



# SOLDERON™ ST-200

For Electronic Finishing Applications

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

## DESCRIPTION

Solderon ST-200 is a low-foaming, organic sulfonate electroplating process for the high- and low-speed deposition of uniform, large, well-polygonized grain tin deposits.

Solderon ST-200 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. The process can also be operated at modified parameters to meet the needs of low-speed plating applications.

## ADVANTAGES

- Environmentally-friendly, lead-free coating
- Low stress
- Large grain size keep well polygonized
- Excellent solderability
- Low-foaming electrolyte
- Uniform, satin-matte deposit appearance

## DEPOSIT DATA

Structure/Appearance: Large grained, satin-matte

Alloy Composition: 100% Tin

Melting Point: 232°C (450°F)

## BATH MAKE-UP

See specific application for the exact quantities required for make-up.

### Chemicals Required

1. Deionized Water
2. Solderon Tin HS-300 Concentrate or Solderon Tin 300 Concentrate\*
3. Solderon Acid HC
4. Solderon ST-200 Primary

5. Solderon ST-200 Secondary
  6. Solderon AO-52/Solderon RD Concentrate
- \*Dependent on region

## MAKE-UP PROCEDURE

1. Add deionized water to the tank.
2. Add Solderon Acid HC and mix thoroughly.
3. Add Solderon Tin HS-300 or Solderon Tin Concentrate 300 g/l and mix thoroughly.
4. Add Solderon ST-200 Primary and mix thoroughly.
5. Add Solderon ST-200 Secondary and mix thoroughly.
6. Add Solderon AO-52 or Solderon RD Concentrate and mix thoroughly.
7. Dilute to final volume with deionized water.

**Note:** Solderon Tin HS-300 Concentrate/Solderon Tin Concentrate 300 g/l contains Solderon Acid HC. This component contributes to the concentration of total Solderon Acid HC in the electroplating process.

## PRETREATMENT

A final activation step of 70–140 ml/l (9.3–18.6 oz./gal.) Solderon Acid HC is recommended prior to entering the electroplating cell.

Bath Make-up (High-Speed)		
Chemicals Required	5–30 A/dm <sup>2</sup>	50–300 A/ft <sup>2</sup>
Deionized Water	570 ml/l	57% v/v
Solderon Tin HS-300 Conc. or Solderon Tin Conc. 300 g/l	217 ml/l	21.7% v/v
Solderon Acid HC	80 ml/l	8% v/v
Solderon ST-200 Primary	100 ml/l	10% v/v
Solderon ST-200 Secondary	5.0 ml/l	0.5% v/v
Solderon AO-52 or Solderon RD Concentrate	15.0 ml/l	1.5% v/v
Dilute to final volume deionized water		

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### Bath Operation—Metric (High-Speed)

Parameter	Range	Recommended
Tin (II)	55–75 g/l	65 g/l
Total Solderon Acid HC	175–245 ml/l	210 ml/l
Solderon ST-200 Primary	70–130 ml/l	100 ml/l
Solderon ST-200 Secondary	2.0–8.0 ml/l	5.0 ml/l
Solderon AO-52 or Solderon RD Conc.	10–20 ml/l	15 ml/l
Temperature	45–55°C	50°C
Cathode Current Density	5–50 A/dm <sup>2</sup>	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/dm <sup>2</sup>	

### Bath Operation—U.S. (High-Speed)

Parameter	Range	Recommended
Tin (II)	7.3–10.0 oz./gal.	8.6 oz./gal.
Total Solderon Acid HC	17.5–24.5% v/v	21.0% v/v
Solderon ST-200 Primary	7.0–13.0% v/v	10.0% v/v
Solderon ST-200 Secondary	0.2–0.8% v/v	0.5% v/v
Solderon AO-52 or Solderon RD Conc.	1.0–2.0% v/v	1.5% v/v
Temperature	114–130°F	122°F
Cathode Current Density	50–500 A/ft <sup>2</sup>	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/ft <sup>2</sup>	

### Bath Make-up (Medium-Speed)

Chemicals Required	5–15 A/dm <sup>2</sup>	50–150 A/ft <sup>2</sup>
Deionized Water	600 ml/l	60% v/v
Solderon Tin HS-300 Conc. or Solderon Tin Conc. 300 g/l	133 ml/l	13.3% v/v
Solderon Acid HC	130 ml/l	13% v/v
Solderon ST-200 Primary	100 ml/l	10% v/v
Solderon ST-200 Secondary	10 ml/l	1% v/v
Solderon AO-52 or Solderon RD Conc.	15 ml/l	1.5% v/v
Dilute to final volume deionized water		

### Bath Operation—Metric (Medium-Speed)

Parameter	Range	Recommended
Tin (II)	30–50 g/l	40 g/l
Total Solderon Acid HC	175–245 ml/l	210 ml/l
Solderon ST-200 Primary	70–130 ml/l	100 ml/l
Solderon ST-200 Secondary	5–15 ml/l	10 ml/l
Solderon AO-52 or Solderon RD Conc.	10–20 ml/l	15 ml/l
Temperature	35–45°C	40°C
Cathode Current Density	5–15 A/dm <sup>2</sup>	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	2.5 microns per minute at 5 A/dm <sup>2</sup>	

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### Bath Operation—U.S. (Medium-Speed)

Parameter	Range	Recommended
Tin (II)	4.0–6.7 oz./gal.	5.3 oz./gal.
Total Solderon Acid HC	17.5–24.5% v/v	21.0% v/v
Solderon ST-200 Primary	7–13% v/v	10% v/v
Solderon ST-200 Secondary	0.5–1.5% v/v	1.0% v/v
Solderon AO-52 or Solderon RD Conc.	1.0–2.0% v/v	1.5% v/v
Temperature	95–113°F	104°F
Cathode Current Density	50–150 A/ft <sup>2</sup>	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/ft <sup>2</sup>	

### Bath Make-up (Low-Speed)

Chemicals Required	0.5–5 A/dm <sup>2</sup>	5.0–50 A/ft <sup>2</sup>
Deionized Water	580 ml/l	58% v/v
Solderon Tin HS-300 Conc. or Solderon Tin 300 Conc.	83 ml/l	8.3% v/v
Solderon Acid HC	235 ml/l	23.5% v/v
Solderon ST-200 Primary	75 ml/l	7.5% v/v
Solderon ST-200 Secondary	4 ml/l	0.4% v/v
Solderon AO-52 or Solderon RD Conc.	15 ml/l	1.5% v/v
Dilute to final volume deionized water		

### Bath Operation—Metric (Low-Speed)

Parameter	Range	Recommended
Tin (II)	20–30 g/l	25 g/l
Total Solderon Acid HC	270–300 ml/l	285 ml/l
Solderon ST-200 Primary	50–100 ml/l	75 ml/l
Solderon ST-200 Secondary	2–6 ml/l	4 ml/l
Solderon AO-52 or Solderon RD Conc.	10–20 ml/l	15 ml/l
Temperature	25–35°C	30°C
Cathode Current Density	0.5–5 A/dm <sup>2</sup>	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	0.5 microns per minute at 1 A/dm <sup>2</sup>	

### Bath Operation—U.S. (Low-Speed)

Parameter	Range	Recommended
Tin (II)	2.7–4.0 oz./gal.	3.3 oz./gal.
Total Solderon Acid HC	27.0–30.0% v/v	28.5% v/v
Solderon ST-200 Primary	5.0–10.0% v/v	7.5% v/v
Solderon ST-200 Secondary	0.2–0.6% v/v	0.4% v/v
Solderon AO-52 or Solderon RD Conc.	1.0–2.0% v/v	1.5% v/v
Temperature	76–96°F	86°F
Cathode Current Density	5–50 A/ft <sup>2</sup>	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/ft <sup>2</sup>	

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### BATH MAINTENANCE

#### Solderon ST-200 Primary

Solderon ST-200 Primary is necessary to maintain smooth deposits and throwing power. Solderon ST-200 Primary is controlled in the bath by the cyclic voltmetric stripping procedure (CVS).

#### Solderon ST-200 Secondary

Solderon ST-200 Secondary is necessary to maintain uniform low-current density deposit coverage. Add 20–30 ml of Solderon ST-200 Secondary for every 1,000 ampere hours, or as required by UV/VIS analysis to maintain the concentration between 3.0–7.0 ml/l.

#### Solderon Tin HS-300 Concentrate or Solderon Tin Concentrate 300 g/l

Maintain tin concentration based on titration analysis. Solderon Tin HS-300 Concentrate or Solderon Tin Concentrate 300 g/l contains 300 g/l tin (II). To raise tin (II) concentration 1.0 g/l, add 3.33 ml/l (0.333% v/v) of Solderon Tin HS-300 or Solderon Tin Concentrate 300 g/l.

#### Solderon Acid HC

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

#### Solderon AO-52 or Solderon RD Concentrate

Solderon AO-52 or Solderon RD Concentrate are designed to minimize the oxidation of tin in the electrolyte. Maintenance additions are made based on analysis.

### GENERAL NOTES

1. The application of 0.5  $\mu\text{m}$  (20 microinches) of Nikal SC nickel underlayer is recommended to enhance whisker-free deposits of ST-200.
2. Lead contamination of 100 ppm and higher will show detrimental effects. The deposit becomes darker at high current densities with increasing levels of lead. The minimum acceptable concentration depends upon the operating current density, with lower current densities tolerating more lead.
3. Lead contamination could easily come from residual tin lead plating solution (if tank is not new) or anodes.

### EQUIPMENT

- Tanks: Polypropylene, Polyethylene, CPVC or Type 316L stainless steel
- Anodes: Soluble: Tin 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.
- Heaters: Titanium, silica sheathed or Teflon™ fluoropolymer-coated
- Filtration: Continuous, 1 micron polypropylene filter cartridge

### EQUIPMENT PREPARATION

#### Leaching Method

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 HC

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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### 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 ST-200 Primary**

**Solderon ST-200 Secondary**

**Solderon Tin HS-300 Concentrate or**

**Solderon Tin Concentrate 300 g/l**

**Solderon AO-52**

**Solderon Acid HC**

**Solderon RD Concentrate**

### 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 ST-200**

 **Circuit Board Technologies**

 **CMP Technologies**

 **Display Technologies**

 **Microelectronic Technologies**

 **Packaging and Finishing Technologies**

For locations and information please visit [www.rohmhaas.com](http://www.rohmhaas.com)

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