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DIRECT PLATING SYSTEM
Copper Plating Process

INTRODUCTION

This process provides a stable, bright, ductile copper deposit with a solution throwing power designed specifically for through-hole plating in the printed circuit industry, etc. Single additive, easy control, economical. Resistant to organic and metallic pollution. Deposits withstand all standard thermal shock tests to all known specifications.

SOLUTION MAKE-UP

Copper plating solution	use as supplied
Copper carrier	7.5 ml/l
Copper Additive	5 ml/l

Fill the plating bath with copper plating solution as supplied to the working volume. Electrolyze the solution at current density 1 amp/dm^2 for 3 to 4 hours using cleaned board. then add 7.5 ml/l Copper Carrier and 5 ml/l Copper Additive.

OPERATIONAL DATA

	Optimum	Range
Copper Sulfate ($CuS0_4.5H_20$)	90 g/l	75 - 90 g/l
Sulfuric Acid (H_2S0_4)	100 ml/l	70 - 110 ml/l
Sodium Chloride (NaCl)	0.1 g/l	0.07 - 0.13 g/l
Copper Carrier	7.5 ml/l	5.0 - 10.0 ml/l
Copper Additive	5 ml/l	4 - 6 ml/l
Temperature	27°C	21 - 32°C
Agitation	Vigorous air sparging, cathode movement speed 6 meters/minute.	
Cathode Current Density	4 amps/dm^2	
Anode Current Density	1 - 3 amps/dm^2	
Anodes	Phosphorus-deoxidized copper anode (to BS6017:1981or equivalent) bagged with woven Terylene or polypropylene bags.	
Deposition Rate	48 micron/hour at 3 amps/dm^2, 100% cathode efficiency under all normal operating conditions	

REPLENISHER

15 - 20 ml. Copper Additive/100 ampere hours, depend on operation.

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EQUIPMENT RECOMMENDATIONS

Tank	Semi-hard PVC, polyethylene or polypropylene
Heaters	Silica, PTFE or aluminous porcelain immersion heaters with thermostat control.
Filtration	Continuous using filter paper stacks or 3–5-micron woven polypropylene cartridges (with siliceous filter aid if required). Flow rate of three times tank volume per hour.
Agitation	Preferably vigorous using oil-free air sparging, higher cathode current densities are permissible with air agitation as opposed to mechanical agitation.
Electrical Supply	6 – 8 V rectifier

NOTES

1. Run for maximum throwing power with boards racked rigidly vertical with flat plane moving in a reciprocal fashion normal to anodes, so as to produce sluicing action through the holes. A longer stroke rather than a higher reciprocation speed is conducive to faster deposition. Air agitation should also be used in combination.
2. High chloride levels (greater than 120 ppm) can cause anode polarization.
3. Too low or too high anode surface area, especially with anodes operating in titanium baskets, will increase additive consumption, in extreme cases this can even cause deposit roughness.
4. Anode bagging is strongly recommended.
5. Store the Additive in as cool a place as possible preferably below 25 °C and always out of direct sunlight.

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