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NIPHOS®

NICKEL-PHOSPHORUS ELECTROLYTE



Electrolytic Process for the Deposition of Nickel-Phosphorus

With NIPHOS® nickel-phosphorus alloy layers in barrel-, rack and reel-to-reel lines can be plated electrolytically. The electrolytes are free from halides and contain, besides nickel, no other heavy metals such as lead or cadmium.

It is possible to work with soluble anodes (nickel), insoluble anodes (platinum-plated titanium or MMO) or a combination of both. The lifetime is almost unlimited and corresponds to the one of bright nickel electrolytes. Nickel-phosphorus layers are amorphous, diamagnetic, abrasion and corrosion resistant. The layers are applied as intermediate layers (prior to e.g. tin, chromium or gold) or as final layer.



Advantages

- Electrolytic deposition of nickel-phosphorus alloy layers
- Simple electrolyte maintenance at temperatures of 60°C
- Long lifetime of the electrolyte
- Does not contain halides, ammonia or heavy metals such as lead or cadmium
- For rack-, barrel- or reel-to-reel operation
- High hardness (up to 1,200 HV after heat treatment)
- Very good abrasion resistance
- Corrosion resistant
- Suitable as final or intermediate layer

Applications

- Replacement of electroless nickel
- Alternative or addition to technical chromium-plating
- Weldable and bondable surface finish
- Decorative, stainless steel coloured surface finish
- Diamagnetic coating of RF connectors
- Intermediate layer prior to gold-plating of connectors
- Electroforming, e.g. of matrices

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TECHNICAL SPECIFICATIONS NIPHOS® 966

Electrolyte characteristics

| | |
|-------------------------------------------|-----------------------------------------------------------|
| Electrolyte type | Acidic |
| Contents | 80 (60 - 90) g/l Ni 25 (22 - 28) g/l P |
| pH value | 2.6 (2.5 - 2.7) |
| Operating temperature | 60 (55 - 75) °C |
| Current density | |
| Rack | 4 (3 - 5) A/dm ² |
| Barrel | 1.5 (1 - 2) A/dm ² |
| Plating speed | |
| Rack operation at 4 A/dm ² | 0.4 µm/min |
| Barrel operation at 1.5 A/dm ² | 0.15 µm/min |
| Anode material | Nickel (type S) or Pt-Ti, MMO (type PLATINODE® 177) |

NIPHOS® Nickel-Phosphorus Electrolytes

- NIPHOS® 965 for reel-to-reel lines
- NIPHOS® 966 for rack and barrel operation
- NIPHOS® 967 for rack and barrel operation
- NIPHOS® 968 for rack operation

Coating characteristics

| | |
|-----------------------------------|-----------------------------------|
| Coating | Nickel-phosphorus |
| Alloy composition | 87 - 89 wt.% Ni 11 - 13 wt.% P |
| Colour of deposit | Steel-grey |
| Brightness | Bright |
| Hardness of deposit | 550 - 600 HV |
| HV 0.015 (Vickers) approx. values | |
| Density | Appr. 7.8 g/cm ³ |

Corrosion Resistance

Neutral salt spray test (DIN EN ISO 9227-NSS)

| | | |
|-----------------------------------|---------|--|
| Chrom 35 µm | 24 h | |
| NIPHOS® 20 µm | > 336 h | |
| NIPHOS® 10 µm + Chromium 10 µm | > 336 h | |

CASS test (DIN EN ISO 9227-CASS)

| | | |
|-----------------------------------|---------|--|
| Chrom 35 µm | 6 h | |
| NIPHOS® 20 µm | > 150 h | |
| NIPHOS® 10 µm + Chromium 10 µm | > 150 h | |

Corrodokote-Test (DIN EN ISO 50958)

| | | |
|-----------------------------------|-----------|--|
| Chrom 35 µm | 1 Cycle | |
| NIPHOS® 20 µm | 7 Cycles | |
| NIPHOS® 10 µm + Chromium 10 µm | 10 Cycles | |

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