



SOLDERON™ BI MH-400

For Electronic Finishing Applications

DESCRIPTION

High-speed Matte Tin/Bismuth Alloy Electroplating Process

Solderon Bi MH-400 is a lead-free, organic sulfonate electroplating process for the high-speed deposition of uniform, fine grain, matte tin-bismuth alloy coatings.

Solderon Bi MH-400 is specifically designed for use in high-speed magazine-to-magazine and reel-to-reel electroplating equipment, where the process versatility is particularly well-suited for semiconductor lead frame and electronic connector applications.

ADVANTAGES

- Environmentally-friendly, lead-free coating
- Excellent solderability
- Uniform deposit appearance
- Excellent alloy stability
- Low co-deposited organics

DEPOSIT DATA

Structure/Appearance: Fine grained, matte
Alloy Composition: 95/5–99/1% Tin/Bismuth

BATH MAKE-UP

95/5 Tin/Bismuth Alloy

Chemicals Required	5–20 A/dm ²	50–200 A/ft ²
Deionized Water	500 ml/l	50% v/v
Solderon Tin HS-400 Concentrate	125 ml/l	12.5% v/v
Solderon Bi Bismuth Concentrate (100 g/l Bi Metal)	62 ml/l	6.2% v/v
Solderon Acid HC	110 ml/l	11.0% v/v
Solderon Bi MH-400 Additive	100 ml/l	10.0% v/v
Solderon Antioxidant	10 ml/l	1.0% v/v

Dilute to final volume with deionized water.

Make-up for Various Alloys of Tin Bismuth

Solderon Bi Alloy	Solderon Bi Bismuth Concentrate
99/1	0.6 g/l (6.0 ml/l)
98/2	1.4 g/l (14.0 ml/l)
97/3	2.4 g/l (24.0 ml/l)
96/4	3.9 g/l (39.0 ml/l)
95/5	6.2 g/l (62.0 ml/l)

MAKE-UP PROCEDURE

1. Add deionized water to the tank.
2. Add Solderon Acid HC and mix thoroughly.
3. Add Solderon Tin HS-400 Concentrate and mix thoroughly.
4. Add Solderon Bi Bismuth Concentrate and mix thoroughly.
5. Add Solderon Bi MH-400 Additive and mix thoroughly.
6. Dilute to final volume with deionized water.

Note: Solderon Tin HS-400 contains Solderon Acid HC. This component contributes to the concentration of Solderon Acid HC in the electroplating process.

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Operating Parameter—Metric

Component	Range	Recommended
Tin (II)	40–60 g/l	50 g/l
Bismuth	1.0–6.0 g/l	2.0 g/l
Solderon Acid HC	175–245 ml/l	210 ml/l
Solderon Bi-MH Additive	75–125 ml/l	100 ml/l
Temperature	40–60°C	50°C
Cathode Current Density	5–20 A/dm ²	Dependant upon equipment design and production requirements
Anode to Cathode Ratio	1:1 minimum	
Agitation	Moderate solution coupled with cathode movement	
Cathode Efficiency	95–100%	
Deposition Rate	5 microns per minute at 10 A/dm ² (100 A/ft ²)	

Operating Parameter—U.S.

Component	Range	Recommended
Tin (II)	5.3–8.0 oz./gal.	6.7 oz./gal.
Bismuth	0.1–0.8 oz./gal.	0.3 oz./gal.
Solderon Acid HC	17.5–24.5% v/v	21.0% v/v
Solderon Bi-MH Additive	7.5–12.5% v/v	10.0% v/v
Temperature	104–140°F	122°F
Cathode Current Density	50–200 A/ft ²	Dependant upon equipment design and production requirements
Anode to Cathode Ratio	1:1 minimum	
Agitation	Moderate solution coupled with cathode movement	
Cathode Efficiency	95–100%	
Deposition Rate	5 microns per minute at 100 A/ft ²	

PRETREATMENT

A final activation step of 70–140 ml/l (7–14% v/v) Solderon Acid HC is recommended prior to entering the electroplating cell.

BATH MAINTENANCE

Solderon Bi MH-400 Additive

Solderon Bi MH-400 Additive is required upon make up to achieve smooth uniform deposits as well as alloy stability. Replenish Solderon Bi MH-400 Additive at a rate of 100–200 ml every 1,000 ampere-hours.

Solderon Tin HS-400 Concentrate

Solderon Tin HS-400 Concentrate contains 400 g/l of Tin (II). To raise Tin (II) concentration by 1.0 g/l, add 2.5 ml/l Solderon Tin HS-400 Concentrate.

Solderon Acid HC

Solderon Acid HC contains methane sulfonic acid. To raise concentration 1%, add 10 ml/l.

Solderon Bi Bismuth Concentrate

Solderon Bi Bismuth Concentrate contains 100 g/l of bismuth. To raise bismuth concentration 0.1 g/l (0.013 oz./gal.), add 1 ml/l (0.10% v/v) Solderon Bi Bismuth Concentrate.

PRODUCT DATA (TYPICAL PROPERTIES)

Solderon Bi MH-400 Additive

Appearance: Colorless
 pH: <2
 Specific Gravity: 1.02

Solderon Tin HS-400 Concentrate

Appearance: Colorless to pale yellow
 pH: <2
 Specific Gravity: 1.695

Solderon Acid HC

Appearance: Colorless to pale yellow
 pH: <1
 Specific Gravity: 1.35

Solderon Bi Bismuth Concentrate

Appearance: Colorless
 pH: <2
 Specific Gravity: 1.29

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EQUIPMENT

Tanks:	Polypropylene, Polyethylene or PVDC
Anodes Soluble:	Tin or Tin/Bismuth alloy balls or slugs in titanium baskets; tin or Tin/Bismuth alloy slabs; Pt/Ti insoluble anodes
Note: Anode baskets must be kept full at all times.	
Anode Bags:	Anodes should be contained in polypropylene or equivalent anode bags to prevent the anode film particulates from entering the solution
Heaters:	Titanium, Silica sheathed or Teflon coated
Filtration:	Continuous, 1–5 microns polypropylene filter cartridge

EQUIPMENT PREPARATION

Prior to make up, the process tank and ancillary equipment should be thoroughly cleaned and then leached with a Solderon Acid HC.

This procedure is particularly important for new equipment or equipment previously used for tin-lead plating processes.

I. Cleaning solution

- a) Trisodium Phosphate: 15 g/l
- b) Sodium Hydroxide: 15 g/l

II. Leaching Solution

Solderon Acid HC: 70 ml/l

III. Procedure

- a) Thoroughly wash down tank and ancillary equipment with clean water.
- b) Recirculate water through the complete system to remove water soluble materials.
- c) Discard water.
- d) Add cleaning solution to the tank, heat to 55–60°C and recirculate through the complete system.
- e) Discard cleaning solution.
- f) Recirculate water through the complete system.
- g) Discard water.
- h) Add leaching solution and recirculate through the complete system.

- i) Leave leaching solution in tank for a minimum of 8 hours.
- j) Recirculate leaching solution through the complete system.
- k) Discard leaching solution.
- l) Recirculate water through the complete system.
- m) Discard water.

HANDLING PRECAUTIONS

Before using this product, consult the Material Safety Data Sheet (MSDS)/Safety Data Sheet (SDS) for details on product hazards, recommended handling precautions and product storage.

CAUTION! Keep combustible and/or flammable products and their vapors away from heat, sparks, flames and other sources of ignition including static discharge. Processing or operating at temperatures near or above product flashpoint may pose a fire hazard. Use appropriate grounding and bonding techniques to manage static discharge hazards.

CAUTION! Failure to maintain proper volume level when using immersion heaters can expose tank and solution to excessive heat resulting in a possible combustion hazard, particularly when plastic tanks are used.

STORAGE


Store products in tightly closed original containers at temperatures recommended on the product label.

DISPOSAL CONSIDERATIONS


Dispose in accordance with all local, state (provincial) and federal regulations. Empty containers may contain hazardous residues. This material and its container must be disposed in a safe and legal manner.

It is the user's responsibility to verify that treatment and disposal procedures comply with local, state (provincial) and federal regulations. Contact your Rohm and Haas Electronic Materials Technical Representative for more information.

SOLDERON BI MH-400**ELECTRONIC MATERIALS**


Circuit Board Technologies


CMP Technologies


Microelectronic Technologies


Packaging and Finishing Technologies

For locations and information please visit; <http://electronicmaterials.rohmhaas.com>

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