

NSS Performance Test UMICORE Antitarnish 616 PLUS in combination with Auruna 5400 Hard Gold Electrolyte

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throughout North America
exclusively through



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616 PLUS

- Monolayer
- Deposit layer

Requirements

- Coating of an organic protecting film within 2 – 10 seconds.
- Well suited for reel-to-reel plating lines.
- Test criteria: Neutral Salt spray test (NSST) over 72 hours to DIN EN ISO 9227 NSS, by daily monitoring.
- Test equipment: Modell 608, Fa. Erichsen, test volume: 1000 Liter
- NSS - Tests were conducted at the Institute for Precious Metals (FEM).

Process

Antitarnish 616 Plus



Type

aqueous, metal-free process

Bath makeup

Umicore Antitarnish 616
Initial Concentrate

10 ml/l (Storage stability min. 3 years)

Umicore Antitarnish 616
Makeup Salt PLUS

2.5 g/l (Storage stability: unlimited)

Sodium Hydroxide (chem. pure)

0.2 g/l (for pH adjustment)

Bath replenishment

Umicore Antitarnish 616

Replenishment after analysis.

Initial Concentrate

To increase the concentration of active ingredient, use Umicore Antitarnish 616 Initial Concentrate for replenishment.

Operating conditions for sampling of specimen

Antitarnish 10 ml/l Initial concentrate
616 Plus: 2.5 g/l Make-up salt PLUS

NaOH (chem. pure.): 0.2 g/l

pH: 3.7

Conductivity: 460 μ S

Temperature: 55 °C

Exposition time: 2, 5, 10 seconds

Voltage: 4,5 volt

Current density: <0,1 ASD

Anodes: MMO 187 SO

Process sequence for sampling

Process sequence

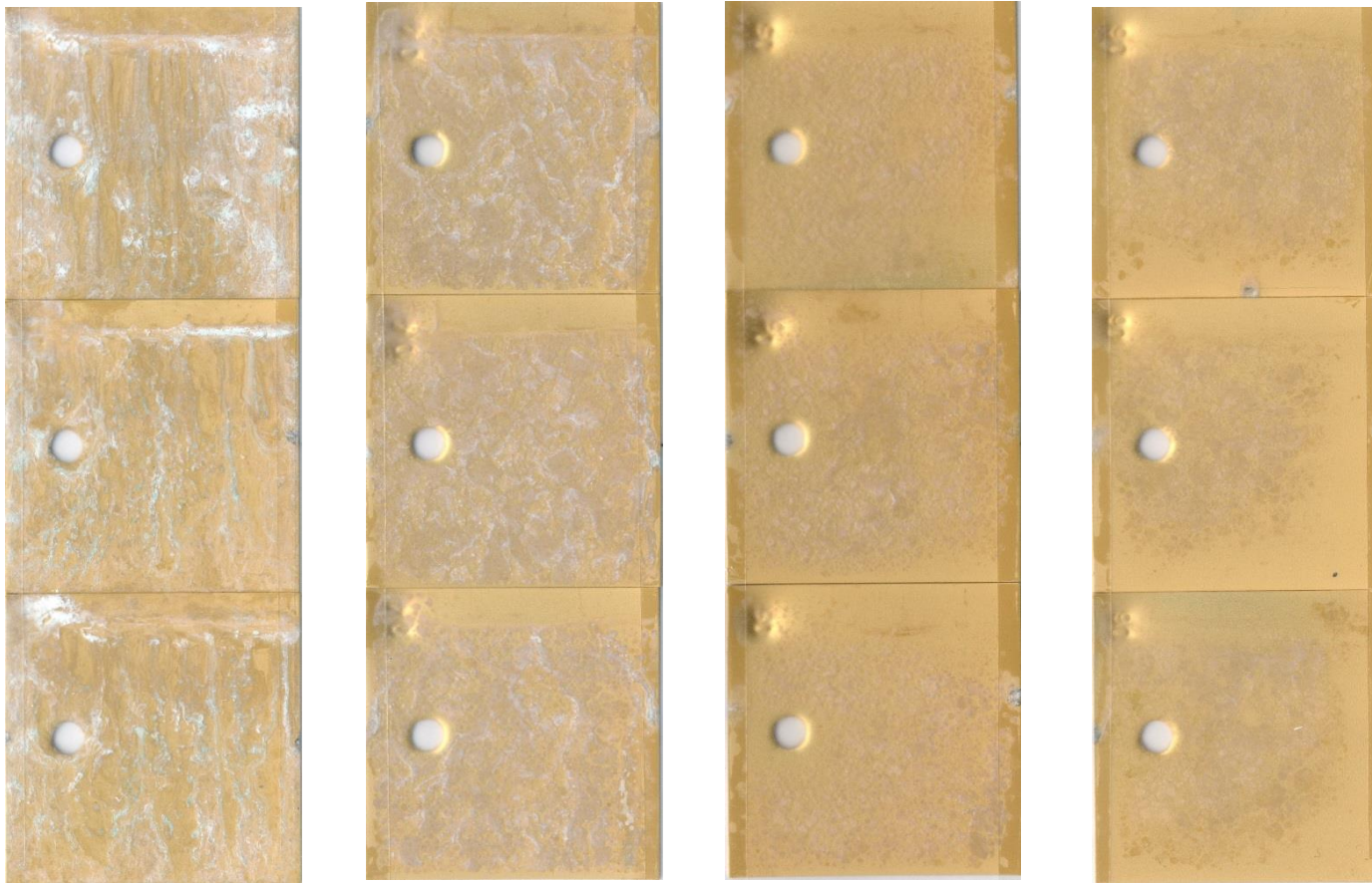
1. Niruna 808, Sulfamate nickel with wetting agent CR, 3 – 5 μm , 5 ASD
2. Rinsing
3. Auruna 5400, (0,05 – 0,4 – 0,8 μm), 1 ASD
4. Rinsing
5. Activation(10% H_2SO_4)
6. Rinsing
7. Antitarnish 616 Plus (2, 5, 10 seconds; 4,5 Volt; 55° C)
8. Rinsing = monolayer / no rinsing = Deposit layer
9. Drying, 70°C, 10 min.

0,05 μm Hard Gold

Comparison of
Mono & Deposit layer of
Antitarnish 616 Plus

0,05 μm Au with Antitarnish 616 Plus on top (Mono)

55°C; 4,5 Volt, rinsed after coating (monolayer), 72h NSS test



Reference -
no protection

2s 616 plus

5s 616 plus

10s 616 plus

0,05 μm Au with Antitarnish 616 Plus (Deposit)

55°C; 4,5 Volt, not rinsed after coating (deposit layer), 72h NSS test



Reference -
no protection

2s 616 plus

5s 616 plus

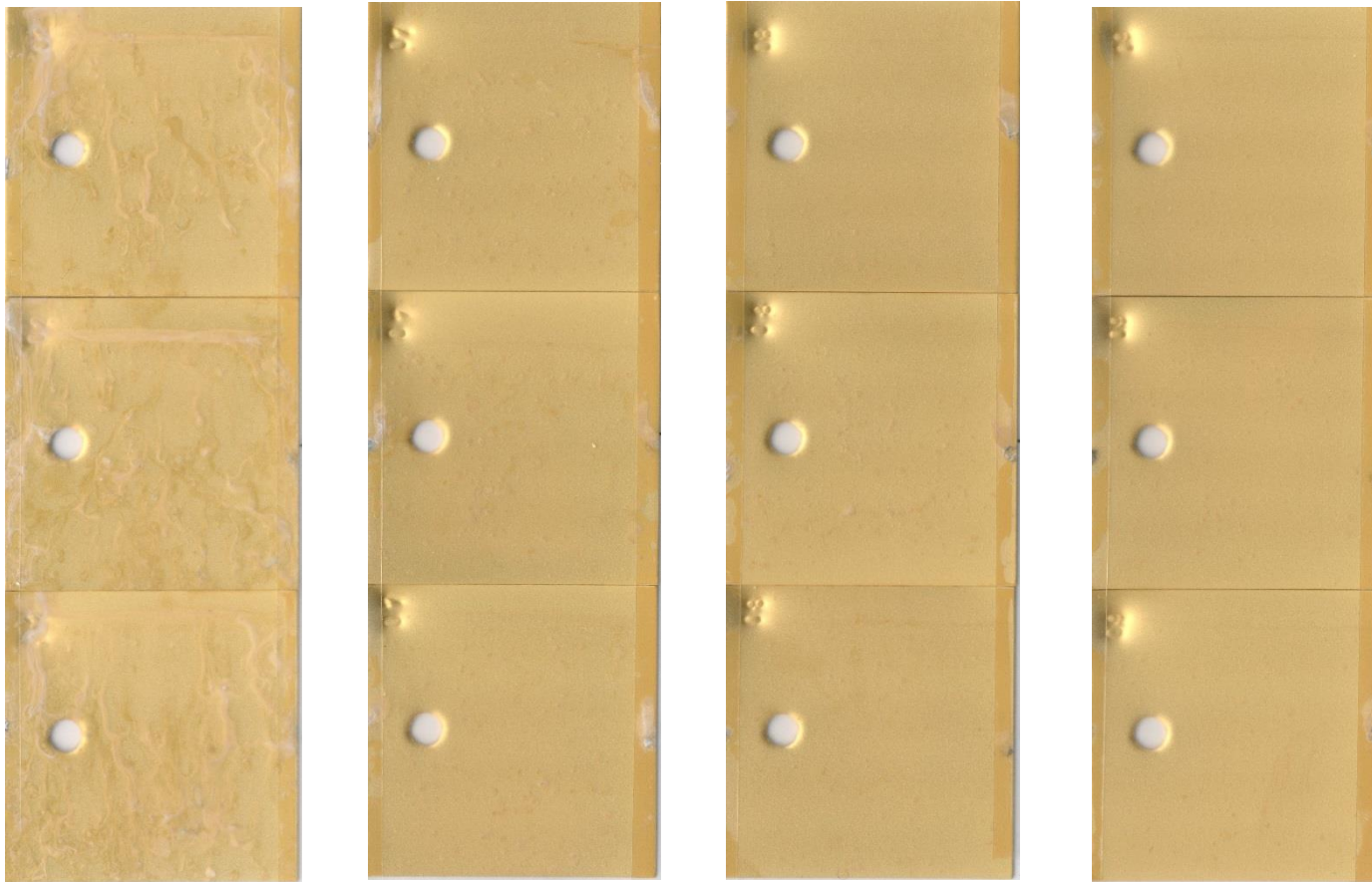
10s 616 plus

0,4 μm Hard Gold

Comparison of
Mono & Deposit layer of
Antitarnish 616 Plus

0,4 μm Au with Antitarnish 616 Plus on top (Mono)

55°C; 4,5 Volt, rinsed after coating (monolayer), 72h NSS test



Reference –
no protection

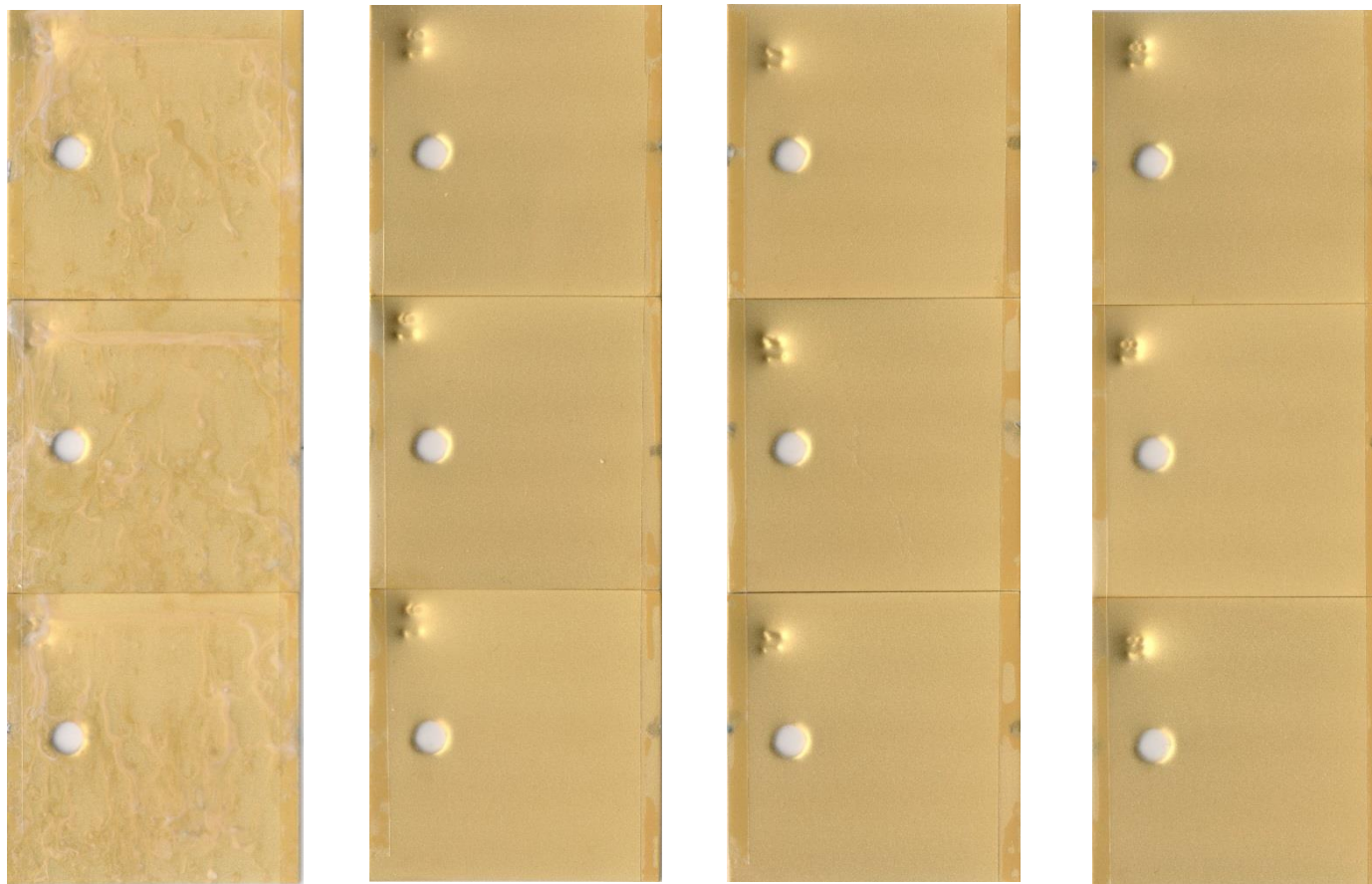
2s 616 plus

5s 616 plus

10s 616 plus

0,4 μm Au with Antitarnish 616 Plus (Deposit)

55°C; 4,5 Volt, not rinsed after coating (depot layer), 72h NSS test



Reference –
no protection

2s 616 plus

5s 616 plus

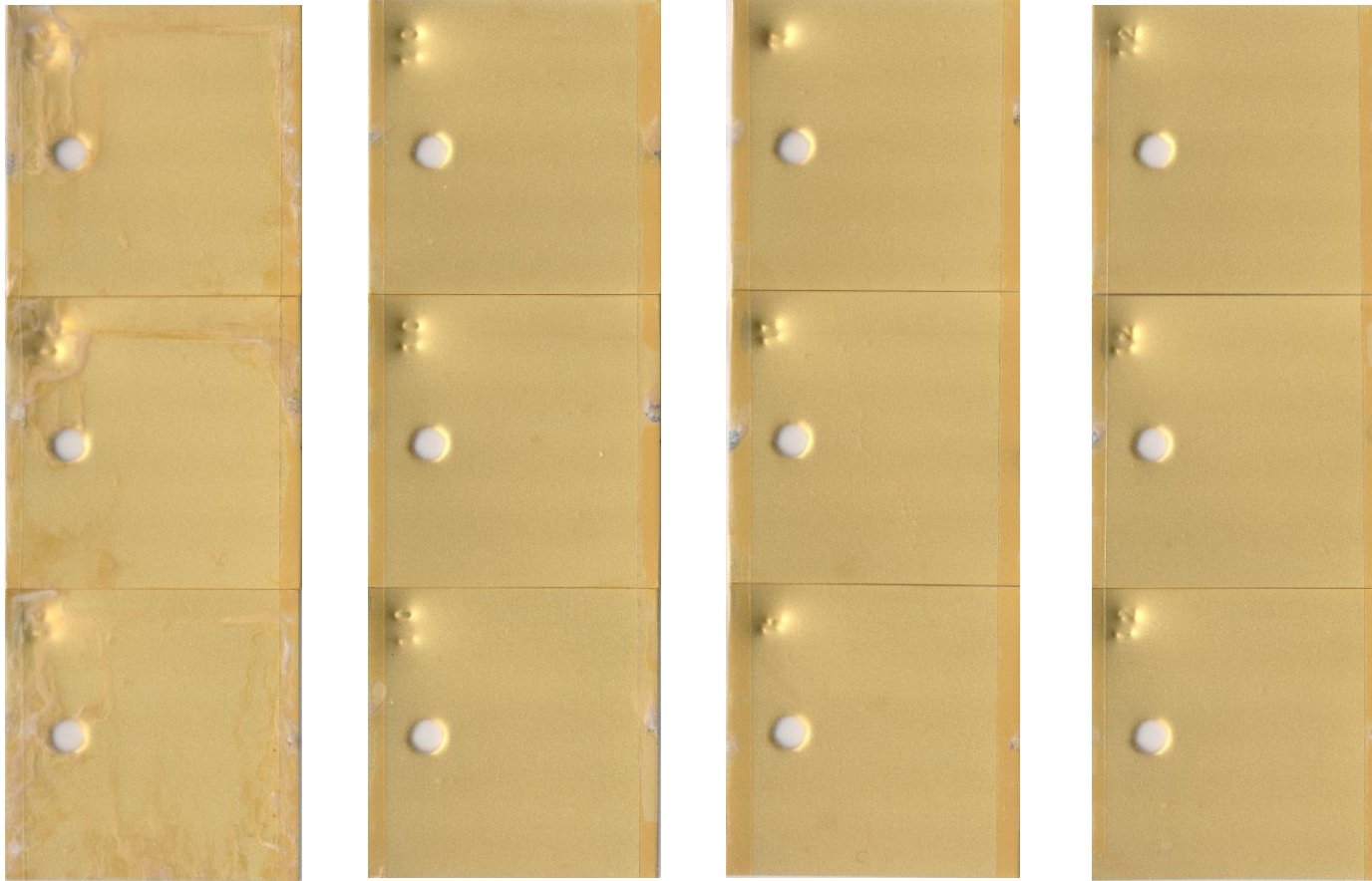
10s 616 plus

0,8 μm Hard Gold

Comparison of
Mono & Deposit layer of
Antitarnish 616 Plus

0,8 μm Au with Antitarnish 616 Plus (Mono)

55°C; 4,5 Volt, rinsed after coating (monolayer), 72h NSS test



Reference –
no protection

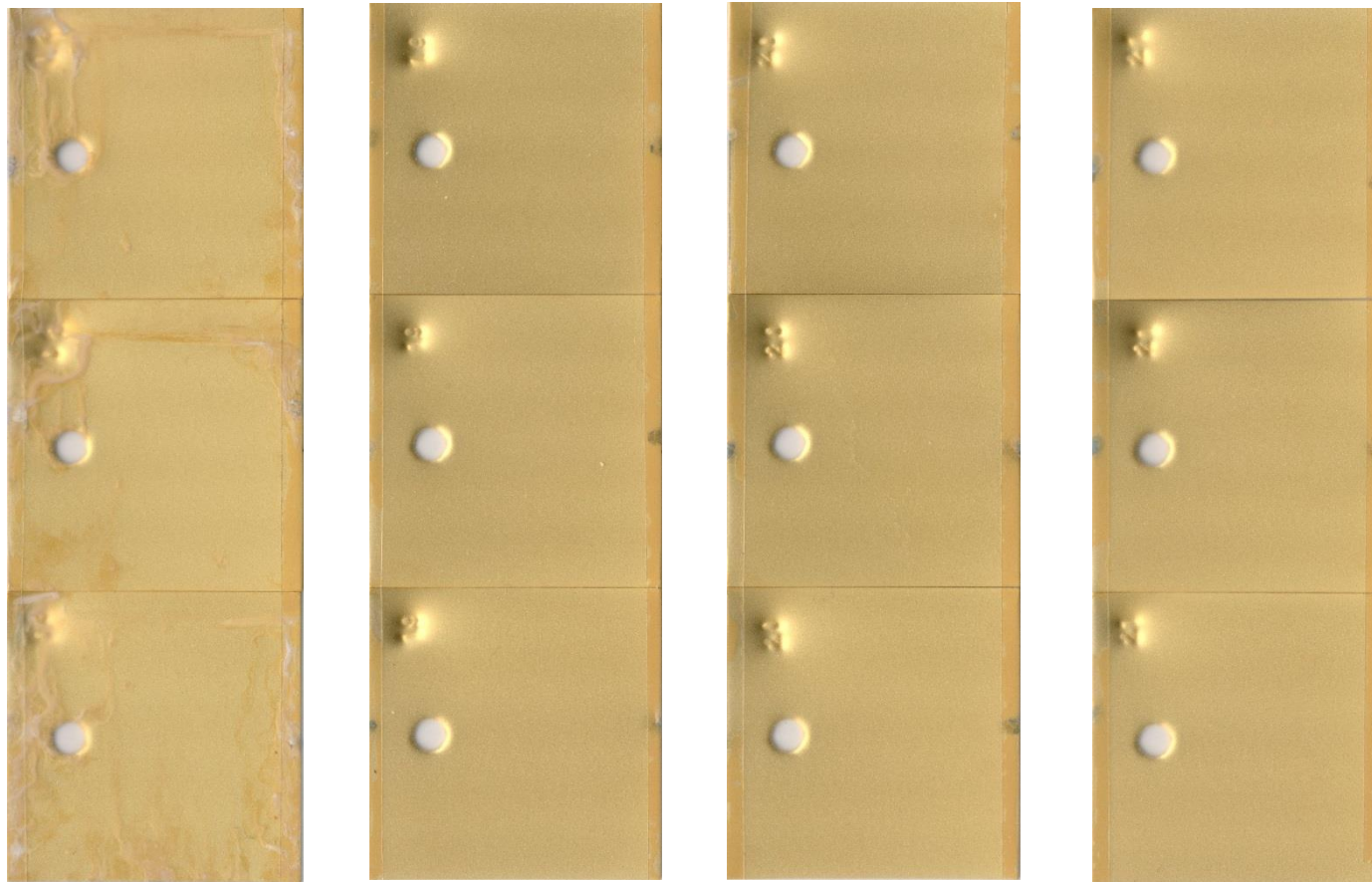
2s 616 plus

5s 616 plus

10s 616 plus

0,8 μm Au with Antitarnish 616 Plus (Deposit)

55°C; 4,5 Volt, not rinsed after coating (deposit layer), 72h NSS test



Reference –
no protection

2s 616 plus

5s 616 plus

10s 616 plus

Result and Conclusions of performance test
of Antitarnish 616 Plus
in combination with Hard Gold

616 Plus in combination with Hard Gold

Antitarnish 616 plus

Monolayer (with rinsing step after Antitarnish 616 plus coating step)

- NSS test at 0,05 μm Au thickness – 616+ monolayer, protection performance is limited.
- Up from $\geq 0,4$ μm Au thickness, no corrosion products could be observed.

Deposit layer (no rinsing after Antitarnish 616 plus coating step)

- No corrosion products could be observed, independent from exposition time (2, 5 & 10 s) and thickness of gold layer (0.05, 0.4. & 0.8 μm).

Conclusion

- Reduced Hard Gold layers fail the NSS test.
- In combination with Umicore Antitarnish products, reduced Hard Gold layers can pass NSS test.

Thank you for your attention!

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