



Version: 26 April 2017



# MIRALLOY®

## COPPER-TIN-(ZINC-)ELECTROLYTES



### Barrel and Rack Plating Electrolyte for Functional Applications

MIRALLOY® has been offering nickel-free plating for the connector, clothing and fashion jewellery industries for more than 30 years. You can benefit from our experience and the ongoing development of our product range. The trademark MIRALLOY® comes from the English words “mirror” and “alloy”. It refers to the Bronze Age, when copper and tin were used to make mirrored alloys.

MIRALLOY® denotes electroplating processes for the deposition of alloy coatings of copper and tin or of copper, tin and zinc. Depending on the electrolyte used, white or yellow layers can be deposited. You can choose electrolytes for rack and barrel plating from the wide range of MIRALLOY® processes available.

Alloy Components Example		
Coating	white	yellow
Copper	55 %	85 %
Tin	30 %	10 %
Zinc	15 %	5 %



### Advantages

- White layer, similar to silver
- Diamagnetic
- High reflectivity
- Good wear and corrosion protection
- Abrasion- and tarnish-resistant
- Can be combined with precious metals
- Good sliding properties
- High hardness
- Solderable and weldable
- Very good metal distribution
- Low porosity
- Free from heavy metals like CR, Pb, Co, Th etc.
- Low intermodulation
- Platings are RoHS-compliant

### Applications

- High frequency connectors
- Battery covers
- Hydraulic parts
- Contact pins
- Cooling coils
- Bearing shells
- Conducting elements

# MIRALLOY®

## COPPER-TIN-(ZINC)-ELECTROLYTES



### TECHNICAL SPECIFICATIONS MIRALLOY® 2844

Electrolyte characteristics	
Electrolyte type	Alkaline-cyanide
Metal content	8.5 g/l Cu 34 g/l Sn 0.75 g/l Zn
pH value	> 13
Operating temperature	60 (58 - 62) °C
Current density range	0.5 (0.3 - 1) A/dm <sup>2</sup>
Plating speed	0.12 µm/min at 0.5 A/dm <sup>2</sup>
Anode material	MMO (type PLATINODE® 167, graphite)
Electrical conductivity	>50 m <sup>∞</sup> (Ω*mm <sup>2</sup> ) <sup>-1</sup>

Coating characteristics	
Coating	Copper-tin-zinc
Alloy composition	55 wt. % Cu 30 wt. % Sn 15 wt. % Zn
Colour of deposit	white
Hardness of deposit HV 0.015 (Vickers) approx. values	550 HV
Max. coating thickness	5 µm

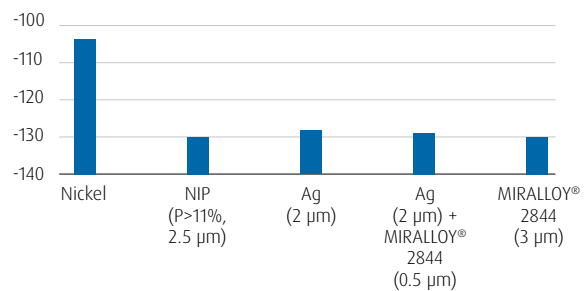
MIRALLOY® coatings are characterized by an excellent thickness distribution even in the case of parts with complex shapes. The coating hardnesses of MIRALLOY® layers are 400 HV 0.1 (MIRALLOY® yellow) and 550 HV 0.05 (MIRALLOY® white). The layers are abrasion-resistant. For this reason yellow MIRALLOY® layers are particularly suitable for coating bearing shells or pistons. Furthermore, the layers are diamagnetic. Therefore connectors for high-frequency technology provided with MIRALLOY® coatings reach very low intermodulation values in the mobile radio frequency range.

Intermodulation at 935/960 Mhz (GSM)

$$f_1 = 935 \text{ MHz at } 43 \text{ dBm (20 W)} \rightarrow f_{IM3} = 2 \times f_1 - f_2 = 910 \text{ MHz}$$

$$f_2 = 960 \text{ MHz at } 43 \text{ dBm (20 W)}$$

IM3 in dBm (Average)



Test piece: Inner conductor sleeve of phosphor bronze  
Measurements carried out by:  
Rosenberger Hochfrequenztechnik GmbH & Co. Fridolfing, Tittmoning  
Coating: Umicore Galvanotechnik GmbH, Schwaebisch Gmuend

Umicore Galvanotechnik GmbH  
Klarenbergstrasse 53-79  
73525 Schwaebisch Gmuend (Germany)

Technical Support: Phone +49 7171 607-223  
Sales Department: Phone +49 7171 607-204

[www.ep.UMICORE.com](http://www.ep.UMICORE.com)

**umicore**  
Electroplating