

PD3-ECO

Technical chart

Last revision

31/10/2013

READY TO USE PALLADIUM FLASH AMMONIA FREE 3g/l PURE

Pag. 1/2

Colour **White**

[L: 84,8 a: 0,4 b: 4,3 c: 4,3]

Product description

PD3-ECO is a ready-to-use pure palladium plating bath without ammonia. As PD3-ECO is completely ammonia free, beside an environmental impact reduction, it permits to afford a more comfortable and safety work for the operator who will not check frequently the pH of the solution neither do anymore frequent concentrated ammonia additions inside the palladium solution. Moreover, because the pH of this solution is very closed to the neutral value, the gaseous hydrogen developed from any surface is limited with respect to the traditional palladium ammonia-based processes thus giving whiter and less porous deposits. The main features of PD3-ECO are:

- **Low concentration of palladium**
- **Neutral process, easy to use**
- **Completely ammonia free**
- **Stability**

Recommended applications

PD3-ECO is purposely designed for flash plating for use as a barrier against the diffusion of gold deposits on copper and its alloys. It is also particularly suitable as an intermediate layer between white gold and rhodium plating. As ammonia free solution it is also able to give whiter deposits of pure palladium and, for this reason, it is possible to use their deposits as final layers.

Deposit data

Purity [%]	99.9
Density [g/cm ³]	12
Thickness [μm]	0.02-2
Appearance	Shiny

Operating data

	Range	Optimum
Initial solution concentration [Palladium, g/l]	3	3
Cathode efficiency [mg/Amin"]	circa 30	
Time of exposure [min]	1- 8	4
Operating temperature [°C]	35 - 50	40
pH	6.0 - 7.5	6.5
Current density [A/dm ²]	0.5-1.5	1
Voltage [V]	1.0-1.5	1.2
Anodes	---	Pt or Ti/Pt
Agitation	Suggested	Moderate

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Additional informations

Packaging

The product comes in a high-density polyethylene bottle.

Equipment

It is more practical to use glass containers for quantities up to 5 litres, whereas for greater quantities it is best to install PTFE or polypropylene plants equipped with:

- a current rectifier with an ampmeter and voltmeter, with low residual AC (<5%).
- amp/min counter.
- platinum-coated titanium anodes, coated with 2.5 µ of platinum.
- magnetic drive filter pumps with 5-15 µ cartridge.

N.B. Before use boiling and washing of the cartridges with demineralized water is recommended to prevent organic contamination.

General notes on the palladium plating process

The items to be treated are prepared according to the usual method. In general you are recommended to start by washing in an ultrasound bath, followed by rinsing and subsequent alkaline electrolytic degreasing (e.g. Legor SGR1) at 5-6 Volts for 1-2 minutes. Neutralise by immersion in a 5% sulphuric acid solution or similar (e.g. Legor NEUT1), rinse in demineralised water and immerse the pieces in the palladium plating bath at 30°C for 2 minutes, at an approximate voltage of 1.5 - 2 Volts, agitating moderately. Although this is a flash treatment, the high plating time is due to the reduced electrodeposition speed. Avoid the application of high voltages as they can cause burning on the pieces, which is visible even after successive plating treatments. If the palladium plating treatment is applied as an intermediate layer on white gold items which are then rhodium-plated, it is important that the palladium and rhodium plating are performed in rapid succession. After the palladium plating treatment, the pieces are rinsed with demineralised water and neutralised in a 5% sulphuric acid solution or using the Legor NEUT1 solution. After rinsing with demineralised water, the pieces must be immediately rhodium plated following the normal instructions. Never perform electrolytic degreasing treatment on the palladium plating as it will cause blackening of the piece due to absorption of the hydrogen in the palladium. If you have accidentally done this, anodic degreasing treatment (inverted polarity) or heating of the pieces for a few minutes at 80°C should restore the original characteristics of the plating.

Temperature

PD3-ECO gives excellent performance for standard flash treatments at 35-50°C temperature with an optimum of 40°C. Should it be necessary to speed up the deposition process, the temperature can be increased up to 50°C.

pH

pH must be checked regularly and, in case, corrected around the optimal value with a 50% solution of ammonia or 10% solution of sulphuric acid.

Analytical checks

The process in question is particularly easy to perform and does not require frequent analytical checks. However, our Technical Assistance Service is at hand to offer suggestions, advice and periodic analytical checks on all bath components.

Galvanic Bath Maintenance

For small volume baths (up to 5-6 litres) use the bath until exhaustion, without adding any replenisher. For bigger baths, additions shall be performed using the appropriate replenishing unit as reported in the table below. For optimum performance of the bath, it is best to work with a bath concentration that is within 20% less than the initial concentration; for example, with a bath at 3 g/l nominal value, additions must be done after a maximum consumption of 0,6 g/l of Palladium. In order to perform the additions, always consider that a 3 g/l bath deposits on average 30 mg of Palladium per Ampere/minute. As Palladium is a precious metal, and in order to control consumption, periodic analytic controls are advised.

Replenishing compound usage

The replenisher units necessary in the PD3-ECO process, are available in 100 g form (PD100R) of Palladium. Moreover it is possible to use the replenisher PDXWR or PD3-ECOB to restore all the other components present inside the solution. Brighteners should also be restored in a separate way after our Technical Service Assistance suggestions with the following products: PDXWBR1 and PDXWBR2. It is important to highlight that the palladium contained in PD100R is in salt form and 2 grams of powder contains around 1 g of pure palladium. As consequence, as PD3-ECO has a cathodic efficiency of 30 mg/amin, the solution consumes about 100 g of palladium every 3000 Ampere/minutes. For this reason 100 g of palladium are restored with 1 bottle of PD100R together with 1 unit of PDXWR complete replenisher. For small users, restore 20 g of Pd with 40 ml (entire bottle) of PD3-ECOB.

Safety Information

Although PD3-ECO can be considered a low-toxicity product, irritation to the skin, eyes and mucous membrane cannot be excluded. Caution should be exercised when using the product, avoiding contact with the eyes and skin. Use gloves and safety goggles. For further information please refer to the relative safety sheet.

PD3-ECO bath plating solutions	Code
Ready-to-use palladium plating bath (1 liter bottle with containing 3 g of palladium)	PD3-ECO
Palladium replenisher for PD3-ECO (palladium salts in powder containing 100 g of palladium)	PD100R
Replenisher solution for PD3-ECO (5 units = 1 liter)	PDXWR
Replenisher solution for PD3-ECO (40 ml bottle)	PD3-ECOB
Conducting salts for PD3-ECO	PDXWSC
Stabilizer salts for PD3-ECO	PDXWSS
Brightening solution 1 for PD3-ECO palladium plating bath (packaging: 1 liter)	PDXWBR1
Brightening solution 2 for PD3-ECO palladium plating bath (packaging: 1 liter)	PDXWBR2