Luster-On Products

Technical Data Sheet

LUSTER-ON COPPERBRITE II

Bright Acid Copper Plating System

I. GENERAL DESCRIPTION

The Luster-On Copperbrite II Copper Plating Process is a high performance system of addition agents for acid copper plating that offers extremely bright and ductile deposits for decorative applications.

The Luster-On Copperbrite II process features outstanding brightness and superior leveling over a wide operating range. The Luster-On Copperbrite II Process offers ease of control and economy. Routine replenishment is usually accomplished with a single maintenance addition of Luster-On Copperbrite II Secondary.

II. CHEMICAL COMPOSITION

	Preferred	Range
Copper Metal	5.5 oz/gal	5.0-7.0 oz/gal
Sulfuric Acid	6.25% by volume	5-8% by volume
Chloride	60 ppm	40-80 ppm

III. SOLUTION MAKE-UP

READ MATERIAL SAFETY DATA SHEETS ON ALL BATH COMPONENTS BEFORE MAKING UP BATH

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III. SOLUTION MAKE-UP (continued)

Copper Sulfate Pentahydrate ($CuSO_4.5H_2O$)	21.7 oz./gal
Concentrated Sulfuric Acid, Reagent Grade (H_2SO_4)	6.25% v/v
Chloride	60 ppm
Copperbrite II Primary	0.6% v/v
Copperbrite II Secondary	0.3% v/v

A. The copper plating solution should be prepared in an off-line tank and not in the plating tank itself. The off-line tank should be thoroughly cleaned, leached with 2% sulfuric acid solution for several hours, drained and rinsed. Tank should then be filled with deionized water to 3/4 of the final volume. **If deionized water is not available, water of known chloride content must be used. Solutions with chloride content above 100 ppm will exhibit decreased deposit brightness and leveling.**

B. With constant stirring, add the required amount of sulfuric acid. **(Never add water to acid as it will erupt in your face. Add the acid to the water slowly and carefully with stirring to avoid eruption of the acid from the extreme heat that is generated.)**

C. Add the required amount of copper sulfate pentahydrate and mix the solution until it is completely dissolved. Add deionized water to about 95% of the final volume.

D. Add activated carbon (sulfur free, acid washed) to the solution at the rate of 3-4 lbs./100 gal. and agitate for 2-3 hours. Allow the carbon to settle for at least eight hours and filter the solution into the clean plating tank which has been leached with 2% sulfuric acid, drained and rinsed as described in "A." above.

E. Add the required amounts of hydrochloric acid, Copperbrite II Primary, and Copperbrite II Secondary. (10 ml. reagent hydrochloric acid per 100 gallons of solution will raise the chloride ion by approximately 12 ppm.) **If deionized water was not used, be sure to compensate for the amount of chloride ion already in the water.**

III. SOLUTION MAKE-UP (continued)

F. Bring solution to final volume with deionized water and agitate well. Dummy solution for 4-6 hours at 10-20 amperes/ft^2. Analyze solution and make any necessary adjustments. Determine optimum level of Copperbrite II Primary and Copperbrite II Secondary by hull cell. Solution is now ready for use.

IV. SOLUTION COMPONENTS

A. Copper Sulfate

Copper Sulfate supplies the copper metal for the operating solution. A proper copper metal concentration will result in the best balance of plating range, throwing power and covering power. Higher concentrations of copper metal allow burn-free plating at higher current densities, but result in decreased throwing and covering power. High metal can also result in precipitation of copper sulfate crystals; leading to poor anode corrosion and roughness. Low copper metal can cause high current density burning and increased sensitivity to excess additions of Copperbrite II Secondary.

B. Sulfuric Acid

Sulfuric Acid affects the conductivity of the solution and allows plating at higher current densities without burning. High Sulfuric Acid concentrations can result in reduced throwing power, anode polarization and excessive consumption of Copperbrite II Secondary. Low concentrations of Sulfuric Acid result in reduced solution conductivity and require higher voltages to produce required current densities.

C. Chloride Ion

Chloride Ion improves anode corrosion, brightness, and plating range. High chloride will result in decreased brightness and leveling; lead to anode polarization and increase the likelihood of rough deposits. Low chloride will result in burning in the high current density and may decrease anode corrosion, resulting in anode polarization.

D. Luster-On Copperbrite II Primary

Copperbrite II Primary is used on make-up of new solutions, and for conversion to the Luster-On Copperbrite II process. Normally, additions of Copperbrite II Primary are necessary only for the replacement of materials lost by drag-out. Need for additions of Copperbrite II Primary is determined by hull cell. High concentrations of Primary have little effect. An extremely high concentration of Primary may result in dullness in low current density areas. Low concentrations of Primary may result in burning in the high current density areas, overall loss of deposit brightness and reduced leveling.

IV. SOLUTION COMPONENTS (continued)

E. Luster-On Copperbrite II Secondary

Luster-On Copperbrite II Secondary is the principal addition agent for the process. Low concentrations of the addition agent result in reduced brightness and leveling, and is most noticeable in the low current density ranges. High levels of Copperbrite II Secondary can result in pitting in the high current density ranges and reduction in covering power. Extremely high levels of Secondary can result in deposit stress and reduced low current density brightness.

V. PLATING CONDITIONS

A. Temperature

Luster-On Copperbrite II Process operates satisfactorily in the range of 70°-80°F. with 75°F the optimum temperature. Lower operating temperatures reduce the effectiveness of the addition agents. High temperatures can adversely affect throwing power and brightener usage.

B. Cathode Current Density

The Luster-On Copperbrite II Process produces bright level deposits in a current density range of 25 to 40 amps/ft^2. Usual operating current for most operations is approximately 30 amps/ft^2. Too low an operating current results in excessively long plating times and a rise in the copper metal. Too high a current will produce burned deposits.

D. Anode Current Density

Anode current density should be maintained at less than 20 amps/ft^2. Too high an anode current density can result in polarization of anodes. Too low an anode current density may result in roughness due to poor anode dissolution. Both high and low anode current density will result in increased consumption of Copperbrite II Secondary.

VI. EQUIPMENT

A. Anodes

Rolled oval anodes of phosphorized copper with titanium hooks are the preferred anode material. Phosphorized copper balls and titanium anode baskets may be used if desired; but the use of titanium baskets tends to increase usage of Copperbrite II Secondary.

VI. EQUIPMENT

B. Anode Bags

Napped polypropylene anode bags should be used. New anode bags should be thoroughly leached to remove sizing materials which can introduce organic contaminants into the plating bath.

C. Agitation

Low pressure air agitation should be used with all installations. Compressed air should not be used due to the risk of contamination with oil.

D. Tanks and Heaters

Lined steel tanks are recommended. Fabricated polyethylene or polypropylene tanks may be used. Fiberglass tanks are not recommended. Rinse tanks should be of the same materials.

Cooling coils of Teflon, titanium, tantalum, quartz or Karbate are suggested. If the temperature of the solution will drop below 65°F during cold weather, steam coils of the same materials are recommended. If steam is not available, electric heaters of quartz or titanium may be used.

E. Filtration

Copper solutions should be continuously filtered through an in-tank filter system such as the Flo-King system. Filter should be sized to provide 1-2 turnovers per hour. 1-2 micron filter cartridges are recommended. Continuous carbon filtration is **not** recommended.

VII. REPLENISHMENT

Replenishment of the Luster-On Copperbrite II Bright Copper Process is accomplished by additions of Luster-On Copperbrite II Secondary. As a guide for additions, Luster-On Copperbrite II Secondary should be added at the rate of 1 quart every 2000-2500 ampere hours. Actual operating experience will determine the optimum addition rate for a particular operation. The Luster-On Equipment Department can supply ampere hour feeders for optimum control of brightener additions.

VI. EQUIPMENT (continued)

Replenishment of the Luster-On Copperbrite II Primary is normally necessary only to replace drag-out losses. Where drag-out rate is known, a schedule of replenishment can be designed. Periodic Hull Cell analysis is helpful in determining the need for additions of Copperbrite II Primary. A reduced plating range in the high current density area or a streaky HCD usually indicates the need for Copperbrite II Primary.

VIII. CONTROL

A. Control of brightener levels in Luster-On Copperbrite II solutions may be accomplished with the Hull cell. It is suggested that a sample be submitted to the Luster-On Customer Service Laboratory every 4 - 6 weeks for routine brightener check.

B. Major solution components should be analyzed weekly by standard analysis methods. A copy of standard analysis methods is available upon request from the Luster-On Customer Service Laboratory or may be found in the METAL FINISHING GUIDEBOOK AND DIRECTORY.

IX. PACKAGE

All Luster-On Copperbrite II products are packaged in 5 and 55 gallon plastic non-returnable containers.

X. STORAGE

Keep container closed when not in use. Keep from freezing. If product freezes, it should be completely thawed and thoroughly re-mixed prior to use.

XI. WASTE TREATMENT

The Luster-On Copperbrite II addition agents do not require waste treatment. It is, however, necessary that the solutions in which they are used be treated for the removal of copper metal and pH adjusted prior to disposal.

XII. HANDLING PRECAUTIONS

MODERATELY ACIDIC INDUSTRIAL PRODUCT.

Copper plating solutions prepared per this data sheet are moderately acidic industrial products.

DO NOT GET IN EYES.
AVOID SKIN CONTACT.
DO NOT TAKE INTERNALLY.
EXERCISE NORMAL SAFETY PRECAUTIONS TO AVOID EYE AND SKIN CONTACT.

XIII. FIRST AID

FOR EYE CONTACT: Immediately flush eyes with plenty of water for at least 15 minutes. Get immediate medical attention.

FOR SKIN CONTACT: Wash the affected area thoroughly with soap and water. Wash contaminated clothing before re-use.

KEEP OUT OF REACH OF CHILDREN

FOR INDUSTRIAL USE ONLY

This product is sold for industrial use only. Our suggestions for its use are based upon tests and procedures which from experience we believe to be reliable. Since the use is beyond our control, neither we nor our distributors can assume responsibility, either expressed or implied for the results and/or for violation of any patents or any claims resulting from such use.

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