

Dura-100 **High Speed / Ultra Crack** **Hard Chrome Plating Process**

Description

Dura-100 is specialized liquid additive used for High Speed / High Efficiency hard chromium plating with a maximum Micro Crack Structure, known as Ultra Crack. The Dura-100 is a high fluoride catalyst that produces deposits that are extremely hard and have the optimum crack structure for Maximum Wear and Corrosion Resistance. This is an excellent bath for both flash as well as for heavy build-up work.

Dura-100 provides the ultimate in Deposit Metallurgical Properties. Dura-100 is used with generic chromic acid; no proprietary blends to buy.

The process is very user friendly, easy to control and inexpensive to operate.

Advantages

Following are the benefits of using the Dura-100 bath over conventional or proprietary processes.

- **Metallurgical properties, crack structure and hardness are optimized.**
- **Superior Corrosion Resistance with the Ultra Crack deposit.**
- **Maximum Deposit Hardness, 70 -72 RC.**
- **Deposits are extremely Bright.**
- **Less Treeing and Noduling in HCD Areas.**
- **High Speed Bath with Maximum Efficiency.**

Bath Control

The Dura-100 bath can operate with a chromic acid level of 20-50 oz/gal. Most operations control the chrome at 30 oz/gal. A sulfate ratio of 215:1 (190-260:1) is generally used with a bath temperature of 140 degrees F. Dura-76F is also be used in this process to chelate bath contaminants and improve throwing power. The following are the typical control points:

Item	Optimum	Range
Chromic Acid	30.0 oz/gal.	20-50
Sulfate	0.14 oz./gal.	
Ratio	215:1	190-260
Dura-100	3 % Vol.	2-5
Dura-76F	2.5 oz/gal.	2.0-5.0
Trivalent Cr	1 % of Hex.	0.70-2.50
Metal Impurities	< 5.0 g/l	
Chloride	< 20 ppm	
Insolubles	< 0.04 g/l	
Temperature - F	140	120-150
Current Density	2.0 ASI	1-10 ASI

Additions

The initial addition of Dura-100 is 3 % of the bath volume and the Dura-76F is 2.5 oz/gallon. Maintenance additions should be made as follows. Also, send a bath sample to Plating Resources, Inc. on a monthly basis for a complete analysis.

<u>Item</u>	<u>Per 100,000 Ampere Hours</u>	<u>Approx. Per 100 lbs. of Chrome</u>
Dura-100	0.5 gals.	2 gallons
Dura-76F	2.5 lbs.	10 pounds

Deposition Rates

Dura-100 also allows operation at high current densities for faster plating speeds. The following is typical, per hour per side:

2 ASI	0.0012"
4 ASI	0.0024"
6 ASI	0.0036"

Stop-Off & Masking

Masking is not needed for short runs or where the entire surface is plated, except to control the deposition. Stop-Off should be used, however, in critical unplated areas to avoid unnecessary cathodic etching, especially for highly machined or polished areas. Bare steel, copper or aluminum fixtures should not be used with this bath. These should be coated with adequate stop-off to prevent their corrosion and subsequent bath contamination.

Anodes

The typical stick or conforming type anodes can be used with Dura-100. The best alloy is 7% tin-lead, but a small amount of antimony can be added for rigidity if needed.

Equipment

The equipment normally used for hard chrome plating is satisfactory for the Dura-100 process. Typical tank linings like PVC, Koroseal or molded HD polyethylene are best. Lead linings should never be used due to corrosion. The rectifier(s) can be the typical SCR type (or other control types) and should have sufficient amperage capacity at up to 9-12 volts, with a maximum of 5% ripple at the actual voltage used. This slightly higher voltage can be beneficial when contaminants build-up. The tank should be ventilated and PVC systems are commonly used. The heating and cooling systems should be made of Teflon. Titanium may be used, but it will eventually corrode. Mild air agitation is desirable for mixing in chemical additions and avoiding temperature stratification in deep tanks. The air agitation should be provided by a low pressure blower and controlled to avoid excess chrome mist. Pumps, filters and plumbing should be schedule 80 CPVC with glued fittings.

Bath Impurities

Bath impurities should be kept as low as possible for best results. Of particular concern is trivalent, copper and iron. High impurity levels require additional voltage to maintain the desired current density with a greater tendency for burning, pitting and a reduction in throwing power. The best removal method for trivalent and chloride is to dummy the bath using CR-3 Reducer and an anode ratio of at least 20:1. Porous pots used with CR-3 Reducer can be used to remove copper and iron; this process can be slow if the levels are high though. Dura-76F is helpful in overcoming the effect of bath impurities by buffering and chelation.

Analytical Control

The Dura bath should be analyzed on a regular basis for chromic acid and sulfate. Make additions as needed to maintain the desired concentrations. The recommended frequency depends on the tank volume and the work load; most shops do this weekly. Bath samples can be sent to Plating Resources, Inc. on a monthly basis for a detailed analysis at nominal cost. This service can be used as either the primary control or as a back-up for your in-house tests. We can also provide analysis of the Dura Additive without cost at any time.

Regulations

Like all chrome plating solutions, the Dura bath produces misting and this can be reduced if lower chrome levels are used. This mist contains Cr(VI) which is regulated by the EPA for environmental and OSHA for worker safety issues. Be sure to follow all federal, state and local regulations for safe operation and hazardous disposal.

Caution

The Dura bath contains chromic acid, sulfuric acid and the various Dura additives outlined above. These are all industrial chemicals and must be handled carefully and in accordance with the directives provided in the individual SDS forms.

Read and understand the SDS on all of these chemicals before handling or using. Ensure that all regulatory standards are followed and limit personal exposure as required for Cr(VI) by OSHA.

Avoid personal contact with these chemicals, avoid splashing and avoid breathing any fumes released during operation. Do not inhale any dust, mist or vapors from these chemicals. Do not allow these products to contact the skin or eyes. In case of contact, flush immediately with large amounts of fresh water and seek immediate medical attention.

Wear protective clothing such as aprons, gloves, face masks and respirators. Be sure that adequate eyewashes and emergency showers are available nearby before handling or using any of these chemicals.

Designated work clothing should be worn while using these chemicals and the worker(s) should thoroughly shower and change into fresh-clean street clothing before going home. Decontaminate all work clothing before reuse.

The user is responsible for providing adequate work clothing, personal protection, limiting personal exposure, and providing any required clean-up, decontamination as well as any needed medical attention.