

E-Brite™ B-150

Brass Plating Process

Plates Twice As Fast As Any Other Cyanide Brass

The **E-Brite B-150** is a single additive grain refining process with excellent throwing power that produces a lustrous, highly desirable yellow-green, 70/30 brass color.

Copper/Zinc proportions can also range from 60/40 to 80/20. Flashing over nickel plate produces a super bright brass finish.

Users previously concerned about production problems with a brass process find the **B-150** system to be virtually trouble-free with excellent color uniformity and ease of operation. It is the preferred process for brass plated parts which will be oxidized or antiqued. The **B-150** is a low temperature process operating at 105°F (40°C), as compared to greater energy-consuming baths operating at 150°F (65°C).

The copper and zinc plate together in a uniform alloy composition over wide current density and temperature range, thereby helping to reduce rejects due to poor color, non-uniformity and poorly oxidized finishes. The system maintains a uniform color with parts from several plating baths in a plant or from baths at widely scattered locations and uniform color with parts from the top and bottom of a rack. It produces a uniform color on large surfaces and is used extensively in lighting fixtures, furniture, architectural and fireplace hardware.

The **B-150** process can be used in both barrel and rack lines. It can be cathode rod or air agitated. Using air agitation allows higher current density and hence higher plating speeds resulting in greater thickness in less time.

The **B-150** is a low caustic bath, less than ½ ounce per gallon (3.8g/l), which means it can be plated directly onto high quality (porosity-free) zinc die-castings without the conventional copper strike.

This system is easy to use because it does not require constant adjustments of ammonia. The normal breakdown of cyanide in the bath gives off enough ammonia to maintain the right concentration, thus lessening the need for the constant additions of ammonia common with competitive baths. With the **B-150** process users can put cost-boosting ammonia on the back shelf. Further, users relying on ammonia get different colors on the same part due to the different alloy compositions caused by variable current densities.

The **B-150** solution does not contain amines which are hard to control and are detrimental for waste treatment systems. Also, if amines get too high, the bath must be dumped which is costly and time wasting.

EPI has developed a modern, accurate method of controlling the brass solution which is reproducible. It is a scientific brass plating process that produces plating of greater thickness in less time, has superior throwing power together with consistency of color that repeats itself day after day, month after month.

Solution Composition for Barrel and Rack Plating

Component	Optimum	Range
Copper, metal as copper cyanide	4.0 oz/gal (30 g/l) 5.6 oz/gal (42g/l)	3.5-4.5 oz/gal (26-34 g/l) 4.9-6.3 oz/gal (36-47 g/l)
Zinc, metal as zinc cyanide	1.7 oz/gal (12.8g/l) 3.0 oz/gal (22.5 g/l)	1.5-2.0 oz/gal (11-15 g/l) 2.7-3.6 oz/gal (20-27g/l)
Free cyanide (calculated)	2.0 oz/gal (15g/l)	1.5-2.5 oz/gal (11-19 g/l)
Caustic soda (NaOH)	0.2 oz/gal (1.5 g/l)	0.2-0.5 oz/gal (1.5-3.8g/l)
Soda Ash (Na ₂ CO ₃)	8.0 oz/gal (60 g/l)	4.0-12.0 oz/gal (30-90 g/l)

Addition Agents Required for Makeup or Conversion

E-Brite™ B-150	Brightener	1% by Volume
Electrosolv™	Anode corroder/ bath stabilizer	5% by Volume
E-Wet 300-WB	Wetting agent	0.1% by Volume

Makeup of a New Solution

The quantities of chemicals for each **100 gallons and 100 liters** of solution are as follows:

		100 gallons	100 liters
Copper Cyanide	CuCN	35 lb	4.20 kg
Zinc Cyanide	Zn(CN) ₂	19 lb	2.28 kg
Sodium Cyanide	NaCN	66 lb	7.92 kg
Soda Ash	Na ₂ CO ₃	25 lb	3.00 kg
Caustic Soda	NaOH	None	None
Ammonium Hydroxide	NH ₄ OH	1 Quart (946 mls)	250 mls

Operating Conditions

	Optimum	Range
pH (electrometric)	10.4	10.2-10.7
Temperature	105°F (40°C)	90°-120°F (32-49°C)
Agitation	Air, cathode rod 15 ft/min (5 meters/min) or by barrel rotation	
Anode to Cathode ratio	2:1	
Voltage	Barrel, 9-12 v.	Rack 2-6 v.
Filtration	Continuous with minimum of one (1) turn per hour	

Equipment

Anodes - CDA 26000 only	Rolled or extruded 70/30 brass
Anode basket	Titanium
Tank	Mild steel is permissible however, a lined tank is preferred to avoid stray currents
Filter	Standard type for alkaline cyanide solutions
Heating elements	Mild steel permissible
Ventilation	Forced ventilation required

Preparing a New Solution

No additions of caustic soda are to be made on make-up because some is formed as a by-product during solution make-up. The addition of caustic is to be determined by analysis of the solution after make-up and break-in adjustments are to be made at that time.

In about ½ of the quantity of water required for the final tank volume dissolve the chemicals in this order. First, add the sodium cyanide, second, the zinc cyanide, third, the copper cyanide. Dilute the solution to about ¾ of the final volume and dissolve the soda ash. After everything is in solution add one quart of Ammonium Hydroxide (NH₄OH) for every 100 gallons of final solution (0.25 liters of Ammonium Hydroxide per 100 liters of final solution). Filter, and bring volume close to the final level. Heat the solution to operating temperature and dummy plate for several hours. Add the addition agents...**Electrosolv™** 5%, **B-150** 1% and the **300-WB** wetting agent 0.1%.

Ammonium Hydroxide Maintenance Additions

If bath sits over the weekend (48 hours) add 50-100% of the initial charge of ammonium hydroxide on Monday. VERIFY BY HULL CELL TESTING .On Tuesday you might find you may need to add more ammonium hydroxide 10-50% of original make up. VERIFY BY HULL CELL TESTING. Afterwards you should generate enough ammonia as a break down product of the sodium cyanide. IF YOU HAVE TOO MUCH AMMONIA heat solution to 130-140° F this will drive off the excessive ammonia. You will need to add ammonia again (VERIFY BY HULL CELL TESTING) after heating the brass plating solution. Other factors that will affect ammonia consumption are the level of free sodium cyanide, amount of production and air agitation.

Function of the Addition Agents

E-Brite B-150 promotes luster and refines the grain with heavy deposits (0.0003 to 0.0006 in or 8 to 15 microns). Use one quart (1 liter) for every 2500 ampere-hours of plating.

Electrosolv™ promotes anode corrosion and stabilizes the solution. It increases anode efficiency, reduces carbonate build-up, and greatly reduces anode polarization. **Electrosolv** is consumed only by dragout.

300-WB provides wetting, reduces gassing, and reduces the effects of organic contamination. The quantity is not critical, but enough should be present to provide for a small amount of foam on the surface.

Copper Metal

1. Pipette a 1 ml sample into a 250 ml Erlenmeyer flask.
2. Add 25 ml deionized or distilled water.
3. Add 2 to 3 grams Ammonium Persulfate – **let stand for a minimum of 10 minutes.** (Swirl a few times.)
4. Add Ammonium Hydroxide (approx. 10 ml) – solution will be a clear deep blue.
5. Add 50 ml distilled or deionized water.
6. Add 8 drops PAN INDICATOR. Do not add more than 8 drops of Pan Indicator because the end point is affected.
7. Color of the solution should be reddish-purple. Add 2 grams Chloral Hydrate and swirl to mix.
8. Titrate **immediately** with 0.1 Molar EDTA solution to a green yellow endpoint.

Calculations:

oz/gal of copper metal = [(1.74 x ml of EDTA) minus 2 times the zinc metal] X 0.488

Oz/gal x 7.5=grams/liter

Zinc Metal

1. Pipette a 2 ml sample into a 250 ml Erlenmeyer flask.
2. Add 50 ml of deionized water and a small amount of Eriochrome Black T mixture.
3. Add about 2 grams of Chloral Hydrate; titrate **immediately** (end point fleeting).
4. Titrate with 0.2 N EDTA to a color change of wine-red to blue.

Calculations:

ml of EDTA x 0.438 = oz/gal of zinc metal

Oz/gal x 7.5=grams/liter

Sodium Hydroxide

1. Pipette a 10 ml sample into a 250 ml Erlenmeyer flask.
2. Add 10 ml of deionized water, 1 gram of Sodium Cyanide and 10 drops of LaMotte Sulfo-Orange Indicator.
3. Add 2 drops of Alkali-Blue Indicator.
4. Titrate with standard 1.0N Hydrochloric Acid to a color change from brown-gray to green.

Calculations:

ml of 1.0N HCl x 0.535 = oz/gal of Caustic Soda

Oz/gal x 7.5=grams/liter

Free Cyanide (calculated)

1. Pipette a 2 ml sample into a 250 ml Erlenmeyer flask.
2. Add 50 ml of deionized water.
3. Add 7 ml of 20% Sodium Hydroxide solution.
4. Add 5 ml of 10% Potassium Iodide
5. Titrate with 0.1N Silver Nitrate solution until a faint turbidity appears and remains.

Calculations:

Total Cyanide in oz/gal = ml of AgNO₃ x 0.655

Oz/gal x 7.5=grams/liter

Free Cyanide in oz/gal = Total Cyanide in oz/gal minus 3 times the zinc metal in oz/gal

Carbonates

1. Pipette a 10 ml sample into a 250 ml beaker and add 100 ml of deionized water.
2. Add 25 ml of 10% Barium Nitrate solution while stirring. Stir until the precipitate stops forming. Allow to settle.
3. Add a few drops of 10% Barium Nitrate solution to the clear part of the test solution. If precipitation forms again, add 5 ml more of the Barium Nitrate to the beaker and again stir well. Allow to settle. Repeat the above procedure until no additional precipitate forms.
4. Filter using #40 paper. Wash with water.
5. Transfer filter paper and the precipitate to the original beaker and add 50 ml of deionized water. Make a slurry out of the paper and the precipitate.
6. Add a few drops of 0.2% Methyl Orange Indicator.
7. Titrate with 1.0N Hydrochloric Acid solution until a permanent pink color is obtained.

Calculations:

Na₂ CO₃ (Carbonate), oz/gal = ml of 1.0 N HCl x 0.706
Oz/gal x 7.5=grams/liter

E-Brite B-150 Additions

Replenishment additions should be made according to the number of ampere-hours of plating done since the last addition. The exact amount to be added will depend upon the level of brightness required and solution dragout. As a starting point, add one quart (1 liter) every 2500 ampere-hours of plating. The concentration of **E-Brite B-150** can be determined empirically by observing the appearance of the plated parts or by in-plant Hull Cell tests. Periodically, a sample of the solution should be sent to **EPI** or **EPI's** local representative for comparative analysis.

Electrosolv Analysis

1. Pipette a 5 ml sample into a 250 ml Erlenmeyer flask.
2. (Under the Hood) add about 10 ml concentrated Hydrochloric Acid and boil until there is no precipitation left and solution is clear yellow, indicating that all cyanide has been removed. (If the volume falls below 5 ml, and precipitate is still present, start with a new sample and add 20 ml concentrated HCl and boil again. **Remove from heat immediately** after the solution is a clear yellow, as in the above procedure.)
3. Dilute the above solution to 50 ml with deionized water and add ½ gram of zinc dust. Stir well so as to precipitate all the copper. (This is indicated by the absence of the green or yellow color in the solution.) If the solution is green or yellow add ¼ gram more zinc dust and allow to effervesce again.
4. After the zinc dust has absorbed the copper and the effervescence has stopped, filter through #41 filter paper into a 250 ml graduated Erlenmeyer flask. (CHECK THE FLASK MARKINGS FOR VOLUME ACCURACY BEFORE USING.) Wash filter paper well with room temperature deionized water (approximately 150 ml). The filtrate should be colorless. Bring the filtrate volume up to **exactly** 200 ml with deionized water. **Mix solution well.**
5. Pipette exactly 50 ml of this solution into a 500 ml Erlenmeyer flask.
6. Add 5 ml of concentrated Sulfuric Acid. Then add 1-2 grams of Manganese Sulfate (monohydrate) and 100 ml deionized water
7. Heat to about 170°-180°F (77-82°C) and add slowly, with agitation, **exactly** 20 ml of standard 0.1 Normal Potassium Permanganate solution. Keep the temperature stable for all samples – **do not boil.**
8. Allow the hot solution to stand for at least 5 minutes and then cool to room temperature under running water or ice bath.
9. Add 10 ml of 20% Potassium Iodide and titrate with 0.1N Sodium Thiosulfate until a light straw yellow color is noted. Then add approximately 1-2 ml of 1% starch solution. **Make a fresh starch solution daily.** The color of the solution should be dark blue. Continue titration with 0.1N Sodium Thiosulfate until absence of blue color is noted for approximately 1 minute.

Calculations:

$$\% \text{ Electrosolv} = (20 - \text{Titration}) \times 1.36$$

Companion Product B.P.A. – Brass Passivating Agent

This companion **EPI** product is a very economical, alkaline, chromate-based passivating solution for brass, copper, silver and bronze. It is used after plating to prevent spotting and bleed-out, and preserves the original color of plated surfaces. It provides excellent short-term protection for parts in process. **B.P.A.** leaves a clear film and is the preferred agent for color protection and corrosion resistance on brass products top-coated with a clear acrylic or epoxy lacquer. **B.P.A.** is non-acidic and operates at a pH of 8.5. It destroys excess cyanide and alkalinity from plating solutions left in pores better than other weak acid compounds, and requires only a couple of volts of direct current and a short dwell time to treat the part.

B.P.A. does not affect the color of brass or other plating, nor does it strip the plating or reduce the thickness, as is common with acidic chromates. It does not de-zinc the surfaces of brass as chromates do. It can be used to passivate ultra-thin flash brass plating. **B.P.A.** is used by leading manufacturers of plumbing hardware, brass display racks, high quality bright brass lamps, and furniture.

Packaging

5 and 55 gallon non-returnable containers

IMPORTANT NOTICE! For Industrial Use Only

The following is made in lieu of all warranties, expressed or implied, including warranties of merchantability and fitness for purpose: seller's and manufacturer's only obligation shall be to replace such quantity of the product as proved to be defective. Before using, user shall determine the suitability of the product for its intended use, and user assumes all risk and liability whatsoever in connection therewith. **Neither seller nor manufacturer shall be liable either in tort or in contract for any loss or damage, direct, incidental or consequential arising out of the use or the inability to use the product.**

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