



ACID COPPER PLATING SYSTEM

INTRODUCTION

Acid copper plating has gained importance in recent years due to two main reasons – firstly, because of the steep rise in the price of nickel metal and secondly, because of the remarkable advances in the development of organic brighteners and additives. These developments enable us today to plate mirror-bright, ductile, pore-free, highly leveled copper deposits. The **Acid Copper Plating Systems** are products of in-house research in our laboratories. This data sheet describes the Acid Copper System for plating on components such as jewellery, hardware, industrial components etc.

DEPOSIT PROPERTIES

The **Acid Copper Plating System** is a stable and easy-to-maintain system. There are very few breakdown products formed which might affect the quality of the deposits. The deposits obtained – in both barrel and rack plating - are mirror-bright and cover both high and especially low current density areas easily. As a result, even hollow components can be plated with copper giving a uniform appearance. The deposits are highly leveled and ductile and have very little stress. The deposits are compatible, e.g., with subsequent bright nickel plating.

BATH PARAMETERS (RANGE)

Copper sulphate pentahydrate	220g/L (200-240g/L)
Chloride ions	110ppm
Sulphuric acid, conc.	30mL/L
ACU C Make up	7mL/L (6 - 8mL/L)
ACU A Brightener	0.7mL/L (0.4-0.6mL/L)
ACU B Booster	0.4mL/L (0.4-0.6mL/L)
ACU D Leveller	q.s.
<u>Bath values desired:</u>	
Copper metal	55g/L (50-60g/L)
Sulphuric Acid, conc.	30mL/L (26-45mL/L)
Chloride	110ppm (80-120ppm)

BATH PREPARATION

Dissolve the weighed quantity of concentrated sulphuric acid (gloves, goggles!) in DI Water corresponding to three-fourths of the final volume of the bath. *Considerable heat is generated during the dissolution.* Cool to about 50°C and dissolve the weighed quantity of the copper sulphate by adding in portions with

stirring. Purify this solution first by carbon treatment using a cartridge filter and then by hydrogen peroxide treatment. Ensure that all hydrogen peroxide is expelled by warming. Finally, add the requisite amount of sodium chloride, dissolved in a small quantity of demineralized water. Finally, add the required amount of demineralized water to bring the volume to the final volume.

BATH OPERATING CONDITIONS

Parameter	Ideal	Range
Bath density, °Be @ 25°C	22	20-22
Temperature, °C	25	20-30
pH	<1	-
Cathodic current density, A/dm ²	3	1-6
Bath voltage, V	1.0-3.6	up to 5-6 for large baths

Consumption:

ACU A Brightener	125-175mL/1000A.h
ACU B Booster (POP)	25-50mL/1000A.h
ACU C Make Up (POP)	150-200/1000A.h

The above values are typical values for vat plating of items such as imitation jewellery.

Note: If the bath temperature is higher, then the consumption of the ACU additives increase proportionately. In addition, there will be dullness at low current density areas of the components.

BATH MAINTENANCE

The bath volume must be filtered twice or thrice per hour. The copper, sulphuric acid and chloride contents must be analyzed on a regular basis. The addition of the various additives is dependent on the Hull cell panel results. If the bath performance does not improve with the addition of the additives, it could be an indication for higher levels of impurities. In this case, an activated carbon treatment is indicated.

The functions/indications for the various ACU additives are as follows:

ACU A Brightener is indicated when the overall brightness is low, when there is dullness in low current density regions, when there is burning at high current density regions, and when the throwing power of the bath is poor.

ACU B Booster is indicated when pitting occurs, when the appearance of the deposit is patchy or non-uniform, when the low current density areas appear dull, and when there is excessive brightener in the bath.

ACU C Make Up is indicated when the deposits are rough and/or brittle, when there is burning at high current density, when the wetting action is poor, when the appearance of the deposit is non-uniform and when there is excessive brightener in the bath.

ACU D Leveler is indicated when a high degree of leveling of the deposits is required.

PLATING EQUIPMENT AND ACCESSORIES

The anodes must be phosphorized copper anodes containing 0.03 to 0.06% P. They must be placed in anode bags which are made of material resistant to sulphuric acid. The air agitation must be with the help of oil-free compressed air and should be in the range of 150 to 300 liters per minute per meter length of the cathode. In addition, cathode rod movement may also be used.

The material of construction of the tanks can be hard rubber lined mild steel where the lining is reinforced with PVC or PE/PVC. Polypropylene tanks can also be used.

BATH ANALYSIS

Please contact us for full details.

EFFLUENT TREATMENT

Acid copper baths and their rinse waters are acidic in nature and must be neutralized to permissible pH values before discharge. The heavy metal(s) must be precipitated at alkaline pH and the filtrate brought to the desired pH value.

ACID COPPER SYSTEM - TROUBLESHOOTING

The functions/indications for the various ACU additives are as follows:

ACID COPPER Brightener A is indicated when the overall brightness is low, when there is dullness in low current density regions, when there is burning at high current density regions, and when the throwing power of the bath is poor.

ACID COPPER Booster B is indicated when pitting occurs, when the appearance of the deposit is patchy or non-uniform, when the low current density areas appear dull, and when there is excessive brightener in the bath.

ACID COPPER Make Up C is indicated when the deposits are rough and/or brittle, when there is burning at high current density, when the wetting action is poor, when the appearance of the deposit is non-uniform and when there is excessive brightener in the bath.

Warranty: The above information is based on our knowledge and experience and is given in good faith. RRR does not have control over the goods and over their usage, once they leave our premises. The normal precautions while handling chemicals must be followed (hand gloves, spectacles and so on), even when no hazard label is evident on the packing. The local regulations for treatment and discharge of chemicals must be followed. No liability arises out of handling or use.

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