TECHNICAL DATA SHEET

DUROBRITE SRHS 231

DUROBRITE SRHS 231 is an unique additive to be added chromium plating to increase cathode efficiency of the process. It has got substantial advantages over conventional chromic acid and sulphate based process.

1. High cathode efficiency, high current density range cuts down the plating time by 50-60%.
2. Activate the nickel surface to improve chrome coverage.
3. Low initial make-up concentration.
4. Due to self-regulation of catalyst bath, maintenance is easy.
5. Improved corrosion resistance.
6. Interruption of current for short period does not affect the brightness of the deposition.

SOLUTION MAKE-UP

	Range	**Optimum**
Regulex* Chrome Salt	220 - 300 g/l	250 g/l
Durobrite SRHS 231 Additive	3 - 7 ml/l	5 ml/l

* Grobrite, Durobrite, Chrome CA & HENE Chrome salt can also be used alongwith Durobrite SRHS 231 additive.

OPERATING CONDITIONS

Density	19-23 ^{o}Be
Temperature	30-56 ^{o}C
Cathode Current Density	10-30 A/dm^2
Anode Current Density	5-15 A/dm^2
Voltage	4-12 volts
Ratio of chromic acid to sulphate	175-250 : 1

SOLUTION PREPARATION

The Durobrite SRHS 231 Chrome solution preparation is very simple. However, certain precautions must be taken in the initial make-up, to obtain good results from the beginning. The salts should be completely dissolved before starting the production trials. It is important that the tank linings are cleaned well. The recommended procedure is given as follows :

1) Fill the clean plating tank with clean deionized water to about two-thirds of the operating level and heat the water to 50 ^{o}C.
2) Add the calculated quantity of Regulex* Chrome Salts with stirring. The salts should be added in small increments and stirring should be continued until all the salts are completely dissolved.
3) Add clean D.M. and apply water to the operating level and continue the stirring.
4) When the salt is completely dissolved, add appropriate amount of Durobrite SRHS 231additive. Place the anodes in the tank, electrolyse the bath for few hours at operating temperature, 25-35 Amps/dm^2, until a brown chocolate film is formed on the anode. Now the bath is ready for plating.

EQUIPMENT

Small M.S. plating tanks can be lined with soft special grade PVC Material. Bigger capacity tanks are usually of special PVC lined or Tin lead alloy (containing 7% tin) lined mild steel tank. In case of tin lead alloy lined tank, loose PVC Sheets are normally kept on all the sides of the tank to prevent, undesirable stray electrical currents.

The plating tanks should be equipped with teflon or lead tin lined M.S. heaters or coils. Thermostat control is to be provided to maintain the temperature within the specified range. Water jacketed tanks are preferred for bigger capacity tanks since this serves the dual purpose of heating and cooling. Cooling is required to control the rise in temperature of the solution since heat is evolved due to higher operating current and voltage. For direct heating and cooling, lead tin alloy and Tantalum coils are normally used. Tantalum is expensive and hence teflon or similar fluoro carbon polymer coils are also suitable materials for heating and cooling for chrome plating solution. Titanium cooling coils are not suitable for this type of chrome plating process.

ANODES

Anodes of tin lead alloy (approx. 7% tin) preferably of round section are recommended, although flat or corrugated are satisfactory.

The round anodes are effective over their whole area whereas the other types are less effective as compared to that of the round type.

Many of the hard chromium jobs require conforming tin lead anode set-ups. This is to maintain a fixed anode to cathode position and to improve the thickness distribution. For complicated and intricated items, such as moulding dies etc. auxiliary anodes have to be employed.

During idling period the anodes become passive and this can be cleaned mechanically by wire brush or immersing in a alkaline cleaner. When the solution is idle for more than a few days, the anodes may be removed from the solution and kept outside. On resumption of plating, anodes should be electrolysed to form the protective lead peroxide film (chocolate brown in colour) on anodes.

POWER SUPPLY

A D.C. power source rated at 8-18 volts depending on the current density and distance between cathode and anode requirement is suitable for use with Durobrite SRHS 231 Chrome solution. The rectifiers used should be of preferably 3 phase rectification with low ripple content (less than 5%). The current carrying capacity of all electrical connections, bus bars and plating jigs must be designed to carry the required amount of current continously.

SOLUTION MAINTENANCE

The solution concentration can be maintained on the basis of hydrometer reading and this can be maintained by regular additions of Regulex* Chrome salt and Durobrite SRHS 231 additive, usually every 1 kg of Regulex* chrome Salt we recommend to add 50-100 ml of Durobrite SRHS 231 additive. We do not recommend the use of commercial chromic acid for maintaining the solution, as this will change the ratio of chromic acid to special catalyst.

To maintain consistent results the solution should be periodically analysed in chromic acid and sulphate. The sulphate should be maintained between 1.0 - 1.6 g/l (Ratio of chrome acid to sulphate should be 175-250:1) and sulphate is determined by standard gravimetric analysis. The active catalyst plays an important role in maintaining better efficiency, good hardness and this should be kept in the range of 0.7 - 1.1 g/L. The analytical method for determining the active catalyst is available on request from Growel. Good quality of barium carbonate is to be added at the rate of 2.0-3.0 g/L to reduce the sulphate content by 1.0 g/L. To make-up for the losses during working, the solution from the drag-out tank should be added and clean D.M. water (chloride free) should be used while dissolving the required replenishment chemicals.

CONVERSION

The conventional and other type of baths can be easily converted into Durobrite SRHS 231 Chrome bath system by adjusting the sulphate to optimum level and adding the required amount of conversion additive. However, we recommend one litre sample should be sent to Growel laboratory for analysis and plating tests. Before drawing the sample the solution should be well and representative sample is to be taken for analysis.

TABLE I

DENSITY OF DUROBRITE SRHS 231 CHROME SOLUTIONS

Concentration of Chrome Salt g/L	Density in Degree Baume at 25°C
152.0	14.0
164.0	15.0
177.0	16.0
190.0	17.0
203.0	18.0
216.0	19.0
229.0	20.0
242.0	21.0
256.0	22.0
270.0	23.0
286.0	24.0
300.0	25.0

TABLE II

PLATING SPEED (AVERAGE THICKNESS)

(Time to Deposit 1.0 microns)

	Current Density A/dm^2	Durobrite SRHS 231 Chromium	Conventional
1.	15.0	7.0	11.7
2.	20.0	4.5	7.7
3.	30.0	2.4	3.6
4.	40.0	1.5	2.6
5.	50.0	1.2	2.0

AMOUNT OF BARIUM CARBONATE REQUIRED TO REDUCE THE SULPHATE

G/L So_4^{2-} to be removed	TANK SIZE - (LITRES)					
	100	200	400	600	800	1000
	Grams of Barium Carbonate Required					
0.1	20	40	80	120	160	200
0.2	40	80	160	240	320	400
0.3	60	120	240	360	480	600
0.4	80	160	320	480	640	800
0.5	100	200	400	600	800	1000
0.6	120	240	480	720	960	1200
0.7	140	280	560	840	1120	1400
0.8	160	320	640	960	1280	1600
0.9	180	360	720	1080	1440	18800
1.0	200	400	800	1200	1600	2000

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