

RHODUNA[®]-Alloy 1

Operating Instructions

Edition: 22 August 2011

Acidic rhodium-ruthenium alloy electrolyte for white and ultra-bright coatings

- Crack-free up to 1 µm
- Wide operating range
- Extremely abrasion-resistant
- Suitable for rack and barrel

Bath Characteristics

The acidic rhodium-ruthenium alloy electrolyte RHODUNA[®]-Alloy 1 is used for depositing smooth, brilliant and extremely abrasion-resistant rhodium-ruthenium coatings of a light colour up to a coating thickness of 1 µm.

Rhodium content:	1.6 g/l	(1.4 – 1.8 g/l)
Ruthenium content:	0.4 g/l	(0.3 – 0.5 g/l)
Average Rh : Ru:	4 : 1; Conc. Rh = 4 x Conc. Ru	
pH-value:	Acidic	no control required
Temperature:	45 °C	(40 – 50 °C)
Bath density:	1.015 g/cm ³ , rising	
Current density:	4.0 A/dm ²	(3.0 – 5.0 A/dm ²)
Voltage:	3.5 volts	(3.0 – 4.0 volts)
Deposition speed:	Approx. 0.2 µm/min at 4.0 A/dm ²	
Deposition rate:	Approx. 5 mg/Amin at 4.0 A/dm ²	

Coating Characteristics

Coating:	Rhodium: 75 %	Ruthenium: 25 %
Colour:	White	
Hardness:	Not measurable, approx. 600 – 900 HV	
Maximum coating thickness:	1 µm	
Density of the coating:	Approx. 12.38 g/cm ³	

Form of Supply

- | | |
|---------------------|---|
| Bath makeup: | a) RHODUNA [®] -Alloy Rhodium Concentrate (50 g/l Rh)
32 ml with 1.6 g of rhodium for 1 litre of electrolyte
Storage stability: min. 2 years |
| | b) RHODUNA [®] -Alloy Ruthenium Concentrate (50 g/l Ru)
8 ml with 0.4 g of ruthenium for 1 litre of electrolyte
Storage stability: min. 2 years |
| | c) Sulphuric Acid 94-98% p.a.
D=1.84 g/cm ³
10 ml (20 g) for 1 litre of electrolyte
Storage stability: unlimited (provided by the customer) |
| | d) RHODUNA [®] -Alloy Brightener
40 ml for 1 litre of electrolyte
Storage stability: min. 2 years |
| Bath replenishment: | e) RHODUNA [®] -Alloy Rhodium Concentrate (50 g/l Rh)
Storage stability: 2 years (as item a) |
| | f) RHODUNA [®] -Alloy Ruthenium Concentrate (50 g/l Ru)
Storage stability: 2 years (as item b) |
| Bath correction: | g) RHODUNA [®] -Alloy Rhodium Concentrate (50 g/l Rh)
Storage stability: min. 2 years (as item a) |
| | h) RHODUNA [®] -Alloy Ruthenium Concentrate (50 g/l Ru)
Storage stability: min. 2 years (as item b) |
| | i) RHODUNA [®] -Alloy Brightener
Storage stability: min. 2 years (as item d) |
| | j) For pH corrections dilute sulphuric acid (AR) and ammonia solution (AR) should be available. |

RHODUNA[®]-Alloy 1

Bath Makeup

Makeup sequence: To make up 1 litre of RHODUNA[®]-Alloy 1 electrolyte, slowly stir 10 ml of conc. Sulphuric Acid (94-98%; p.a.), 32 ml RHODUNA[®]-Alloy Rhodium Concentrate, 8 ml RHODUNA[®]-Alloy Ruthenium Concentrate, and 40 ml RHODUNA[®]-Alloy Brightener into approx. 700 ml of deionized water, then fill up to the intended bath volume of 1 litre.

Bath Replenishment

Normally not more than 10 % of the rhodium or ruthenium content should be withdrawn from the bath, then 15 ml of RHODUNA[®]-Alloy Rhodium Concentrate and 5 ml/l 1 RHODUNA[®]-Alloy Ruthenium Concentrate per gram of alloy deposited (75 : 25) have to be added.

Bath Monitoring and Correction

Continuous filtration of the bath is recommended.

Analytical monitoring of the rhodium and ruthenium concentrations is recommended.

Metallic impurities:

As base metals readily dissolve in the strongly acidic RHODUNA[®]-Alloy 1 electrolyte, special attention should be paid to avoid metallic impurities.

Always immerse the parts with the current switched on! Any parts that have dropped into the electrolyte tank should be removed as soon as possible!

Metallic impurities in the bath (e.g. > 1 g/l of Ni) result in poorly adhering, hazy and dark coatings. Interfering contents of foreign metals in the bath can be generally lowered by selective purification. For further information, please contact your supplier.

Special Process Hints

Pre-treatment: Degrease the parts, rinse thoroughly, acid dip (in 5 % sulphuric acid), then rinse again, finally in deionized water, and plate.

RHODUNA[®]-Alloy 1 can be directly deposited on nickel, palladium-nickel and gold. With all other substrate metals, a nickel undercoat with a thickness of at least 1 to 2 µm is absolutely essential.

Substrate metals with a tendency to passivate have to be activated prior to plating.

Production stop: During production stops we recommend switching off the heating of the electrolyte. Heating can cause premature deterioration of the electrolyte.

Equipment

Bath tanks: Plastic tank of acid-proof and temperature-resistant (70°C) material. We recommend PP, PE or PTFE. PVC must not be used as tank material since the plasticizers contained in PVC will be gradually dissolved out and destroy the electrolyte.

Pumps: Centrifugal pump with magnetic coupling made from alkali-proof and heat-resistant (70 °C) plastics. We recommend the materials PP, PE, or PTFE. PVC must not be used.

Tubing, pipes: For tubes and pipes, we recommend the materials PP, PE, or PTFE. Types of tubing: SOLVENT-TRIX[®] 100 or 300 (supplier e.g. Angst + Pfisterer, Zurich, CH); PE tubing (e.g. from PIOFLEX, Denzlingen, D); fluoroplastic tubing (e.g. from Wolf-Technik, Stuttgart, D).

Barrels: PP, PE, or PTFE, no PVC.

Heating: Immersion heaters sheathed with porcelain, quartz, or Teflon-coated Equipment for temperature control.

Product agitation: Required, recommended 2 - 8 cm/s

Anodes: Titanium anodes coated with mixed metal oxide (MMO). We recommend PLATINODE[®] 187 SO. Surface ratio anodes : parts approx. 2 : 1

Rectifier: With sufficient capacity, with current display

Exhaust system: Absolutely essential! (Strongly acid bath vapours carried along by evolution of hydrogen. Allergenic effect possible!)

Filtration: Required. Filtration through active carbon (For removing organic contaminants, the electrolyte can be filtered through active carbon filter cartridges. Afterwards 40 ml/l RHODUNA[®]-Alloy Brightener have to be replenished.)

RHODUNA[®]-Alloy 1

Note

Our information relating to the storage stability refers to storage in closed original storage containers under the conditions stated on the label.

Precautionary Measures/Safety Hints

For information on safety, please see the corresponding Material Safety Data Sheets!
The valid accident prevention regulations and safety information must be observed!

Reference to

Trouble-shooting table: Available on request

Analytical methods: Available on request

The information and statements contained herein are provided free of charge. They are believed to be accurate at the time of publication, but we make no warranty with respect thereto, including but not limited to any results to be obtained or the infringement of any proprietary rights.

Use or application of such information or statements is at the user's sole discretion, without any liability on our part. Nothing herein shall be construed as a license of or recommendation for use which infringes upon any proprietary rights. All sales are subject to our General Conditions of Sale and Delivery.

Umicore Galvanotechnik GmbH

P.O. Box 12 40 • D-73502 Schwaebisch Gmuend

Delivery address:

Klarenbergstraße 53-79 • D-73525 Schwaebisch Gmuend
GERMANY

Telephone +49 7171 - 607 01

Fax +49 7171 - 607 316

e-mail: galvano@eu.umicore.com

www.umicore-galvano.com