ELECTRONIC MATERIALS
PACKAGING AND FINISHING TECHNOLOGIES

SOLDERON™ MHS-W

MATTE TIN AND TIN-LEAD PROCESS

For Electronic Finishing Applications

Regional Product Availability			
N. America	Japan/Korea	Asia	Europe
✔		✔	✔

DESCRIPTION

Solderon MHS-W is a high-speed, non-foaming electroplating process for the rapid deposition of fine grain, matte tin and tin-lead alloy coatings from an organic sulfonate electrolyte. The process is particularly designed for use in reel-to-reel wire plating equipment where foaming of the electrolyte is undesirable and can cause severe handling problems.

The components of the Solderon MHS-W are stable and soluble in the electrolyte at elevated temperatures, which allows for operation at higher cathodic current densities of operation. Uniform pure tin and tin-lead alloy deposits, which exhibit excellent solderability and fusing characteristics, are obtainable over a wide current density range.

ADVANTAGES

- Based on biodegradable acid, effluent treatment can be readily achieved with standard neutralization and filtration procedures
- Non-foaming electrolyte
- Non-fluoborate
- High achievable deposition rates
- Excellent thickness distribution and alloy stability over a wide current density range

DEPOSIT PROPERTIES

Alloy Composition: Pure Tin to 60/40 Tin-Lead

Appearance: Fine grained, matte

BATH MAKE-UP

Refer to specific alloy solution make-up procedures for exact quantities.

CHEMICALS REQUIRED

Solderon Acid HC

Solderon Tin HS-300 Concentrate

Solderon Lead Concentrate (if necessary)

Solderon MHS-W Primary

Solderon MHS-W Secondary (if necessary)

MAKE-UP PROCEDURE

1. Add deionized water to tank.
2. Slowly add Solderon Acid HC. Mix thoroughly.
3. Add Solderon Tin HS-300 Concentrate and mix thoroughly.
4. Add Solderon Lead Concentrate, if necessary, and mix thoroughly.
5. Add Solderon MHS-W Primary and mix thoroughly.
6. Add Solderon MHS-W Secondary, if necessary, and mix thoroughly.
7. Dilute to final volume with deionized water and mix thoroughly.

Note: Solderon Tin and Lead Concentrates contain Solderon Acid HC. These components contribute to the total concentration of Solderon Acid HC in the electroplating process.

Bath Operation—Metric		
Parameter	**Range**	**Recommended**
Temperature	20–65°C	Dependent upon current density requirements
Cathode Current Density	5–200 A/dm²	Dependent upon equipment design and production requirements
Anode to Cathode Ratio	3:1 minimum	
Agitation	Vigorous solution with cathode movement	
Cathode Efficiency	95–100%	
Deposition Rate	5.0 microns per minute at 10 A/dm²	

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Bath Operation—U.S.		
Parameter	**Range**	**Recommended**
Temperature	68–150°F	Dependent upon current density requirements
Cathode Current Density	50–2,000 A/ft²	Dependent upon equipment design and production requirements
Anode to Cathode Ratio	3:1 minimum	
Agitation	Vigorous solution with cathode movement	
Cathode Efficiency	95–100%	
Deposition Rate	200 microinches per minute at 100 A/ft²	

PRETREATMENT PROCEDURES

A final activation step of 7–14% Solderon Acid HC is recommended prior to entering the electroplating cell.

Bath Make-up, Pure Tin—Metric		
Parameter	**5–50 A/dm²**	**20–200 A/dm²**
Deionized Water	400 ml/l	350 ml/l
Solderon Acid HC	80 ml/l	25 ml/l
Solderon HS-300 Concentrate	167 ml/l	240 ml/l
Solderon MHS-W Primary	100 ml/l	100 ml/l
Solderon MHS-W Secondary	*As required	*As required
Dilute to final volume with deionized water		

Bath Make-up, Pure Tin—U.S.		
Parameter	**50–150 A/ft²**	**150–300 A/ft²**
Deionized Water	40% v/v	35% v/v
Solderon Acid HC	8% v/v	2.5% v/v
Solderon HS-300 Concentrate	16.7% v/v	24.0% v/v
Solderon MHS-W Primary	10% v/v	10% v/v
Solderon MHS-W Secondary	*As required	*As required
Dilute to final volume with deionized water		

***Note:** Solderon MHS-W Secondary should be used when additional grain refinement is required. Solderon MHS-W Secondary is particularly active at high current densities. Additions of 1–5 ml/l (0.1–0.5% v/v) are recommended in these cases.

Bath Operation, Pure Tin (5–50 A/dm²)—Metric		
Parameter	**Range**	**Recommended**
Tin (II)	20.0–60.0 g/l	50.0 g/l
Solderon Acid HC	140.0–250.0 ml/l	215.0 ml/l

Bath Operation, Pure Tin (20–200 A/dm²)—Metric		
Parameter	**Range**	**Recommended**
Tin (II)	50.0–100.0 g/l	72.0 g/l
Solderon Acid HC	140.0–285.0 ml/l	215.0 ml/l

Bath Operation, Pure Tin (50–500 A/ft²)—U.S.		
Parameter	**Range**	**Recommended**
Tin (II)	2.7–8.0 oz./gal.	6.7 oz./gal.
Solderon Acid HC	14.0–25.0% v/v	21.5% v/v

Bath Operation, Pure Tin (200–2,000 A/ft²)—U.S.		
Parameter	**Range**	**Recommended**
Tin (II)	6.7–13.3 oz./gal.	9.6 oz./gal.
Solderon Acid HC	14.0–28.5% v/v	21.5% v/v

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Bath Make-up, 90/10 Tin-Lead Alloy—Metric		
Parameter	**5–50 A/dm²**	**20–200 A/dm²**
Deionized Water	400 ml/l	300 ml/l
Solderon Acid HC	110 ml/l	30 ml/l
Solderon HS-300 Concentrate	120 ml/l	240 ml/l
Solderon Lead Concentrate	13.3 ml/l	35.5 ml/l
Solderon MHS-W Primary	100 ml/l	100 ml/l
Solderon MHS-W Secondary	4 ml/l	4 ml/l
Dilute to final volume with deionized water		

Bath Make-up, 90/10 Tin-Lead Alloy—U.S.		
Parameter	**50–150 A/ft²**	**150–300 A/ft²**
Deionized Water	40% v/v	30% v/v
Solderon Acid HC	11% v/v	3% v/v
Solderon HS-300 Concentrate	12% v/v	24% v/v
Solderon Lead Concentrate	1.33% v/v	3.55% v/v
Solderon MHS-W Primary	10% v/v	10% v/v
Solderon MHS-W Secondary	0.4% v/v	0.4% v/v
Dilute to final volume with deionized water		

***Note:** Solderon MHS-W Secondary is necessary to control alloy composition over the functional current density range and improve high current density grain refinement.

90/10 Tin-Lead Alloy Bath Operation (5–50 A/dm²)—Metric		
Parameter	**Range**	**Recommended**
Tin (II)	30.0–45.0 g/l	36.0 g/l
Lead	4.0–10.0 g/l	6.0 g/l
Solderon Acid HC	180.0–250.0 ml/l	215.0 ml/l
Tin:Lead in Solution	4:1 to 7:1	Dependent upon equipment design and mode of operation

90/10 Tin-Lead Alloy Bath Operation (20–200 A/dm²)—Metric		
Parameter	**Range**	**Recommended**
Tin (II)	45.0–90.0 g/l	72.0 g/l
Lead	10.0–20.0 g/l	16.0 g/l
Solderon Acid HC	180.0–285.0 ml/l	215.0 ml/l
Tin:Lead in Solution	5:1 to 10:1	Dependent upon equipment design and mode of operation

90/10 Tin-Lead Alloy Bath Operation (50–500 A/ft²)—U.S.		
Parameter	**Range**	**Recommended**
Tin (II)	4.0–6.0 oz./gal.	4.8 oz./gal.
Lead	0.53–1.3 oz./gal.	0.8 oz./gal.
Solderon Acid HC	18.0–25.0% v/v	21.5% v/v
Tin:Lead in Solution	4:1 to 7:1	Dependent upon equipment design and mode of operation

90/10 Tin-Lead Alloy Bath Operation (200–2,000 A/ft²)—U.S.		
Parameter	**Range**	**Recommended**
Tin (II)	6.0–12.0 oz./gal.	9.6 oz./gal.
Lead	1.3–2.7 oz./gal.	2.1 oz./gal.
Solderon Acid HC	18.0–28.5% v/v	21.5% v/v
Tin:Lead in Solution	5:1 to 10:1	Dependent upon equipment design and mode of operation

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Bath Make-up–60/40 Tin-Lead Alloy—Metric		
Parameter	**5–50 A/dm²**	**20–200 A/dm²**
Deionized Water	400 ml/l	400 ml/l
Solderon Acid HC	150 ml/l	100 ml/l
Solderon HS-300 Concentrate	73 ml/l	133 ml/l
Solderon Lead Concentrate	33.5 ml/l	58.5 ml/l
Solderon MHS-W Primary	100 ml/l	100 ml/l
Solderon MHS-W Secondary	4 ml/l	4 ml/l
Dilute to final volume with deionized water		

Bath Make-up–60/40 Tin-Lead Alloy—U.S.		
Parameter	**50–150 A/ft²**	**150–300 A/ft²**
Deionized Water	40% v/v	30% v/v
Solderon Acid HC	15% v/v	10% v/v
Solderon HS-300 Concentrate	7.3% v/v	13.3% v/v
Solderon Lead Concentrate	3.35% v/v	5.85% v/v
Solderon MHS-W Primary	10% v/v	10% v/v
Solderon MHS-W Secondary	0.4% v/v	0.4% v/v
Dilute to final volume with deionized water		

***Note:** Solderon MHS-W Secondary is necessary to control alloy composition over the functional current density range and improve high current density grain refinement.

60/40 Tin-Lead Alloy Bath Operation (5–50 A/dm²)—Metric		
Parameter	**Range**	**Recommended**
Tin (II)	15.0–30.0 g/l	22.0 g/l
Lead	10.0–20.0 g/l	15.0 g/l
Solderon Acid HC	180.0–250.0 ml/l	215.0 ml/l
Tin:Lead in Solution	1.3:1 to 1.5:1	Dependent upon equipment design and mode of operation

60/40 Tin-Lead Alloy Bath Operation (20–200 A/dm²)—Metric		
Parameter	**Range**	**Recommended**
Tin (II)	30.0–50.0 g/l	40.0 g/l
Lead	20.0–35.0 g/l	26.0 g/l
Solderon Acid HC	180.0–285.0 ml/l	215.0 ml/l
Tin:Lead in Solution	1.2:1 to 1.5:1	Dependent upon equipment design and mode of operation

60/40 Tin-Lead Alloy Bath Operation (50–500 A/ft²)—U.S.		
Parameter	**Range**	**Recommended**
Tin (II)	2.0–4.0 oz./gal.	3.0 oz./gal.
Lead	1.3–2.7 oz./gal.	2.0 oz./gal.
Solderon Acid HC	18.0–28.5% v/v	21.5% v/v
Tin:Lead in Solution	1.3:1 to 1.5:1	Dependent upon equipment design and mode of operation

60/40 Tin-Lead Alloy Bath Operation (200–2,000 A/ft²)—U.S.		
Parameter	**Range**	**Recommended**
Tin (II)	4.0–6.7 oz./gal.	5.3 oz./gal.
Lead	2.7–4.7 oz./gal.	3.5 oz./gal.
Solderon Acid HC	18.0–28.5% v/v	21.5% v/v
Tin:Lead in Solution	1.2:1 to 1.5:1	Dependent upon equipment design and mode of operation

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BATH MAINTENANCE

Solderon MHS-W Primary

Solderon MHS-W Primary is necessary to maintain smooth deposits and throwing power. Add 150–250 ml for every 1,000 ampere hours (2.0–3.3 gal. per 50,000 ampere hours) or as required by CVS analysis to maintain the concentration between 80–120 ml/l.

Solderon MHS-W Secondary

Solderon MHS-W Secondary improves the high current density range of operation and is necessary to control alloy variation in tin-lead applications. Add 5–10 ml for every 1,000 ampere hours or as required by analysis to maintain the concentration between 3–5 ml/l.

Solderon Tin HS-300 Concentrate

Solderon Tin HS-300 Concentrate contains 300 g/l (40 oz./gal.) tin (II). To raise tin (II) concentration 1.0 g/l (0.13 oz./gal.), add 3.33 ml/l (0.33% v/v) Solderon Tin HS-300 Concentrate.

Solderon Lead Concentrate

Solderon Lead Concentrate contains 450 g/l (60.0 oz./gal.) lead. To raise lead concentration 1.0 g/l (0.13 oz./gal.), add 2.2 ml/l (0.22% v/v) Solderon Lead Concentrate.

Solderon Acid HC

To raise acid concentration 1% by volume, add 10 ml/l Solderon Acid HC.

Solderon RD Concentrate

Solderon RD Concentrate is designed to minimize the oxidation of tin in the electrolyte. Additions of Solderon MHS-W Primary are designed to maintain the concentration of Solderon RD Concentrate at 5 ml/l in the working solution. For applications with severe oxidation conditions it may be necessary to increase the concentration to between 5 and 10 ml/l with supplemental additions of Solderon RD Concentrate. Maintenance additions are made based on UV analysis for Solderon RD Concentrate.

PRODUCT DATA

For the specific Product Data values, please refer to the Certificate of Analysis provided with the shipment of the product(s).

ASSOCIATED PRODUCTS

Solderon MHS-W Primary
Solderon MHS-W Secondary
Solderon Tin HS-300 Concentrate
Solderon Lead Concentrate
Solderon RD Concentrate
Solderon Acid HC

SOLDERON MHS-W MATTE TIN AND TIN-LEAD PROCESS

EQUIPMENT

Tanks: Polypropylene, polyethylene, CPVC or Type 316L stainless steel

Anodes: Soluble: Tin or Tin-Lead alloy balls or slugs in Type 316 stainless steel or titanium baskets; Tin or Tin-Lead alloy slabs

Note: Anode baskets must be kept full at all times.

Insoluble: Iridium Oxide coated titanium or platinized titanium

Heaters: Titanium, silica sheathed or Teflon™ fluoropolymer coated

Filtration: Continuous, 1 micron 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 solution.

This procedure is particularly important for new equipment or equipment previously used for other processes, for example, fluoboric acid based systems.

I. Cleaning Solution

a) Trisodium Phosphate: 15 g/l (2 oz./gal.)

b) Sodium Hydroxide: 15 g/l (2 oz./gal.)

II. Leaching Solution

Solderon Acid HC: 70 ml/l (7% v/v)

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 rinse water.

d) Add cleaning solution to the tank, heat to 55–60°C (130–140°F) and recirculate through the complete system.

e) Discard cleaning solution.

f) Recirculate water through the complete system.

g) Discard rinse 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 rinse water.

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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 MHS-W MATTE TIN AND TIN-LEAD PROCESS

ELECTRONIC MATERIALS

Circuit Board Technologies

CMP Technologies

Flat Panel Display Technologies

Microelectronic Technologies

Packaging and Finishing Technologies

For locations and information please visit **www.rohmhaas.com**

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