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Description

Nickel Sulfamate with a purity of $\geq 99.99\%$ deposited from Sulfamate baths is well known in the metal finishing industry. It is the base matrix of many dispersion coatings and an ideal partner for various alloys. Nickel Sulfamate deposition is an electrolytic surface coating process, which is relatively independent from the base material and absolutely unproblematic. Nickel Sulfamate coatings have compressive stress and can be deposited with high current density and practically plated in an unlimited thickness. Nevertheless, the MTV works with moderate plating rates to get a better metal distribution (to avoid lines of flux and with it an edge construction and the dog bone effect) and to guarantee a homogeneous build-up of the coating.

Properties

Nickel Sulfamate displays an excellent micro and macro throwing power by which cracks and pores in the base material are covered very efficiently (see Fig.1). Already a low coating thickness results in excellent diffusion tightness and corrosion resistance. Nickel Sulfamate coatings produce an atomic, metallic bonding to the base material and provide a good electric and thermal conductivity. They are also very well solder- and weldable and can be simply mechanically treated. In case of a repair, layers out of Nickel Sulfamate electrolytes could be stripped without attacking the base material and it is easy to apply a new coating.

- Adhesion strength: $\geq 100 \text{ N/mm}^2$ (on Fe)
- Hardness: $\sim 200 \text{ HV}_{0.1}$
 $\sim 350 \text{ HV}_{0.1}$ (with Co)
- Elongation at break: $\geq 15\%$
- Tensile strength: $\sim 450 \text{ N/mm}^2$



Fig.1: Cross section of a Nickel Sulfamate coating



Fig.2: Coating of casting rollers (up to $\varnothing 3.200 \text{ mm}$)



Fig.3: Inside coating of CASTOR containers (96 t)



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Corrosion Resistance

Due to the atomic, metallic bond of the Nickel Sulfamate to the base material and the excellent micro throwing power, already with low coating thicknesses cracks and pores are very well covered and good corrosion resistance is achieved. Due to this the coatings are already diffusion resistant from 10 μm and withstand aggressive climate and most organic and inorganic media. Therefore, Nickel Sulfamate is also used in chemical industry equipment or as an additional corrosion protection underneath e.g. hard chrome wear coatings.

➤ **Neutral Salt Spray Test** (according to DIN EN ISO 9227 NSS) 50 μm : $\geq 1,000 h^*$

* Rating of the test pieces (according to DIN EN ISO 10289):
Degree of protection R_p 10 (no failure visible)

Wear Resistance

Due to the ductile, columnar structure, Nickel Sulfamate coatings show a satisfactory resistance against abrasive wear. Because it could practically be deposited in unlimited thickness, Nickel Sulfamate is also used as a wear resistant coating for ingot moulds as well as for the repair of damaged and faulty parts like for example big shafts and hubs.

Temperature Resistance

Coatings out of Nickel Sulfamate electrolytes offer an excellent thermal shock resistance. They are used for coating of flat and tubular ingot moulds for the steel production. Nickel Sulfamate coatings are also used for casting rolls for various foil manufacturing.



Fig.3: 500 μm Nickel Sulfamate coated panel face



Fig.4: Repair of a Gear Wheel Hub (4,000 kg)



Fig.5: Ingot Mould with 5000 μm Nickel Sulfamate