

# ACCU-LABS INC.

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**A2LA Accredited ISO/IEC 17025:2005 Certificate # 2558.01**

## L C F

### *Ultra-low cadmium plating process*

#### **Introduction**

Accu-Lab's L C F has been formulated to produce bright, high quality cadmium plating from an ultra-low cadmium and cyanide solution, so you can achieve both customer satisfaction and environmental compliance.

#### **Features and benefits**

Two-part liquid system	Easy to use and control
Highly concentrated	Very cost-effective
High quality finish	Meets QQ-P-416
No metallic brighteners	Easier pollution control
Versatile system	Works in both rack and barrel

#### **Operating guidelines**

<b><u>Operating guidelines</u></b>	<b><u>Range</u></b>	<b><u>Optimum</u></b>
Cadmium metal	0.5 – 1.3 oz/gal	1.0 (7.5 g/L)
Total sodium cyanide	1.5 – 4.0 oz/gal	3.0 (22.5 g/L)
Sodium hydroxide (Caustic soda)	2.0 - 5.0 oz/gal	3.5 (26 g/L)
Sodium carbonate (Soda ash)	3.0 – 10.0 oz/gal	
<b>L C F CONDITIONER</b>	3.0 – 6.0 % by volume	
<b>L C F BRIGHTENER</b>	0.5 - 2.0 % by volume	
Cathode current density	5 - 50 amps per square foot	
Anode current density	3 - 30 amps per square foot	

#### **Pretreatment for low-cyanide cadmium plating**

Proper conditioning of the work to be plated is often more important than the rest of the plating operation. Work must be clean and free of metalworking lubricants, rust, fines, mold releases, and so on. Consult with your sales representative for information and assistance with pretreatment products.

## **Preparation of new solution**

- 1) Carefully review all equipment to verify that tanks, pumps, heaters, and related items meet the requirements for the work this line will do.
- 2) Thoroughly clean all tanks and equipment. Use a separate tank for bath preparation if possible.
- 3) Fill tank  $\frac{1}{3}$  full with water. If the local water is not very pure, use deionized water for make-up.
- 4) Use the following table to determine the amount of chemicals required for make-up:

<b><u>Chemical</u></b>	<b><u>100 gallons</u></b>	<b><u>1000 liters</u></b>
Cadmium oxide	7.2 pounds	8.6 kilograms
Sodium cyanide	19 pounds	23 kilograms
Sodium hydroxide	18 pounds	21 kilograms
Sodium carbonate	19 pounds	23 kilograms

- 5) While agitating (mechanical preferred) slowly add the caustic soda and sodium cyanide. Mix until fully dissolved.
- 6) To avoid dusting of the toxic cadmium chemicals, prepare slurry (paste) of the cadmium oxide with water. Add this slurry to the mixing tank. Mix thoroughly until all material is dissolved.
- 7) Add appropriate combination of **L C F Conditioner** and **L C F Brightener** components and mix well. Dilute to final volume and mix. Analyze solution and fine-tune balance.

Electrolyze the new solution at low current (below  $\frac{1}{2}$  amp/ft<sup>2</sup>) for 24 hours to remove whatever trace impurities may have been in the make-up chemicals. Bath is now ready for plating.

## **Conversion of existing baths**

**L C F Ultra-low Cyanide Cadmium** components are fully compatible with most existing systems, so that a simple "slide-in" conversion is acceptable. In general, allow the cyanide levels in the solution to slowly go down over a period of a couple of months; the length of time required depends on initial cyanide levels and your rate of drag-out. The solution must be watched closely during this transition period. Frequent analysis and close inspection of the work is essential. **L C F Ultra-low** additives may be used all through this time. We suggest that a representative sample of the solution be sent to Accu-Labs for analysis and Hull cell testing. We will then advise the best conversion method.

## **Solution maintenance**

For best results, **L C F Conditioner** and **L C F Brightener** should be added to the working solution at the rate of one gallon of each per 12,000 – 18,000 ampere-hours (one liter per 3,000 – 5,000 ampere-hours). Chemical analysis at regular intervals will help to maintain solution balance.

## **Filtration and purification**

All plating solutions benefit from filtration. For low-cyanide cadmium solutions it becomes more important. Depending on the type of solid contaminant, either pitting or roughness can result. Impurities can come from the incoming water, drag-through from the racks or barrels, even particles on the work itself. Contaminants are both organic and inorganic. Thorough filtration should be done upon make-up; then, weekly or more often as work load increases. Use a ten-micron filter and filter until all particulates are removed – at least ten turnovers of the solution volume. Activated carbon may be used in this filtration process to maintain organic contaminants at a tolerable level. If the solution is plating a dull or dark, spotted deposit, the probable cause is organic contamination. This is the result of a combination of cleaner being carried into the plating bath and electrolytic breakdown of additives. Even with carbon-packed filter units, a thorough carbon treatment may sometimes be required. Prior to thorough carbon treatment, sprinkle granules of potassium permanganate over the surface of the solution and allow them to dissolve. This step breaks down some of the organics for more efficient removal by carbon. Consult with your sales representative for information and assistance with purification. Metallic contamination is usually caused by work lost in the plating tank, drag-in from pickling, corrosion of busing, or leaks in the tank liner. Proper equipment maintenance is the best way to avoid problems. The most common metallic impurity is copper. Cadmium solutions can tolerate relatively high amounts of copper, but levels above 200 ppm can affect the quality of the work. If copper becomes a problem, the best way to treat is to sprinkle zinc dust over the bath and filter to remove the zinc dust. After removal, the zinc dust must be dissolved in a strong solution of sodium hydroxide (caustic soda) for safe disposal. The wet zinc dust can become a fire hazard. For all problems with solution contamination, try to find the cause of the problems and correct it! Eliminating the problem is better than treating it.

**Cadmium anodes:** Only high-purity cadmium anodes should be used. Anode baskets should be constructed from steel, which will not corrode in a properly maintained plating solution. Anodes do not need to be bagged unless impurities cause poor anode corrosion. Consult with your Accu-Labs representative for further information.

## **Safety and handling**

**L C F Conditioner** and **L C F Brightener** may cause skin and eye irritation. Use only with suitable protective clothing. Wash thoroughly after using. Refer to Material Safety Data Sheet for more complete information. Handle this and all chemicals with care.

The plating solutions where these products are used contain highly toxic cyanide and corrosive sodium hydroxide (caustic soda). Use extreme care when working with or near the plating solutions and all related processes.

## **Non-warranty**

*The information contained in this bulletin is, to the best of our knowledge, true and accurate. All recommendations are made without guarantee Accu-Labs, Inc.; disclaim any and all liability arising from the use of this product or the information contained herein.*