PRODUCT INFORMATION

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MARTRON SN2012 PROCESS

Bright Acid Tin Plating Process

Section 1: PRODUCT DESCRIPTION and FEATURES

Martron SN2012 is an easy to use, bright acid tin process that gives exceptional brightness and leveling from a standard sulfate acid tin electrolyte.

- The deposits from this bath exhibit exceptional solderability
- Maintained with one additive after initial make up.
- Maintenance additive can be added on an ampere hour basis
- Easy to analyze
- Operates over a wide concentration of bath constituents

This process consists of the following products:

Martron SN2012 MU
Martron SN2012 MA
Martron SN2012 Purifier
Martron SN2012 Defoamer

Section 2: SAFETY PRECAUTIONS

Always read and understand the Safety Data Sheet (SDS) for any chemical product prior to using the product to ensure familiarity with the methods of safe handling and health hazards associated with the **Martron SN2012** process.

Section 3: MAKE UP and MAINTNEANCE of the MARTRON SN2012 PROCESS

Equipment

Tanks and any ancillary equipment should be constructed of Koroseal lined or PVC line steel, polyethylene or polypropylene. Plastic molded tanks can be used for smaller installations. Rinse tanks after plating should also be lined. Fiberglass is not recommended because of the possible solubility of their bonding resins.

Filtration, especially for rack installations is recommended. A filter capable of turning the solution over at least once per hour (twice per hour preferable) should be used to avoid roughness in the tin deposit. A filter with the capability of coating the filter media with either filter aid or carbon is highly recommended. Cellulose or paper filtering media should not be used. 10 – 20-micron cartridge filter with polypropylene cartridges is suitable for acid tin solutions.

Despite the high cathode efficiency of the **Martron SN2012** process, a certain amount of heat will be generated during plating. Higher temperatures generally increase brightener consumption and the overall bath performance will be less than optimum. When cooling of the plating solution is required, the coils should be made of Teflon or lead. Steel pipe coated with a suitable plastic can also be used.

Tin anodes should be at least 99.99% pure tin slabs. In rack applications polypropylene or polyester cloth anodes bags should be used to prevent shelf roughness.

Anode hooks should be made of titanium or Monel.

For anode bars, use copper anode bars, preferably covered with plastic over all but the contact areas.

Do not use air agitation for rack and/or barrel operations. Air will oxidize the tin metal and cause excessive stannic tin sludge in the plating tank. For rack installations, use gentle cathode rod agitation of approximately 4 to 6 feet per minute. The rotation of the barrels in a barrel installation will provide sufficient agitation to ensure a flow of fresh solution to the parts being plated. Also, there should be no violent agitation of the plating solution, but agitation by circulation as a result of return filtration or stirring helps. Violent agitation will cause staining at the edges of rack work stampings.

For a power source, rectifiers having a six-volt capability with a maximum ripple of 5% should be used.

Solution Make Up

	Optimum:	Range:
Stannous Sulfate	4 oz/gal	1.4 – 4.5 oz/gal
Sulfuric Acid (CP Grade)	10% (vol)	8 -12% (vol)
Martron SN2012 MU	2% (vol)	1.5 – 2.5% (vol)
Martron SN2012 MA	0.75% (vol)	0.5 – 1% (vol)

Make Up Procedures

- Leach the plating tank with 1 - 2% sulfuric acid if it is new or has been used in other applications.
- To the clean tank add 75% by volume cold DI water.
- Add the sulfuric acid to the tank slowly with stirring. Solution will heat up. Fast addition of the sulfuric is not recommended because spattering will occur.
- Add a slurry of the required amount of stannous sulfate and water to the above acid solution with vigorous mixing.
- Fill tank to 95% of operating level with cold DI water.
- Cool the solution to operating temperature (75 – 80°F).
- Add the appropriate amount of **Martron SN2012 MU** diluted 50% with DI water.
- Add the appropriate amount of **Martron SN2012 MA** diluted 50% with DI water.
- Add balance of DI water to fill tank.
- Agitate to mix uniformly.
- Adjust solution to operating temperature.
- Confirm solution composition by analysis and performing Hull Cell tests.

Operating Conditions

	Optimum	Range
Tin Metal	1.8 oz/gal	0.75 – 2.5 oz/gal
Sulfuric Acid (CP Grade)	10% (vol)	8 – 12% (vol)
Martron SN2012 MU	2% (vol)	1.5 – 2.5% (vol)
Martron SN2012 MA	0.75% (vol)	0.5 – 1% (vol)
Temperature	70° F	65 -90° F
Anode Current Density	10 ASF	1 -30 ASF
Cathode Current Density	15 ASF	5 – 30 ASF

Operating Notes

Brass

Parts made of brass should first be plated with a barrier coating of copper or nickel. The thickness of the barrier coating should be 0.00010 to 0.00012 inches (2.5 – 3.0 microns). The barrier coating is used to prevent the migration of zinc metal from the brass into the tin deposit. Zinc in the tin deposit will cause poor solderability and discolor the tin deposit.

Rinsing
Once the part has been plated with tin, it should be rinsed well with water and under certain conditions a mild alkaline rinse may be used to ensure a bright deposit and improved solderability.

Chloride

Extreme care must be taken to prevent the introduction of chloride ions into the acid tin plating solution. Chloride contamination may be introduced by drag-in of rinse water containing chloride ions. Chloride concentration in excess of 200 mgs/L will cause poor throw and deterioration of the tin deposit brightness. Once the chloride ion has been introduced into the plating solution, it is not easy to remove.

Temperature

The temperature of the acid tin plating solution should be maintained between 65° – 90°F to obtain optimum results. High temperatures tend to cause dullness in the low current density areas requiring higher consumption of **Martron SN2012 MA** to maintain desired brightness of the tin deposit. Therefore, it is necessary to be able to cool or heat the plating solution to maintain the desired temperature range.

Metallic Contamination

The common metallic impurities such as copper, iron, etc. can be removed by electrolytic purification. The purification is best accomplished by using corrugated dummy cathodes and a current density of 3 ASF.

Organic Contamination

During the plating process, organic contamination can be introduced into the acid tin plating solution by drag-in of the pre-treatment solutions. If the contamination is minimal and not severe, the plating solution can be continuously filtered through a small amount of carbon pack on the filter. If the tin solution becomes severely contaminated with organics, 0.27 – 0.4 oz/gal of carbon treatment is recommended to remove the contamination. However, this treatment will also remove a portion of **Martron SN2012 MU AND Martron SN2012 MA.**

Function of Solution Components

Tin Metal

The tin metal is maintained in the plating bath by electrochemical dissolution of tin anodes. The proper choice of anode area will keep the concentration of metal within the proper limits, and minimize the need for additions of stannous sulfate to adjust the metal concentration.

Stannous sulfate is used to make up a new plating solution and/or used to increase the tin metal in the plating solution. Make certain that a high purity grade with a maximum of 0.009% heavy metals is used.

For optimum tin deposit brightness and throwing power in the low current density areas, the tin metal should be maintained between 1 – 1.5 oz/gal. However, the cathode efficiency at the high current density areas will decrease. Therefore, for barrel installations where deposit brightness is important, low tin metal concentration is recommended. Tin metal concentrations above 2.5 oz/gal will have high cathode efficiency but the throwing power and brightness of the low current density will diminish.

Sulfuric Acid

Sulfuric acid provides the necessary conductivity of the plating solution. Sulfuric acid is typically lost by dray out and maintenance additions are added based upon analysis.

Low sulfuric acid concentrations will result in dull deposits in the low current density areas, reduced low current densities coverage, reduce anode corrosion, and reduced plating rate.

High concentrations of sulfuric acid will result in an increase of tin metal in the plating solution by increasing the rate of tin dissolution.

Function of Addition Agents

Martron SN2012 MU

Martron SN2012 MU is used at the time of bath conversion, new bath make-up, and routine maintenance of an operating solution. This addition agent establishes and maintains the proper concentration of wetter, coupler, ductilizers, and low current density brightener.

A low concentration will cause burning, loss of ductility, and reduced overall brightness and grain refinement. Normally **Martron SN2012 MU** is lost to a small degree to electrolysis, and to a larger degree through drag out.

Typical control of **Martron SN2012 MU** is accomplished by direct observation of the work and Hull Cell procedures. It is highly recommended that **Martron SN2012 MU** be diluted with water before addition to the plating tank.

Martron SN2012 MA

Martron SN2012 MA is the additive that provides the overall deposit luster, leveling, and brilliance. Although this process is unusually tolerant to brightener overload, high concentrations can cause random staining. This can normally by corrected by the addition of 0.5 – 1.0% by volume **Martron SN2012 MA.** Low concentrations will reduce leveling and brightness of the deposit.

Martron SN2012 MA is maintained in the plating solution at the rate of 1 gallon per 10,000 amp-hours. It is highly recommended that **Martron SN2012 MA** be diluted with water before addition to the plating tank.

Typical control of the **Martron SN2012 MA** additive is accomplished by direct observation of the work and Hull Cell procedures.

Martron SN2012 Purifier

Martron SN2012 Purifier may be used for periodic treatments for stannic tin in the plating solution. Additions of 0.025% to 0.05% by volume (95 to 190 mls per 100 gallons) may be added to assist in the separation and settling of the stannic tin from the working solution. Periodic treatments will result in better process performance and improved solution appearance.

Martron SN2012 Defoamer

Martron SN2012 Defoamer is used when excessive foam formation occurs during the electroplating process. This excessive foam can lead to non-uniform plate deposition, increased consumption of plating bath chemistry, and increased drag-out of the plating solution.

To deal with this formation of foam, **Martron SN2012 Defoamer** can be sprayed directly into the foam blanket on the surface of the plating solution to break down the foam. The reduction of the foam is usually not permanent only lasting for a short duration. Therefore, it will be necessary to repeat spraying the foam with **Martron SN2012 Defoamer** as it develops during the electroplating cycle.

Process Control

Solution maintenance is a function of drag-out, contamination, current density, and varies by application. Daily visual inspection of the plated work is required to help maintain the plating solution. The tin metal and sulfuric acid needs to be analyzed on a regular basis to maintain the quality of the tin deposit. The addition of proprietary additives should always be confirmed by Hull Cell tests before adding to the plating solution. Frequent, small additions on a regular basis are preferred over the occasional large dosage.

Analytical Methods

Determination of Stannous Sulfate in Acid Tin Plating Solution

Equipment Required

- 5.0 ml pipet
- 250 ml Erlenmeyer flask
- 25 or 50 ml buret with stand

Reagents Required

- Conc. Hydrochloric Acid, Reagent Grade
- Sodium Bicarbonate, Powder
- Starch Indicator Solution
- 0.1 N Iodine Solution

Procedure

- Pipet a 5.0 ml sample of the plating bath into a 250 ml Erlenmeyer flask.
- Add approximately 100 mls of deionized water.
- Add 50 mls Conc. Hydrochloric Acid.
- Slowly, add 2 grams of Sodium Bicarbonate.
- Add 5 mls of Starch Indicator solution.
- Titrate with 0.1 N Iodine solution to a permanent blue-black endpoint.

Note: If the endpoint is difficult to determine, repeat Analytical Procedure using a 1.0 ml sample of the plating solution, and multiply results by 5

- Calculations:

  (oz/gal) Stannous Sulfate = mls of 0.1 N Iodine x 0.287
  (oz/gal) Tin Metal = mls 0.1 N of Iodine x 0.158

Determination of Sulfuric Acid in Acid Tin Solution

Equipment Required

- 5.0 ml pipet
- 250 ml Erlenmeyer Flask
- 25 or 50 ml buret with stand

Reagents Required

- Bromocresol Purple Indicator Solution
- 1.0 N Sodium Hydroxide Solution

Procedure

- Pipet a 5.0 ml sample of plating solution into a 250 ml Erlenmeyer flask.
- Add 5 drops of Bromocresol Purple Indicator solution.
- Titrate with 1.0 N Sodium Hydroxide solution to a blue endpoint.
- Calculation:

  (% vol) Sulfuric Acid = mls of 1.0 N NaOH x 0.53

Section 4: WASTE TREATMENT

Consult appropriate Federal, State, and local regulatory agencies to ascertain proper disposal procedures. Do not discharge into waterways or sewer systems. Disposal will depend on the nature of waste material.

Section 5: STORAGE

Avoid freezing of the **Martron SN2012** process components. Store the **Martron SN2012** components in an

appropriate area with compatible materials. All chemicals should be stored in compliance with all applicable federal, state or local requirements.

Section 6: NON- WARRANTY and DISCLAIMER

The data contained in this bulletin is believed by ***Martron Inc.*** to be true, accurate and complete. Since the final methods of use of this product are in the hands of the customer, and beyond ***Martron Inc.*** control, we cannot guarantee that the customer will obtain any specific result. Accordingly, ***Martron Inc.*** does not assume any responsibility for the use of this product by the customer, the results obtained, nor the infringement of any patents of third parties.