



TECHNICAL DATASHEET

RAMAC 6200

Acid Copper Plating Process

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Process Information

The decorative and functional acid copper process RAMAC 6200 is mainly used for rack plating applications to obtain mirror bright and highly levelled copper deposits within short plating time and providing excellent low current density brightness.

Equipment and Working Parameters

Tank	Mild steel with hard rubber lining, PVC/Polyester-reinforced material.
Tank ventilation	Recommended
Exhaust	Required
Heating/Cooling	Graphite, Titanium, PTFE, PVC, Polyethylene.
Mechanical/electrolytical agitation	Necessary preferably air, additionally mechanical also possible
Air agitation	The volume of air required for this purpose is approx. 12 - 20 m ³ /h and meter cathode rod length. The air agitation pipes are situated parallel to the cathode rod, approx. 30 - 80 mm above the bottom of the tank. Depending on the size of the tank, they are equipped with holes with a diameter of about 3 mm drilled at intervals of 80 to 100 mm at an angle of 45 ° to the bottom of the tank. Each pipe has two rows of holes set opposite to each other at intervals of 40 to 50 mm. It is advisable to install at least two agitation pipes (internal diameter 20 to 40 mm) in the bath. The distance between the pipes should be 150 to 250 mm. Suitable materials are PVC or polyethylene.
Anodes	Special copper anodes with a phosphorus content of 0.03 to 0.06 %, preferably bar anodes or phosphor containing copper parts in titanium anode baskets. The anodes are must be provided with bags made of special acid-resistant, fully synthetic material. Anode bag frames with suitable bags made of special fully synthetic material are applicable.
Metal content	Approx. 55 g/l Cu
Bath density	1.17 g/cm ³ at 20 °C
pH-value	Less than 1; does not need to be monitored
Bath temperature	20 to 30 °C, preferably 24 to 28 °C. If the temperature rises above 30 °C, the bright throwing power diminishes and the brightener consumption rises.



Filtration	Continuous, 3 to 10 tank volumes per hour throughput, 5 to 10 micrometer mesh filter media.
Filter aid	diatomaceous earth, cellulose (A minor increase of additives consumption might occur by using diatomaceous earth)
Voltage	1.0 - 4.0 V with larger baths up to 6 V, depending on the current density and the loading of the bath
Current density	Cathodic: Up to 6 A/dm ² Anodic: 0.5 - 2.5 A/dm ² For the formation of the anodefilm the anodic current density has to be greater than 0.5 A/dm ²
Current efficiency	100 %
Rate of deposition	Approx. 0.7 µm Cu/min at 3 A/dm ²

Make up

	Optimum		Range	
CuSO ₄ *5H ₂ O	200,0	g/l	180-240	g/l
H ₂ SO ₄ (d= 1.84) Chem Pure	65,0	g/l	50-90	g/l
NaCl Chem Pure	0,2	g/l	0,18-0,25	g/l
Ramac 6200 Part A Brightener	0,5	ml/l	0,3 -0,8	ml/l
Ramac 6210 Part B Brightener	0,5	ml/l	0,3 -0,8	ml/l
Ramac 6220 Part C Make up	8,0	ml/l	4 - 10	ml/l

Make up procedure:

- Into a separate and clean tank, water is filled up to approximately 75 % tank volume.
- Add carefully the required quantity of copper sulphate in small doses while stirring the solution until fully dissolved.
- Add 5 g/l activated carbon powder into the solution and stir for at least 30 minutes, then stop all agitation.
- Allow active carbon to precipitate.
- Filter the solution through a 5 micrometer mesh filter media into the working tank. Make sure no active carbon particles are in the working solution.
- While stirring, add slowly and carefully the required quantity of concentrated sulfuric acid into the solution. (Attention !: Exothermic reaction, wear protective clothes and goggles!).
- Dissolve separately the required quantity of sodium chloride in warm water and add into the solution while stirring.
- Switch on air agitation and top tank with water to reach final volume.
- Add the necessary quantity of additives.
- Adjust operation temperature if necessary to operation range.
- Solution is ready for start up.



Maintenance

Under standard production conditions dosing of the additives Ramac 6200 part A Brightener to Ramac 6210 Part B Brightener should be done in a ratio of 1:1 Regular addition of Ramac 6220 Make up Part C is not necessary, additions are done improve the HCD behaviour.

Consumption per 10.000Ah:

Ramac 6200 Part A Brightener	0,5l (0,25 l – 1,0 l)
Ramac 6210 Part B Brightener	0,5l (0,25 l – 1,0 l)

The consumption Depends On the degree of brilliance and levelling required. It is recommended to make corrective additions in small doses.

Trouble-shooting:

- Dullness at the low cd-area is corrected by adding 0,2 ml/l of the Ramac 6210 Part B Brightener
- Treeing or burning at the high cd-area results from lack of chloride ions or Ramac 6220 Make up Part C. It is recommended to first correct the chloride content. After that and in case of further having treeing or burning, add 0,4 ml/l Ramac 6220 Make up Part C
- Poor brightness throwing power is corrected by addition of up to 0,2 ml/l Ramac 6200 Part A Brightener.
- The anode surface always has to turn black during operation. If the surface becomes reddish, high overloading of Levellers has happened. In this case, dummy plating will be necessary.
- All Levellers are removed by carbon. Never add peroxide because it will decrease the brightness and levelling as long as peroxide is staying in the solution.
- An overdosing of chloride shows a white anode surface and is causing passivation of the anodes.
- If the copper content of the electrolyte decreases the desired value during operation it can be increased by addition of copper sulphate $5H_2O$. To do this, the salt should be dissolved in fully demineralized water and the solution treated with active carbon (as described under make- up) after careful filtration the solution can be added to the electrolyte.

Effluent treatment:

All concentrates and rinsing waters have to be treated according to local regulations.

Health and Safety

Material Safety Data Sheets are available for all GALVANO MONDO products, they are normally issued with relevant quotations and Technical Data Sheets. They explain hazards associated with the product following classification by European Statutory Requirements. Normally more than one product will be used in a process. Risk evaluation of the process is the users responsibility because the user controls men, materials, methods and machines. The user must consider all of the substances present in the solution, whether they present a risk to people and the environment, whether abatement measures are needed.