riag Oberflächentechnik AG · Postfach 169 · CH-9545 Wängi TG

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riag Ag 817

Cyanide free semi-bright silver electrolyte

riag Ag 817 is an alkaline cyanide free silver electrolyte. It is suitable for either barrel or rack operations and can also be used for electronic applications.

Properties

- cyanide free silver process
- direct coating of nickel, silver, copper and copper alloys possible
- bright, white-yellowish deposits
- very good layer thickness distribution
- very good ductility

Make up

The electrolyte preparation can be done in a wide range.

	Range	Optimum
Silver (contained in riag Ag 817 Make up)	9.5 – 17 g/L	11 – 15 g/L
riag Ag 817 Make up	250 – 450 mL/L	300 – 400 mL/L
riag Ag 817 Replenisher	200 – 450 mL/L	250 – 400 mL/L
***riag Ag 817 Brightener**	0 – 15 mL/L	10 mL/L

***riag Ag 817 Brightener** is **not** to be added for electronic parts

While stirring mix **riag Ag 817 Make up**, **riag Ag 817 Replenisher** and **riag Ag 817 Brightener** with cold deionised water. Adjust the pH to 10.0 with KOH 50 %.

Pre-silver plating: Copper, copper alloys and nickel do not have to be pre-silver plated prior to **riag Ag 817** plating to ensure the adhesion of the bright silver deposit. Steel parts must be pre-copper plated or nickel-plated, we recommend using the cyanide free copper process **riag Cu 385** in order to stay completely free of cyanide.

Make up

Barrel application (all base materials)

	Range	Optimum
riag Ag 817 Make up	250 – 350 mL/L	300 mL/L
riag Ag 817 Replenisher	350 – 450 mL/L	400 mL/L
***riag Ag 817 Brightener**	0 – 15 mL/L	10 mL/L

Rack application (nickel as base material)

	Range	Optimum
riag Ag 817 Make up	250 – 350 mL/L	300 mL/L
riag Ag 817 Replenisher	250 – 350 mL/L	300 mL/L
***riag Ag 817 Brightener**	0 – 15 mL/L	10 mL/L

Rack application (nickel **not** as base material)

	Range	Optimum
riag Ag 817 Make up	350 – 450 mL/L	400 mL/L
riag Ag 817 Replenisher	200 – 300 mL/L	250 mL/L
***riag Ag 817 Brightener**	0 – 15 mL/L	10 mL/L

***riag Ag 817 Brightener** is **not** to be added for electronic parts

In case of mixed application, the make up concentration for barrel application must be used in any case. If necessary, the silver content can be increased.

Operating conditions

Temperature:	Range: 16 – 24 °C Optimum: 20 °C
pH-value:	Range: 9.5 – 10.5 Optimum: 10.0
pH-value adjustment:	To increase the pH use KOH 50 %, to lower it use nitric acid 30 %. The pH value must not exceed 11.5 under any circumstances.
Current density:	Rack: 0.3 – 1 A/dm^2 (max. range: 0.2 – 2 A/dm^2) Barrel: 0.1 – 0.3 A/ dm^2 (max. range: 0.05 – 0.5 A/dm^2)
Voltage:	The required rectifier voltage depends on various determinants, e.g. current density, concentration, temperature, type of electrode and electrode interval. Rack: approx. 4 V Barrel: approx. 8 V
Anode/Cathode ratio:	2 : 1
Anode material:	Pure silver anodes (999.7 fine- milled)

Rectifier:	Rectifiers have to be adjusted until residual ripple is less than 5 % within the total current density range.
Agitation:	Strong air movement (large volume, low pressure) required underneath the material, movement of the cathode rod is helpful
Filtration:	Filtration should be continued during non-operational time to ensure a trouble-free and quick start of the operation.
Activated carbon:	Continuous filtration of the electrolyte with A-carbon filter cartridges must not be provided under any circumstances. Should an A-carbon cleaning be necessary due to the drag-in of impurities, it is essential to add the organic additives that have been removed. For a treatment with 6 - 9 g/L A-carbon (1 - 2 hours), experience shows that a dosage of approx. 20 mL/L **riag Ag 817 Additive** 30 mL/L **riag Ag 817 Replenisher** must be carried out.
Deposition rate:	Approx. 0.60 µm/min at 1 A/dm^2 95 % cathode power at all normal current densities
Tanks:	Polypropylene or plastic tanks
Cooling:	possibly required (PP, possibly stainless steel), if the temperature is excessively exceeded, decomposition of the electrolyte is possible
Attention:	All used electrolyte materials containing cyanide must be cyanide free by applying a suitable method, e.g. treatment with a sodium hypochlorite solution (2 %) for 24 hours followed by a good rinse
Maintenance:	Maintain pH value in the pH range, analyse silver content regularly, add **riag Ag 817 Replenisher** according to the special info Consumptions amount to approx. **riag Ag 817 Replenisher** 1.5 L/1000 Ah **riag Ag 817 Brightener** 3.0 L/1000 Ah

Electrolyte components / consumption values

riag Ag 817 Make up

The **riag Ag 817 Make up** is used for the electrolyte preparation and the silver replenishment. The shelf life of the additive since manufacturing is twelve months.

riag Ag 817 Make up contains 37.5 g/L silver and weak complexing agents.

riag Ag 817 Brightener

The **riag Ag 817 Brightener** is needed to achieve gloss and fine-grained deposits. The shelf life of the additive since manufacturing is twelve months.

riag Ag 817 Replenisher

riag Ag 817 Replenisher is necessary to complex dissolved silver. When increasing the silver content by 1 g/L, a dosage of 27 mL/L **riag Ag 817 Replenisher** must be applied. To ensure maximum adhesion, especially when plating nickel, a regular addition of **riag Ag 817 Replenisher** is necessary. Hull cell tests can reveal possible underdosing. The shelf life of the additive since manufacturing is twelve months.
Underdosing reduces the adhesive strength of the precipitates, overdosing causes milky precipitates in the high current density.

Waste water treatment

The wastewater must be treated according to the legal regulations before it enters the sewage system. The electrolyte contains silver and weak complexing agents. A static rinse after silver plating coupled with ion exchange for recycling of the silver is recommended.

Safety instructions

Please refer to the safety data sheet and the general instructions for handling chemicals. Chemicals must not be stored below 10 ° C.

Liability

This instruction manual was compiled with reference to the state of the art and all current standards, and is based on the long-term knowledge and experience of riag. However, riag cannot monitor compliance with this instruction manual and the methods described herein at the customer/end-user's premises. Work carried out with riag products must be adapted accordingly to meet local conditions. In particular, riag cannot accept liability for damage, loss or cost incurred due to a failure to adhere to this instruction manual, improper application of the methods, unauthorised technical modifications, insufficient maintenance or the absence of maintenance in respect of the requisite technical hardware or equipment, or in the event of use by unqualified personnel. riag is not liable for damage or loss caused by riag or its employees except where intention or gross negligence can be proved.
riag furthermore reserves the right to make changes in relation to products, methods and the instruction manual without prior notice.

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This transaction is governed by material Swiss law (Law of Obligations), excluding private international law (conflict of laws) and intergovernmental treaties, specifically the CISG.

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Hull cell instruction

Current density: 0.4 A on the Hull cell

Anodes: Fine silver 99.97 % fine-grained

Movement: strong air movement

If the Hull cell is intended to test the applicability of the electrolyte for coating nickel-plated parts, a freshly pre-nickel-plated Hull cell plate is to be coated.

The coated Hull cell plates are mainly intended to test the adhesive strength of the deposits.

Evaluation of the adhesive strength

Coat the hull cell plates as described above.
After coating, dry (e.g. with compressed air).
Apply adhesive tape (Scotch 250 YT 15245, Mfg.) to the sheet.
Secure the tape well to the surface.
Bend the plate at one edge at the height of the tape approx. 90°.
Next, bend the sheet back so that it is roughly straight again.
Remove the tape from the surface with as much force and speed as possible.
The adhesive tape test is only passed if no layer could be peeled off.