Process Descriptions

Electroless Nickel, Incorporation of PTFE Particles, MultiChrome AN-4-SD®

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1. Electroless Nickel

1.1. Field of Application

The electroless nickel process is used for the deposition of highly corrosion-resistant coatings with a phosphorus content of 9–13%.

Using this process, steel, alloys, non-ferrous metals and aluminium can be coated to a high quality, provided appropriate pre-treatment is applied.

Areas of application include mechanical engineering, mining, the food industry, the chemical and electrical industries, as well as the plastics, textile, paper and packaging industries.

1.2. Properties of Nickel-Phosphorus Coatings

- Uniform coating thickness distribution compared to electrolytic coatings – dimensional accuracy
- Very good corrosion resistance due to phosphorus incorporation
- Achievement of high hardness values, 500 to 1100 HV
- Excellent tribological properties – low friction and wear resistance
- Good solderability
- Distinct barrier layer function (electronics)
- Suitable for barrel and rack processing
- Elongation at break 1.5–2.0%
- Compressive stress (MTO) < 10 based on 5 g/l Ni
- Non-magnetic; ferromagnetic after heat treatment
- Appearance: bright semi-gloss
- Melting point 860–880°C
- Deposition rate 10–15 µm/h
- Deposition temperature 85–92°C

2. Incorporation of PTFE Particles

2.1. Field of Application

In principle, all materials that can be

electrolytically or chemically (electroless) coated are suitable for producing this coating.

Possible areas of application therefore include:

- Plastics, textile and paper processing
- Transport
- Food industry
- Packaging industry
- Pharmaceutical industry
- Forming technology

Processing of workpieces with dimensions up to Ø 800 × 6,000 mm and a weight of up to 4 t is possible.

2.2. Properties

The incorporation of bound PTFE particles into the defined structure of the chrome surface results in exceptional tribological properties. This incorporation can also be carried out in electroless nickel and anodized coatings.

- Anti-adhesive
- Low coefficient of friction
- High load-bearing capacity
- Low susceptibility to damage
- Exceptional durability
- Wide operating temperature range (−240°C to +250°C)
- Excellent thermal conductivity (99.8%)
- High abrasion resistance
- Resistant to cleaning agents
- Extreme hardness
- Exceptionally strong bonding of PTFE to the base material (snap-fit effect)
- Antistatic

3. MultiChrome AN-4-SD®

3.1. Field of Application

Thanks to the exceptionally versatile properties of this coating, there are virtually no limits to its fields of application. Mechanical engineering, plastics, textile, paper, packaging and food industries.

3.2. Properties

- Hardness, melting point and thermal resistance – approx. 1000 HV – 1800°C – +250°C / −50°C
- Color, thermal conductivity and electrical conductivity – metallic silver gloss, 99.5% – antistatic and non-insulating, 6–12 µm ⇒ 1 ohm/cm
- Anti-adhesion – repellent effect and prevention of solid adhesion
- Fatigue strength – 30…40 kp/mm²
- Coefficient of friction – MultiChrome/steel 0.12…0.13 / MultiChrome/nickel 0.20
- Adhesion strength – 40…55 kp/mm²
- Corrosion resistance – resistant to most media (except hydrochloric acid and chlorides); according to DIN 50021 ESS > 400 h, according to DIN 50018 2.0 S, 11 cycles
- Coating thicknesses – 20 to 250 µm; in exceptional cases and with intermediate grinding up to max. 1000 µm
- Substrate materials – all metallic materials that can be electroplated