SOLDERON™ SC

For Electronic Finishing Applications

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

DESCRIPTION

Solderon SC is a low-foaming, organic sulfonate electroplating process for the high-speed deposition of uniform, fine-grain, matte tin and tin/lead alloy coatings.

Solderon SC 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

- Very low-foaming electrolyte
- Extremely stable alloy and thickness distribution across the operating current density range
- Outstanding performance at high current densities
- Uniform deposit appearance

DEPOSIT PROPERTIES

Structure/Appearance: Fine grained, matte

Alloy Composition: 60–100% Tin, 0–40% Lead

Deposits meet or exceed Military Specification Method 202F, Method 208F.

% CO-DEPOSITED CARBON

Conditions: 90/10 Sn/Pb Alloy, 45°C, 10 A/dm^2; Solderon Acid HC 215 ml/l

Additive Content	% Co-deposited Carbon
50 ml/l SC Primary, 2 ml/l SC Secondary	0.0037
100 ml/l SC Primary, 4 ml/l SC Secondary	0.0049
150 ml/l SC Primary, 6 ml/l SC Secondary	0.0064

BATH MAKE-UP

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

Chemicals Required

1. Solderon Tin HS-300 Concentrate
2. Solderon Lead Concentrate
3. Solderon Acid HC
4. Solderon SC Primary
5. Solderon SC Secondary
6. Solderon RD Concentrate

MAKE-UP PROCEDURE

1. Add deionized water to tank.
2. Add Solderon Acid HC and mix thoroughly.
3. Add Solderon Tin HS-300 Concentrate and mix thoroughly.
4. Add Solderon Lead Concentrate and mix thoroughly.
5. Add Solderon SC Primary and mix thoroughly.
6. Add Solderon SC Secondary and mix thoroughly.
7. Add Solderon RD Concentrate and mix thoroughly.
8. Dilute to final volume with deionized water.

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.

Solderon SC Primary contains Solderon RD Concentrate and will contribute to the total concentration of Solderon RD Concentrate in the solution.

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Bath Operation—Metric		
Parameter	**Range**	**Recommended**
Solderon SC Primary	75.0–125.0 ml/l	100.0 ml/l
Solderon SC Secondary	3–7 ml/l	5.0 ml/l
Solderon RD Concentrate	10–20 ml/l	15 ml/l
Temperature	40–60°C	45°C
Cathode Current Density	5–30 A/dm²	Dependent 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	5.0 microns per minute at 10 A/dm²	

Bath Operation—U.S.		
Parameter	**Range**	**Optimum**
Solderon SC Primary	7.5–12.5% v/v	10.0% v/v
Solderon SC Secondary	0.3–0.7% v/v	0.5% v/v
Solderon RD Concentrate	1.0–2.0% v/v	1.5% v/v
Temperature	105–140°F	115°F
Cathode Current Density	50–300 A/ft²	Dependent 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	200 microinches per minute at 100 A/ft²	

PRE-TREATMENT

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

Bath Make-up–Pure Tin—Metric		
Parameter	**5–15 A/dm²**	**15–30 A/dm²**
Deionized Water	400 ml/l	350 ml/l
Solderon Tin HS-300 Concentrate	150 ml/l	215 ml/l
Solderon Acid HC	110 ml/l	70 ml/l
Solderon SC Primary	100 ml/l	100 ml/l
Solderon SC Secondary	5 ml/l	5 ml/l
Solderon RD Concentrate	10 ml/l	10 ml/l
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 Tin HS-300 Concentrate	15% v/v	21.5% v/v
Solderon Acid HC	11% v/v	7% v/v
Solderon SC Primary	10% v/v	10% v/v
Solderon SC Secondary	0.5% v/v	0.5% v/v
Solderon RD Concentrate	1.0% v/v	1.0% v/v
Dilute to final volume with deionized water		

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Bath Operation–Pure Tin (5–15 A/dm²)—Metric		
Parameter	**Range**	**Recommended**
Tin (II)	35.0–55.0 g/l	45.0 g/l
Solderon Acid HC	180–250 ml/l	215 ml/l

Bath Operation–Pure Tin (15–30 A/dm²)—Metric		
Parameter	**Range**	**Recommended**
Tin (II)	55.0–75.0 g/l	65.0 g/l
Solderon Acid HC	180–250 ml/l	215 ml/l

Bath Operation–Pure Tin (50–150 A/ft²)—U.S.		
Parameter	**Range**	**Recommended**
Tin (II)	4.7–7.3 oz./gal.	6.0 oz./gal.
Solderon Acid HC	18.0–25.0% v/v	21.5% v/v

Bath Operation–Pure Tin (150–300 A/ft²)—U.S.		
Parameter	**Range**	**Recommended**
Tin (II)	7.3–10.0 oz./gal.	8.7 oz./gal.
Solderon Acid HC	18.0–25.0% v/v	21.5% v/v

Bath Make-up–90/10 Tin-Lead Alloy—Metric		
Chemicals Required	**5–15 A/dm²**	**15–30 A/dm²**
Deionized Water	400 ml/l	350 ml/l
Solderon Tin HS-300 Concentrate	130 ml/l	200 ml/l
Solderon Lead Concentrate	9 ml/l	13 ml/l
Solderon Acid HC	120 ml/l	80 ml/l
Solderon SC Primary	100 ml/l	100 ml/l
Solderon SC Secondary	5 ml/l	5 ml/l
Solderon RD Concentrate	10 ml/l	10 ml/l
Dilute to final volume deionized water		

Bath Make-up–90/10 Tin-Lead Alloy—U.S.		
Chemicals Required	**50–150 A/dm²**	**150–300 A/dm²**
Deionized Water	40% v/v	35% v/v
Solderon Tin HS-300 Concentrate	13% v/v	20% v/v
Solderon Lead Concentrate	0.9% v/v	1.3% v/v
Solderon Acid HC	12% v/v	8% v/v
Solderon SC Primary	10% v/v	10% v/v
Solderon SC Secondary	0.5% v/v	0.5% v/v
Solderon RD Concentrate	1.0% v/v	1.0% v/v
Dilute to final volume deionized water		

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90/10 Tin-Lead Alloy Bath Operation (5–15 A/dm²)—Metric		
Parameter	**Range**	**Recommended**
Tin (II)	30.0–50.0 g/l	40.0 g/l
Lead	3.0–5.0 g/l	4.0 g/l
Solderon Acid HC	180–250 ml/l	215 ml/l
Tin:Lead in Solution	8:1 to 12:1	10:1*

90/10 Tin-Lead Alloy Bath Operation (15–30 A/dm²)—Metric		
Parameter	**Range**	**Recommended**
Tin (II)	50–70 g/l	60 g/l
Lead	5.0–7.0 g/l	6.0 g/l
Solderon Acid HC	180–250 ml/l	215 ml/l
Tin:Lead in Solution	8:1 to 12:1	10:1*

***Note:** This ratio may vary depending on agitation, temperature and current density.

90/10 Tin-Lead Alloy Bath Operation (50–150 A/ft²)—U.S.		
Parameter	**Range**	**Recommended**
Tin (II)	4.0–6.7 oz./gal.	5.3 oz./gal.
Lead	0.4–0.7 oz./gal.	0.5 oz./gal.
Solderon Acid HC	18.0–25.0% v/v	21.5% v/v
Tin:Lead in Solution	8:1 to 12:1	10:1*

90/10 Tin-Lead Alloy Bath Operation (150–300 A/ft²)—U.S.		
Parameter	**Range**	**Recommended**
Tin (II)	6.7–9.3 oz./gal.	8.0 oz./gal.
Lead	0.7–0.9 oz./gal.	0.8 oz./gal.
Solderon Acid HC	18.0–25.0% v/v	21.5% v/v
Tin:Lead in Solution	8:1 to 12:1	10:1*

***Note:** This ratio may vary depending on agitation, temperature and current density.

Bath Make-up–85/15 Tin-Lead Alloy—Metric		
Chemicals Required	**5–15 A/dm²**	**15–30 A/dm²**
Deionized Water	400 ml/l	350 ml/l
Solderon Tin HS-300 Concentrate	130 ml/l	200 ml/l
Solderon Lead Concentrate	16 ml/l	22 ml/l
Solderon Acid HC	120 ml/l	80 ml/l
Solderon SC Primary	100 ml/l	100 ml/l
Solderon SC Secondary	5 ml/l	5 ml/l
Solderon RD Concentrate	10 ml/l	10 ml/l
Dilute to final volume deionized water		

Bath Make-up–85/15 Tin-Lead Alloy—U.S.		
Chemicals Required	**50–150 A/dm²**	**150–300 A/dm²**
Deionized Water	40% v/v	35% v/v
Solderon Tin HS-300 Concentrate	13% v/v	20% v/v
Solderon Lead Concentrate	1.6% v/v	2.2% v/v
Solderon Acid HC	12% v/v	8% v/v
Solderon SC Primary	10% v/v	10% v/v
Solderon SC Secondary	0.5% v/v	0.5% v/v
Solderon RD Concentrate	1.0% v/v	1.0% v/v
Dilute to final volume deionized water		

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85/15 Tin-Lead Alloy Bath Operation (5–15 A/dm²)—Metric		
Parameter	**Range**	**Recommended**
Tin (II)	30.0–50.0 g/l	40.0 g/l
Lead	4.0–10 g/l	7.0 g/l
Solderon Acid HC	180–250 ml/l	215 ml/l
Tin:Lead in Solution	4:1 to 8:1	6:1*

85/15 Tin-Lead Alloy Bath Operation (15–30 A/dm²)—Metric		
Parameter	**Range**	**Recommended**
Tin (II)	50–70 g/l	60 g/l
Lead	8–12 g/l	10 g/l
Solderon Acid HC	180–250 ml/l	215 ml/l
Tin:Lead in Solution	4:1 to 8:1	6:1*

***Note:** This ratio may vary depending on agitation, temperature and current density.

85/15 Tin-Lead Alloy Bath Operation (50–150 A/ft²)—U.S.		
Parameter	**Range**	**Recommended**
Tin (II)	4.0–6.7 oz./gal.	5.3 oz./gal.
Lead	0.5–1.3 oz./gal.	1.0 oz./gal.
Solderon Acid HC	18–25.0% v/v	21.5% v/v
Tin:Lead in Solution	4:1 to 8:1	6:1*

85/15 Tin-Lead Alloy Bath Operation (150–300 A/ft²)—U.S.		
Parameter	**Range**	**Recommended**
Tin (II)	6.7–9.3 oz./gal.	8.0 oz./gal.
Lead	1.1–1.6 oz./gal.	1.3 oz./gal.
Solderon Acid HC	18.0–25.0% v/v	21.5% v/v
Tin:Lead in Solution	4:1 to 8:1	6:1*

***Note:** This ratio may vary depending on agitation, temperature and current density.

Bath Make-up–60/40 Tin-Lead Alloy—Metric		
Chemicals Required	**5–15 A/dm²**	**15–30 A/dm²**
Deionized Water	400 ml/l	400 ml/l
Solderon Tin HS-300 Concentrate	100 ml/l	150 ml/l
Solderon Lead Concentrate	33 ml/l	49 ml/l
Solderon Acid HC	135 ml/l	100 ml/l
Solderon SC Primary	100 ml/l	100 ml/l
Solderon SC Secondary	5 ml/l	5 ml/l
Solderon RD Concentrate	10 ml/l	10 ml/l
Dilute to final volume deionized water		

Bath Make-up–60/40 Tin-Lead Alloy—U.S.		
Chemicals Required	**50–150 A/dm²**	**150–300 A/dm²**
Deionized Water	40% v/v	40% v/v
Solderon Tin HS-300 Concentrate	10% v/v	15% v/v
Solderon Lead Concentrate	3.3% v/v	4.9% v/v
Solderon Acid HC	13.5% v/v	10% v/v
Solderon SC Primary	10% v/v	10% v/v
Solderon SC Secondary	0.5% v/v	0.5% v/v
Solderon RD Concentrate	1.0% v/v	1.0% v/v
Dilute to final volume deionized water		

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60/40 Tin-Lead Alloy Bath Operation (5–15 A/dm²)—Metric		
Parameter	**Range**	**Recommended**
Tin (II)	25.0–35.0 g/l	30.0 g/l
Lead	10–20 g/l	15 g/l
Solderon Acid HC	180–250 ml/l	215 ml/l
Tin:Lead in Solution	1:1 to 3:1	2:1*

60/40 Tin-Lead Alloy Bath Operation (15–30 A/dm²)—Metric		
Parameter	**Range**	**Recommended**
Tin (II)	35.0–55.0 g/l	45.0 g/l
Lead	17–27 g/l	22.0 g/l
Solderon Acid HC	180–250 ml/l	215 ml/l
Tin:Lead in Solution	1:1 to 3:1	2:1*

***Note:** This ratio may vary depending on agitation, temperature and current density.

60/40 Tin-Lead Alloy Bath Operation (50–150 A/ft²)—U.S.		
Parameter	**Range**	**Recommended**
Tin (II)	3.3–4.7 oz./gal.	4.0 oz./gal.
Lead	1.3–2.7 oz./gal.	2.0 oz./gal.
Solderon Acid HC	18–25.0% v/v	21.5% v/v
Tin:Lead in Solution	1:1 to 3:1	2:1*

60/40 Tin-Lead Alloy Bath Operation (150–300 A/ft²)—U.S.		
Parameter	**Range**	**Recommended**
Tin (II)	4.7–7.4 oz./gal.	6.0 oz./gal.
Lead	2.3–3.6 oz./gal.	3.0 oz./gal.
Solderon Acid HC	18.0–25.0% v/v	21.5% v/v
Tin:Lead in Solution	1:1 to 3:1	2:1*

***Note:** This ratio may vary depending on agitation, temperature and current density.

BATH MAINTENANCE

Solderon SC Primary

Solderon SC Primary is required upon make-up to achieve smooth uniform deposits. Replenish Solderon SC Primary at a rate of 100–200 ml every 1,000 ampere hours or as required based on analysis to maintain the concentration between 75–125 ml/l (7.5–12.5% v/v). See the analytical procedure for the determination of Solderon SC Primary Concentration by CVS.

Solderon SC Secondary

Solderon SC Secondary is required upon make-up to achieve desired deposit properties such as thickness uniformity and alloy distribution. Replenish Solderon SC Secondary at a rate of 20–50 ml every 1,000 ampere hours or as required based on analysis to maintain the concentration between 3–7 ml/l (0.3–0.7% v/v). See the analytical procedure for the determination of Solderon SC Secondary Concentration by UV/VIS Spectrophotometry.

Solderon SC Primary and Solderon SC Secondary may be pre-mixed for use in automatic replenishment systems. Upon establishing the individual consumption rates of Solderon SC Primary and Secondary using the analytical procedures described above, the ratio of these materials in the premix can be customized to satisfy specific application requirements.

It is recommended that the Solderon SC Primary and Solderon SC Secondary be pre-mixed in quantities that will require no longer than a one week storage period.

Solderon Tin HS-300 Concentrate

Solderon Tin HS-300 Concentrate contains 300 g/l (40 oz./gal.) of 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.) of 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.

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Solderon RD Concentrate

Solderon RD Concentrate is designed to aid in minimizing the oxidation of stannous tin. An initial addition of 10 ml/l Solderon RD Concentrate to the solution is recommended. Replenish Solderon RD Concentrate at a rate of 40 ml every 1,000 ampere hours or as required based on analysis to maintain the concentration between 10–20 ml/l (1.0–2.0% v/v) using the analytical procedure.

EQUIPMENT

Tanks:	Polypropylene, Polyethylene or PVDC
Anodes:	Tin or Tin-Lead alloy balls or slugs
	Soluble: in Type 316 stainless steel baskets; Tin or Tin-Lead alloy slabs; A range of anode compositions can be utilized depending on desired deposit composition and operational parameters
	Note: Anode baskets must be kept full at all times.
	Insoluble: Platinized Titanium
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™ 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 HC 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 water.

d) Add cleaning solution to the tank, heat to 55–60°C (130–140°F) and recirculate through the complete system for 1–4 hours.

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 the 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.

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PRODUCT DATA

Solderon SC Primary

Appearance:	Clear, colorless liquid
pH:	<2.0
Specific Gravity:	1.010

Solderon SC Secondary

Appearance:	Clear, dark blue/black liquid
pH:	4.5
Specific Gravity:	1.038

Solderon Tin HS-300 Concentrate

Appearance:	Colorless to yellow liquid
pH:	1.0
Specific Gravity:	1.55

Solderon Lead Concentrate

Appearance:	Clear, colorless to pale yellow liquid
pH:	<2.0
Specific Gravity:	1.60

Solderon Acid HC

Appearance:	Clear, colorless to pale yellow liquid
pH:	<1.0
Specific Gravity:	1.35

Solderon RD Concentrate

Appearance:	Clear, colorless to pink/amber liquid
pH:	<1.0
Specific Gravity:	1.043

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.

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