Laser® EX 50

Laser EX 50 is a peroxide -based chemical polishing product that will provide a high luster on brass and most copper alloys. In many cases the Laser ^{EX} 50 will give a chemical alternative to buffing. Parts processed in the laser system can subsequently be plated, oxidized, soldered, or lacquered. The high luster produced by Laser EX 50 is superior to that obtained in the conventional chromic or nitric acid based bright -dips. It is not a direct replacement for these solutions, longer immersion times and extra process tanks are required for optimum results of the Laser EX 50 process.

Features & Benefits

No acid Fumes	Safer to work with/Longer equipment life
Highly stabilized	High metal tolerance/Longer bath life
Quality chemicals	Product and performance consistency

Typical Applications

- Chemical polishing of brass components
- Improve Buffing yields
- Rack or Barrel

Operating Conditions

Solution make-up: The operating solution is easily made up by adding 21% by volume of Laser EX 50 to water (21 Gal of Laser EX 50 per 100 Gal of total volume) and 0.6% by volume of 66° Be Sulfuric Acid (5 pints per 100 gal). The addition and maintenance of the Sulfuric Acid level is critical.

Provision for both heating and cooling of the Laser EX 50 solution is required.

Operating range	17.5 – 24.5% by volume Laser EX 50 0.5 – 0.7% by volume of 66° be Sulfuric Acid
Temperature	100°F – 115°F Do not exceed 120° F

Time	1 – 5 minutes
Agitation	Work rod Agitation

Note 1: The recommended Laser EX 50 operating range will provide the optimum results for most applications. Should you feel that your finish requirements cannot be met by the recommended operating parameters, please contact your Hubbard-Hall representative for a detailed written procedure.

Note 2: It is always important that the Sulfuric Acid concentration be maintained in the above range. If the sulfuric acid can deplete, the Hydrogen Peroxide will become very active and readily decompose. All baths should be brought to the upper end of the Sulfuric Acid, Sulfuric Acid, range when the line will be idle, and heat lowered to the Laser EX 50 bath. Never shut down a Laser EX 50 bath without adding back the required Sulfuric Acid.

Cooling of the bath will be required when continuous production is being run. For best results, a bath loading of 0.5 ft^2/Gal. should not be exceeded

Brightness is dependent upon immersion time in the solution and alloy composition. A normal treatment of 2 minutes at 110°F will produce an excellent luster on brass. Although leveling will continue to increase with longer treatment time, chemical consumption will be excessive for the slight increase in leveling. The finish on copper is bright but to a lesser degree than 70/30 brass. Cycle time may be best defined by the time it takes to form a brown oxide "skin" on the work.

Equipment

Tanks	PVC, Polypropylene, Polyethylene, 304 or 316 stainless steel
Heaters	Quartz, Teflon or 316 stainless steel
Cooling Coils	304 or 316 stainless steel
Ventilation	Required
Fixtures, Racks. & Baskets	Polypropylene, PVC, nylon, or stainless steel

Parts must be free of oil and other soils to insure uniform brightening.

Scale Free Surfaces
1. Clean in the Aquaease product determine by your Hubbard-Hall service representative*.
2. Cold water rinse.
3. Activate in 5 to10% by volume Sulfuric Acid, room temperature, 1 - 2 minutes.
4. Cold water rinse.
5. Chemical polish in Laser EX 50, 110°F, 1-5 minutes.
6. Cold water rinse.

7. Laser Brilliant Dip, 10% volume, room temperature, 30 to 60 seconds.
8. Cold water rinse.
9. Dry.

*If parts have heavy oxides or scale present your Hubbard-Hall service representative will assist you developing a procedure to remove such oxides and scale.

Titration Method

Analysis of Laser EX 50 - Potassium Permanganate Method

1. Pipette a 2 mL sample into a 100 mL volumetric flask and dilute to the mark with DI water.
2. Pipette a 10 mL sample of the diluted solution into a 250 mL Erlenmeyer flask and add 75 mL of DI water.
3. Add 5 mL of concentrated Sulfuric Acid.
4. Titrate with 0.1 N Potassium Permanganate solution until a pink color remains for 10 to 20 seconds.
5. Record mL used.

Calculation

$$Concentration = mL\ 0.1\ N\ KMnO_4 \times 1.5$$

Analysis of Laser EX 50 - Ceric Sulfate Method

Chemicals required:

1. Sulfuric Acid solution - 50% by volume.
2. Ferroin Indicator - Mix 1.3 grams of 1,10 - Phenanthroline with 0.7 grams of ferrous sulfate heptahydrate and dissolve in 100 mL DI water.
3. Standard Ceric Sulfate Solution - 0.1N. Slowly add 30 mL conc. Sulfuric Acid to 500 mL DI water with constant stirring, then add 63.25 grams of ceric ammonium sulfate dihydrate and mix until dissolved. Add DI water to 1 liter in a volumetric flask.

Procedure:

1. Pipette a 2 mL sample into a 100 mL volumetric flask and dilute to the mark with distilled water.
2. Pipette a 10 mL sample of the diluted solution into a 250 mL Erlenmeyer flask and add 75 mL of DI water.
3. Add 5 mL of Sulfuric Acid solution and mix.
4. Add 1 mL Ferroin Indicator.
5. Titrate with 0.1N Ceric Sulfate solution until the color changes from pale red to pale blue.
6. Record mL used.

Calculation

$$Concentration = mL\ 0.1\ N\ Ce(SO_4)_2 \times 1.5$$

For every 1% low in Laser EX 50 concentration, add 0.9 fluid ounces of Laser EX 50 per gallon of operating solution (7 mL of Laser EX 50 per liter of operating solution).

The Laser EX 50 should be maintained between 17 to 22.5% by volume.

Analysis of Sulfuric Acid
1. Pipette 5 mL sample into a 250 mL Erlenmeyer flask.
2. Add 75 mL of DI water.
3. Add 5 drops of Methyl Orange indicator.
4. Titrate with 0.1 N Sodium Hydroxide to a yellow endpoint.
5. Record mL used.

Calculation

Concentration = mL 0.1 N NaOH x 0.05

For every 0.1% low in Sulfuric Acid, add 0.13 fluid ounces of concentrated Sulfuric Acid per gallon of operating solution. (1 mL of concentrated sulfuric acid per liter of operating solution).

The Sulfuric Acid concentration must be maintained between 0.5 to 0.7% by volume for optimum polishing. Over additions of Sulfuric Acid will result in a diminished polish. This effect may be overcome by running.

Analysis of Copper

Chemicals required:
- Pan indicator, makeup:
  Dissolve 0.1 gram of pan indicator (1-(2-pyridylazo)-1-napthol) in 100 mL of methanol.

- 0.0575 M EDTA disodium salt solution, makeup:
  Dissolve 21.4 grams of EDTA disodium salt in 10 mL of concentrated ammonium hydroxide and 100mL of distilled water, dilute up to 1 liter with distilled water.

1. Pipette 1.0 mL of Laser EX 50 solution into a 500 mL Erlenmeyer flask.
2. Add 2 mL of concentrated Ammonium Hydroxide (28% by weight). The solution will gas vigorously. The color should be a blue violet.
3. Add 100 mL of distilled water and about 4 drops of pan indicator.
4. Titrate with 0.0575 M EDTA disodium salt solution until an endpoint color changes from blue violet to green.
5. Record mL used.

Calculations

Oz/Gal Cu = mL 0.0575 M EDTA x 0.48
g/L Cu = mL 0.0575 M EDTA x 3.6

Waste Disposal

Spent solutions contain Hydrogen Peroxide and Sulfuric Acid (although to varying degrees). They will contain dissolved metals - copper, zinc, lead, etc. They do not contain chelators. Spent solutions should never be stored in non-vented tanks or containers. The spent solution should also be kept acidic until any remaining peroxide can be released in a controlled manner.

Laser solutions can be treated with other waste streams or they can be segregated, and batch treated independently. If a clarifier is used in the separation of solids and liquids, the batch method is preferred. Small gas bubbles produced by peroxide destruction can lift previously precipitated

sludge and cause "floaters". If membrane filters, cartridge filters, sand filters, filter presses, etc., are used, then everything can be mixed.

Hydrogen Peroxide is generally unstable on the alkaline side. Since laser solutions are acidic, they require adjustment with caustic, caustic potash, lime, soda ash, etc. When the pH rises above 8.0, an effervescence will occur. This will vary with the concentration of peroxide. Certain dissolved metals like iron, lead, copper - will accelerate this.

This breakdown should be allowed to run to completion - as evidenced by the absence of gassing. If the dwell time is very short, sodium bisulfite can be used to expedite the process.

When the pH was raised, the various metals will precipitate in their hydroxide forms. If the laser solution is mixed with chelate-containing wastes, some can remain in solution. Care should be taken to prevent this.

After metal precipitation and peroxide breakdown are complete, the waste stream can be handled in the normal fashion. The addition of coagulants and flocculants can proceed as normal.

Caution

DO NOT STORE USED LASER SOLUTIONS IN SEALED DRUMS. DISCHARGE USED LASER SOLUTIONS TO WASTE TREATMENT SYSTEMS EQUIPPED TO HANDLE THEM.

Laser EX 50 contains Hydrogen Peroxide. Hydrogen Peroxide is strongly oxidative and acts caustically on the eyes and skin. Self-ignition is possible if the liquid is soaked up by an inflammable material. Protect eyes and skin.

Laser EX 50 is a Hydrogen Peroxide mixture and should be stored in original vented container in a dry location, out of sun and away from heat. Empty containers should be diluted with large quantities of water and discarded. A spill or leak should be quickly flushed away by flooding with water.

Avoid contamination from any source, including metals, dust and especially organic materials. Avoid contact with combustible materials. Do not get in eyes - wear goggles. Avoid contact with skin - wear neoprene, butyl rubber or vinyl gloves. Wash thoroughly after handling. Do not breathe mists or vapors; adequate ventilation should be provided.

In the event the Laser EX 50 drum begins to vent, immediately apply a cold-water spray to cool the drum. Do not physically handle the drum. Also, contact HUBBARD-HALL INC. for further assistance.

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Our People. Your Problem Solvers.

For more information on this process,
please call us at 203.756.5521 or email: techservice@hubbardhall.com

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