

# Laser<sup>®</sup> EX

Laser EX is a peroxide-based chemical polishing system that will provide a high luster on brass and most copper alloys.

Parts processed in the laser system can subsequently be plated, oxidized, soldered, or lacquered. The high luster produced by Laser EX 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.

## 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

## Operating Conditions

Operating range	25% – 35% v/v Laser EX 0.5% – 0.7% v/v 66° Be Sulfuric Acid
Temperature	100°F – 115°F ( <u>Do not</u> exceed 120°F)
Time	1 – 5 minutes
Agitation	Work rod agitation

### Solution make-up

The operating solution is easily made up by adding 30% by volume of Laser EX to water (30 Gal of Laser EX per 100 Gal of total volume) and 0.6% by volume of 66° Be Sulfuric Acid (5 pints per 100 gallon).

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

**Note:** It is always important that the Sulfuric Acid concentration be maintained in the above range. If the pH of the solution rises above 5.0, there may be an explosive release of the Laser EX solution. Recommended practice requires titration of the solution both prior to and following use of the bath. See "Analysis of Sulfuric Acid" on page 3 for the proper method of adjusting the solution.



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Cooling of the bath will be required when continuous production is being run. For best results, a bath loading of 0.5 ft<sup>2</sup>/gallon 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.

#### 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 & Barrels	Polypropylene, PVC, nylon, or stainless steel

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

#### Scale free surfaces

1. Clean using the product recommended by your Hubbard-Hall service representative\*.
2. Cold water rinse.
3. Activate in 5-10% by volume Sulfuric Acid, room temperature, 1 to 2 minutes.
4. Cold water rinse.
5. Chemical polish in Laser EX, 110°F, 1 to 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

#### Laser EX – 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 0.1N Potassium Permanganate solution until a pink color remains for 10 to 20 seconds.
5. Record mL used.

Calculation

$$\text{Concentration} = \text{mL } 0.1\text{N KMnO}_4 \times 2.5$$



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For every 1% low in Laser EX concentration, add 1.3 fluid ounces of Laser EX per gallon of operating solution (10 mL of Laser EX per liter of operating solution).

The Laser EX should be maintained between 25% to 35% by volume.

#### Sulfuric Acid Concentration

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

$$\text{Concentration (H}_2\text{SO}_4) = \text{mL 0.1N NaOH} \times 0.05$$

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.

#### Copper Concentration

##### Chemicals Required

1. Pan indicator  
Dissolve 0.1 gram of pan indicator (1-(2-pyridylazo)-1-naphthol) in 100 mL of methanol.
2. 0.0575 M EDTA disodium salt solution  
Dissolve 21.4 grams of EDTA disodium salt in 10 mL of concentrated ammonium hydroxide and 100 mL of distilled water, dilute up to 1 liter with distilled water.

##### Procedure

1. Pipette 1 mL of Laser EX solution into a 500 mL Erlenmeyer flask.
2. Add 2 mL of concentrated ammonium hydroxide. 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

$$\text{Copper (oz/Gal)} = \text{mL 0.0575 M EDTA} \times 0.48$$

$$\text{Copper (g/L)} = \text{mL 0.0575 M EDTA} \times 3.6$$

## 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.



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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 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 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<sup>EX</sup> 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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WARRANTY: THE QUALITY OF THIS PRODUCT IS GUARANTEED ON SHIPMENT FROM OUR PLANT. IF THE USE RECOMMENDATIONS ARE FOLLOWED, DESIRED RESULTS WILL BE OBTAINED. SINCE THE USE OF OUR PRODUCTS IS BEYOND OUR CONTROL, NO GUARANTEE EXPRESSED OR IMPLIED IS MADE AS TO THE EFFECTS OF SUCH USE, OR THE RESULTS TO BE OBTAINED.

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## Our people. Your problem solvers.

For more information on this process please call us at

1-800-648-3412

or [techservice@hubbardhall.com](mailto:techservice@hubbardhall.com)

