# Laser® 2000

Laser 2000 is a peroxide based-chemical polishing system that will provide a high luster on brass and most copper alloys. In many cases the Laser 2000 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 2000 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 2000 process.

## Features & Benefits

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| No acid fumes | Safer to work with/Longer equipment life |
| Highly stabilized | High metal tolerance/ Longer bath life |
| Quality chemicals | Product and performance consistency |
| Rack or Barrel | Process flexibility |

## Operating Conditions

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| Operating Range | 17.5% – 22.5% v/v Laser 2000<br>0.6% – 1.5% v/v 66° be sulfuric acid |
| Temperature | 100°F – 115°F Do not exceed 120°F |
| Time | 1 – 5 minutes |
| Agitation | Work rod agitation |

Solution make-up
The operating solution is easily made up by adding 20% by volume of Laser 2000 to water (20 gal of Laser 2000 per 100 gal of total volume) and 0.85% 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 2000 solution is required.

Note: 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.
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

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| Tanks | PVC, Polypropylene, Polyethylene, 304 or 316 Stainless Steel |
| Heaters | Quartz, Teflon or 316 Stainless Steel |
| Cooling Coils | 304 or Stainless Steel |
| Ventilation | Required |
| Fixtures, Racks, & Baskets | Polypropylene, PVC, Nylon, or Stainless Steel |

Process Cycle

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 to 2 minutes.
4. Cold water rinse.
5. Chemical polish in Laser 2000, 110°F, 1-5 minutes.
6. Cold water rinse.
7. Laser Brilliant Dip, 10% by 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

The Laser 2000 and Sulfuric Acid concentrations can be easily analyzed and accurately replenished using the following analytical procedures.

Analysis of Laser 2000 – 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 the mL used.

Calculation

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

Analysis of Laser 2000 – 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 the mL used.

Calculation

$$Concentration = mL0.1N\ Ce\ (SO_4)_2 \times 1.5$$

For every 1% low in Laser 2000 concentration, add 0.9 fluid ounces of Laser 2000 per gallon of operating solution (7 mL of Laser 2000 per liter of operating solution).
The Laser 2000 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 the mL used.

Calculation

$$Concentration\ (H_2SO_4) = mL\ 0.1N\ NaOH \times 0.0588$$

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 0.6% to 1.5% 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
1. Pan Indicator
   Dissolve 0.1 gram of pan indicator (1-(2-pyridylazo)-1-napthol) 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 1.0 mL of Laser 2000 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 the mL used

Calculations

*Copper (oz/Gal) = mL 0.0575 M EDTA x 0.48*
*Copper (g/L) = 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.

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 2000 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 2000 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 2000 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.

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.

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