CT-164 Catalyst

DESCRIPTION

CT-164 is an important part of activation of printed circuit boards. It is a single step, low acid catalyst designed to be used in the electronic industry as an activator for non active surfaces that will promote electroless copper coverage. **CT-164** contains a balanced blend of acidic chloride compounds which helps to prevent the attack of black oxide inner layers. It is the ideal activator for multi-layered activation.

CT-164 contains a special blend of acidic and organic compounds that help it increase the coating's deposit energy. The **CT-164** solution is followed by the AC-177 accelerator step. It produces the final link of the coating that produces a highly conductive surface

OPERATING PARAMETERS

Make-Up	3% **CT-164** by volume for rigid board 4% **CT-164** by volume for flexible boards Balance PD-140 If using PF-140C calculate 97% of bath volume, acidify the de-ionized water first with 1% HCl then add 1.8 pounds per gallon PD-140C, mix until dissolved. Then add 3% **CT-164**.
Temperature	80 to 110°F (27 to 44°C)
Immersion Time	4 to 7 minutes
Process	Batch Tank
Agitation	Will speed through hole activation
Circulation	Continuous
Ventilation	Advised
Tanks	Polypropylene, Polyethylene, PVC
Racks/Baskets	Stainless Steel
Heaters	Teflon Coils

PHYSICAL PROPERTIES

Specific gravity	1.50-1.56
Appearance	Dark, opaque liquid
pH(1%solution)	<1.0
Odor	Acidic
Flash Point	>200F

CONTROL PROCEDURES

Replenishments can be made to **CT-164** working solution. You should be able to process a minimum of 12,000 sq. feet of surface area per gallon of liquid concentrate. This amount will vary, and will depend on the number of holes in the panel. Poor drainage of the parts is the major reason for low consumption values. The preferred method of control is a simple bench analysis. Maintain by additions of **CT-164** based on square footage processed. Add 320 mL for every 1000 sq. feet.

ANALYSIS

Acid Normality

Reagents and Equipment

1.0 N Sodium Hydroxide
Phenolphthalein indicator solution
250 ml Erlenmeyer flask
10 ml pipet
50 ml buret

Procedure

1. Pipet 10 ml of **CT-164** working solution into the 250 ml Erlenmeyer flask.

2. Add 2 to 3 drops of 50% hydrogen Peroxide to break the complex.

3. Add 75 ml of de-ionized water and 1 to 2 drops of Phenolphthalein indicator solution.

4. While swirling the solution, titrate with 1.0 N sodium hydroxide to a purple endpoint.

5. Calculation:

$$\text{Acid Normality (N)} = (\text{mls of NaOH}) \times (\text{Normality of NaOH}) \times 0.1$$

An active **CT-164** solution should be maintained between a normality of 0.14 and 0.75 for rigid boards and between 0.14 and 1.0 for flex boards. An addition of 10 ml per liter of concentrated HCl will raise the Normality 0.1 units.

Determination of Stannous Chloride

Reagents and Equipment

25 ml buret
10 ml pipet
250 ml Erlenmeyer Flasks
100 ml graduated cylinder

0.1 N Iodine Solution
Fresh Starch Indicator Solution
50% Hydrochloric Acid solution

Procedure

1. Pipet 10 mls of working solution into the 250 ml Erlenmeyer flask.

2. Add 25 mls of a 50% hydrochloric acid solution and 75 mls of de ionized water.

3. Add 5 mls of starch indicator solution.

4. Titrate the solution with 0.1 Normal Iodine solution to a dark blue/black endpoint.

5. Calculation:

Stannous chloride (g/liter) = (mls of Iodine Solution) x (Normality of Iodine Solution) x 9.8

The stannous chloride content should be maintained above 15 grams per liter, through additions of CA- 1000 Catalyst Tin Adder. A 1 g/L addition of CA-1000 will increase the stannous chloride value by 1g/L.

pH Control

Maintain the pH of the working solution below 0.5 with additions of concentrated hydrochloric acid.

Copper Control

When the copper concentration reaches 10 grams per liter, by AA analysis, re-make the **CT164** bath.

CT-164 Concentration by Test Kit Method

The activity of **CT-164** working solution can be determined by comparing the color of a dilute working solution to that of color standard samples. If another analytical method is desired, see the analysis procedure by UV-Vis below.

Reagents and Equipment

PD-140 Solution
CT-164 Standards
10 ml pipet
Clear glass test bottles (any size, but they must all be the same size)

Procedure

1.Pipet 10 ml of the working solution into the test bottle.

2. Add PD-140 solution to fill the bottle.

3. Compare the color of the test solution with that of the supplied standards.

4. Determine the amount of **CT-164** needed for replenishment, and make adjustments.

The solution level of the **CT-164** working solution should be maintained with a solution of PD-140 concentrate solution (0.9 lbs./gal)

Maintain the concentration of **CT-164** between 2.5 and 4.0% for rigid boards and between 4.0 and 5.0% for flex boards through additions of **CT-164** concentrate.

Color Standards

Color standards help to visually control the concentration of **CT-164**. To make color standards use the following procedure.

1. Pipet 5 mls of **CT-164** concentrate into a 100 ml volumetric flask. Dilute this solution using PD-140 and mix.

2. Pipet 4 ml, 6 ml, 8 ml, and 10 ml of this dilute solution into each of the test bottles. Fill each of the test bottles using PD-140.

Note: you may use test bottles of any size, but they must all be the same size.

3. These will represent 2.0%, 3.0%, 4.0%, and 5.0% working solution concentration of CT-164. Over a period of time the solutions will form a black precipitate. Fresh color standards should be made at that time. Do not attempt to make only one color standard at time. The color will vary. Make the entire kit over again. You can use your first diluted stock solution from part one for three months before discarding it.

CT-164 Concentration by UV-Vis

CT-164 absorbs light of a particular wavelength in a linear relationship with respect to the concentration. This can be expressed using the Beer-Lambert law, Absorbance = ε C L where ε = the molar absorptivity, C is the concentration and L is the path length.

We recommend that each customer verify the calculation shown below by generating their own calibration curve. This can be done by measuring the absorbance of several different known concentrations of **CT-164** solutions at 420 nm. The plot of a best fit line through the data gives the calibration curve. The slope of the best fit line of absorbance vs. concentration is the calculation factor.

We recommend using absorbance instead of % transmittance because the relationship between concentration and % transmittance is logarithmic, not linear. The relationship between transmittance and concentration is shown here for reference, T = $10^{-\varepsilon C L}$, where T = transmittance and ε C L are defined above.

Reagents and Equipment

PD-140 Solution
100 mL volumetric flask
10 ml pipet
Spectronic 20 or other UV-Vis Spectrophotometer

Procedure

1. Pipet 10mL of working solution into a 100mL vol. flask.

2. Dilute to the mark with PD-140 solution and mix well.

3. Zero the instrument and set 0 absorbance (100% transmittance) using PD-140 as a blank.

4. Measure the absorbance of the sample at 420nm.

5. Calculation:

Concentration of **CT164** (% by vol.) = (Absorbance) x 5.71

Maintain the concentration of **CT-164** between 2.5 and 4.0% for rigid boards and between 4.0 and 5.0% for flex boards through additions of **CT-164** concentrate.

SAFETY AND STORAGE

CT-164 is a corrosive, acidic solution containing inorganic and organic acids. Avoid breathing vapors. CONTAINS HYDROCHLORIC ACID. Use in a well-ventilated area. When handling concentrate or working solution, wear protective clothing, gloves and chemical safety goggles. In case of skin contact, remove

contaminated clothing and flush affected area with plenty of cold water. In case of eye contact, flush immediately with plenty of cold water and seek medical attention immediately.

Store **CT-164** in its original container. Keep away from direct sunlight and temperature extremes. Protect from freezing.

WASTE TREATMENT

CT-164 contains organic and inorganic acids, palladium and tin metal salts. In the process of activating copper clad material, some copper may be removed and dissolved in solution. The spent working solution of **CT-164** may be treated by pH adjusting the solution to a pH above 10 with dilute caustic soda. Allow the precipitate to settle. Filter the solution and make a final pH adjustment of the solution to between 6 and 8 with dilute sulfuric acid before sending the spent solution to the sewer. Consult with local officials for further waste disposal regulations. Please ask a Florida CirTech technical sales rep. for more information regarding waste treatment of this chemistry and our complete line of waste treatment line if additional help or information is desired.

MISCELLANEOUS

Available in 51 gallon bottles. Consult MSDS for additional information.