



# Florida CirTech, Inc.

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## TECHNICAL BULLETIN ENIG CT300 Catalyst

### I. Description

The ENIG CT300 Catalyst is a key step in the Electroless Nickel Immersion Gold process. It is a palladium activator that catalyzes the copper surface enabling electroless nickel deposition. Use of a pre-dip is required before the palladium activator step. The pre-dip protects and limits drag-in to the activator bath. Use of an acid post dip is also required after the activator.

### II. Operating Parameters

Make-Up	See section IV. Control Procedures
Temperature	70 – 90°F (21 – 32°C) - 80°F nominal
Immersion Time	1 – 3 min (2 min nominal)
Process	Batch tank
Agitation	Recommended (do not aerate)
Circulation	Panel agitation, and pump circulation at 3-5 turnovers/hr
Filtration	N/A
Ventilation	Recommended
Tanks	Polypropylene, Polyethylene
Racks, Baskets	Plastic coated stainless steel; 300 series or acid resistant
Heaters	Quartz or PTFE coated

Please refer to our ENIG Process Flow for more details on recommended dwell times, temperatures at each stage. This document gives more details regarding the pre-dip and acid post-dip solutions.

### III. Physical Properties

	<u>CT300</u>
Specific gravity	0.99 – 1.01
Appearance	Orange liquid
Odor	None
PH	1.0 – 2.0
Contents	Palladium metal

### IV. Control Procedures

#### Bath Makeup

The makeup quantities are shown below. Follow the order given in the table for additions, and mix well after each step.

Bath Makeup Step	Pre-dip, sulfuric acid	ENIG CT300	Post-dip, sulfuric acid
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Step 1	Add about 50% by volume of DI water	Add about 50% by volume of DI water	Add about 50% by volume of DI water
Step 2	Slowly add 5% by volume of sulfuric acid, reagent grade, 94 - 98%	Slowly add 5% by volume of sulfuric acid, reagent grade, 94 - 98%	Slowly add 2% by volume of sulfuric acid, reagent grade, 94 - 98%
Step 3	Bring tank to level with DI water	Add 4% by volume of ENIG CT300 Catalyst	Bring tank to level with DI water
Step 4	---	Bring tank to level with DI water	---

Warning: sulfuric acid addition will generate heat. Allow time for cooling.

#### Bath Replacement

The sulfuric acid pre-dip should be replaced when the copper content reaches 150 ppm, or at least once per month.

This bath should be replaced after 5 MTO (metal turn overs), or when the replenishments equal 5 times the make-up amounts. This bath should also be replaced when the copper content reaches 300 ppm, or after every 6 months.

The sulfuric acid post-dip should be replaced when the copper content reaches 100 ppm, or at least once per month.

## V. Analysis Procedures

### Palladium Concentration (CT300 bath)

1. Pipet 10.0 mL of the working solution into a 100 mL volumetric flask.
2. Dilute to the mark with 10% by vol. Sulfuric acid and mix.
3. Calibrate the AAS for palladium using, 1.0, 5.0, and 10.0 ppm standard solutions.
4. Run the diluted sample and determine the concentration in ppm.
5. Calculation:

$$\text{Palladium content (ppm)} = \text{AAS Reading} \times 10$$

Maintain the palladium metal content between 25 and 35 ppm through additions of palladium catalyst solution. An addition of 0.7% CT300 by volume will increase the palladium content by 5 ppm.

### Sulfuric Acid Concentration (Pre-dip, CT300, and Post-dip)

1. Pipet 5.0 ml of the working solution into a 250 ml Erlenmeyer flask.
2. Add ~75 ml of DI water and 3 - 4 drops of bromophenol blue indicator solution.
3. Titrate with 1.0 N sodium hydroxide from yellow to the blue violet endpoint.
4. Calculation:

$$\text{Sulfuric acid content (\% by vol)} = (\text{mLs of base}) \times (\text{Normality of base}) \times 0.56$$

#### Pre-dip additions

Maintain the sulfuric acid content between 4 and 5% by volume through additions. Reagent grade sulfuric acid, 94 – 98% should be used for additions.

#### CT300 bath additions

Maintain the sulfuric acid content between 4 and 5% by volume through additions. Reagent grade sulfuric acid, 94 – 98% should be used for additions.

#### Post-dip additions

Maintain the sulfuric acid content between 1 and 2% by volume through additions. Reagent grade sulfuric acid, 94 – 98% should be used for additions.

#### **Copper Concentration (Pre-dip, CT300, and Post-dip)**

1. Pipet 5.0 mL of the bath into a 100 mL volumetric flask.
2. Dilute to the mark with 10% by vol sulfuric acid, and mix well.
3. Calibrate the AAS for Cu.
4. Analyze the dilute sample for Cu.
5. Note: if the Cu content falls outside of the calibration range, then alternate dilutions may be required, and the calculation should be adjusted.
6. Calculation:

$$\text{Copper content (ppm)} = (\text{Cu reading from AAS in ppm}) \times 20$$

Discard and remake the bath in question when the copper content reaches or exceeds the limit.

#### **Discard limits for copper**

Pre-dip: 150 ppm

CT300: 300 ppm

Post-dip: 100 ppm

## **VI. Safety and Handling**

- Reference the MSDS sheets for detailed information.

Bath components are corrosive, acidic solutions. Avoid breathing vapors. 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 components in their original containers. Keep away from direct sunlight and temperature extremes. Protect from freezing.

## **VII. Waste Treatment**

The spent bath contains sulfuric acid, palladium metal, and copper salts. Consult with FCT Water Treatment personnel for more details. Consult with federal, state, and local authorities for regulations regarding disposal of solutions.

## **VIII. Miscellaneous**

- Components are available in 1 gallon containers.

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