



CUPRABRITE™ AC PLUS

- **Outstanding low current density areas.**
- **Tolerant to an excess of brightener.**
- **Stable addition agents.**
- **No complexors or chelating agents.**
- **Bright, highly leveled deposits.**
- **Rack or barrel application.**
- **Economical to use.**

BRIGHT ACID COPPER PROCESS

AC PLUS is specifically formulated to produce exceptionally bright, highly leveled, ductile copper deposits on steel, plastics and zinc die casting, with very low internal stress.

AC PLUS provides improved corrosion resistance when used under nickel/chrome or nickel/brass deposits. Its outstanding low current density performance makes it ideal for plating complicated shaped parts.

AC PLUS has very high leveling ability combined with exceptional ductility and is excellent for filling in and eliminating scratches, pits and polishing lines. Parts may be nickel plated without further buffing or used as a final finish.

AC PLUS is a single maintenance additive system composed of extremely stable organic components. No harmful breakdown products are formed during operation or downtime periods.

OPERATING DATA

RACK APPLICATION

	<u>RANGE</u>	<u>OPTIMUM</u>
Copper Sulfate	20-30 oz./gal. (150-225 g/l)	25 oz./gal. (187 g/l)
Sulfuric Acid	7-20 oz./gal.* (52-150g/l) or 4-10 fl. oz./gal * by weight	12 oz./gal.* (90g/l) or 6.3 fl. oz/gal * by weight
Chloride Ion	25-80 ppm	50 ppm
AC PLUS REPLENISHER	0.3-0.6%/vol.	0.5%/vol.
AC PLUS BRIGHTENER	0.075-0.125%/vol.	0.1%/vol.
Temperature	70-100° F. (21-38° C)	80° F. (27.7° C)
Current Density	10-60 ASF (1.0-6.5 a/dm ²)	
Voltage	3-9 volts	

BARREL APPLICATION

	<u>RANGE</u>	<u>OPTIMUM</u>
Copper Sulfate	15-25 oz./gal. (112-187 g/l)	20 oz./gal. (150 g/l)
Sulfuric Acid	12-22 oz./gal.* (90-165 g/l) or 6.5-11.9 fl. oz./gal * by weight	15 oz./gal.* (112 g/l) or 8.1 fl. oz/gal * by weight
Chloride Ion	25-80 ppm	50 ppm
AC PLUS REPLENISHER *	0.3-0.6%/vol.	0.5%/vol.
AC PLUS MAINTENANCE	0.075-0.125%/vol.	0.1%/vol.
Temperature	70-100° F. (21-38° C)	80° F. (27.7° C)
Current Density	10-50 asf (1-5.4 a/dm ²)	
Voltage	3-9 volts	

As a rule of thumb, the sum of copper sulfate and sulfuric acid concentrations in opg should be 40. For rack applications 25 opg copper sulfate and 12 opg sulfuric acid is the most versatile. For barrel applications, 15 opg is normally recommended as more sulfuric acid is required for barrel plating. In some cases the sulfuric acid content is increased to 20 opg paired with 20 opg copper sulfate.

BATH MAKE-UP

- 1) Clean and leach the plating tank with 1-2%/vol. sulfuric acid solution for 2-4 hours. Discard leach solution prior to building new bath.
- 2) In separate tank, add $\frac{3}{4}$ final volume of water, then copper sulfate, then **slowly and very carefully** add required sulfuric acid. **Always add acid to water!**
- 3) Carbon treat with 4 lbs/100 gallon of activated carbon. Agitate for 2 hours and allow to settle for 8 hours.
- 4) Filter into tank and adjust to operating level.
- 5) Add required amount of hydrochloric acid. 100 ml HCL/1000 gallons = 10-13 ppm chloride ion.
- 6) Add **AC PLUS REPLENISHER** and **AC PLUS MAINTENANCE** and mix. Bath is ready to plate.

BATH COMPONENTS

Copper Sulfate

This supplies the copper ions. High concentrations can result in formation of crystals on the tank and anodes causing poor anode corrosion and roughness. Low concentrations cause burning, reduced leveling, narrow plating range and slower deposition. High purity copper sulfate is available from **A BRITE**.

Sulfuric Acid

This increases solution conductivity and makes it possible to maintain a current density at reduce voltages. High concentrations cause high current density burning. Low concentrations cause loss of brightness in the low current density area, reduce conductivity and increase voltage requirements.

Chloride Ion

This is an essential part of the process. It improves overall quality of the plate and improves increased anode corrosion. High concentrations cause striated deposits and high brighter consumption as well as a loss of overall brilliance and leveling. Low concentrations result in high current density burning and rough deposits.

AC PLUS MAINTENANCE*

This is used for maintaining overall brightness and leveling of the deposit. High concentrations will produce a wrinkled highly bright deposit that can turn frosty. Low concentrations reduce overall deposit luster, poor lcd areas and poor leveling. In some instances and/or in barrel plating, when a total addition of 0.2% of AC PLUS Maintenance fails to provide sufficient luster, a 0.05-0.1%/volume of **CupraBrite 431 Brightener** may be used to restore proper bath performance.

AC PLUS REPLENISHER

This is used for new bath make up, bath conversions, and to replenish for drag-out or restore performance after carbon treatment. It is the primary grain refiner and high current density brightener. Low concentrations produce poor overall appearance, burning and lack of response to the **AC PLUS MAINTENANCE**. Very high concentrations can cause organic overloading of the bath.

BATH CONTROL

The major components should be analyzed using standard wet chemical methods at least once per week, depending on how heavily the bath is used and how uniform the work load. The level of the **AC PLUS** addition agents can be determined by hull cell plating tests or by submitting a sample to the **A BRITE TECHNICAL SERVICE LABORATORY** for complete addition agent analysis.

In most cases, **AC PLUS MAINTENANCE** is the only material is required to maintain high quality, trouble free plating. **AC PLUS REPLENISHER** is used at the time of new bath make up or to rebalance an operating bath. If it is determined that an addition is necessary, should either be based on the amount of solution lost by drag out or upon recommendation of the A Brite Technical Service Laboratory. Replenishment additions of **AC PLUS MAINTENANCE** should be made based on the number of amp hours plated since the last addition. The exact amount required varies depending on drag out, performance required and temperature. However most installations should add:

1 quart of AC PLUS MAINTENANCE per 4,500 - 5,500 amp hours.
(1 liter per 4500-5500 amp hours)

EQUIPMENT

Tank

Koroseal or lined steel, polyethylene or polypropylene is satisfactory. Fiberglass is not recommended. The rinse tanks following the plating tank should also be of similar material to the plating tank to prevent corrosion.

Heating/Cooling

Bath temperature is very important to the proper performance of the bath. High temperatures adversely affect the low current density areas and increase **MAINTENANCE** consumption. Low temperatures can cause a loss of solution conductivity. Teflon cooling coils are recommended. Titanium may also be used.

Agitation

Low pressure air, supplied by a blower is satisfactory. Compressed air should not be used due to the likelihood of introducing oil to the plating bath. Agitation piping should be of PVC or similar material. It should be situated beneath the parts being plated. The volume of air should be sufficient to provide uniform movement of the solution throughout the tank, including the area around the anode. **A BRITE** can provide additional information on proper agitation system design upon request.

Filtration

Continuous filtration is a must for high quality and lower operating costs. A filter capable of turning the solution over at least twice per hour should be used. The filter should be constructed of one of the previously mentioned materials or lined with a material suitable for use with solutions containing chlorides and sulfuric acid. A carbon packed filter should only be utilized upon the recommendation of the **A BRITE TECHNICAL SERVICE LABORATORY**.

Anodes/Anode Bags

Anodes should be phosphorized copper nuggets or slab. Anode bags should be napped polypropylene. Bags must be leached prior to use for 6-8 hours in a solution containing 2% sulfuric acid and 0.5% **AC PLUS REPLENISHER**. Failure to do so will introduce sizing agents into the solution. This will cause dull deposits that are difficult to correct.

CONVERSION

AC PLUS is compatible with most other addition agent systems currently in use. Conversion can usually be done without the need for any batch treatment or loss of production. A sample should be submitted to the **A BRITE TECHNICAL SERVICE LABORATORY** for exact recommendations that will insure an easy, trouble free conversion.

STORAGE/HANDLING

Store at room temperature. Keep from freezing. **AC PLUS** addition agents are themselves not hazardous, however, the solutions in which they are used contain highly acidic materials. Avoid contact with skin and eyes. Wear proper protective clothing and face shield. In case of contact, flush affected area with fresh water. Contact a physician. **Refer to the Material Safety Data Sheet for more complete information.**

WASTE TREATMENT

AC PLUS addition agents do not require treatment nor do they complicate treatment. However the solutions in which they are used contain acidic materials and copper metal. Spent solutions and normal effluents generally require treatment prior to discharge. **A BRITE** has a staff of trained professionals to assist in the proper disposal of this or any metal finishing material.

MATERIAL SAFETY DATA SHEETS

Material Safety Data Sheets (M.S.D.S.) are readily available on this product. It is strongly recommended that all personnel thoroughly read and understand the information contained in both the Technical Data Sheet and the Material Safety Data Sheet before using this product.

WARRANTY

The information presented herein, while not guaranteed, is to the best of our knowledge true and accurate. No warranty or guarantee expressed or implied is made regarding the performance of any products, since the manner of use is beyond our control. No suggestion for product use nor anything contained herein, shall be construed as a recommendation for its use in infringement of any existing patent, and we assume no responsibility or liability for operations which do infringe any such patents. The above includes confidential and proprietary information of **A BRITE COMPANY** and is furnished to you for your use solely on products or processes supplied to you by us.