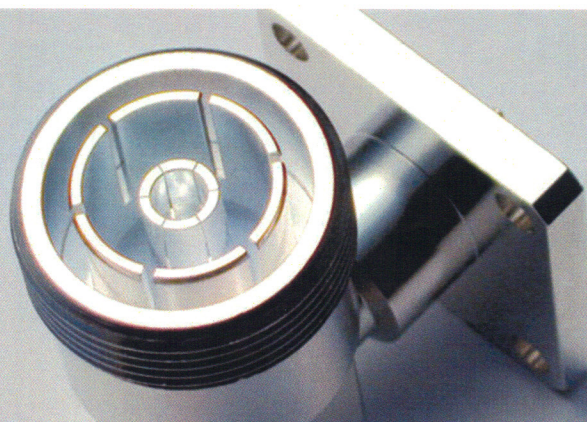




MIRALLOY® Copper-Tin-(Zinc-) Electrolytes



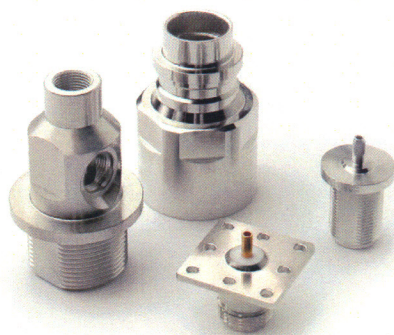
Your advantages:

- + Coating colour: white, similar to silver
- + Diamagnetic
- + Good covering power
- + 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

Barrel and rack plating electrolyte for functional applications

More than 30 years of MIRALLOY®, the nickel-free alternative for coatings in the connector, clothing and costume jewellery industries. You can take advantage of our experience as well as continuous improvements to our product line. The trademark MIRALLOY® comes from the English words "mirror" and "alloy". It refers to the Bronze Age when mirror-like coatings were produced from copper and tin.

MIRALLOY® denotes electroplating processes for the deposition of alloy coatings of copper and tin or of copper, tin and zinc. The basic composition of the electrolytes is alkaline cyanide. Depending on the type of electrolyte, either white or yellow layers can be deposited. White coatings contain about 55 % of copper and 45 % of tin, or 55 % of copper, 30 % of tin and 15 % of zinc. Yellow coatings as alloy components on an average contain 80 % of copper, 17.5 % of tin and 2.5 % of zinc, or 85 % of copper, 10 % of tin and 5 % of zinc, or 85 % of copper and 15 % of tin. From the wide range of MIRALLOY® processes, electrolytes for rack or for barrel operation can be selected.



Miralloy® electrolytes are worldwide used for coating nickel-free RF-connectors of leading manufacturers.

Applications

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

Technical specification e. g. MIRALLOY® 2844

Electrolyte characteristics MIRALLOY® 2844

Electrolyte type	Alkaline-cyanide
Metal content	8.5 g/l Cu 34 g/l Sn 0.75 g/l Zn KCN 50 g/l KOH 30 g/l
pH value	13
Operating temperature	60 (58 - 62) °C
Current density range	0.5 (0.3 - 1) A/dm ²
Plating speed (approx.)	0.12 µm/min at 0.5 A/dm ²
Anode material	MMO (type PLATINODE® 167, graphite)
Electrical conductivity	>50 m*(Ω*mm ²) ⁻¹

Coating characteristics MIRALLOY® 2844

Coating	Copper-tin-zinc
Alloy composition	50 - 55 wt. % Cu 30 - 35 wt. % Sn 13 - 17 wt. % Zn
Colour of deposit	white
Hardness of deposit	550 HV
HV 0.05 (Vickers) approx. values	
Max. coating thickness	5 µm

MIRALLOY® coatings are characterized by an excellent thickness distribution even in the case of parts with complex shapes.

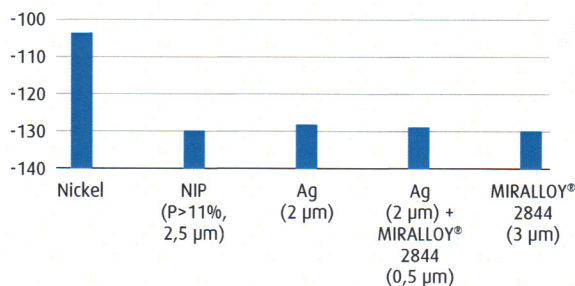
The coating hardnesses of MIRALLOY® layers are 400 HV 0.1 (MIRALLOY® yellow) and 550 HV 0.05 (MIRALLOY® white). The layers are abrasion-resistant. For this reason yellow MIRALLOY® layers are particularly suitable for coating bearing shells or pistons. Furthermore, the layers are diamagnetic. Therefore 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)

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

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

IM3 in dBm (average value)



Test piece: Inner conductor sleeve of phosphor bronze

Measurements carried out by:

Rosenberger Hochfrequenztechnik GmbH & Co. Fridolfing, Tittmoning
Coating: Umicore Galvanotechnik GmbH, Schwäbisch Gmünd

