



# 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.



## Electrolyte characteristics

Electrolyte type	Acidic
Metal content	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 range: Rack operation	4 (3 - 5) A/dm <sup>2</sup>
Current density range: Barrel operation	1.5 (1 - 2) A/dm <sup>2</sup>
Plating speed: Rack operation at 4 A/dm <sup>2</sup>	0.4 µm/min
Plating speed: Barrel operation at 1,5 A/dm <sup>2</sup>	0.15 µm/min

## Coating characteristics

Coating	Nickel-phosphorus
Alloy composition	87 - 89 wt.% Ni 11 - 13 wt.% P
Colour of deposit	Steel-grey
Brightness	Bright

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Hardness	550 - 600 HV
Density of the coating	Appr. 7.8 g/cm <sup>3</sup>

## 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

## 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	

## Your contact person



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