

# Prime Chemicals-Pakistan

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## HENE-6000 CATALYST

A UNIQUE NON FLUORIDE CATALYST FOR  
HIGH SPEED CHROMIUM PLATING

HENE-6000 CATALYST is specially designed to be used for hard chrome plating process. This additive should be used to prepare the initial working bath along with Chrome Salt and also for regular replenishment.

### Salient Features

- Higher Cathode efficiency 23-26% resulting in saving of expensive electrical power by 30-40%.
- Increased Wear Resistance by 20-25% results in longer life of the plated compounds.
- Produces micro-cracked deposits (600-1000 cracks per linear cm) resulting in better corrosion resistance.
- Easy to maintain the constituent of the bath.
- Bath operates satisfactorily within a wide range of operating parameters without affecting the deposit characteristics.
- Wide cathode C. D. operation 30-70 A/dm<sup>2</sup>.

### Bath Make-up

	Unit	Optimum	Range
Basic Salt CN-5008	gm/lit.	240	200-275
Catalyst HENE-6000 Part I	ml/lit	5	3-5
Catalyst HENE-6000 Part II	ml/lit.	50	45-50

**Note:** After the above addition the operating solution should be analysed for chromic acid and sulphate. For the chromic acid adjustment, add 12 g/lit Basic Salt for 1°Be rise. If required, sulphate should be adjusted by adding proportionate quantities of Catalyst HENE-6000 Part I. Addition of 1.5 ml/lit Part I would increase 1.0 gm/l of sulphate in the operating solution.

### OPERATING CONDITIONS

Density	20° Be	17 - 23° Be
Temperature	55° C	52 - 60° C
Cathode Current Density	50 A/dm <sup>2</sup>	30 - 70 A/dm <sup>2</sup>
Anode Current Density	17.5 A/dm <sup>2</sup>	15 - 22 A/dm <sup>2</sup>

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Voltage

6

4 – 12 Volts

It is advisable that for getting hard chromium deposit, the current density and temperature both are maintained at optimum levels although this process gives consistent quality results with wide operating condition.

The base metal surface has to be smooth and uniform and surface imperfections are to be removed by mechanical polishing and burnishing operations.

The components to be hard chromium plated should be pre-cleaned in suitable hot alkaline soak cleaner and rinsed well. To ensure good adhesion of hard chromium deposit on mild steel components, anodic etching in conventional chromic / sulphuric acid bath at 50° to 65° C for 30 secs.-120 seconds, should be carried out in a separate tank. The parts should be transferred into the plating bath without rinsing. After plating, the parts are dipped in drag-out and neutralizer followed by water rinse and hot water rinse.

## **SOLUTION PREPARATION**

The preparation of plating solution is very simple and is given as under:

1. Fill the cleaned plating tank with D.M. water to almost one-third of the operating level.
2. Add the calculated quantity of Basic Salt with stirring. The salt should be added in small quantities and continue stirring to ensure complete dissolution of the added salt. Then add corresponding quantity of Catalyst HENE-6000 Part I and HENE-6000 Part II.
3. Add DM water with constant stirring upto the density 21°Be which will maintain the working level and stir for another 2-3 hours.
4. When the solution becomes homogenous, heat the solution to 55° C. Place the anodes and electrolyze the bath for 3-4 hours at operating temperature of 55° and at a current density of 35-45 amps./ dm<sup>2</sup>. It is very much important to achieve usual 'chocolate brown' film on the anodes during initial electrolysis for smooth and trouble-free production.

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## EQUIPMENT

Chlorinated, flexible PVC lined mild steel tanks are suitable. Lead lined tanks are not suitable and if tanks are lead lined, they should further be lined with flexible grade PVC.

The plating tanks should be equipped with a suitable heating device and thermostat control to maintain the temperature within the specified range. Suitable exhaust system with scrubber facilities should be provided to keep the environment clean. Cooling is required to control the temperature of the solution since heat is evolved due to higher voltage and operating current. For direct heating and cooling titanium coils are normally used. Teflon or PVDF coils are also suitable for heating and cooling.

## ANODES

The Anodes should be 7-10% tin / 93-90% lead alloy. Round anodes are normally preferred as compared to flat type. However, the life expectancy of tin/lead alloy anodes is comparatively less than in conventional chrome plating solution. When the bath is not in use, anodes must be removed. Lead-Tin-Silver (93:6:1) anodes have longer life than Lead-tin anodes.

Platinized titanium anodes can also be used. But care should be taken that these are completely covered with lead dioxide film (brown black layer).

## POWER SUPPLY

A direct current source at 6-12 volts depending on the current density requirements is suitable for use with this plating process. The rectifiers used should be of 3 phase rectification preferably with oil cooling and provided with stepless voltage control between 0-100%. The residual ripple must be below 5 %. The current carrying capacity of all electrical connections, busbars and plating jigs must be designed to carry the required amount of current continuously.

## SOLUTION MAINTENANCE

The solution be analyzed regularly and maintained as under :

Chromic Acid	:	200 – 275 g/l (Optimum 240 g/Liter)
Sulphate	:	2.2 – 4 g/l (1.1% to 1.5% of CrO <sub>3</sub> Content)

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The solution concentration can be maintained on the basis of hydrometer reading and the solution density can be maintained by regular additions of Basic salt. Usually a maintenance addition of 175 gm per 1000 Amp.-hr. of Chromic Acid should automatically maintain the electrolyte composition. However, it is always advisable to analyze periodically the sulphate and chromic acid content and maintain the electrolyte accordingly.

To maintain the proper concentration of HENE-6000 Part II CATALYST is advisable to add the same at the rate of 100 ml per one kg. of Basic Salt being added to maintain the Chromic Acid content in the working bath.

To increase the sulphate content, add calculated amount of HENE-6000 Part I.

We do not recommend any addition of Chemicals other than specified in this instruction manual as this may adversely affect the performance of the bath.

## TABLE 1 – PLATING SPEED

Time in minutes to deposit 1.0 Micron (Average)

<b>Current Density A/dm<sup>2</sup></b>	<b>HENE-6000 (Mins)</b>	<b>Conventional (Mins)</b>
20.0	4.2	7.7
30.0	2.1	3.6
40.0	1.4	2.6
50.0	1.1	2.1
60.0	0.9	1.8

### **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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