

RIAG Ni 140

Sulphur free semi-bright nickel process

The **RIAG Ni 140** semi-bright nickel process gives ductile deposits with the following characteristics:

- sulphur free deposits (car, bicycle, motorcycle and all parts) when high corrosion resistance is required
- ideal for four step nickel deposits for aluminium plating due to CASS
- ductile deposits
- very active deposits
- depends on the quantity of replenishing solution (**RIAG Ni 140 Brightener**) brilliant deposits.

The process can be used in both rack and barrel applications and has an exceptional throwing power.

Make up

	optimum	range
Nickel sulphate ($\text{NiSO}_4 \times 6 \text{H}_2\text{O}$)	300 g/L	250 to 300 g/L
Nickel chloride ($\text{NiCl}_2 \times 6\text{H}_2\text{O}$)	30 g/L	25 to 40 g/L
Boric acid (H_3BO_3)	40 g/L	35 to 45 g/L
RIAG Ni 140 Make up	4 mL/L	3 to 5 mL/L
RIAG Ni 140 Brightener	1 mL/L	0,8 to 1,5 mL/L
RIAG Ni 138 Tenside M * (mechanical agitation)	3.5 mL/L	3 to 4 mL/L
RIAG Ni 139 Tenside L * (air agitation)	1.5 mL/L	1 to 2 mL/L

* mechanical or air agitation possible

Make up procedure

- 1) Fill hot deionised water up to approximately 60 % tank volume.
- 2) While stirring, add slowly and carefully the required quantity of Nickel chloride into the water. (Attention!: Nickel chloride must be fully dissolved!).
- 3) While continue stirring, add slowly and carefully the required quantity of boric acid into the water. (Attention!: Boric acid must be fully dissolved!).
- 4) While further stirring, add slowly and in small quantities the required quantity of Nickel sulphate into the water. (Attention!: Nickel sulphate must be fully dissolved!).
- 5) Add 3 g/L activated carbon powder into the solution and stir for at least 30 minutes, then stop all agitation and allow carbon to settle down.
- 6) 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.
- 7) Top working tank with water up to operation level and switch on air agitation (if possible)
- 8) Measure and adjust the pH with diluted (1:10) sulphuric acid to operation range (3.8 to 4.4; optimum 4.0). The operating pH of the **RIAG Ni 140** semi-bright nickel process is of prime importance to obtain maximum results in brightness, levelling and structure of the deposit.
- 9) Add the necessary quantity of additives
- 10) Adjust operation temperature
- 11) Dummy plate for approximately 1 ampere hours per litre
- 12) Solution is ready for start up

Operating parameters

	optimum	range
Temperature	55 °C	50 to 65 °C
pH	4.0	3.8 to 4.2
Cathode current density:		
• mechanical agitation	2.5 A/dm ²	0.5 to 5 A/dm ²
• air agitation	3 A/dm ²	0.5 to 7 A/dm ²
Anode current density	under 3 A/dm ²	

Additive consumption The additives are consumed during electrolytic reactions as well a drag-out losses and the use per 10 kAh can therefore vary.

RIAG Ni 140 Brightener 1.5 – 2.5 L/10 kAh

RIAG Ni 138 Tenside M * 0.2 – 0.5 L/10 kAh

RIAG Ni 139 Tenside L * 0.2 – 0.5 L/10 kAh

(* depends on kind of agitation)

Metallic contamination

Copper and zinc can be removed by dummy plating. Recommended current density is 0.3 – 0.5 A/dm².

Equipment

Tanks	SM Steel with hard rubber or synthetic lining. Synthetic tank.
Heating:	Hard glass or porcelain immersion heater. Eventually indirect heating. It is essential to use controlled heating.
Filtration:	For high capacity semi bright nickel electrolytes a continual filtration is necessary. The electrolyte should be rotated at least once per hour. A continual filtration over active carbon is recommended.
Anodes:	<p>If the nickel anodes have the prescribed degree of purity (at least 99.7 %) any kind may be employed. To keep sludge and other impurities away from the electrolyte, the anodes should be packed in titanium baskets with polypropylene anode bags. New anode bags should be treated in a 5 % sodium carbonate solution. Afterwards they must be rinsed very thoroughly. Furthermore, the bags are to be dipped into HCl (10 % sol.) and again very well rinsed.</p> <p>New tanks lined with hard rubber must be first cleaned with HCl 10 % before electrolyte make up. Useful is the addition of 1 mL/L RIAG Ni 138 Tenside M to dissolve eventual lining impurities. Afterwards rinse thoroughly with cold water.</p>

Structure of the deposit

Structure of a semi-bright nickel deposit in dependence of pH value and current density.

Ideal value:	pH	3.8 – 4.4
	A/dm ²	0.5 – 7.0

For semi bright, sulphur free nickel deposit (specially for multilayered nickel deposit. It is very important to have a columnar structure)

Environmental considerations and product safety

All concentrates, rinse waters and waste solution must be treated and discharged in accordance with local effluent control regulations. Information can be gleaned from the material safety data sheets. Chemicals shall not be stored below 10 °C.

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