



# PALLAMERSE™ SMT 2000

For PWB Metallization Applications

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

## DESCRIPTION

The Pallamerse SMT 2000 is an autocatalytic palladium process designed for printed circuit applications. The process is capable of depositing palladium coatings onto either copper or nickel as necessary for subsequent SMT assembly requirements.

## ADVANTAGES

- Autocatalytic process allows high deposit thicknesses to be achieved
- Low temperature operation minimizes attack of soldermask
- Deposits are bondable with either gold or aluminum wire
- Stable solution with a wide operating window.
- Consistent deposition rate.
- Deposits exhibit excellent solderability

## BATH MAKE-UP (FOR 1 LITER)

Chemicals Required	Metric	(U.S.)
Deionized Water:	200 ml/l	(20% v/v)
Pallamerse SMT 2000 Make-up Solution:	500 ml/l	(50% v/v)
Pallamerse SMT Reducer:	200 ml/l	(20% v/v)
Pallamerse SMT Palladium Concentrate (100 g/l Pd):	10.0 ml/l	(1.0% v/v)

## MAKE-UP PROCEDURE

1. Add deionized water to tank.
2. Add Pallamerse SMT 2000 Make-up Solution and mix thoroughly.
3. Add Pallamerse SMT Reducer and mix thoroughly.

4. Add Pallamerse SMT Palladium Concentrate (100 g/l Pd) and mix thoroughly.
5. Dilute to final volume with deionized water and mix thoroughly.
6. Make sure circulation pump is working.
7. Adjust pH to 8.2–8.4 at room temperature (see pH control).
8. Analyze Pd content and reducer concentration and adjust to optimum values.
9. Heat the solution to operating temperature 67°C (153°F) and maintain the temperature for at least five hours before starting the process (cover the tank to keep evaporation to a minimum).
10. Process a first piece article and inspect adhesion and thickness of deposited metals using tape test and X-ray.

## Operating Parameters

Parameter	Range	Recommended
Palladium Metal	0.7–1.3 g/l	1.0 g/l
Pallamerse SMT Reducer	175–225 ml/l	200 ml/l
pH	8.0–8.5	8.3
Temperature	65–70°C (149–158°F)	67°C (153°F)
Agitation	Continuous solution flow and/or mechanical agitation	
Deposition Rate	0.020–0.035 microns per minute on Ni 0.8–1.4 micro inches per minute on Ni 0.030–0.045 microns per minute on Cu 1.2–1.8 micro inches per minute on Cu	

## PALLAMERSE SMT PROCESS SEQUENCE

The following process flow may be used to prepare PWB substrates for applications requiring both solderability and wire bonding.

## PALLAMERSE SMT 2000

### Process Sequence

Process	Temperature	Time
Ronaclean™ PC-454 or PC-921	57–63°C (135–145°F)	3 minutes
Rinse	RT	1 minute
Rinse	RT	1 minute
Preposit Etch 748	21–32°C (70–90°F)	1 minute
Rinse	RT	1 minute
Rinse	RT	1 minute
20% v/v Hydrochloric Acid	RT	1 minute
Ronamerse SMT Catalyst	21–27°C (70–80°F)	5–15 minutes depending on substrate
Rinse	RT	1 minute
20% v/v Hydrochloric Acid	RT	1 minute
Rinse	RT	1 minute
DI Rinse	RT	1 minute
Duraposit™ SMT-88	82–91°C (180–195°F)	22 minutes
Rinse	RT	1 minute
DI Rinse	RT	1 minute
Ronamerse™ SMT Catalyst	25–35°C (78–95°F)	2–3 minutes
Rinse	RT	0.5 minutes
DI Rinse	RT	0.5 minutes
Pallamerse SMT 2000	65–70°C (149–158°F)	8–12 mins. (0.10–0.30 µm) (4–12 µinches)
Palladium Drag Out	RT	1 minute
DI Rinse	60°C (140°F)	1 minute
Auroelectroless SMT	86°C (187°F) 85–88°C (185–190°F)	10 minutes
Gold Dragout	RT	1 minute
DI Rinse	60°C (140°F)	1 minute
Dry		

### BATH OPERATION

- Before heating the bath make sure that the filter cartridge is not in the circulation system. After the last rack is through the Pallamerse tank, shut down the heater and cover the tank. Maintain solution circulation for a minimum of 45 minutes after the heater is turned off.
- Regularly filter the solution between production periods with circulation pump and 1 micron filter cartridge (when bath temperature is below 50°C).
- Clean and etch the tank only when significant Pd metal is found in the tank or on the heater:
  - Transfer the solution (below 50°C) into a holding tank through a 1 micron filter bag.
  - Thoroughly rinse out the working tank with deionized water. Flush or vacuum away metal deposits as much as possible. Remove the water to waste.
  - Add etching solution (30 ml/l nitric acid conc., tank volume) to the working tank and circulate the solution for approximately 1 hour and allow the etching solution to remain in the tank overnight. Transfer the solution to a storage container.
  - Thoroughly rinse the tank and the pump system with tap water. Discard water;
  - Add ammonia solution (approximately 30 ml/l ammonia hydroxide). Adjust pH of the solution above 8.0 with ammonia. Circulate the solution for approximately 0.5 hour. Discard the ammonia solution.
  - Repeat step d).
  - Use deionized water for final rinse. Discard water.
  - Transfer the working solution to working tank through a 1 micron filter bag. Control pH before heating the bath.

### SOLUTION MAINTENANCE OPERATING NOTES

Deposition rate is influenced by palladium concentration, temperature, pH and Pallamerse SMT Reducer concentration. To ensure consistency of deposition rate, maintain these constituents within recommended operating range.

## PALLAMERSE SMT 2000

### PALLAMERSE SMT PALLADIUM CONCENTRATE (100 G/L PD)

Palladium metal is replenished by additions of Pallamerse SMT Palladium Concentrate (100 g/l Pd). To raise palladium metal concentration by 0.1 g/l, add 1.0 ml/l Pallamerse SMT Palladium Concentrate (100 g/l Pd).

Replenishment is carried out on the basis of atomic absorption analysis or throughput, periodically verified by analysis.

### PALLAMERSE SMT 2000 REPLENISHER

Pallamerse SMT 2000 Replenisher is required to maintain the basic constituents of the electrolyte.

Add 15 ml Pallamerse SMT 2000 Replenisher for every 1.0g palladium metal deposited.

### PALLAMERSE SMT REDUCER

Pallamerse SMT Reducer is required to maintain the reducing agent concentration. Replenishment is carried out on the basis of analysis. See Analytical Procedure.

Approximately 45–50 ml Pallamerse SMT Reducer will be required for every 1.0g palladium metal deposited.

### pH CONTROL

The pH of the solution affects the bath stability and the quality of Pd deposition. pH should be maintained between 8.0–8.5 by additions of Pallamerse SMT 2000 pH Adjuster or reagent grade hydrochloric acid. The pH should be measured daily at **room temperature**.

Add 1.0 ml/l Pallamerse SMT 2000 pH adjuster to increase pH by ca. 0.1 units.

Add 1.5 ml/l of 50% (v/v) hydrochloric acid to reduce pH by ca 0.1 units.

### DEPOSITION RATE

Deposition rate depends on the substrate plated. Process a sample plating for every new batch of boards to determine the deposition rate (or thickness). The deposition rate may reduce slightly with the age of the bath. Check deposition rate after any prolonged idle time (e.g. weekend). Low throughput at working temperature may slow down the deposition rate. The deposition rate can be increased by addition of Pallamerse SMT 2000 Accelerator when necessary. Add Pallamerse SMT 2000 Accelerator with Pallamerse SMT 2000 Replenisher and do not exceed 0.5 ml/l at any one time. An addition of 0.1 ml/l will increase the rate approximately —%.

## PALLAMERSE SMT 2000

### Notes

- Always make additions of chemicals slowly and carefully distribute over the solution with good agitation. Replenish the bath components in the order of:
  - Pallamerse SMT 2000 Replenisher
  - Pallamerse SMT Palladium Concentrate
  - Pallamerse SMT Reducer
- If a second catalization step after Ni deposition is not used, the conditions of the electroless Ni bath may have an influence on initiation of Pd deposition.
- For the application of Pd over Cu, base materials having a rough Cu surface (i.e. Cu on Teflon™ fluoropolymer) may need a longer immersion time in the Catalyst and higher Catalyst concentration (120 mg/IPd).
- Avoid heating the solution over prolonged periods without plating. Cover the tanks (working and holding) when the bath is not in use to minimize evaporation loss of the bath contents.
- Measurement of the mixed potential of deposition is a useful tool to check the initiation of Pd plating and the consistency of bath composition.

### ANALYTICAL PROCEDURE FOR PALLAMERSE SMT REDUCER

#### I. Equipment

- 250 ml glass-stoppered iodine flask
- 25 ml graduated cylinder
- 50 ml transfer pipette
- 10 ml transfer pipette
- 50 ml burette

#### II. Reagents

- Reagent Grade Sulfuric Acid Solution, 50% v/v (9M, 18N)
- Iodine Solution, (0.05M) 0.1N

#### III. Titrant

- Sodium Thiosulfate Solution, (0.1M) 0.1N

### IV. Procedure

- Pipette 10.0 ml of Pallamerse SMT working solution into a 250 ml iodine flask.
- Add a magnetic stir bar.
- Pipette 50.0 ml of iodine solution into the flask.
- Add 25 ml of sulfuric acid solution. Immediately stopper flask and mix thoroughly. Seal the stopper with deionized water. Place the flask in a cool dark place for 30 minutes.
- Remove stopper. Rinse the inside and outside of the stopper with deionized water. Place it on a magnetic stir plate.
- Carefully titrate with sodium thiosulfate solution until the first permanent yellow color is obtained. If iodine crystals are observed, the solution has been titrated too quickly. Repeat Steps 1–6.

### V. Calculation

$$\text{Pallamerse SMT Reducer ml/l} = (5.0\text{-ml Titrant} \times M(N)) \times 105.8$$

$$\text{Pallamerse SMT Reducer \% v/v} = (5.0\text{-ml Titrant} \times M(N)) \times 10.58$$

### EQUIPMENT

- Tanks: Koroseal-lined, PVDC, polypropylene or other suitable plastics; check with Rohm and Haas Electronic Materials if the suitability of any material is in question
- Heater: Low density Teflon fluoropolymer-coated electric heater, 3 Watts/in maximum rating
- Filter: 1 μm filters are recommended
- Pump: Sufficient capacity for four solution turnovers per hour
- Agitation: Moderate to vigorous

## PALLAMERSE SMT 2000

### EQUIPMENT PREPARATION

Prior to make-up, the process tank and ancillary equipment should be thoroughly cleaned and then leached with an ammonium hydroxide solution.

This procedure is particularly important for new equipment or equipment previously used for other processes.

#### Cleaning Solution

Trisodium Phosphate: 15 g/l 2 oz./gal.

Sodium Hydroxide: 15 g/l 2 oz./gal.

#### Neutralizing Solution

Hydrochloric Acid: 50 ml/l 5% v/v

#### Leaching Solution

Ammonium Hydroxide: 50 ml/l 5% v/v

### PROCEDURE

1. Thoroughly wash down tank and ancillary equipment with clean water.
2. Recirculate water through the complete system to remove water soluble materials.
3. Discard rinse water.
4. Add cleaning solution to the tank, heat to between 55–60°C (130–140°F) and recirculate through the complete system.
5. Discard cleaning solution.
6. Recirculate water through the complete system.
7. Discard rinse water.
8. Add neutralizing solution and recirculate through the complete system.
9. Discard neutralizing solution.
10. Recirculate water through the complete system.
11. Discard rinse water.
12. Add leaching solution and recirculate through the complete system.
13. Leave leaching solution in tank for a minimum of 8 hours.
14. Recirculate leaching solution through the complete system.
15. Discard leaching solution.
16. Recirculate water through the complete system.
17. Discard rinse water.

## PALLAMERSE SMT 2000

### DEPOSIT PROPERTIES

Composition:	98–99% Pd, 1–2% P
Density:	9.5–10.5 g/cc
Hardness:	350–400 HK <sub>25</sub>

### PRODUCT DATA

#### Pallamerse SMT 2000 Make-up Solution

Appearance:	Clear, colorless to pale yellow liquid
Specific Gravity:	1.015–1.025
pH:	8.0–8.5

#### Pallamerse SMT 2000 Replenisher

Appearance:	Clear, colorless to pale yellow liquid
Specific Gravity:	1.050–1.070
pH:	8.0–8.5

#### Pallamerse SMT Palladium Concentrate

Appearance:	Clear, yellow liquid
Specific Gravity:	1.120–1.130
pH:	8.0–8.5

#### Pallamerse SMT Reducer

Appearance:	Clear, colorless liquid
Specific Gravity:	1.010–1.050
pH:	6.0–7.0

#### Pallamerse SMT 2000 pH Adjuster

Appearance:	Clear, colorless to pale yellow liquid
Specific Gravity:	0.990–1.000
pH:	>12

#### Pallamerse SMT 2000 Accelerator

Appearance:	Clear, colorless liquid
Specific Gravity:	0.995–1.004
pH:	5.0–8.0

## PALLAMERSE SMT 2000

### 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.



## PALLAMERSE SMT 2000



**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)

Duraposit, Pallamerse, Ronaclean, Ronamerse, Rohm and Haas, and Rohm and Haas Electronic Materials are trademarks of Rohm and Haas Company, Philadelphia, PA, USA, or its affiliates. Teflon is a trademark of E.I. DuPont de Nemours and Company, Inc.

### UNITED STATES

**Marlborough, MA**

Tel: 800.832.6200

Fax: 508.485.9113

### JAPAN

**Tokyo**

Tel: +81.3.5213.2910

Fax: +81.3.5213.2911

### ASIA

**Hong Kong**

Tel: +852.2680.6888

Fax: +852.2680.6333

### EUROPE

**Paris, France**

Tel: +33.1.40.02.54.00

Fax: +33.1.40.02.54.07

For Industrial Use Only. This information is based on our experience and is, to the best of our knowledge, true and accurate. However, since conditions for use and handling of products are beyond our control, we make no guarantee or warranty, expressed or implied, regarding the information, the use, handling, storage or possession of the products, or the applications of any process described herein or the results sought to be obtained. Nothing herein shall be construed as a recommendation to use any product in violation of any patent rights.