



SP – 130 Tin Addition Agent

DESCRIPTION

SP-130 organic grain refiner that is used to aid in the electroplating of tin in the application for SMOBC fabrication. SP-130 is formulated to improve the throwing power of the bath, aid in refining grain structure, and prevent treeing. It is added based on amp hours and will increase limiting current density and control deposit characteristics over a wide range of current densities. It produces a bright silver white deposit. SP-130 eliminates the need for lead and fluoborates used in conventional etch resist plating processes. If an extra wetting agent is needed, use SP130W. Please consult your service representative for additions.

OPERATING PARAMETERS

| | |
|-----------------------------|---|
| SP130 Make-Up | 1.0% by vol on make-up (1.3 oz/gal) |
| Stannous Sulfate | 15 to 45 grams per liter (2.0 to 6.0 oz/gal) |
| Stannous Tin metal | 7.5 to 22.5 grams per liter (1.0 to 3.0 oz/gal) |
| Sulfuric Acid 66 deg. Baume | 10 to 15% by volume (12.8 to 19.2 fl oz/gal) |
| Replenishment | 0.25 to 0.4 ml per amp hour |
| Temperature | 60 to 100F (16 to 38C) |
| Immersion Time | Depends upon thickness desired |
| Current Density | 1.1 to 4.5 Amps per decimeter (10 – 40 ASF) |
| Anodes | Baskets or Slab, pure tin |
| Anode Bags | Polypropylene or Dynel (optional) |
| Filtration | Continuous while plating |
| Ventilation | Advised |
| Tanks | Polypropylene, Polyethylene, PVC |
| Racks/Baskets | Stainless Steel, Plastisol Covered Steel |
| Heaters | Stainless Steel, Teflon Coils |



PHYSICAL PROPERTIES

| | |
|------------------|-----------------------------|
| Specific gravity | 0.98-1.03 |
| Appearance | Light clear to amber liquid |
| pH (1% solution) | NA |
| Odor | None |
| Flash Point | >200F |

CONTROL PROCEDURES

| NEW BATH MAKE-UP COMPONENT | PER 100 LITERS | 100 GALLONS |
|----------------------------|----------------|-------------|
| Stannous sulfate | 3.0 Kilograms | 25 Pounds |
| Sulfuric acid | 10.0 Liters | 10 gallons |
| SP-130 Make-up | 1.0 liter | 1 gallon |

NEW BATH START-UP PROCEDURES

All equipment, heaters, filters, racks, etc., should also be washed prior to coming in contact with the new plating solution. The tank must be clean and leached with a 5% solution of sulfuric acid for a period of 12 hours. The anode bags should be washed in warm water to remove any sizing and then leached in 5% solution of sulfuric acid before being placed in service.

MAKE-UP

1. Fill tank half way with de ionized water.
2. USING CAUTION. Slowly add the required amount of sulfuric acid and mix.
3. Add the required amount of stannous sulfate and mix while solution is still warm.
4. Add the required amount of SP-130 addition agent and mix when the temperature has dropped below 38oC (100oF).
5. Raise the volume of the bath to operating height with de ionized water.
6. The plating solution is now ready to use.

ANALYSIS

DETERMINATION OF STANNOUS TIN

1. Pipet 5.0 ml of the plating bath into a 250-ml Erlenmeyer Flask.
2. Dilute with ~75 mL of DI water.
3. Add 10 ml of 1:1 hydrochloric acid and 5-10 ml of starch indicator solution.
4. Titrate with 0.1 N iodate-iodide solution to a dark blue end point.
5. Calculations:

Stannous tin (g/L) = (ml of iodate-iodide) x (Normality iodate-iodide) x 11.9

Stannous tin (oz/gal) = (ml of iodate-iodide) x (Normality iodate-iodide) x 1.59

To convert from stannous tin to stannous sulfate:

(Stannous tin in g/L) x 1.81 = Stannous sulfate in g/L

(Stannous tin in oz/gal) x 1.81 = Stannous sulfate in oz/gal

Maintain the stannous tin above 7.5 g/L (1 oz/gal) through regular anode maintenance.

DETERMINATION OF SULFURIC ACID

1. Pipet 5.0 ml of the plating bath into a 250-ml Erlenmeyer Flask.
2. Add 50 ml of 4% wt. ammonium oxalate and ~50 mL of DI water.
3. Add 1-2 drops of methyl red indicator solution.
4. Titrate with 1.0N sodium hydroxide solution until the color change from pink to yellow.
5. Calculations:

Sulfuric acid (% vol) = (ml of NaOH) x (Normality of NaOH) x 0.58

Sulfuric acid (fl oz/gal) = (ml of NaOH) x (Normality of NaOH) x 0.74

Maintain sulfuric acid content above 10% v/v (12.8 fl oz/gal) through analysis and additions.

SAFETY AND STORAGE

SP-130 is a mildly active solution. 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 SP-130 in its original container. Keep away from direct sunlight and temperature extremes. Protect from freezing.

WASTE TREATMENT

SP-130 contains organic wetting agents and surfactants. Discarded solution can be treated by adjusting the pH to between 6 and 8 before sending the spent solution to the sewer. Consult with local officials for further waste disposal regulations. Please ask a Florida CirTech sales rep. for more information regarding waste treatment of this chemistry and our complete line of waste treatment chemistry if additional help or information is desired.

MISCELLANEOUS

Available in 5-gallon pails and 55 gallon drums. Consult MSDS for additional information.

TROUBLESHOOTING GUIDE

| PROBLEM | CAUSE | CORRECTION |
|------------------------|--|---|
| Treeing | Low SP-130 Low Sulfuric Acid Low Temperature | Add SP-130 to required levels Analyze and adjust acid content Adjust to within operation limits |
| Roughness | Stannic tin or solids in bath | Filter solution |
| Graininess | Low SP-130 Tin content too low | Add SP-130 to required levels Add Stannous Sulfate |
| Dark Plating Bath | Low temperature Low SP-130 | Adjust temperature Add SP-130 to required levels |
| Burning | Low temperature Too high current density | Adjust temperature Lower current |
| Blistering | Poor surface Cleaning | Check and adjust pre-cleaning |
| Streaking | Low SP-130 | Add SP-130 to required levels |
| Reduced Throwing Power | Low SP-130 Low Sulfuric acid Low tin content | Add SP-130 to required levels Analyze and adjust acid content Analyze and adjust |
| Gassing | Too high a current | Lower current density |
| Polarized Anodes | Anode current density too high | Add anodes or lower current density |
| Brittle deposits | Organic contamination | Carbon treat |