

Techniphos 615

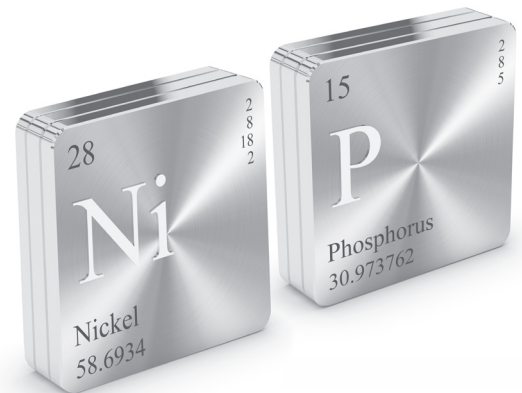
Electrolytic Nickel/Phosphorous Plating



High Speed, High Phosphorous (>10% P) Electrolytic Nickel Alloy Process

Techniphos 615 is an electrolytic nickel/phosphorous (NiP) plating process that produces >10 % phosphorous over a wide current density range. Unlike typical NiP processes that exhibit low phos content at high current densities, Techniphos 615 represents a truly unique formulation that outperforms anything currently available.

Techniphos 615 is recommended for all applications requiring an electrolytic NiP alloy with greater than 10% P. One of the more significant values for Techniphos 615 is its demand in the growing 5G applications markets by meeting the requirements for a lower degree of magnetism.

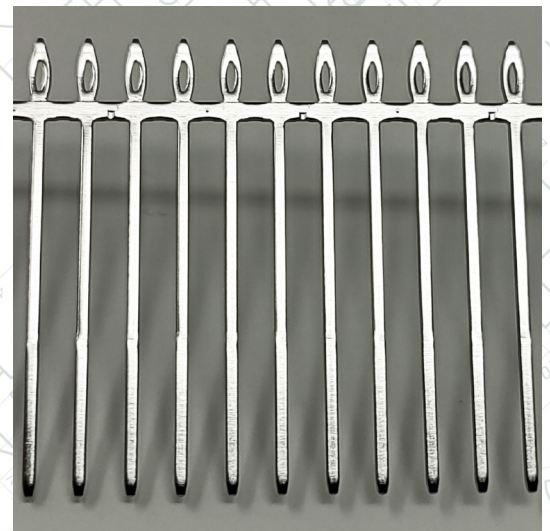


Features

- Consistently deposits greater than 10% phosphorous
- Capable of high speed deposition with high phosphorus content
- Deposits are highly corrosion resistant
- Non-magnetic deposit - suitable for high frequency/5G applications
- Wider CD range/higher throughput
- Completely boron-free, no crystallization
- Easily analyzable components

Benefits

- Improves corrosion resistance compared to pure nickel barrier layers
- Can be used in reel-to-reel, barrel, and rack plating applications
- Superior performance in high speed applications
- Suitable for single or duplex applications
- Potential reduction in precious metal thickness
- Can be used in standard nickel cells



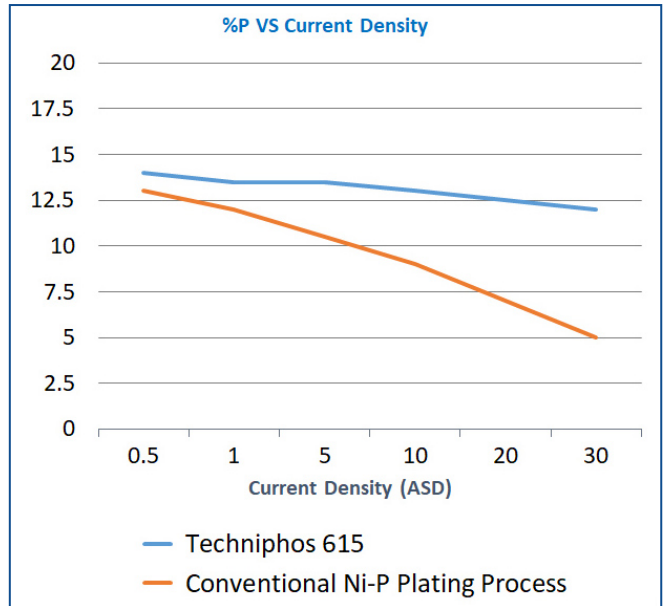
Techniphos 615

Electrolytic Nickel/Phosphorus Plating

Operating Parameters

Note: Optimum values below are dependent on application.

| Parameters | Range |
|--|---|
| Nickel metal | 25 – 110 g/l |
| Nickel Chloride | 8 – 18.0 g/l |
| Techniphos 615 Phosphorous Concentrate | 110 – 140 ml/l |
| Techniphos 615 Additive | 75 – 125 ml/l |
| Techniphos 615 Secondary | 15 – 25 ml/l |
| pH | 1.7 – 2.2 |
| Cathode Current Density | 0.3 – 40 ASD |
| Operating Temperature | 58 – 62 °C |
| Deposition Rate | Up to or exceeds 2 $\mu\text{m}/\text{min}$ (80 $\mu\text{in}/\text{min}$) depending on current density. |



Techniphos 615 produces high phos content (>10%P) at higher current densities compared to conventional NiP.

Magnetic Permeability

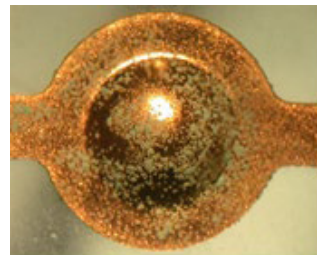
Magnetic permeability (μ) is the degree of magnetization of material in response to a magnetic field.

Results for connector substrates plated with 2.5 μm of nickel or Techniphos 615 are shown below:

| Sample | $\mu \times 10^3$ |
|----------------|-------------------|
| Nickel | 1.26 |
| Techniphos 615 | <0.1 |

NAV Testing - Nitric Acid Vapor Test Results

30 min Flash Gold over Ni



Sulfamate Ni (2 μm)
+ Conventional Au-Ni (3 μin)

FAIL

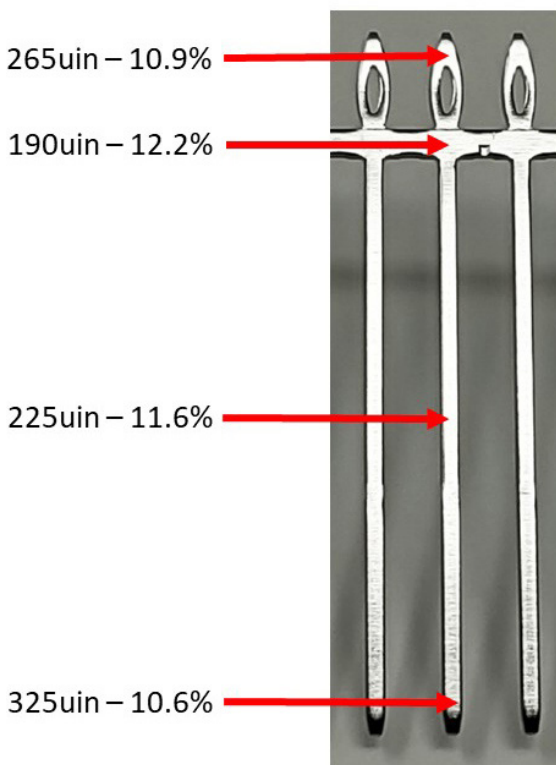


Goldeneye Ni (1.5 μm)
+ Techniphos 615 (0.5 μm)
+ Au-Ni (3 μin)

PASS

Connector Substrate Plating at 25 ASD

Techniphos 615 demonstrates excellent high phosphorus distribution, all measured locations provide >10% P.



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