NILUX-SNS Sulfamate Nickel

Additive System for Sulfamate Nickel Plating — Bright and Semi-Bright, Rack and Barrel

Product Codes: 1166 (Carrier), 1171 (Wetter), 1047 (Brightener), 3131 (Anode Corroder)

1. PERFORMANCE

OVERVIEW

Acculabs NILUX-SNS is an additive system for sulfamate nickel plating baths, formulated to deliver the special deposit characteristics — low internal stress, ductility, and machinability — that sulfamate nickel processes are chosen for. The series adapts across rack and barrel installations and across bright and semi-bright work, supported by the NILUX-SNS Carrier (grain refiner), Wetting Agent (anti-pit, surface-tension control), and SNS-B components. The result is dependable plating performance with a wide operating window and minimal operator burden.

FEATURES & BENEFITS

VERSATILE ACROSS APPLICATIONS	A single additive system adapts across rack and barrel installations and across bright and semi-bright work — supporting low-stress, ductile, and machinable sulfamate-nickel deposits in one chemistry family.
WIDE OPERATING WINDOW	Tolerant to a broad band of nickel sulfamate (65–85 oz/gal), pH (3.2–4.2 depending on line type), temperature (110–140°F), and current density (5–500 ASF cathode) — easy to control and forgiving of routine drift.
GRAIN-REFINING CARRIER	NILUX-SNS Carrier acts as a grain refiner that hardens the nickel deposit relative to plain sulfamate baths, and contributes a measurable degree of brightness even at very low concentrations (0–1% by volume).
ANTI-PIT WETTING AGENT	NILUX-SNS Wetting Agent improves solution contact with the work surface, reduces the tendency to pit on complex geometries, and provides tolerance to incidental organic contamination — added at 0.1–0.25% by volume.
COMPATIBLE WITH EXISTING BATHS	Fully compatible with most existing sulfamate-nickel systems, supporting a simple slide-in conversion by allowing existing additives to deplete while still

	producing acceptable work. Send a representative sample to Acculabs for analysis and Hull Cell guidance on conversion.
DEPENDABLE OPERATOR EXPERIENCE	Maximum operator ease — pH adjustments are made with dilute sulfamic acid (lower) or nickel-carbonate powder (raise); routine maintenance is well-documented for anodes, filtration, and contamination control.

OPERATING PARAMETERS

Parameter	Optimum / Reference	Range
Nickel as Metal	—	15.5–19.5 oz/gal
Nickel Sulfamate	—	65–85 oz/gal
Anode Corroder	—	3.0–5.0 oz/gal
Boric Acid	Near saturation (~5.5 oz/gal)	4.5–6.5 oz/gal
pH (Rack)	—	3.8–4.2
pH (Barrel)	—	3.2–3.8
NILUX-SNS Carrier	Per application	0–1% by volume
NILUX-SNS Wetting Agent	Per application	0.1–0.25% by volume
Temperature	—	110–140° F
Cathode Current Density	—	5–500 ASF
Anode Current Density	—	3–200 ASF
Anode-to-Cathode Ratio	2:1	—

NOTE: Boric acid is recommended to buffer pH but is not always required; when used, maintain near the saturation point, which varies with operating temperature. Avoid excessive bath temperature, which can break down the sulfamate ion. Avoid addition of oxidizing agents such as peroxide or

permanganate — these will also break down the sulfamate ion, producing sulfate and ammonium ions that are deleterious to the plating solution.

2. PROCESS SETUP & OPERATIONS

EQUIPMENT REQUIREMENTS

Tanks and Equipment: Lined steel or heat-resistant plastic. Review all tanks, pumps, heaters, and related equipment to verify they meet the requirements for the work the line will do.

Anodes: Only high-purity nickel anodes should be used. Rolled, sulfur-depolarized anodes are recommended as the best choice for rack applications; sulfur-depolarized chips are preferred for barrel. Maintain an anode-to-cathode ratio of 2:1.

Anode Baskets: Titanium, bagged. Titanium will not corrode in a properly maintained nickel solution. Anode bags retain nickel fines.

Anode Polarization: Because the sulfamate ion is not highly corrosive, anodes can polarize even with sulfur-depolarized anodes. If polarization occurs, check the anode-to-cathode ratio and reduce the number of anodes if the ratio is high. If the ratio is correct and anodes still polarize, raise the anode-corroder concentration. As a general indicator, if nickel-metal levels drop or pH rises during plating, there is an anode problem.

Filtration: Continuous, with media capable of five-micron retention. Solution turnover should be three times per hour. Activated carbon can be used in filtration on a regular basis to maintain organic contaminants at a tolerable level.

Agitation: Mechanical agitation is preferred; filtered air agitation is acceptable.

Pretreatment: Work must be clean and free of metalworking lubricants, rust, fines, mold releases, and other contaminants. Consult your Acculabs representative for pretreatment-product recommendations for your application.

MAKE-UP COMPONENTS

Material	Quantity (per 100 gal)	Notes
Nickel Sulfamate Concentrate (24 oz/gal as Ni)	73 gallons	Primary nickel-source make-up component
Boric Acid	34.5 pounds (≈ 5.5 oz/gal)	Buffer; maintain near saturation
Dilute Sulfamic Acid Solution	As required	Lowers pH
Nickel Carbonate Powder	≈ 0.5 lb per 100 gal	Raises pH; allow to dissolve completely before rechecking
NILUX-SNS Carrier	0–1% by volume	Grain refiner; brightener at low concentration
NILUX-SNS Wetting Agent	0.1–0.25% by volume	Reduces pitting; surface-wetting
NILUX-SNS-B	Per application	Component for bright work

MAKE-UP PROCEDURE

NEW SOLUTION PREPARATION

1. Carefully review all equipment to verify that tanks, pumps, heaters, and related items meet the requirements for the work this line will do.
2. Thoroughly clean all tanks and equipment. Use a separate tank for bath preparation if possible.
3. Fill the tank to half volume with high-purity deionized water.
4. While agitating (mechanical preferred), slowly add chemicals. Mix thoroughly.
5. Bring the solution to 90% of final volume, mix well, and adjust pH. If pH is high, add dilute sulfamic acid solution to reduce; if pH is low, add ½ pound nickel-carbonate powder per 100 gallons to raise.

Allow nickel carbonate to dissolve completely before rechecking pH. Continue adjustments until pH is within range.

6. Add the appropriate combination of NILUX-SNS components and mix well. Dilute to final volume and mix. Analyze the solution and fine-tune balance.
7. Electrolyze the new solution at low current (below ½ amp/ft²) for 24 hours. The bath is then ready for plating.

CONVERSION OF EXISTING BATHS

NILUX-SNS components are fully compatible with most existing sulfamate-nickel systems, supporting a simple slide-in conversion. It is common to allow existing additives to deplete while still producing acceptable work. Send a representative sample of the solution to Acculabs for analysis and Hull Cell testing; we will then advise the best conversion method.

BATH MAINTENANCE

BATH-COMPONENT FUNCTIONS

Nickel sulfamate provides the nickel metal. The sulfamate chemistry yields specialized deposit characteristics (low stress, ductility, machinability) that other bath formulations cannot provide.

Anode corroder is required because the sulfamate ion is not highly corrosive. Ultra-high-purity magnesium chloride is required for the most critical optical or electroforming applications; purified nickel bromide is preferred for high-ductility applications such as electrical contacts; purified nickel chloride is acceptable for other applications. Concentration must be determined by in-house evaluation — maintain so that nickel concentration and pH stay within range.

Boric acid buffers pH; maintain near saturation, varying from approximately 4 to 6 oz/gal with operating temperature.

NILUX-SNS Carrier is a grain refiner that hardens the nickel deposit and contributes brightness even at low concentration.

NILUX-SNS Wetting Agent improves solution contact with the surface, reduces the tendency to pit, and provides tolerance for organic contaminants.

FILTRATION & PURIFICATION

Filtration is critical for sulfamate nickel: even small particulates affect plating quality, producing pitting or roughness depending on the solid contaminant. Maintain continuous filtration with media capable of five-micron retention and three solution turnovers per hour. Activated carbon can be used in filtration on a regular basis to maintain organic contaminants at a tolerable level. Even with carbon-packed filter units,

a thorough carbon treatment may sometimes be required to address accumulated organic impurities; consult your Acculabs representative for purification assistance.

METALLIC CONTAMINATION

Metallic contamination is usually caused by work lost in the plating tank, drag-in from pickling, corrosion of bussing, or leaks in the tank liner. Proper equipment maintenance is the best preventive measure. Low-current dummying may be required when contamination is more severe. Avoid the addition of oxidizing agents such as peroxide or permanganate — these can break down the sulfamate ion, producing sulfate and ammonium ions that are deleterious to the plating solution.

OPERATING TEMPERATURE

NILUX-SNS baths operate through a temperature range of 110–140°F. The exact range depends on the chemical balance of the bath and the type of work being plated. Avoid excessive temperatures, which can break down the sulfamate ion.

ANALYTICAL METHODS

HULL CELL CONTROL

Routine bath control is supported by Hull Cell testing. The Hull Cell will indicate whether the NILUX-SNS additive concentrations are within the operating window and will guide fine-tuning of carrier and wetting-agent additions to maintain deposit quality.

BATH CHEMISTRY VERIFICATION

Periodic verification of nickel as metal (15.5–19.5 oz/gal), boric acid (4.5–6.5 oz/gal), anode corroder (3.0–5.0 oz/gal), and pH (3.2–3.8 barrel; 3.8–4.2 rack) should be performed by the lab using standard analytical procedures. A representative bath sample should be sent to Acculabs periodically to serve as a check against in-house analysis and to support Hull Cell-based optimization.

NOTE: NILUX-SNS products have a suggested maximum shelf life of one year from date of manufacture.

3. HANDLING & COMPLIANCE

SAFETY & HANDLING

Follow normal safe-handling guidelines when using NILUX-SNS products. Sulfamate-nickel plating solutions can be highly irritating to sensitive skin and mucous membranes — wear chemical-resistant gloves (Neoprene, Buna-N, or natural rubber), safety goggles or face mask, apron, and footwear, and use a NIOSH-approved respirator when handling additives or working near the working solution. Read,

understand, and follow the Safety Data Sheets (SDS) for all chemicals used at every stage of the plating cycle. Ensure all applicable health, environmental, and safety regulations and standards (OSHA, NIOSH, ACGIH, NFPA) are met.

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