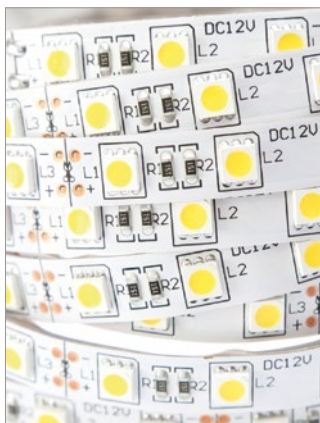




Version: 26 April 2017

# UMICORE SEALING 691 EL



## Protection for Technical Precious Metal Surfaces

Umicore Sealing 691 EL is a perfect all-rounder to protect technical precious metal surfaces including electrical contacts. The coefficient of friction will be reduced enormously, the sliding performance of connectors will be improved, and even under strong mechanical stress, the functional layer is protected for much longer. In addition, Umicore Sealing 691 EL prevents tarnishing and discolouring. Silver surfaces treated with Umicore Sealing 691 EL as a final layer produce outstanding results in  $K_2S$  tests.

There are no disadvantages in using Umicore Sealing 691 EL: Electrical characteristics are unchanged, and solderability and contact resistance are unaffected. In addition, Umicore Sealing 691 EL is easy to use: either in a simple dipping process or by electrolytic application for very short contact times in continuous lines. Finally, Umicore Sealing 691 EL is free of chromium and doesn't contain environmentally harmful substances like CFCs, CHCs and HCs.



## Advantages

- Especially developed for technical components like electrical contacts
- Very short treatment times, making it suitable for continuous lines
- Long-lasting protection against tarnishing and discolouration
- Easy to use, both electrolytic and dipping process
- Free of components like CFCs, CHCs, HCs and chrome
- No influence on colour or brightness of the finished coating
- Increased sliding performance, reduced insertion force
- Provides high reliability in  $K_2S$  test, therefore a perfect protection for silver layers

## Applications

- Connectors
- Lead frames
- Smartcards

# UMICORE SEALING 691 EL



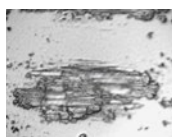
## TECHNICAL SPECIFICATIONS

Electrolyte characteristics	
Electrolyte type	Aqueous, metalfree passivation
pH value	Weakly acidic to neutral
Operating temperature	55 (48 - 52) °C
Immersion time Rack/barrel Reel-to-reel	30 (10 - 120) s 5 (2 - 10) s
Anode material	MMO (type PLATINODE® 187 SO)

Coating characteristics	
Colour	No influence
Brightness	No influence
Coefficient of friction	Reduced
Sliding properties	Improved
Solderability	No influence
Contact resistance	< 10 mΩ
Bondability	Protected parts remain bondable

### Umicore Sealing 691 Reduces Friction Forde Friction Marks After 500 Friction Cycles

COF (coefficient of friction)



Pure silver without sealing

COF: 0.76



Pure silver with Umicore Sealing 691

COF: 0.04

### Excellent Silver Passivation

K<sub>2</sub>S Test 2% and 5 % Until Discoloration Appears

K<sub>2</sub>S 2% 3 min.



without Sealing

K<sub>2</sub>S 2% >10 min.



10 sec. / 5 V electrolytic version

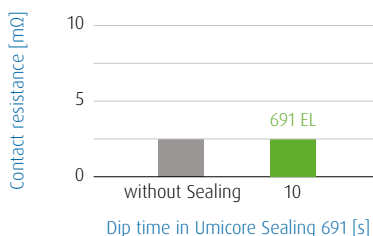
K<sub>2</sub>S 5% 5 min.



10 sec. / 5 V electrolytic version

### Stable Contact Resistance

Dip Time vs Contact Resistance at Contact Normal Force 50 cN on silver



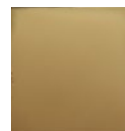
### Excellent Resistance in Salt Spray Test 72h NSS Test (Ni/Au Plated)

0.05 μm Au without Sealing



vs.

0.05 μm Au with Sealing



0.4 μm Au without Sealing



vs.

0.4 μm Au with Sealing



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Electroplating

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