KOCOUR

ISO 9001 CERTIFIED

WARNING!!!

PLEASE BE ADVISED THAT KOCOUR 110 VOLT HULL CELLS ARE ONLY RATED FOR USE WITH 110 VOLT AC POWER SUPPLY. DAMAGE TO THE HULL CELL AND/OR FIRE CAN OCCUR!

220 VOLT HULL CELLS ARE AVAILABLE!

Operating Instructions for TCCG & TCACG
267 & 1000 ML Heated & Non-Heated Hull Cells

The heated hull cell provides a simple, accurate method for making plating tests on any baths, such as bright nickel, high speed copper, tin, etc. which require an elevated operating temperature. The hull cell is equipped with a thermostatically controlled circuit guard heater which will maintain the bath temperature to a maximum of 150°F. **To avoid damage to the hull cell do not exceed 150°F**. The standard hull cell is not equipped with a heating element and operates at room temperature without the need to preheat the solution. Hexavalent chromium plating solutions cause the Lucite hull cells to craze and eventually leak. **Do not use Lucite cells with Hexavalent Chromium solution**. A PTFE hull cell is recommended for use with hexavalent chromium solutions.

Operating Procedure:

1. Analyze all plating solution components (e.g., metals chlorides, boric acid, specific gravity, pH etc.) and make adjustments as required.

Note: If preheating the solution is not required, withdraw a sample to be tested and transfer directly into the hull cell. Fill to the bottom of the red printed triangle. Then proceed to Step #5.

WARNING: DO NOT LEAVE UNATTENDED OR OPERATE WITHOUT LIQUID

2. Withdraw approximately 1500 ml of solution to be tested and transfer into a 2000 ml beaker. Place the beaker on a heat source and then preheat the solution to the proper operating temperature. (Periodically check the temperature with the thermometer).

3. After reaching the desired temperature, remove beaker from heat source and fill the hull cell with the preheated solution to the bottom of the red printed triangle in either the 267 ml or 1000 ml hull cell.

4. Plug the heater into the short jumper connector cord and slide the boot cover over the connection. Plug in the power cord and turn the control knob fully clockwise, the red indicator light should now be on. When the desired temperature is reached slowly turn the control knob counterclockwise until the light goes off. This will turn off the heater and maintain the preheated solution temperature within ±5°F of the desired operating range. (Periodically check the temperature with the thermometer).

5. If agitation is required, use either the air or mechanical system. Use the system that duplicates your production process.

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6. Using the table below as a guide, select the proper anode and connect it to the red lead (+) from the rectifier. Again, using the table, select the proper cathode, clean according to the instructions on the package, then connect it to the black lead (-) from rectifier.

   Note: Kocour rectifier model 5D is recommended for the 267 ml hull cell and the model 15D is recommended for the 1000 ml hull cell. Do not use rectifiers with greater than 3% ripple.

Plating Bath	Agitation	Anode	Cathode	Amperage		Plating Time (min)
				267 mL	1000 mL	
Acid Copper	Air	Phos. Copper	Copper/Brass	3	5	5
Pyro Copper	Air	Copper	Copper/Brass	2	3	5
Cyanide Copper		Copper	Copper/Brass/Steel	2	3	5
Cadmium Barrel		Cadmium	Steel	2	3	5
Cadmium Rack		Cadmium	Steel	1	3	5
Acid Zinc Rack	Air or Mech.	Zinc	Steel	3	3	5
Acid Zinc Barrel		Zinc	Steel	1	3	5
Alkaline Zinc Rack		Zinc	Steel	3	3	5
Alkaline Zinc Barrel		Zinc	Steel	1	3	5
Cyanide Zinc		Zinc	Steel	2	3	5
Hexavalent Chromium		Lead	Steel/Copper	5	5	2
Trivalent Chromium		Pt. Titanium	Copper/Brass/Steel	10	10	1
Nickel (All)	Air or Mech.	Nickel	Copper/Brass/Steel	2	3	5
Acid Tin Rack	Mech.	Tin	Copper/Brass/Steel	2	5	5
Acid Tin Barrel		Tin	Copper/Brass/Steel	1	-	5
Silver	Mech.	Silver	Copper/Brass/Steel	0.75	-	5
Gold		Pt. Titanium	Copper/Nickel plated Brass	0.25	-	1
Brass		Brass	Steel	1	-	5
Lead		Lead	Copper/Brass/Steel	2	3	5

7. Plate the cathode for the specific time and amperage recommended by the plating process supplier or use the general plating times and amperages listed above.

8. After plating, remove the cathode and rinse thoroughly with water, then dry. Use the plastic hull cell scale (or Figure 2) to determine the current density at variously points along the plated panel.

9. If any additions are required, calculate the amount from the chart below:

   2 g/267mL Hull Cell = 1 oz/gal = 7.5 g/L
   2 mL/267mL Hull Cell = 0.96 fl oz/gal = 7.5 mL/L
   7.5 g/1000mL Hull Cell = 1 oz/gal = 7.5 g/L
   7.5 mL/1000mL Hull Cell = 1fl oz/gal = 7.5 mL/L

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10. After testing is complete, unplug the heater and allow the heating element to cool before removing the solution.

Maintenance:

1. Clean hull cell thoroughly with water when testing various solutions or after additions have been made. Residues left in the cell can affect the results. **ELECTRICAL HAZARD**. **Unplug power cord before cleaning.**

2. It is strongly recommended to use different hull cells for different solutions. This reduces the risk of contaminating the plating solution.

3. The hull cell is not waterproof. To avoid damaging the heating element and thermostat, **DO NOT IMMERSE IN WATER.**

Electrolytic Purification of Baths:

It is frequently necessary to electrolyze plating baths to remove metallic impurities. The manner in which this is accomplished in the hull cell is to electrolyze the bath sample at a low current density with the anode and cathode parallel, i.e., the cathode plate adjacent to the longest side of the hull cell, with the anode opposite. Agitation may be used if desired. The amount of electrolysis required to give a good test plate in the regular manner can then be translated to the plating tank.

As an example, 5 amperes per ft^2 on the cathode (3.938" long by 2" deep (immersed)), calculate as:

$$\frac{3.938 \text{ in x } 2 \text{ in x } 5 \text{ amp/ft}^2}{144 \text{ in}^2/\text{ft}^2} = 0.27 \text{ ampere through the hull cell}$$

If 20 minutes electrolysis removes the impurities satisfactorily, the total electrolysis is 20 min x 0.27 amp = 5.4 amp-minutes. Therefore, since 3,785 ml equals 1 gallon, 5.4 amp-minutes for 267 ml calculates as follows:

$$\frac{3.785 \text{ ml}}{267 \text{ ml}} \text{ x } \frac{5.4 \text{ amp} - \text{min}}{60 \text{ min/hr}} = 1.27 \text{ amp} - \text{hr per gal of plating solution}$$

Proprietary Process:

When using hull cell control on proprietary plating baths, it is usually advisable to contact the manufacturer of the particular process for their recommendations. These recommendations may suggest a change in the amperage or time of the hull cell test in order to better illustrate the bath parameters to be controlled. Some processes also use special addition agents, which have a pronounced effect on appearance of the hull cell panel.

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Figure 1: Methods of Testing

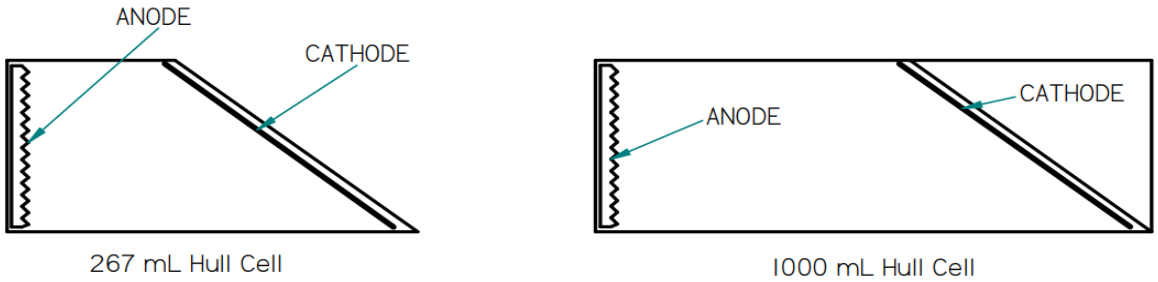
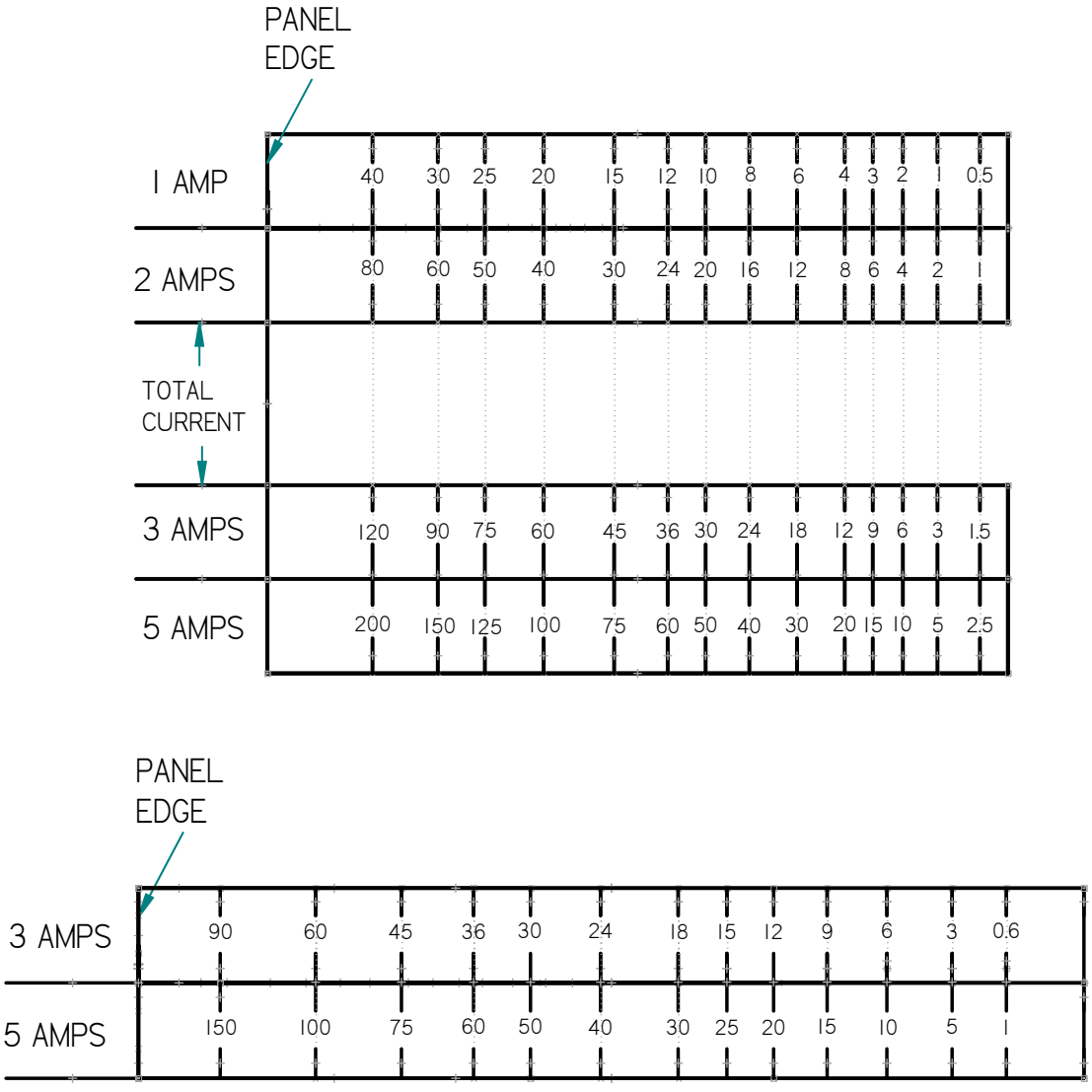


Figure 2: Current Density in Amps per Square Foot



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