

# ACCU-LABS INC.

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

## 902 ZINC CHLORIDE PLATING PROCESS

### ADVANTAGES OF THE ACCU-LABS 902 SYSTEM

- MIRROR BRIGHT FINISH
- EXCELLENT CHROMATE RECEPTIVITY
- TEMPERATURE TOLERANCE UP TO 130°F.
- EXCELLENT ORGANIC STABILITY
- EASE OF PLATING BATH CONTROL
- NO CHELATING AGENTS
- TOTAL WATER SOLUBLE BRIGHTENER SYSTEM
- EXCELLENT HIGH CURRENT DENSITY RANGE
- LOW OR NON-FOAMING
- EXCELLENT ADHESION AND DUCTILITY
- SUITABLE FOR EITHER RACK OR BARREL OPERATION
- SIMPLIFIED WASTE TREATMENT
- ECONOMICAL TO OPERATE

#### BATH OPERATING PARAMETERS (LISTED IN OUNCES/GALLON):

BARREL OPERATIONS	LOW AMMONIA		ALL AMMONIA	
	<u>RANGE</u>	<u>OPTIMUM</u>	<u>RANGE</u>	<u>OPTIMUM</u>
ZINC	2.0 - 4.5	3.0	2.0 - 4.0	2.5
POTASSIUM CHLORIDE	15.0 - 20.0	18.0		
AMMONIUM CHLORIDE	4.0 - 8.0	6.0	15.0 - 24.0	18.0
<b>RACK OPERATIONS</b>				
ZINC	3.0 - 5.0	3.5	2.5 - 5.5	3.0
POTASSIUM CHLORIDE	15.0 - 20.0	18.0		
AMMONIUM CHLORIDE	4.0 - 8.0	6.0	15.0 - 24.0	18.0

#### ADDITION AGENTS

##### BARREL & RACK OPERATIONS (LOW OR ALL AMMONIA SYSTEMS)

		<u>RANGE</u>	<u>OPTIMUM</u>
ACCU-LABS 902-W	% BY VOLUME	2 - 5%	3%
ACCU-LABS 902-B	% BY VOLUME	0.075 - 0.150%	0.1%

#### OPERATING CONDITIONS

##### BARREL & RACK OPERATIONS (LOW OR ALL AMMONIA SYSTEMS)

PH	4.5 - 6.2	5.8
TEMPERATURE	60 - 130°F	80°F
CURRENT DENSITY	1-80 AMPS/SQ FT	
ANODE AREA	1:1 MINIMUM ANODE TO CATHODE	

### MAINTENANCE SCHEDULE

ZINC	-	BY ANALYSIS
POTASSIUM CHLORITE	-	BY DRAG-OUT AND ANALYSIS
AMMONIUM CHLORIDE	-	BY DRAG-OUT AND ANALYSIS
ACCU-LABS 902-W	-	BY DRAG-OUT OF TOTAL SALTS
ACCU-LABS 902-B	-	1 GAL/15,000 - 25,000 AMPERE HOURS

### BATH MAKE-UP

1. PREPARE A LINED TANK BY LEACHING IT WITH 5% HYDROCHLORIC ACID FOR A PERIOD OF 12 - 24 HOURS.
2. RINSE THE TANK CLEAN WITH WATER.
3. FILL THE LINED TANK TO 2/3 OF THE WORKING VOLUME WITH 100-120 F. WATER.
4. ADD THE REQUIRED AMOUNT OF AMMONIUM CHLORIDE AND POTASSIUM CHLORIDE AND MIX WELL TO DISSOLVE. (*PREFERABLY USE AMMONIUM AND POTASSIUM CHLORIDE CONTAINING NO ANTI-CAKING AGENTS.*)
5. ADD THE REQUIRED AMOUNT OF ZINC CHLORIDE AND MIX WELL TO DISSOLVE
6. HANG SLAB ANODES OR ZINC FILLED TITANIUM ANODE BASKETS IN THE BATH.
7. ADD THE RECOMMENDED AMOUNTS OF ACCU-LABS 902-W AND ACCU-LABS 902-B. MIX WELL.
8. ADD WARM WATER TO FILL THE TANK TO WORKING LEVEL.

### EQUIPMENT

**TANK** - A POLYPROPYLENE, PVC, OR KOROSEAL LINED TANK IS REQUIRED.

**ANODES** - USE SPECIAL HIGH GRADE (99.99% PURE) ZINC BALLS.

**ANODE BASKETS** - TITANIUM BASKETS CAN BE USED. IT IS STRONGLY RECOMMENDED TO KEEP THE BASKETS FILLED WITH ZINC ANODES ALL THE TIME AND NOT TO EXCEED 9 VOLTS ON THE RECTIFIER. IF THIS RECOMMENDATION IS NOT FOLLOWED, THE TITANIUM BASKETS WILL DISSOLVE IN THE BATH AND THE BASKETS WILL HAVE TO BE REPLACED.

**RECTIFIER** - UP TO 12 VOLTS

**TEMPERATURE CONTROL** - THE ACCU-LABS 902 ZINC CHLORIDE PLATING PROCESS IS TOLERANT OF TEMPERATURES RANGING FROM 60 - 130°F A TITANIUM PLATE STYLE HEAT EXCHANGER IS STRONGLY PREFERRED FOR BOTH COOLING AND HEATING.

**VENTILATION** - THE ACCU-LABS 902W ZINC CHLORIDE PLATING PROCESS DOES NOT NORMALLY REQUIRE VENTILATION. YOU SHOULD, HOWEVER, CHECK THE LOCAL REGULATIONS.

#### **OPTIONAL EQUIPMENT**

- AUTOMATIC PH CONTROLLER.
- AUTOMATIC BRIGHTENER FEEDER IN CONCERT WITH RECTIFICATION.
- AUTOMATIC TEMPERATURE CONTROL.

**ANODE BAGS** - NYLON OR POLYPROPYLENE BAGS ARE OPTIONAL. BAGS ARE NORMALLY REQUIRED FOR RACK OPERATIONS.

**ANODE BARS** - USE COPPER ANODE BARS, PREFERABLY COATED OR COVERED WITH PLASTIC.

**AGITATION** - AIR OR MECHANICAL AGITATION IS RECOMMENDED FOR RACK OPERATIONS.

**FILTRATION** - USE A 5 - 20 MICRON FILTER CARTRIDGE OR A 5 - 15 MICRON CARTRIDGE PACKED WITH A NON-CELLULOSE FILTER AID OR ACTIVATED CARBON. FILTRATION SPEED SHOULD BE AT LEAST 1 TANK TURNOVER PER HOUR. SAND FILTERS HAVE BEEN FOUND TO WORK QUITE SATISFACTORILY.

## TROUBLE SHOOTING CHART

<u>PROBLEM</u>	<u>CAUSE</u>	<u>SOLUTION</u>
<b>SLOW PLATING SPEED</b>	LOW TEMPERATURE	RAISE TEMPERATURE
	LOW CURRENT	INCREASE CURRENT
<b>BLISTERING</b>	POOR CLEANING AND/OR PICKLING	IMPROVE PRETREATMENT
	ORGANIC CONTAMINATION	TREAT WITH CARBON
	METALLIC CONTAMINATION	TREAT WITH ZINC DUST
	CHROME CONTAMINATION	TREAT WITH SODIUM BISULFITE
	HIGH CURRENT	LOWER CURRENT
	HIGH ACCU-LABS 902-B	HOLD 902-B ADDITIONS
	LOW ACCU-LABS 902-W	ADD ACCU-LABS 902-W
	IMMERSION PLATE PRIOR TO PLATE	DUMP PICKLE
	HIGH PH	REDUCE PH
	LOW ZINC LEVEL	ADD ZINC CHLORIDE AND/ OR INCREASE ANODE AREA
<b>ROUGHNESS</b>	INADEQUATE FILTRATION	IMPROVE FILTRATION
	LOW ACCU-LABS 902-W	ADD ACCU-LABS 902-W
	LOW ANODE AREA	INCREASE ANODE AREA
	ANODES NEED BAGGING	BAG THE ANODES
	HIGH CURRENT	LOWER CURRENT
<b>FLAKING OR STAR DUSTING</b>	HIGH ACCU-LABS 902-B	HOLD 902-B ADDITIONS
	LOW ACCU-LABS 902-W	ADD ACCU-LABS 902-W
	CURRENT INTERRUPTION	CHECK ALL CONTACTS
<b>POOR LOW-CURRENT DENSITY COVERAGE</b>	EXCESS PEROXIDE ADDED	ELECTROLYZE THE BATH
	ORGANIC CONTAMINATION	TREAT WITH CARBON
<b>LOW CURRENT DENSITY AREA BRIGHT-DIPS BLACK</b>	COPPER OR CAD CONTAMINATION	TREAT WITH ZINC DUST
<b>OVERALL HAZE</b>	LOW ACCU-LABS 902-W	ADD ACCU-LABS 902-W
	LOW ACCU-LABS 902-B	ADD ACCU-LABS 902-B
	INADEQUATE AGITATION	INCREASE AGITATION
	POOR CLEANING	IMPROVE CLEANING
<b>OVERALL DULLNESS</b>	LOW ACCU-LABS 902-W	ADD ACCU-LABS 902-W
	LOW ACCU-LABS 902-B	ADD ACCU-LABS 902-B
	CAD CONTAMINATION	TREAT WITH ZINC DUST

<b><u>PROBLEM</u></b>	<b><u>CAUSE</u></b>	<b><u>SOLUTION</u></b>
<b>PRECIPITATION IN BATH</b>	CHLORIDE TOO HIGH	HOLD CHLORIDE ADDITION
	TEMPERATURE TOO HIGH	DECREASE TEMPERATURE
	PH TOO LOW	RAISE PH
<b>SLOW PLATING SPEED</b>	ORGANIC CONTAMINATION	TREAT WITH CARBON
	LOW CHLORIDE LEVEL	ADD POTASSIUM/ AMMONIUM CHLORIDE
	LOW ACCU-LABS 902-W	ADD ACCU-LABS 902-W
<b>HIGH CURRENT DENSITY BURN OR DULL GRAY BARREL PERFORATION SPOTS</b>	WEAK PICKLE OR PICKING PROBLEM	IMPROVE PICKLING BY ADDING MORE HCL ACID TO THE PICKLE OR BY MAKING A NEW PICKLE
	LOW ZINC LEVEL	ADD ZINC CHLORIDE OR INCREASE ANODE AREA
	HIGH CURRENT	REDUCE CURRENT
<b>HIGH CURRENT DENSITY AREA BRIGHT DIPS BLACK, OR BARREL WORK EXHIBITS BLACK PERFORATION SPOTS</b>	LOW AMMONIUM CHLORIDE	ADD AMMONIUM CHLORIDE
	LOW TEMPERATURE	RAISE TEMPERATURE
	LOW ACCU-LABS 902-W	ADD ACCU-LABS 902-W
	POOR CLEANING	CHECK CONDITIONS OF CLEANER
<b>LOW CURRENT DENSITY AREA DULL OR HAZY</b>	HIGH IRON	TREAT FOR IRON WITH DILUTED HYDROGEN PEROXIDE
	HIGH PH	REDUCE PH
	LOW CHLORIDE	ADD POTASSIUM OR AMMONIUM CHLORIDE
<b>POOR LOW CURRENT DENSITY COVERAGE</b>	LOW ACCU-LABS 902-W	ADD ACCU-LABS 902-W
	METALLIC OR ORGANIC CONTAMINATION	TREAT WITH ZINC DUST OR TREAT WITH CARBON
	HIGH PH	REDUCE PH
<b>POOR LOW CURRENT DENSITY COVERAGE</b>	LOW CHLORIDE	ADD POTASSIUM OR AMMONIUM CHLORIDE
	LOW ACCU-LABS 902-W	ADD ACCU-LABS 902-W
	LOW/HIGH ACCU-LABS 902-B	CHECK BRIGHTENER LEVEL
	METALLIC CONTAMINATION	TREAT WITH ZINC DUST
	HIGH ZINC LEVEL (>6 OZ/GL)	REDUCE ANODE AREA

### **IRON TREATMENT (PER 1,000 GALLONS OF BATH SOLUTION)**

1. DILUTE 1 PINT OF 35% HYDROGEN PEROXIDE TO 1 GALLON WITH WATER.
2. MIX THIS DILUTED HYDROGEN PEROXIDE THROUGHOUT THE BATH.
3. REPEAT THE PROCEDURE UNTIL ALL THE IRON IS PRECIPITATED. FILTER OUT THE PRECIPITATED IRON.  
*NOTE: USE CAUTION WHEN WORKING WITH HYDROGEN PEROXIDE.*

### **ANALYTICAL PROCEDURES**

#### **ZINC**

##### **REAGENTS:**

1. 0.1M DISODIUM E.D.T.A. SOLUTION
2. AMMONIA BUFFER (NH<sub>4</sub>CL - 54 G/L & NH<sub>4</sub>OH 350 ml/L)
3. ERIOCHROME BLACK T INDICATOR

##### **PROCEDURE:**

1. PIPET A 5 ML SAMPLE INTO A 400 ml BEAKER
2. ADD 200 mls OF DEIONIZED OR DISTILLED WATER
3. ADD 30 mls OF THE AMMONIA BUFFER SOLUTION
4. ADD SUFFICIENT ERIOCHROME BLACK T INDICATOR TO GIVE A LIGHT PURPLE COLOR
5. TITRATE WITH STANDARD E.D.T.A. SOLUTION UNTIL THE COLOR CHANGES FROM PURPLE TO A PERMANENT BLUE
6. CALCULATION:

$$\text{MLS OF TITRATIONS} \times 0.174 = \text{ZINC IN OZ/GL}$$

#### **TOTAL CHLORIDE - FREE CHLORIDE**

##### **REAGENTS:**

1. CHLORIDE INDICATOR (25g POTASSIUM DICHROMATE & 475 g SODIUM BICARBONATE)
2. 0.141N SILVER NITRATE SOLUTION

##### **PROCEDURE:**

1. PIPET A 1 ml SAMPLE OF THE PLATING BATH INTO A 250 ml ERLLENMEYER FLASK.
2. ADD 100 mls OF DEIONIZED OR DISTILLED WATER
3. ADD SUFFICIENT CHLORIDE INDICATOR (5 gms)
4. TITRATE WITH STANDARD SILVER NITRATE SOLUTION
5. CALCULATION:

$$\text{mls OF SILVER NITRATE} \times 0.67 = \text{OZ/GL TOTAL CHLORIDE}$$

**HANDLING:** Always wear eye protection and personal protective gear when handling or working with this product. Read MSDS before using this or any chemical product.

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