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Product Data Sheet

Date: 01/03/06
Supersedes: 09/14/04
Product #: N5116

CIRCUTEK ME-515

Persulfate Microetch

DESCRIPTION:

A powdered material that is mixed with water and sulfuric acid to make a mild etch solution for copper and copper alloys. The operating solution provides a bright, clean, uniformly etched copper surface on printed circuit boards. ***CIRCUTEK ME-515*** operating solution is specially formulated to be used in place of a sulfuric/peroxide or sodium or ammonium persulfate etching solution. It is excellent for removing tarnish and oxidation from the copper surface, and can be used prior to electroless and electrolytic plating, after tab stripping.

When used prior to electrolytic plating as part of a pattern cleaning system, ***CIRCUTEK ME-515*** cleans and etches copper surfaces. It aids in the removal of dry film binder residues that penetrate into the copper-clad surface of printed circuit boards.

BENEFITS:

- **Produces optimal surface topography to ensure excellent copper-to-copper bonding**
- **High loading capacity – holds up to 4 oz/gal of copper**
- **Contains no ammonium ions for easier waste treatment**
- **Versatile – used wherever a copper microetch is needed**

INSTRUCTIONS:

	Standard Operation	**Reduced Etch Rate**
Deionized or distilled water	98 - 99% by volume	98 - 99% by volume
CIRCUTEK ME-515	16 - 24 oz/gal (120 - 180 g/liter)	4 oz/gal (30 g/liter)
Sulfuric Acid (66 Be´) (1.84 sp. Gr.) AR Grade	2 - 5% by volume	1% by volume
Temperature	70 - 90°F (21 - 32°C)	70 - 90°F (21 - 32°C)
pH	0.6 - 1.8	0.6 - 1.8
Time	As required	20 – 30 seconds

Note: Use only sulfuric acid to make the operating solution. Use of hydrochloric acid will liberate chlorine gas; use of nitric acid will liberate nitric oxide and nitrogen dioxide gas.

Make-up Procedure:
Fill a tank approximately 2/3 full of cold water. Then carefully add the required amount of 66 Be' sulfuric acid while stirring. Let the bath cool to 70 - 90°F (21 - 32°C). While stirring, add the required amount of ***CIRCUTEK ME-515***. Bring tank up to volume with water. The solution is now ready for use.

General Operating Conditions:
After cleaning, immerse the printed circuit boards in the operating solution for as long as required. Normal operating temperatures are 70 - 90°F (21 - 32°C). Increased temperatures will reduce the processing time. Bath life will be shortened dramatically if the solution is operated above 110°F (43°C).

The etch rate for ***CIRCUTEK ME-515*** operating solution varies with immersion time, solution temperature and bath composition.

Pattern Plate Cleaning Operations:

A typical cycle to remove residual dry film resist binder from circuit patterns is as follows:

1. ***POSICLEAN C***, 12% by volume in deionized water, 70 - 100°F, 2 - 5 minutes.
2. Water rinse.
3. ***CIRCUTEK ME-515***, 4 oz/gal (30 g/liter) plus AR sulfuric acid, 1% by volume in deionized water, 70 - 90°F (21 - 32°C), 20 - 30 seconds.
4. Water rinse.
5. Sulfuric acid, 10 - 15% by volume in deionized water, room temperature, 1 - 3 minutes.
6. Water rinse.
7. Electrolytic copper plate.

Note: This pre-plate cleaning cycle can also be used after application of screen inks.

EQUIPMENT: PVC, polyethylene, fiberglass, and polypropylene tanks or steel tanks lined with these materials may be used. Koroseal or rubber-lined tanks may also be used. Heaters should be Teflon® or quartz. If titanium heaters are used, all areas of the heater outside the solution should be plastisol coated to just below the solution level.

CONTROL: An analytical procedure to determine copper concentration is listed below. General practice is to discard the bath when the original make-up is exhausted. However, the bath may be replenished in order to maintain higher temperatures of 90 - 110°F (32 - 43°C). Initial make-up should be ¾ - 1 lb/gal and replenishment additions should be ¼ to 1/3 lb/gal.

The high copper capacity and chemical characteristics of the ***CIRCUTEK ME-515*** solution allow for easy recovery of the copper.

DISPOSAL: Spent solution is highly acidic and oxidizing and must be neutralized and reduced before discharging into a sewer system. Dissolved copper must be removed either by treatment with ***RESISTREAT 5000*** or by precipitation with sodium hydroxide. Local regulatory agencies should be consulted to determine maximum copper content of waste effluent. A detailed waste treatment procedure is available upon request. Dispose of all materials in accordance with local, state and federal regulations.

Analysis Procedures

Copper Content

Materials:

50 ml Burette	250 ml Erlenmeyer flask	250 ml beaker
50 ml Graduated Cylinder	2, 5 and 10 ml pipets	

0.0575M EDTA: (2 Na – Ethylenediamine tetraacetic acid disodium salt, dihydrate) – Dissolve 21.4 g EDTA $2H_2O$, Na_2 and 6 g of NaOH, AR grade, 500 mls of distilled water; cool and dilute to one liter in a volumetric flask. This solution should be standardized against a zinc solution of a known concentration.

pH 5.5 Buffer Solution: Dissolve 150 g sodium acetate ($NaC_2H_3O_2$) in H_2O, add 15 ml acetic acid ($HC_2H_3O_2$) and dilute to one liter with distilled water.

Xylenol Orange Indicator: 0.1 g xylenol orange mixed with 100 g NaCl

Sodium Hypophosphite Solution (NaH_2PO_2 . H_2O): Dissolve 400 g of NaH_2PO_2. H_2O in 1000 ml of distilled water

Procedure:

1. Pipet 5 mls of working bath into a 250 ml flask. Add 50 mls of sodium hypophosphite solution.
2. Add 50 mls of pH 5.5 buffer solution and a pinch of xylenol orange indicator. Solution should be purple.
3. Titrate slowly with .0575M EDTA to a gray-green endpoint. Record mls used.

Calculation:

(mls EDTA) (M EDTA) (12.7) = g/l copper
(mls EDTA) (M EDTA) (1.7) = oz/gal copper

Concentration

Materials:

0.10 N Sodium Thiosulfate ($Na_2O_3S_2$) Starch indicator, 1%
Potassium iodide/EDTA solution: Dissolve 100 grams of potassium iodide and 42 grams of tetrasodium EDTA in distilled water, and dilute to 1 liter.

Procedure:

1. Pipet 5 mls of working solution into a 250 ml Erlenmeyer flask, and add 100 mls distilled water.
2. Add 25 mls of potassium iodide/EDTA solution.
3. Titrate with 0.10N sodium thiosulfate to a pale yellow-green color.
4. Add 2 mls starch indicator.
5. Continue titrating until the color changes from dark purple to nearly colorless end point.

Calculation:

(mls $Na_2O_3S_2$ used) (N of $Na_2O_3S_2$) (37.5) = g/L ***CIRCUTEK ME-515***
(mls $Na_2O_3S_2$ used) (N of $Na_2O_3S_2$) (5) = oz/gal ***CIRCUTEK ME-515***

Sulfuric Acid

Materials:

1.0 N Sodium Hydroxide (NaOH) solution
pH meter

Procedure:

1. Pipet 10 mls working solution into a 250 ml beaker.
2. Add 100 mls distilled water.
3. Using a pH meter, titrate with 1.0N sodium hydroxide to an end point of pH 3.8 - 4.0.

Calculation:

(mls NaOH) (0.286) = percent by volume sulfuric acid