CUPRICAL BR-SUPER

HIGH SPEED BRIGHT CYANIDE PLATING PROCESS

INTRODUCTION

AUROMEX CUPRICAL BR-SUPER is a versatile, easy to operate, cyanide bright copper plating process, designed to achieve high speeds on a variety of substrates with a minimum of operational problems.
CUPRICAL BR-SUPER is produces smooth, uniform, fine-grained copper deposits suitable for subsequent nickel plating.
CUPRICAL BR-SUPER has a single brightening agent to simplify operation and control. Hull Cell panels directly reflect the operational aspects of this process and offers a simple easy to use method for process control.

SOLUTION COMPOSITION

Material	Range	Typical Bath
POTASSIUM BATH		
Copper (Cu)	25 – 40 g/l	30
Copper cyanide (CuCN)	40 – 60 g/l	50
Total potassium cyanide (KCN)	100 – 120 g/l	90
Free potassium cyanide (KCN)	15 – 40 g/l	20
Caustic potash (KOH)	10 – 20 g/l	15
Potash (K_2CO_3)*	25 g/l	
SODIUM BATH		
Copper (Cu)	25 – 40 g/l	30
Copper cyanide (CuCN)	30 – 60 g/l	45
Total potassium cyanide (NaCN)	80 – 95 g/l	86
Free potassium cyanide (NaCN)	10 – 30 g/l	12
Caustic potash (NaOH)	10 – 20 g/l	15
Potash (Na_2CO_3)*	19 g/l	

* New solutions should contain these minimum quantities.

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ADDITION AGENTS (ALL BATHS)

	Range	Typical
BR-SUPER AC-B (Brightener)	0.3 – 1.0 %/vol	0.5
BR-SUPER AC-WA (Anti-pitter, Air Agitated and Mechanically Agitated baths)	As required	

OPERATING CONDITIONS (ALL BATHS)

Temperature	65 – 71 ^{o}C	68 ^{o}C
Current interruption cycle	7 -10 seconds on 2 – 3 seconds off	
Agitation	Air or mechanical	

SOLUTION CONTROL ; GENERAL

The analytical frequency will vary and can best be determined by experience; however, a good rule of thumb is copper cyanide, once per week; alkaline hydroxide, twice per week; free cyanide, at least daily. A Hull Cell panel daily is good practice for baths operating 8 hours per day or more.

FUNCTION OF BATH CONSTITUENTS

Copper cyanide
This is the source of copper metal while plating. The concentration can vary over a wide range, depending on the application and individual requirements. Higher plating speeds require higher concentrations of copper in solution. The “free” cyanide concentration must be adjusted to the copper concentration for optimum results.

Alkali cyanide – Referred to as “free cyanide”
This constituent is necessary to solubilise copper ions at the anode and prevent precipitation of copper cyanide. A high free cyanide will result in loss of cathode efficiency and high current density “ burning”. A low free cyanide can result in anode polarization and non-uniform color problems in the deposit. See “copper cyanide” above.

Alkali hydroxide
Although the hydroxide ion can vary over a fairly wide range, 10-20 g/l of alkali hydroxide has been found to be the most practical for most applications. A low concentration can lead to anode polarization and deposits color problems. A high concentration can result in lowered cathode efficiency, attack on some types of substrates, and rapid carbonate build-up.

Temperature
The temperature is preferably maintained between 65.5^{o}C – 71^{o}C. Higher temperatures are not critical, but lead to excessive carbonate formulation and high alkali cyanide consumption. Lower temperatures will reduce the operate current density range.

Filtration
A filtration rate capable of solution turnover every one to two hours is the minimum suggested. This rate will help provide smoothness and brightness to the deposit. Continuous filtration through a suitable filter aid and carbon pack will ensure the best operation.

Current interruption

Current interruption is recommended and has definite advantages. Cycles of the order of 7 – 10 seconds “on” and 2 – 3 seconds “off” have been found to be the best for maximum brightness, cathode current density and anode corrosion. Interrupted current cycles, which accomplish cathode film replenishment, allow higher current densities, which result in an overall gain in plating speed.