



## SOLDERON™ BP TS 6000 Tin/Silver Bump Plating Bath

For Advanced Packaging Applications

### Regional Product Availability

- North America
- Asia
- Europe

### Description

SOLDERON BP TS 6000 Tin/Silver bump plating bath is a newly redesigned formulation specifically for use in a semiconductor wafer plating process, producing reflowable SnAg solder bumps for flip-chip packaging and 2.5D/ 3D packaging applications. This next-generation chemistry delivers industry-leading plating rates, enhanced plating performance, bath stability and ease-of-use and maximum process flexibility.

### Advantages

- Environmentally-friendly, 100% lead-free formulation
- High deposition rates beyond 5 µm/min
- Robust macro- and micro-void-free reflow performance
- Excellent bump thickness and composition uniformity (even for challenging die designs)
- Suitable for both in-via and mushroom depositions
- Applicable to C4, Cu pillar capping, and micro bump applications
- Compatible with all main-stream semiconductor wafer plating equipment
- Low-foaming, long bath life
- Ease-of-process control with in-line metrology

### Deposition Data

Structure/Appearance: Fine grained deposits  
Alloy Composition: 97.5–99.0% Tin, 1.0–2.5% Silver

### Bath Make-up

### Bath Operation Parameters

For high-speed plating

Parameter	Range	Recommended
Sn <sup>2+</sup>	70–80 g/L	75 g/L
Ag <sup>+</sup>	0.3–1.0 g/L	Depends on CD and tool agitation
Total Acid	225–300 mL/L	*Dependent upon tool
Plating Temperature	22–30°C	25°C
Cathode Current Density	6–10+ ASD	8 ASD
Agitation	Moderate	
Cathode Efficiency	> 95%	
*Please see your Dow Technical Representative for further information.		

## Bath Make-up (cont'd)

### For low-speed plating

Parameter	Range	Recommended
Sn <sup>2+</sup>	45–55 g/L	50 g/L
Ag <sup>+</sup>	0.3–1.0 g/L	Depends on CD and tool agitation
Total Acid	225–300 mL/L	*Dependent upon tool
Plating Temperature	22–30°C	25°C
Cathode Current Density	4–8 ASD	6 ASD
Agitation	Moderate	
Cathode Efficiency	> 95%	
*Please see your Dow Technical Representative for further information.		

## Make-up Procedure

### For high-speed plating

Components	Target Concentration	Make Up Volume
SOLDERON BP TS 6000 Tin Concentrate (300g/L)	75 g/L (Sn <sup>2+</sup> )	250mL/L
SOLDERON BP TS 6000 Acid	225mL/L (Total Acid)	75mL/L
SOLDERON BP TS 6000 Secondary	15mL/L	15mL/L
SOLDERON BP TS 6000 Primary	100mL/L	100mL/L
SOLDERON BP TS 6000 Complexer	65mL/L	65mL/L
SOLDERON BP TS 6000 Silver Replenisher (25g/L)	0.65g/L (Ag <sup>+</sup> )	26mL/L
D. I. Water		469mL/L

1. Add 300mL/L of D.I. water in to the tank
2. Add 75mL/L of SOLDERON BP TS6000 Acid into the tank and mix thoroughly
3. Add 250mL/L of SOLDERON BP TS 6000 Tin Concentrate into the tank and mix thoroughly
4. Add 100mL/L of SOLDERON BP TS 6000 Primary into the tank and mix thoroughly
5. Add 65mL/L of SOLDERON BP TS 6000 Complexer into the tank and mix thoroughly
6. Add 15mL/L of SOLDERON BP TS 6000 Secondary into the tank and mix thoroughly
7. Add 26mL/L of SOLDERON BP TS 6000 Silver Replenisher into the tank and mix thoroughly\*
8. Add 169mL/L D.I. water into into the tank and mix thoroughly
9. Circulate for 30minutes before bath analysis
10. Plate a blank Cu wafer at over 3ASD CD for 5minutes to activate plating bath
11. Analyze sample for all components identified target formation in this table.

\*It is recommended to not directly mix SOLDERON BP TS 6000 Tin Concentrate and SOLDERON BP TS 6000 Silver Replenisher in the absence of SOLDERON BP TS 6000 Complexer. If the same container or tubing is used for handling TS 6000 Tin Concentrate and TS 6000 Silver Replenisher, it is recommended to rinse thoroughly with DI water in between additions. For more details, please consult Dow Technical Representative.

Make-up  
Procedure  
(Cont'd)

For low-speed plating

Components	Target Concentration	Make Up Volume
SOLDERON BP TS 6000 Tin Concentrate (300g/L)	50 g/L (Sn <sup>2+</sup> )	167mL/L
SOLDERON BP TS 6000 Acid	225mL/L (Total Acid)	125mL/L
SOLDERON BP TS 6000 Secondary	15mL/L	15mL/L
SOLDERON BP TS 6000 Primary	100mL/L	100mL/L
SOLDERON BP TS 6000 Complexer	65mL/L	65mL/L
SOLDERON BP TS 6000 Silver Replenisher (25g/L)	0.65g/L (Ag <sup>+</sup> )	26mL/L
D. I. Water		502mL/L

1. Add 300mL/L of D.I. water in to the tank
2. Add 125mL/L of SOLDERON BP TS6000 Acid into the tank and mix thoroughly
3. Add 167mL/L of SOLDERON BP TS 6000 Tin Concentrate into the tank and mix thoroughly
4. Add 100mL/L of SOLDERON BP TS 6000 Primary into the tank and mix thoroughly
5. Add 65mL/L of SOLDERON BP TS 6000 Complexer into the tank and mix thoroughly
6. Add 15mL/L of SOLDERON BP TS 6000 Secondary into the tank and mix thoroughly
7. Add 26mL/L of SOLDERON BP TS 6000 Silver Replenisher into the tank and mix thoroughly\*
8. Add 202mL/L D.I. water into into the tank and mix thoroughly
9. Circulate for 30minutes before bath analysis
10. Plate a blank Cu wafer at over 3ASD CD for 5minutes to activate plating bath
11. Analyze sample for all components identified target formation in this table.

\*It is recommended to not directly mix SOLDERON BP TS 6000 Tin Concentrate and SOLDERON BP TS 6000 Silver Replenisher in the absence of SOLDERON BP TS 6000 Complexer. If the same container or tubing is used for handling TS 6000 Tin Concentrate and TS 6000 Silver Replenisher, it is recommended to rinse thoroughly with DI water in between additions. For more details, please consult Dow Technical Representative.

Bath  
Maintenance

**SOLDERON BP TS 6000 Primary**

SOLDERON BP TS 6000 Primary is required to achieve uniform deposits across the full current density range. Replenish with SOLDERON BP TS 6000 Primary, as required, to maintain a concentration of 75–125 mL/L based on analysis. Refer to the analytical procedure for the determination of the SOLDERON BP TS 6000 Primary.

**SOLDERON BP TS 6000 Secondary**

SOLDERON BP TS 6000 Secondary is required to achieve fine grain structures in SnAg deposits. Replenish with SOLDERON BP TS 6000 Secondary, as required, to maintain a concentration of 10–20 mL/L based on analysis. Refer to the analytical procedure for the determination of the SOLDERON BP TS 6000 Secondary.

Bath  
Maintenance  
(Cont'd)

**SOLDERON BP TS 6000 Tin Concentrate**

SOLDERON BP TS 6000 Tin Concentrate is a low alpha particle emitting tin product and contains 300 g/L of Sn<sup>2+</sup>. To raise Sn<sup>2+</sup> concentration by 1.0 g/L in the bath, add 3.33 mL/L SOLDERON BP TS 6000 Tin Concentrate. With the addition of 1 mL/L SOLDERON BP TS 6000 Tin Concentrate, the SOLDERON BP Acid (Total Acid) content will also be increased by 0.53 mL/L.

**SOLDERON BP TS 6000 Silver Replenisher**

SOLDERON BP TS 6000 Silver Replenisher contains 25 g/L of Ag<sup>+</sup>. To raise Ag<sup>+</sup> concentration by 0.1 g/L in the bath, add 4 mL/L SOLDERON BP TS 6000 Silver Replenisher.

**SOLDERON BP TS 6000 Complexer**

SOLDERON BP TS 6000 Complexer is required to stabilize Ag<sup>+</sup> in the plating bath. Replenish with SOLDERON BP TS 6000 Complexer to maintain 100 mL/L Complexer for every 1 g/L of Ag<sup>+</sup> in the plating bath. Refer to the analytical procedure for the determination of the SOLDERON BP TS 6000 Complexer.

**Total Acid**

SOLDERON BP TS 6000 Acid contains methane sulfonic acid. To raise Total Acid concentration 10mL/L, add 10 mL/L SOLDERON BP TS 6000 Acid.

Product Data

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

Equipment

Tanks: Polypropylene, polyethylene or PVDC  
Anodes: Insoluble anodes: Iridium Oxide coated titanium or Platinized titanium  
Heaters: Titanium, Silica Sheathed or PTFE-coated  
Filtration: Continuous, 1–5 micron polypropylene filter cartridge

Associated  
Products

SOLDERON BP TS 6000 Complexer  
SOLDERON BP TS 6000 Primary  
SOLDERON BP TS 6000 Secondary  
SOLDERON BP TS 6000 Tin Concentrate  
SOLDERON BP TS 6000 Silver Replenisher  
SOLDERON BP TS 6000 Acid

## Handling Precautions

Before using this product, associated generic chemicals or the analytical reagents required for its control, consult the supplier's Material Safety Data Sheet (MSDS)/Safety Data Sheet (SDS) for details on material 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 Dow Electronic Materials Technical Representative for more information.

## Product Stewardship

Dow has a fundamental concern for all who make, distribute, and use its products, and for the environment in which we live. This concern is the basis for our product stewardship philosophy by which we assess the safety, health, and environmental information on our products and then take appropriate steps to protect employee and public health and our environment. The success of our product stewardship program rests with each and every individual involved with Dow products - from the initial concept and research, to manufacture, use, sale, disposal, and recycle of each product.

## Customer Notice

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SOLDERON™ BP TS 6000 Matte Tin/Silver Bump Plating Bath / Advanced Packaging

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