ELECTRONIC MATERIALS
PACKAGING AND FINISHING TECHNOLOGIES

NIKAL MP-200 (SE)

HIGH-SPEED NICKEL PROCESS

For Electronic Finishing Applications

Regional Product Availability			
N. America	Japan/Korea	Asia	Europe
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DESCRIPTION

Rohm and Haas Electronic Materials Nikal MP-200 (SE) offers numerous advantages of precision high-speed nickel plating in the electronic, printed circuit and allied fields where low or controlled stress, ductility and good color are desired. The bath has been particularly designed for operation in automated tab plating equipment. Available either in Sulfate Nickel or Sulfamate Nickel versions, the process is characterized by simplicity of operation and high tolerance to metallic impurities. Excellent as an underplate for gold, rhodium and solder.

DEPOSIT DATA

Bright ductile deposits with low porosity and slight tendency to leveling. Color uniform over with range of current densities. Approximate hardness of 550 VPN, increasing with higher additive concentration. Stress normally zero to 140 kg/cm^2 compressive (cf. normal Watts Nickel ca. 1,000 kg/cm^2 tensile). Used as an undercoat for precious metal finishes, Nikal MP-200 (SE) deposits improve resistance.

BATH MAKE UP

High-speed Formulation: (standard)

Chemicals Required	Optimum
Nickel Sulfate ($NiSO_4 \bullet 6H_2O$)	560 g/l (74.7 oz./gal.)
Nickel Chloride ($NiCl_2 \bullet 6H_2O$)	8 g/l (1.0 oz./gal.)
Boric Acid	35 g/l (4.7 oz./gal.)
Nikal MP-200 (SE) Additive	30 ml/l (3% v/v)

High-speed Sulfamate Formulation: (standard)

Chemicals Required	Optimum
Nickel Sulfamate ($Ni(NH_2SO_3)_2$) (180 g/l Ni)	700 ml/l (70% v/v)
Nickel Chloride	8 g/l (1.0 oz./gal.)
Boric Acid	35 g/l (4.7 oz./gal.)
Nikal MP-200 (SE) Additive	20 ml/l (2% v/v)

High-speed Sulfate Formulation: (MP-200-W)

Chemicals Required	Optimum
Nickel Sulfate ($NiSO_4 \bullet 6H_2O$)	605 g/l (80.7 oz./gal.)
Nickel Chloride ($NiCl_2 \bullet 6H_2O$)	8 g/l (1.0 oz./gal.)
Boric Acid	35 g/l (4.7 oz./gal.)
Nikal MP-200 W Additive	30 ml/l (3% v/v)

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MAKE-UP PROCEDURE

1. Dissolve nickel salts in water and heat to 60–70°C (140–158°F).
2. Add 5 ml/l, 20% v/v of hydrogen peroxide and stir for 1 hour.
3. Add 2 g/l (0.3 oz./gal.) of carbon and stir for a further 2 hours at 60–70°C (140–158°F).
4. Filter.
5. Low current density purify overnight at 0.1–0.3 A/dm² (1–3 A/ft²) onto corrugated cathodes.
6. Filter.
7. Add boric acid.
8. Adjust pH to ~3.6 with 10% sulfuric acid (sulfate baths) or 20% sulfamic acid (sulfamic baths).
9. Add Nikal MP-200 (SE) Additive or Nikal MP-200-W Additive.

N.B. Nickel Sulfate, Sulfamate or Chloride Concentrate Solutions from Rohm and Haas Electronic Materials do not require carbon purification.

Operating Parameters—High-speed Sulfate (Standard)

Parameter	Range	Optimum
Total Nickel	100–150 g/l (13.4–20.0 oz./gal.)	125 g/l (16.7 oz./gal.)
Boric Acid	35–50 g/l (4.7–6.7 oz./gal.)	35 g/l (4.7 oz./gal.)
Chloride Ion	0–5 g/l* (0–0.7 oz./gal.)	3.5 g/l (0.5 oz./gal.)
pH	3.2–4.0	3.6
Temperature	50–65°C (122–149°F)	60°C (140°F)
Cathode Current Density	5–60 A/dm² (50–600 A/ft²)	30 A/dm² (300 A/ft²)
Agitation	Vigorous solution and cathode movement	
Anodes	Platinized Titanium* or "S" Ni Rounds in Titanium Baskets	

Operating Parameters—High-speed Sulfamate (Standard)

Parameter	Range	Optimum
Total Nickel	110–150 g/l (14.7–20.0 oz./gal.)	135 g/l (18.0 oz./gal.)
Boric Acid	35–50 g/l (4.7–6.7 oz./gal.)	35 g/l (4.7 oz./gal.)
Chloride Ion	0–5 g/l* (0–0.7 oz./gal.)	3.5 g/l (0.5 oz./gal.)
pH	3.2–4.0	3.6
Temperature	50–65°C (122–149°F)	60°C (140°F)
Cathode Current Density	5–60 A/dm² (50–600 A/ft²)	30 A/dm² (300 A/ft²)
Agitation	Vigorous solution and cathode movement	
Anodes	Platinized Titanium* or "S" Ni Rounds in Titanium Baskets	

Operating Parameters—High-speed Sulfate (MP200-W)

Parameter	Range	Optimum
Total Nickel	110–150 g/l (14.7–20.0 oz./gal.)	135 g/l (18.0 oz./gal.)
Boric Acid	35–50 g/l (4.7–6.7 oz./gal.)	35 g/l (4.7 oz./gal.)
Chloride Ion	0–5 g/l* (0–0.7 oz./gal.)	3.5 g/l (0.5 oz./gal.)
pH	3.5–4.0	3.8
Temperature	50–65°C (122–149°F)	60°C (140°F)
Cathode Current Density	5–60 A/dm² (50–600 A/ft²)	30 A/dm² (300 A/ft²)
Agitation	Vigorous solution and cathode movement	
Anodes	Platinized Titanium* or "S" Ni Rounds in Titanium Baskets	

*Nickel Chloride is required when using soluble anodes and is not recommended when using insoluble platinized titanium anodes. Nickel replenishment when using platinized titanium anodes should be by means high purity nickel carbonate.

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REPLENISHMENT

Add 200—250 ml (6.8–8.5 oz./gal.) Nikal MP-200 (SE) Additive or Nikal MP-200-W Additive per 1,000 Ah.

OPERATING NOTES

1. Nickel Chloride is normally not required and is detrimental when insoluble anodes are incorporated.
2. When incorporating insoluble anodes, the nickel metal content and pH will continue to drop as nickel is plated from the bath. In order to maintain the nickel content, nickel carbonate (approx. 50% nickel metal) should be added periodically in a separate container. The resultant solution should be filtered back into the mail plating tank. The nickel carbonate will increase the nickel content and pH of the solution. The Serfilco Guardian filter with optional slurry tanks or similar unit is very effective for maintenance of the plating bath.
3. Where anodes are used, "S" nickel type anodes are suitable in titanium baskets with polypropylene bags.
4. Nikal MP-200 (SE) Additive is added to improve deposit appearance by refining the grain structure. Excessive concentrations can cause passivity of the deposit. Nikal MP-200 (SE) Additive concentration for the standard sulfate and standard sulfamate baths should be checked by analysis periodically. (See Analytical Procedure.)
5. If it ever becomes necessary to reduce the pH of the plating bath, a dilute solution (10–20%) of sulfuric acid is recommended for sulphate baths and a 20% solution of sulfamic acid for sulfamate baths.
6. It is advisable, particularly when processing organic resist coated circuits periodically to purify solution using ~3–5 g/l (0.4–0.7 oz./gal.) activated carbon to remove organic impurities. After treatment replace required Nikal MP-200 (SE) Additive or Nikal MP-200-W Additive. Regular filtration over carbon cartridges and low current density purification is always beneficial in preventing contamination and ensuring optimum deposit characteristics.

EQUIPMENT

Tanks:	Semi-hard PVC or temperature stabilized translucent white polypropylene
Heaters:	PTFE-coated panel heater with thermostatic control or titanium steam coil
Filtration:	Continuous using filter paper stacks or 3–5 micron woven polypropylene cartridges (capacity at least five times tank volume per hour)
Electrical Supply:	Barrel 8 volt. vat 4 volt, with stepless control and ampere minute meter

PRODUCT DATA

For the specific Product Data values, please refer to the Certificate of Analysis provided with the shipment of the product(s).

ASSOCIATED PRODUCTS

Nikal MP-200 (SE) Additive
Nikal MP-200-W Additive
Nickel Sulfate Concentrate 500 g/l
Nickel Chloride Concentrate 500 g/l
Nickel Sulfamate Concentrate 180 g/l Ni

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HANDLING PRECAUTIONS

Before using this product, consult the Material Safety Data Sheet (MSDS)/Safety Data Sheet (SDS) for details on product hazards, recommended handling precautions and product storage.

CAUTION! Keep combustible and/or flammable products and their vapors away from heat, sparks, flames and other sources of ignition including static discharge. Processing or operating at temperatures near or above product flashpoint may pose a fire hazard. Use appropriate grounding and bonding techniques to manage static discharge hazards.

CAUTION! Failure to maintain proper volume level when using immersion heaters can expose tank and solution to excessive heat resulting in a possible combustion hazard, particularly when plastic tanks are used.

STORAGE

Store products in tightly closed original containers at temperatures recommended on the product label.

DISPOSAL CONSIDERATIONS

Dispose in accordance with all local, state (provincial) and federal regulations. Empty containers may contain hazardous residues. This material and its container must be disposed in a safe and legal manner.

It is the user's responsibility to verify that treatment and disposal procedures comply with local, state (provincial) and federal regulations. Contact your Rohm and Haas Electronic Materials Technical Representative for more information.

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