low efficiency leading to depletion of the nickel content of the solution and/or breakdown of the addition agents.

Boric Acid :

The boric acid content of the solution should be determined and adjusted at least once a week. The control and maintenance of the boric acid content of the plating solution between the specified limits is essential for several reasons:.

While boric acid is not generally recognised as an efficient buffer in the pH range used for the nickel solution, it is an experimental fact that there is noticeably less gassing at the cathode and increased operating efficiency when the boric acid content is kept within the specified limits. Excessive gassing at the cathode causes streaking, as pocketing and is an indication of low operating efficiency. Low boric acid content also contributes to "orange peel" type of pitting.

TEMPERATURE

The temperature of the MAXSHEEN solution should be maintained at between 50 - 75°C. The use of automatic temperature control is recommended to assist in maintaining constant operating conditions. Equipment requirements should be considered, e.g. tank linings and air agitation lines, when operating at higher temperatures.

pH

The pH of the MAXSHEEN solution should be determined regularly and maintained within the range 4.5 - 4.8. Dilute sulphuric acid (one part sulphuric acid to ten parts water) should be used to lower the pH. when necessary to raise the pH, nickel carbonate may be used by application to the filter.

EQUIPMENT

Plating Tanks :

Rubber or PVC Lined steel, composition, ceramic or glass tanks which have been approved for use with PCI Nickel 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..

Heating

Glass coated steel, , electrical heating units and other suitable types as well as external heat exchangers may be used for heating the plating solution. Titanium heating coils can satisfactorily be used in many instances.

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

Anode Area and Anode Current Density

Active Anode area, i.e. that area subject to electrolytic corrosion, must be maintained at the highest practical level. In "still" tanks sufficient active anode area must be provided to maintain the anode current density below 18 ASF. In highly agitated tanks, e.g. air agitated, the anode current density should not exceed 30 ASF. However, the type of nickel anode material and anode bag material as well as agitation can raise or lower these arbitrary anode current density limits. If this limiting current density is continually exceeded, there will be a tendency for the anodes to polarise leading to loss of current, possible loss of ductility and poor corrosion protection. Anode area should be checked frequently and anodes added or positioned so as to present the maximum area until completely corroded..

OPERATING PRECAUTIONS

Anode Bags

Nickel anodes and baskets must be fitted with bags to prevent nickel fines or nickel sulphide residues entering the plating solution. Polypropylene is widely used for anode bags because of its durability. However, other fabrics including cotton and other synthetics are used successfully. Care should be taken to avoid tearing or damage to the bags. This is a common problem when using bar anodes or primary nickel strip, where sharp tips from partially corroded anodes may tear the bags. Bags should be examined frequently for tears, cuts or bruises, and replaced where necessary, since fine particles from the anode will cause roughness if allowed to enter the solution. The use of two bags or double walled bags may be advisable in installations where frequent cutting or tearing occurs.

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.

Nickel

Pipette 1 ml of the plating solution into 500 ml conical flask, dilute it with small quantity of distilled water. Add about 5ml of ammonium hydroxide solution and a few grains of Murexide indicator. Shake the flask well and titrate against 0.1 M EDTA to purple colour end point. Note the reading, let it be 'a' ml of EDTA.

Calculation : 'a' ml of EDTA X 5.869 = gm /ltr. Nickel metal in bath.

Nickel Chloride

Pipette 5 ml of the solution into a 500 ml Conical flask and dilute with distilled water. Add few drops of potassium chromate indicator and titrate against 0.1 N silver nitrate until the white precipitate of silver chloride takes on a very faint reddish brown tint. It requires practice to detect the exact end point easily. Note the reading

Calculation : ml of 0.1 N AgNO₃ used X 2.378 = gm/ltr NiCl₂6H₂O in the bath.

Nickel Sulphate

From total nickel metal and Nickel Chloride concentration Nickel Sulphate can be calculated as follows:

[gm/ltr. of Nickel Metal –(gm/ltr. of Nickel Chloride x 0.247)] x 4.79 = gm/ltr of NiSO₄7H₂O

Boric acid

Pipette out 1 ml of the plating solution into a conical flask. Add 2-3 gms of Mannitol powder and shake well to make a slurry. Titrate with N/10 Sodium Hydroxide after adding 2-3 drops of Bromocresol purple as indicator, The end point is yellow to blue.

Calculation : ml of N/10 NaOH used X 6.184 = gm/ltr. Boric Acid in the bath

CONVERSION OF EXISTING SOLUTIONS

Most semi-bright nickel solutions can be satisfactorily converted to the MAXSHEEN 788 process. The levels of Nickel ions should be replenished and adjusted by Nickel Sulphate, Nickel Chloride and Boric Acid 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.

DISCLAIMER : The data in this leaflet corresponds to our latest knowledge. However, it is not possible to derive any liability there from. Each processor will be himself liable for observation of all regulations, for suitability in a particular application or in matters of legislation or patent law.

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