

# riag Ag 812

## Bright silver plating electrolyte

The bright silver electrolyte **riag Ag 812** is applied for the deposition of highly brilliant haze-free silver deposits for decorative and technical purposes on all rack articles. If perfectly pre-polished base material is used, mirror bright silver deposits are obtained which require no further mechanical treatment.

Immediately after deposition the Vickers-hardness of the silver deposit is approx. 110 – 130 HV 0.1.

A higher degree of hardness can be achieved by operating the electrolyte with the **riag Ag 812 Hardener**. Depending on the concentration of the addition solution, Vickers-hardness's can be obtained up to 120 – 190 HV 0.1.

### Make up

	Range	Optimum
Silver cyanide (AgCN)	30 – 45 g/L	37 g/L
Potassium cyanide (KCN)	130 – 150 g/L	140 g/L
Potassium carbonate (K <sub>2</sub> CO <sub>3</sub> )	5 – 20 g/L	20 g/L
<b>riag Ag 812 Brightener</b>	4 – 6 mL/L	5 mL/L
<b>riag Ag 812 Tenside</b>	4 – 6 mL/L	5 mL/L
<b>riag Ag 812 Hardener</b>	0 – 4 mL/L	2 mL/L

Should, however, maximum brightness be required then we recommend to add 1 – 2 mL/L **Silver Star DL Hardness Solution**.

If a higher degree of hardness is desired, the electrolyte must be operated with **riag Ag 812 Hardener**. The respective make-up quantities are as follows:

Make up quantity	obtained Vickers-hardness (HV 0.1)
1 mL/L <b>riag Ag 812 Hardener</b>	approx. 140
2 mL/L <b>riag Ag 812 Hardener</b>	approx. 170 (normal make-up)
4 mL/L <b>riag Ag 812 Hardener</b>	approx. 190

## Tolerances

	Range	Optimum
Silver	25 – 35 g/L	30 g/L
Potassium cyanide (KCN)	110 – 130 g/L	120 g/L
Potassium carbonate (K <sub>2</sub> CO <sub>3</sub> )	10 – 150* g/L	10 g/L

\* depending on the applied current density, the value can/has to be lower/higher

## Pre-silver plating

Copper or copper alloy and nickel must be pre-silver plated in a pre-silver plating electrolyte prior to bright silver plating, to ensure the adhesion of the bright silver deposit.

Lead, tin, zinc, iron or steel objects must be brass- or copper plated prior to pre-silver plating.

## Make up

Dissolve whilst stirring thoroughly the Potassium cyanide, Silver cyanide and Potassium carbonate in cold, deionised water. After filtration add **riag Ag 812 Brightener**, **riag Ag 812 Tenside** and, depending on the desired hardness, **riag Ag 812 Hardener**.

## Operating Conditions

Temperature:	Range: 18 – 30 °C Optimum: 20 – 24 °C
Current density:	0.5 – 2.0 A/dm <sup>2</sup>
Voltage:	The required rectifier voltage depends on various determinants, e.g. current density, concentration, temperature, type of electrode and electrode interval. Average value: 2 – 4 V.
Anode/Cathode ratio	2 : 1
Rectifier:	Rectifiers have to be adjusted until residual ripple is <b>less than 5 %</b> within the total current density range.
Article movement:	2 – 4 m/min
Filtration:	Continuous filtration of the electrolyte by means of a filter system with PP filters cartridges (filter unit 5 µm has proved to be a trouble-free operation in practice and should be installed in any way).
Deposition rate:	Approx. 0.64 µm/min at 1 A/dm <sup>2</sup> (80 mg/A min) Efficiency about 100 %

## Equipment

We recommend using tanks of polypropylene or glass fibre-reinforced plastic material with PVC-lining. The electrolyte is heated by porcelain heating elements with temperature control device. An ampere minute meter is recommended to stipulate the regeneration intervals of the electrolyte.

As anode material use pure silver anodes (999.7 fine- milled).

## Attention

Addition of other chemicals which are not indicated in our Technical Data Sheet may cause disturbance of the operation and may have a negative influence on the electrolyte and the quality of the deposits.

## Consumption values

The consumption values of the additives can deviate according to the article- or plants specifications. The consumption values for 1'000 Ah are according to our experience:

<b>riag Ag 812 Brightener</b>	0.12 – 0.25 L
<b>riag Ag 812 Tenside</b>	0.05 – 0.10 L

If operating with **riag Ag 812 Hardener**, the consumption value is:

<b>riag Ag 812 Hardener</b>	0.06 – 0.12 L
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The addition should be added regularly in small portions (approx. 10 – 20 % of the make up quantity).

## Waste water treatment / Environmental protection

The electrolyte contains cyanide and heavy metal. They are extremely dangerous for the environment. The waste water needs to be prepared according legal regulations before getting in the canalisation.

A static rinse after silver plating coupled with ion exchanger for recycling of the silver is recommended.

## 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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### Error index – cause and remedy

Error	Cause	Remedy
<b>Rough and porous deposits</b>	Electrolyte contaminated with dirt, dust or suspended particles (poor anode bags)	Filtration Control anode bags
<b>Rough, porous dull deposits</b>	Carbonate content too high.	Dilute electrolyte
<b>Deposits dull perforated (orange-skin)</b>	Content of <b>riag Ag 812 Tenside</b> too low	Add 1 – 3 mL/L <b>riag Ag 812 Tenside</b>
<b>Deposits at edges and corners rough and burnt</b>	Cathode movement too slow	Agitate cathode movement stronger
<b>White precipitation formed when Silver Star DL Wetting agent added to the electrolyte</b>	Use of bad water quality	Use deionised water
<b>Lack of brightness in total working area, hazy deposits</b>	Content of <b>riag Ag 812 Brightener</b> too low	Add 2 – 3 mL/L <b>riag Ag 812 Brightener</b>

### Electrolyte with riag Ag 812 Hardener

<b>Insufficient bright-throwing power</b>	Lack of <b>riag Ag 812 Hardener</b>	Add 1 – 2 mL/L <b>riag Ag 812 Hardener</b>
<b>Deposits tarnish black-iridescent</b>	Overdosing of <b>riag Ag 812 Hardener</b>	Work out <b>riag Ag 812 Hardener</b>

<b>during heat-treatment</b>		
<b>Dull deposits on large surfaces which cross the direction of movement of the electrolyte</b>	Cathode movement too slow, <b>riag Ag 812 Hardener</b> content too low	Improve cathode movement, incline surfaces, add 1 – 2 mL/L <b>riag Ag 812 Hardener</b>