Halltin II

Halltin II is a water soluble, cyanide free salt for applying an immersion tin plate onto copper, copper alloys, solder plate and lead alloys.

Halltin II is a powdered concentrate that must be added to a solution of (37%) Hydrochloric Acid and water.

Features & Benefits

Fast reaction rate	High productivity
Self-limiting	Lower applied cost
Non-cyanide	Easier WWT; lower cost

Operating Conditions

The functions of the immersion tin plate are:
1. Whiten and protect solder plate on the circuit board.
2. Improve solderability.
3. Increase corrosion resistance of copper, copper alloys and lead alloys.

Tin plating of the above metals is simply accomplished by immersing the circuit board in a Halltin II bath operated at 145°F to 160°F (63°C to 71°C). Since Halltin II bath is an electroless operation, the tin will plate uniformly into deep recesses and blind holes. The thickness of the tin plate will be approximately 20 to 30 millionth of an inch for a 5 minute immersion (16 oz/Gal Halltin II). The plate thickness will be dependent upon time and temperature of the solution.

Concentration	12 – 20 oz/Gal (90 – 150 g/L)
Optimum concentration	16 oz/Gal (120 g/L)
Conc. Of 37% (A.R. Grade) HC1:	6.25% (vol) of total solution Volume (6 ¼ Gal/100 Gal)
Temperature	145°F – 160°F (63°C – 71°C)
Time	30 sec – to 6 min
Agitation	Constant, mechanical. Do not use air agitation.
Tanks	Rubber or rubber lined, PVC,

	glass ceramic crock, Polyethylene, Polypropylene
Heaters	Quarts, tantalum, hot water jacket
Racks	Plastisol coated

Bath Make-up

1. Fill the tank approximately 2/3 full of water (de-ionized or distilled).
2. Add Hydrochloric Acid (37%), A.R. Grade. The concentration of the acid is 6.25% (volume).
3. Heat the solution to 145°F – 160°F (63°C – 71°C)
4. Add Halltin II to the solution, with constant stirring to dissolve the Halltin II.
5. Add the remainder of the water to bring the solution to the desired level.

Additional information for a Halltin II bath

1. Halltin II solution will not operate at 125°F (52°C) or below.
2. For heavier deposits, operate Halltin II at 18 to 20 oz/Gal (135 – 150 g/L).
3. Low concentrations are for thin bright deposits and high concentrations are for white thicker deposits.
4. Air agitation *may not* be used.
5. Parts to be cleaned must be cleaned as for any plating process. Application immediately after other plating and rinsing operations will eliminate the need for pre-cleaning. If boards are stored or undergo processing between operations, pre-cleaning before application of the immersion tin is recommended.

Recommended cycle

1. Direct immersion of printed circuit boards in the immersion tin for ½ to 6 minutes with mechanical agitation.
2. Cold water rinse.
3. Hot water rinse.
4. Dry.

Maintenance

1. Restore water lost through evaporation by dilution to the original volume.
2. Make periodic additions of Halltin II (usually 10 to 20 lbs. of Halltin II per 50 gallons of solution). When the maintenance additions total 60 lbs., the solution should be discarded.

The bath is usually stable 60 to 90 days or longer depending on sludge, drag-in and formation of stannic tin.

Titration Method

The Halltin II bath can be controlled by analyzing Halltin II concentration (oz/Gal) and Hydrochloric Acid (37% CP).

Reagents Required

- 0.0575M EDTA solution – Dissolve exactly 21.5 grams of pure EDTA Dihydrate in distilled water and dilute to exactly 1 liter in a volumetric flask.

- Methyl Thymol Blue indicator – 1.0% in distilled or deionized water.

- Acetate Buffer – Dissolve 160 grams sodium acetate anhydrous. 270 grams sodium acetate trihydrate, and 60 mL glacial acetic acid in distilled or deionized water and dilute to 1 liter.

Procedure – Halltin II Analysis

1. Place about 100 mL of distilled water into a 250 mL Erlenmeyer flask.
2. Pipette a 10 mL sample of the Halltin II bath into the flask. Sample at working temperature.
3. Add 25 mL of Acetate Buffer.
4. Add 3 to 6 drops of Methyl Thymol Blue indicator solution.
5. Titrate with 0.0575M EDTA solution to a yellow endpoint.
6. Record mL used.

Calculation

Halltin II (oz/Gal) = mL 0.0575M EDTA x 1.07

Note:

Make the additions of Halltin II to restore the bath to its original concentration.
After the additions have dissolved, obtain another sample from the bath.
The following analysis and calculation yields % vol. conc. of hydrochloric acid in the bath.

Procedure – Hydrochloric Acid Analysis

1. Place 100 mL of distilled or deionized water into a 250 mL Erlenmeyer flask.
2. Pipette a 10 mL sample of Halltin II solution into the flask. The bath must be at operating temperature.
3. Add 3 to 5 drops Phenolphthalein indicator.
4. Titrate with 1.0 N NaOH solution to a pink endpoint.
5. Record mL used as “A”.
6. Now consult the chart to obtain “B” in the equation.
   “B” is the mL of 1.0 N NaOH used to neutralize Halltin II.
   Example, consulting the chart, a 12 oz/Gal solution of Halltin II corresponds to 1.3 mL of 1.0 NAOH.

Calculation

Reagent Grade Concentrate HCl (%) = (A – B) x 0.80

Example Calculation
A = 8.7 mL
B = 1.30 mL

(8.7 – 1.3) x 0.80 = % Volume (37%) Hydrochloric Acid
7.4 x 0.80 = 5.9% Volume (37%) Hydrochloric Acid present in bath.

Waste Disposal

Neutralize the Halltin II solution with alkali to a PH of 6.0 to 8.0 Add the alkali with caution using safety goggles and protective clothing. Allow the solution to settle. Decant the liquid to the sewer and discard the sludge at a dump. The sludge will contain the tin and copper.

Caution

Solutions of Halltin II are acidic. The usual precaution for acids should be observed. Avoid skin, eye and oral contact. Wear protective clothing, gloves and goggles when handling the product. Flush exposed areas immediately with clean, cold water. Contact a doctor immediately in case of injury.

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