



TROUBLE SHOOTING GUIDE

FOR COLUMBIA EXCEL BATHS

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PROBLEM

CAUSE

SOLUTION

Blistering

Poor cleaning

Charge-up or change the soak and electrocleaner

Install an electro-caustic tank directly in front of the plating tank

Chromium contamination (over 15 ppm)

Treat bath with 0.25 lb. Sodium Bisulfite/1,000 gal. (30 g/1,000 liters) per 15 ppm of Chromium

Brightener overload

Treat bath with 10 gal/1,000 gal (10 liters/1,000 liters) Commercial Grade Sodium Hypochlorite 12% Active

Treat bath with 1 to 2 lbs. Potassium Permanganate/1,000 gal (0.12 to 0.24 kg/1,000 liters)

Add 0.1% - 0.2% EXCEL Purifier

Increase the bath temperature to 100° F (38° C)

Increase the zinc metal 0.5 to 1.0 opg (3.75 to 7.5 g/l)

Carbon treat with 1 to 2 lbs./1,000 gal (0.12 to 0.24 kg/1,000 liters)

Cut the bath by 10 - 50%

Copper brazed parts

Use Pickle Pal Inhibitor to eliminate build-up of copper in the pickle and to eliminate immersion copper on parts

| <u>PROBLEM</u> | <u>CAUSE</u> | <u>SOLUTION</u> |
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| <i>Blistering (Continued)</i> | | Go into the electrocleaner before plate |
| | | Install an electro-caustic tank directly in front of the plating tank |
| | Silicon or Aluminum killed steel parts | Skip electrocleaner and pickle parts in 10% Hydrochloric Acid so pockets of silicon or aluminum are not opened |
| | Deposit thickness >1.25 mil (30 microns) | Add 0.1 - 0.2% EXCEL Ductilizer |
| | Over baked parts | Bake 3 to 4 hours at 375° F (190° C) |
| Overall dullness & no response from brightener | Brightener overload | See above section for Brightener overload |
| | Impurities from caustic soda, zinc anodes and water | Add 0.1 - 0.2% EXCEL Purifier Add 0.1 - 0.2% EXCEL Conditioner |
| | Poor filtration | Use 1 to 5 micron filter |
| | Old bath containing years of soils, oils and break-down products | Treat bath with 10 gal/1,000 gal (10 liters/1,000 liters) Commercial Grade Sodium Hypochlorite 12% Active Treat bath with 1 to 2 lbs. Potassium Permanganate/1,000 gal (0.12 to 0.24 kg/1,000 liters) |
| | | Add 0.1 - 0.2% EXCEL Purifier |

| <u>PROBLEM</u> | <u>CAUSE</u> | <u>SOLUTION</u> |
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| <i>Overall dullness & no response from brightener (Continued)</i> | | Add 0.1 - 0.2% EXCEL Conditioner |
| | | Carbon treat with 1 to 2 lbs./1,000 gal (0.12 to 0.24 kg/1,000 liters) |
| | Organic contamination | Treat bath with 10 gal./1,000 gal (10 liters/1,000 liters) Commercial Grade Sodium Hypochlorite 12% Active |
| | | Treat bath with 1 to 2 lbs. Potassium Permanganate/1,000 gal (0.12 to 0.24 kg/1,000 liters) |
| | | Carbon treat with 1 to 2 lbs./1,000 gal (0.12 to 0.24 kg/1,000 liters) |
| HCD dullness, burns and bands that do not respond to brightener | Brightener overload | Treat bath with 10 gal/1,000 gal (10 liters/1,000 liters) Commercial Grade Sodium Hypochlorite 12% Active |
| | | Treat bath with 1 to 2 lbs. Potassium Permanganate/1,000 gal (0.12 to 0.24 kg/1,000 liters) |
| | | Add 0.1% - 0.2% EXCEL Purifier |
| | | Increase the bath temperature to 100° F (38° C) |
| | | Increase the zinc 0.5 to 1.0 opg (3.75 to 7.5 g/l) |
| | | Carbon treat with 1 to 2 lbs./1,000 gal (0.12 to 0.24 kg/1,000 liters) |
| | | Cut or dilute the bath by 10-50% |

| <u>PROBLEM</u> | <u>CAUSE</u> | <u>SOLUTION</u> |
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| Low bath efficiency/ Slow plating | Low zinc | Maintain a zinc level of 1.25 to 2.25 oz/gal (9.5 to 17g/l) for rack plating and 1.5 to 2.75 opg (11 to 20.5 g/l) for barrel plating |
| | Low bath temperature | Keep the bath temperature at 85° F (29° C) |
| | Brightener overload | Treat bath with 10 gal/1,000 gal (10 liters/1,000 liters) Commercial Grade Sodium Hypochlorite 12% Active Treat bath with 1 to 2 lbs. Potassium Permanganate/1,000 gal. (0.12 to 0.24 kg/1,000 liters) Carbon treat with 1 to 2 lbs./1,000 gal. (0.12 to 0.24 kg/1,000 liters) Cut the bath by 10 - 50% |
| Little or no coverage in LCD | High caustic soda | Keep caustic soda at 12 to 20 opg (90 to 150 g/l) |
| | High zinc | Maintain a zinc level of 1.25 to 2.25 oz/gal (9.5 to 17 g/l) for rack plating and 1.5 to 2.75 oz/gal (11 to 20.5 g/l) for barrel plating |
| | High bath temperature | Keep the bath temperature at 85° F (29° C) |
| | Brightener imbalance | Add 0.1 - 0.2% EXCEL Starter |
| | Poor cleaning | Charge-up or change the soak and electrocleaner Install an electro-caustic directly in front of the plating tank |

| <u>PROBLEM</u> | <u>CAUSE</u> | <u>SOLUTION</u> |
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| Excessive fuming | High bath temperature | Cool bath to 85° F (29° C) Use EXCEL Fume Suppressor |
| | High caustic soda | Keep caustic soda at 12 to 20 opg (90 to 150 g/l) Use EXCEL Fume Suppressor |
| | Plating at very high amperage | Lower the current Use EXCEL Fume Suppressor |
| Dark staining | High caustic soda | Keep caustic soda 12 to 20 opg (90 to 150 g/l) |
| | Organic contamination | Add 0.1 - 0.2% EXCEL Purifier Treat bath with 10 gal/1,000 gal. (10 liters/1,000 liters) Commercial Grade Sodium Hypochlorite 12% Active Treat bath with 1 to 2 lbs. Potassium Permanganate/1,000 gal. (0.12 to 0.24 kg/1,000 liters) Carbon treat with 1 to 2 lbs/1,000 gal. (0.12 to 0.24 kg./1,000 liters) |
| | Poor rinsing | Increase the flow rate on rinse tanks to 2 gallons (7.5 liters) per minute |
| Yellow zinc deposit after plating | Iron contamination | Add 0.1 - 0.2% EXCEL Conditioner Change pickle and add 1 - 2% Columbia Pickle Pal |

| <u>PROBLEM</u> | <u>CAUSE</u> | <u>SOLUTION</u> |
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| Polarized anodes (Black film) | Low caustic soda | Keep caustic at 12 to 20 opg (90 to 150 g/l) |
| | Excessive use of EXCEL Purifier | Reduce additions and never pour directly over anodes |
| Smutty or spotted deposit | Poor rinsing | Increase the flow rate on rinse tanks to 2 gallons (7.5 liters) per minute |
| | Impurities in the bath | Add 0.1 - 0.2% EXCEL Purifier Add 0.1 - 0.2% EXCEL Conditioner |
| | Poor cleaning | Charge-up or change the soak and electrocleaner Install an electro-caustic directly in front of the plating tank |
| LCD Band that intensifies with chromate | Impurities in the bath | Add 0.1 - 0.2% EXCEL Purifier |
| HCD gas streaks/striations | Low brightener | Add 0.25 - 1.0% EXCEL Starter |
| Roughness on parts | Polarized anodes | See above section on polarized anodes |
| | Low zinc anode area | Increase the anode area by 10-20% (the caustic soda level may have to be reduced) |
| | Poor filtration | Use a 1 to 5 micron filter |
| Dark in LCD after chromate | Metallic contamination (over 5 ppm of Copper, Lead or Cadmium) | Treat bath with 1 lb. zinc dust/1,000 gal of bath (0.12 kg/1,000 liters) to remove 10 ppm of metallic contaminant |

GLOSSARY OF TERMS

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| BATH EFFICIENCY | The speed at which zinc is electrodeposited on a part. This is based on a 100% theoretical rate of 1.219 grams per ampere hour. Alkaline non-cyanide plating baths typically operate at a 45 - 85% rate which electrodeposits 0.55 grams to 1.04 grams of zinc per ampere hour. |
| BRIGHTENER OVERLOAD | Concentration several times the recommended level. |
| BLISTERING | Electrodeposit lifts off the surface of the substrate in the form of bubbles. |
| CARBON | Activated carbon powder. |
| CAUSTIC SODA | Sodium Hydroxide |
| CHROMATE | A solution of hexavalent or trivalent chromium used to add additional corrosion protection to the surface of the plated part. |
| ELECTRO-CAUSTIC | Ambient temperature alkaline cleaner containing 13 to 20 opg (97.5 to 150 g/l) of caustic soda. Anodic current is used on the parts at 30 to 65 amps per square feet (3.25 to 7 amps per square decimeter). The electro-caustic removes scale and conditions the parts prior to electroplating. Parts can directly enter the plating tank without rinsing. The electro-caustic is usually changed once or twice a week. |
| ELECTROCLEANER | Alkaline cleaner used with anodic current on parts for surface agitation. Used at 140° to 190° F. (60° to 88° C.) after the soak cleaner. |
| G/L | Grams per liter. Multiply by 0.134 to convert to ounces per gallon (opg). |
| HCD | High current density. The highest current density on a part is generally on the edge of the part or the area of the part closest to the anode. In a rack plating bath it is at the bottom edge and ends of the rack. |
| HCD BURNING | Coarse, dark deposit in the high current density area. |
| HCD BAND | Dull electrodeposit in the high current density. |
| LATENT BLISTERING | Blistering that occurs several hours or days after plating. |
| LCD | Low current density. The lowest current density is generally in the recessed area of the part that is farthest from the anode. In a rack plating bath it is the top and middle area of the rack. |
| LCD BAND | Dull electrodeposit in the low current density area. |
| OPG | Ounces per gallon. Multiply by 7.5 to convert to grams per liter (g/l). |
| PICKLE | The acid dip tank after the alkaline cleaners that is used to dissolve rust and oxide scale. It is usually a 20 - 50% solution of Hydrochloric Acid. |
| POLARIZED ANODES | Anodes that have a non-conductive film on the surface. |

SOAK CLEANER

Alkaline cleaner used to remove oils prior to electrocleaning, pickling and electroplating. Soak cleaners are operated at 150° to 200° F (65° to 93° C).

