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A2LA Accredited ISO/IEC 17025:2005 Certificate # 2558.01

402 Black Tin-Nickel

Accu-Labs 402 is operated electrolytically to produce a dark charcoal - black tin-nickel alloy deposit. The **402** can be deposited on nickel plated parts, parts with satin finishes and also works very well over alloyed copper, tin, and zinc (tri-metal) in rack or barrel applications.

Features and Benefits:

- Stable ready to use solution for easy makeup
- Ease of operation; analyzable and controllable
- Non-fluoride formula
- Corrosion resistant parts

Make-Up: The **402-RTU** is supplied as a ready to use liquid at 100% by volume. Therefore, heating the solution to working temperature and verifying that the pH is in range is typically sufficient for start-up. Specify **402-RTU** when ordering product for makeup only.

Operating Guidelines

- pH should be maintained at 7.5 – 8.5
- Temperature 120 - 130°F (125°F optimum)
- Cathode Current Density 5 – 15 ASF typical
- Dwell Time 1 – 3 minutes typical (5 minutes recommended maximum)
- Tanks – Steel lined with PVC or polypropylene
- Anodes – Graphite is recommended; nickel is acceptable
- Heaters – Titanium or quartz
- Exhaust – Recommended
- Agitation – Cathodic only **DO NOT USE AIR** (continuous pumping not recommended see Accu-Labs' Representative for periodic filtration recommendations)

Control and Maintenance Guidelines:

Component	Function/Description	Recommended Replenishment & Control
402-R	Deposit control replenisher; colorless liquid	6.0 mL/amp hour
402-A	Tin component replenisher; white salt	2.25 grams/amp hour (25-30 g/l) or (12-15 g/l tin metal)
402-B	Nickel component replenisher; green liquid	4.5 mL/amp hour (7.0-9.0 g/l)
402-C	Conducting Salts (12 g/l per degree Be´ increase required is typical)	As required to maintain specific gravity of 20-22° Baume´
402-D	Deposit darkener (optional used only for darkening deposit in certain applications)	Per Hull Cell or Visual of Parts being processed
402-pH PLUS	Raise pH; colorless to amber liquid	Maintain pH 7.5 – 8.5
402-pH MINUS	Reduce pH; colorless to yellow amber liquid	Maintain pH 7.5 – 8.5

ANALYTICAL PROCEDURES

402-A

- Pipette 10 mls **402** working solution into a 250 mL e-flask
- Add approximately 50 mls DI water
- Add 25 mls 37% HCl
- Carefully add 1 gram sodium bicarbonate; swirl to dissolve
- Add 1 ml starch indicator solution
- Titrate to first persistent blue color immediately with 0.1N Iodine solution
- (mls of 0.1N Iodine solution) x 1.13 = g/l **402-A** (**maintain 25-30 grams/liter**)

402-B

- **402-B** should be analyzed via AA and maintained at an equivalent of **7.0-9.0 g/l nickel metal**. A 1% by volume addition of **402-B** raises the nickel metal concentration 1.75 g/l.

Hull Cell Procedure – Plate a polished brass panel with bright nickel or comparable under coating; *in some applications a polished brass panel will suffice without under plating*. Place the **402** working solution (heated to operating temperature) into a Hull Cell. Plate properly prepared hull cell panel in the **402** solution at 1 amp for two minutes without agitation; the final deposit should be uniformly black. If all bath parameters are within range but the hull cell panel is not uniformly black, incremental additions of **402-R** may be required.

When making additions: it is recommended to make additions of (402-A, B or C) pre-mixed with a suitable amount of working solution at operating temperature (slurry) to ensure solubility.

Handling Precautions: Contact with 402 components or working bath may be irritating to the skin; if solution comes in contact with skin or eyes flush with plenty of cold water. Always wear eye and personal protective gear when working with or handling this material. Read MSDS prior to using this or any chemicals.

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