RUTHENIUM RU-100

BLACK RUTHENIUM PLATING PROCESS

INTRODUCTION

Ruthenium, a member of the platinum group of metals exhibits properties in the electrodeposited from which are similar to Rhodium. Hardness values obtained, 800-900 DPN, are of the same order as those obtained for Rhodium. Ruthenium has excellent resistance to attack by many corrosive agents at moderate temperatures and by aqua regia, sulfuric, hydrochloric, hydrofluoric and phosphoric acid at 100℃.

The Auromex Back Ruthenium Plating Process is designed to satisfy jewellery and decorative finishing specifications. Deposits obtained possess a bright black colour and is applicable for the finishing of watches, spectacle frames and order jewellery items with excellent corrosion resistance.

PROCESS CHARACTERISTICS

* Uniform, bright black deposits
* Tarnish and corrosion resistance
* Hard deposit
* Ease of control within a wide temperature and current density range.
* Relatively low cost

EQUIPMENT

For a small installation, heat resistant glass vessels are quite satisfactory but the use of water jackets is recommended if only to avoid loss of the electrolyte in the event of accidental breakage. For larger installations, polypropylene and unplasticized PVC lined glass fibre reinforced plastic tanks are suitable. Rubber lined tanks are not recommended.
Temperature regulation is essential, therefore, thermostatically controlled immersion heaters are recommended capable of maintaining the temperature at ±2℃.
The electrical circuit should incorporate fine controls to adjust current and voltage. It is strongly recommended that an ampere minute meter be included in order to provide a direct record of metal plated from the solution. The voltage required is in the range of 1.5 to 5 volts, this being conveniently supplied by a rectifier capable of producing a DC output with acceptable ripple.

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ANODES

The process is operated using platinized anodes. The anode to cathode ratio should be within the range 2:1 to 5:1.

PRE-TREATMENT

Due to the nature of the electrolyte it is recommended that a gold undercoat of approximately 2-4 microinches be applied prior to ruthenium plating. The pre-treatment of the base metals prior to plating will, therefore, be as recommended for gold plating.

OPERATING CONDITIONS

		Range	Optimum
Ruthenium Content	g/l	4.0-6.0	5.0
Temperature	℃	60-70	65.0
pH		1.8-2.1	2.0
Current Density	A/dm²	0.5-1.5	1.0
Agitation		Moderate to Vigorous	
Anode to Cathode Ratio		3:1-5:1	4:1
Cathode Efficiency		15-20%	

MAKE UP PROCEDURES

The Auromex Black Ruthenium RU-100 is supplied in unit packing, each unit is 1 litre in volume contains 5 grammes Ruthenium and ready to use.

SOLUTION MAINTAUNENCE

Replenishment :
Since the ruthenium plating process employs insoluble anodes, metal plated form the solution must be replaced by the addition of a ruthenium compound ; this can conveniently be added in form of a liquid replenisher which contains 20 g/l of ruthenium. The Ruthenium content of the solution should be maintained between 4.0 and 6.0 g/l. For every ampere-hour, replenish with 7 mls of Ruthenium Replenisher Solution.

For colouring conduction replenishment, every replenishment of Ruthenium, add 10 mls of colouring solution per 1 gramme Ruthenium metal.

pH Control :
The pH value of Auromex Black Ruthenium RU-100 process should be maintained between 1.8 and 2.1. As the solution is used, there is a tendency for the pH to raise. To reduce the pH, additions of sulfuric Acid (10% v/v) should be made. If it becomes necessary to raise the pH of the solution, add aqueous Ammonia (50% v/v).