AURUNA® 220

Operating Instructions

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- **gold bath for decorative coatings**
- **pale yellow colour (14 carat Hamilton)**
- **Au/Ni/In coatings**
- **good corrosion and abrasion resistance**
- **for rack and barrel**

Bath Characteristics

The AURUNA® 220 gold plating solution is a weakly acidic electrolyte for the deposition of gold coatings showing a colour which is a pale yellow with a light greyish shade. This colour often is called "14 carat Hamilton". The process is used for decorative applications. Up to 5 µm thickness, the deposits are bright with constant colour. The bath, which can be used both for rack and barrel plating, works unproblematically and is easy to control.

Bath type:	weakly acidic
Gold content:	4 g/l
pH value:	3.5
Temperature:	30 °C
Current density:	0.6 A/dm²
Deposition speed:	0.06 µm/min

Coating Characteristics

Alloy composition:	Au/Ni/In
Fineness:	approx. 96.5 % gold
Caratage:	approx. 23 carats
Colour:	"14 carat Hamilton"
Hardness:	approx. 270 HV 0.025
maximum coating thickness:	5 µm

Form of Supply

Bath makeup:

a) AURUNA® 220 Initial Concentrate
500 ml for 1 l of bath, gold-free
Storage stability: min. 2 years

b) AURUNA® Potassium Gold Cyanide 68.2 %
Storage stability: unlimited
4 g of Au, i.e. 5.87 g of AURUNA® Potassium Gold Cyanide 68.2 %, are needed for 1 l of bath.

Bath replenishment:

c) AURUNA® Potassium Gold Cyanide 68.2 %
(as item b)
1.47 g per 1 g of gold deposited

d) AURUNA® 220 Replenisher Solution, gold-free
5 ml per 1 g of gold deposited
Storage stability: min. 2 years

for corrections:

e) For correction of the bath density:
AURUNA® Density Correction Salt 2
Storage stability: unlimited

Bath Makeup

Makeup sequence:

To make up 1 l of bath, dilute 500 ml of AURUNA® 220 Initial Concentrate to approx. 800 ml with deionized water. Then add 5.87 g of AURUNA® Potassium Gold Cyanide 68.2 % (4 g of Au), previously dissolved in warm deionized water for easy mixing. After making up the volume to 1000 ml with deionized water, the gold concentration is 4 g/l.

If necessary, adjust the pH value of the electrolyte to 3.5 with NaOH or 1 : 1 diluted sulphuric acid (both chemically pure). During this process the pH value should not drop below 3.3.

Operating Conditions

Gold content:	4 g/l	(3.5 - 4.5 g/l)
Operating temperature:	30 °C	(± 2 °C)
pH value:	3.5	(3.4 - 3.7)

Adjust with NaOH or 1 : 1 diluted sulphuric acid. The pH value of the electrolyte should not drop below 3.4 for a longer period, because the bath will become unstable and gold-containing precipitations will occur.

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Bath density:	approx. 1.08 g/cm³ = 11 °Bé (1.06 - 1.10 g/cm³; 8 - 13 °Bé)
Product agitation:	Good product agitation - at least 5 cm/sec.- is necessary. Additional bath agitation is advantageous. Too low agitation will result in coatings which are inhomogeneous and show no constant colour.
Bath agitation:	recommended
Current density:	0.6 A/dm² (0.4 - 1.0 A/dm²)
Deposition quantity:	at recommended current density (0.6 A/dm²):
	approx. 17 mg/Amin.
Current efficiency:	at recommended current density (0.6 A/dm²):
	approx. 14 %
Deposition speed:	at recommended current density (0.6 A/dm²):
	approx. 0.06 µm/min.
	The deposition speed changes proportional to the current density.
Density of the coating:	approx. 17 g/cm³

Calculation of Coating Thickness and Plating time

Coating weight in mg = surface in cm² x 1.7 x coating thickness in µm

(density of the coating approx. 17 g/cm³)

$$\text{Plating time in minutes} = \frac{\text{required coating weight in mg}}{17 \times \text{current in amperes}}$$

Bath Replenishment

In order to guarantee a good colour constancy, the bath should be replenished at the latest after depositing 0.8 g/l of gold. For every 1 g of coating deposited, add to the bath 1.47 g of AURUNA® Potassium Gold Cyanide 68.2 % and 5 ml of AURUNA® 220 Replenisher Solution. The Replenisher Solution already contains the necessary components to compensate drag-out losses.
The Replenisher Solution should be added slowly with good stirring. The pH value should be controlled and kept at nominal value.

Bath Monitoring and Correction

Analytical control: Analytical control of the concentrations of Au, Ni, In.

pH adjustment with sulphuric acid diluted 1 : 1 or NaOH.

Correction of the bath density with AURUNA® Density Correction Salt 2.
24 g per litre of bath volume increase the density by approx. 0.01 g/cm³.

Special Process Hints

Pretreatment:	Degrease the articles, rinse thoroughly, acid dip (5 % sulphuric acid), rinse again, finally in deionized water, then gold-plate. High lustre is achieved only on a perfectly clean and well polished surface.

Equipment

Bath tanks:	Plastic, preferably polypropylene.
	All parts coming into contact with the electrolyte must be resistant to weak acids. Plastic equipment, e.g. tank, pump, hoses, filter cartridges, etc. before use should be rinsed in diluted acid (e.g. 5 % sulphuric acid) for several hours and subsequently cleaned of the contaminated acid by intensive rinsing with water which should be changed several times.
Heating:	Immersion heaters with coating of porcelain, quartz, or Teflon. Equipment for temperature control.
Filtration and bath agitation:	Recommended.
Anodes:	Platinized titanium, e. g. PLATINODE® coated with 1.5 µm of platinum.
Rectifier:	With sufficient capacity, with current display, possibly amperehour meter.

Note

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

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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.

Umicore Galvanotechnik GmbH

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

Delivery address:
Klarenbergstraße 53-79 • D-73525 Schwaebisch Gmuend
GERMANY

Telephone +49 (0) 71 71 / 6 07 - 01
Fax +49 (0) 71 71 / 6 07 - 2 88

e-mail: galvano@eu.umicore.com
www.umicore-galvano.com