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

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riag Cu 385

Alkaline, non-cyanide bright copper process

The **riag Cu 385** bright copper process produces bright deposits on all materials. The deposits are active and can be further plated without any problems.

Properties

- **riag Cu 385** can be used directly on steel, zincated aluminium, zinc diecasting, stainless steel, electroless nickel, copper and brass
- Leaded alloys can be plated in rack lines
- Applicable as strike copper for nickel, tin, solder and silver
- Fine grained, smooth, ductile and bright deposits
- Very good thickness distribution (throwing power)
- Very active deposits
- Easy waste water treatment

Make up

	Rack plating		Barrel plating	
	Range	Optimum	Range	Optimum
riag Cu 385 Make up	300 – 500 mL/L	400 mL/L	300 – 500 mL/L	400 mL/L
riag Cu 385 Replenisher		70 mL/L		70 mL/L
riag Cu 385 pH-Additive	50 – 100 mL/L	80 mL/L	50 – 100 mL/L	80 mL/L

The tank is filled with deionised water to 1/3 of the end volume. Add **riag Cu 385 Make up, riag Cu 385 Replenisher** and **riag Cu 385 pH-Additive**. Check the pH value and correct if necessary. Add water to reach the final volume.

Operating values

	Rack plating		Barrel plating	
	Range	Optimum	Range	Optimum
Copper	5.1 – 9.0 g/L	7.5 g/L	5.1 – 9.0 g/L	7.5 g/L
pH-value	9.2 – 10.0	9.6	9.5 – 10.0	9.8
Cathodic current density	0.5 – 2.7 A/dm^2	1.0 A/dm^2	0.2 – 0.9 A/dm2	0.4 A/dm^2
Anodic current density		≥ 1.0 A/dm^2		≥ 1.0 A/dm^2

Working conditions

Temperature	50 °C (38 – 60 °C)
pH	9.6 – 9.8 (9.2 – 10.0), depending on rack-/barrel plating
Cathodic current density	0.2 – 2.7 A /dm^2, depending on rack-/barrel plating
Anodic current density	Min. 1.0 A /dm^2, important for dissolving copper from the anodes
Anodes	Copper anodes free of phosphorus, with a purity of at least 99.96 % (OFHC). With some installations it is helpful to use a mix of copper and graphite or stainless steel in order to plate down too high concentrations of copper. The current density on the copper anodes should be at least 1.0 A /dm^2.
Anode baskets	Titanium
Anode/cathode ratio	The anode/cathode ratio has to be 1.5 : 1 Calculate the maximum cathode area before setting up the process and ensure that the anode area equals the maximum cathode area.
Anode bags	Not applicable, anodes polarise
Agitation	Vigorous air mandatory for rack lines and also helpful in barrel lines. Use low pressure, large volume blowers only – not compressed air. Air agitation aids in producing a brighter finish while helping to avoid burning in the high current density areas.
Tanks	Mild steel lined with rubber or polypropylene or a drop in plastic liner. All plastic tanks may be used. New plastic tanks and liners must be leached with a 2 % potassium hydroxide or sodium hydroxide solution for 2 days followed by cold water rinsing.
Heating	Teflon coated electric heaters are recommended. Stainless steel or titanium heaters may also be used.
Cooling	Not necessary

Filtration	Permanent filtration by 5 microns powder carbon cartridges is recommended. The carbon concentration should be 1 g/L and has to be changed weekly. The electrolyte should be turned over 2 – 3 times / hour. When plating thick layers (≥ 20 microns) or layers for heat treat stop off, a 1 micron filter must be used.
Exhaust	Not required, but it is a good practice as with all heated plating solutions
Maintenance	Analysis and correction of copper and pH-value.
pH-adjustment	Use **riag Cu 385 pH-Additive** to increase the pH, sulfuric acid 10 % to lower pH (normally not necessary)
Consumption	Additives are consumed by drag-out as well as electrochemically. Consumption therefore may vary
	riag Cu 385 Make up depending on content of copper
	riag Cu 385 Replenisher 6 – 12 L/10 kAh
	riag Cu 385 pH-Additive depending on value of pH

Effects of the electrolyte components

riag Cu 385 Make up

riag Cu 385 Make up is mainly used for electrolyte make up, it contains 19 g/L copper. A lack of **riag Cu 385 Make up** causes burned deposits in high current density areas. An addition after make up is necessary if the copper content is too low.

riag Cu 385 Replenisher

Contains the copper complexing agent, a deficiency has a negative impact on the adhesion of the layer. Important to get a good adhesion of the plated deposits. Additions are regular and depend on the carry-out, metallic impurities and copper content. An increase in the copper content by 1 g/L must be compensated by adding 40 mL/L **riag Cu 385 Replenisher.** Therefore, it is more cost effective to work out an excessively high copper content than to supplement **riag Cu 385 Repenisher.**

riag Cu 385 pH-Additive

Additive to increase the pH

Active carbon treatment

A continuous filtration over active carbon is recommended. Normally the efficiency of powder carbon is much higher than granular carbon, therefore powder carbon should be used.

Environmental Considerations

All concentrates, rinse water and waste water must be treated and discharged according to local effluent control regulations.

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Analytical procedures

Sample preparation: Take a sample from the well mixed electrolyte. Cool down to room temperature.

Copper

Reagents:
Ammonium peroxodisulfate solid
Ammonia solution 25 %
PAN-indicator (0.1 % in Ethanol)
Na_2EDTA 0.1 mol/L

Procedure:

	pipette
5 mL	electrolyte in a 300 mL Erlenmeyer, add
approx. 2 g	Ammonium peroxodisulfate, add
10 mL	deion. water, wait for 15 minutes, add
5 mL	Ammonia solution (sample turns blue), add
100 mL	deion. water, add
10 drops	PAN-indicator

Titrate with Na_2EDTA 0.1 mol/L until the colour turns from blue to green

Calculation: Copper (g/L) = mL EDTA x 1.271