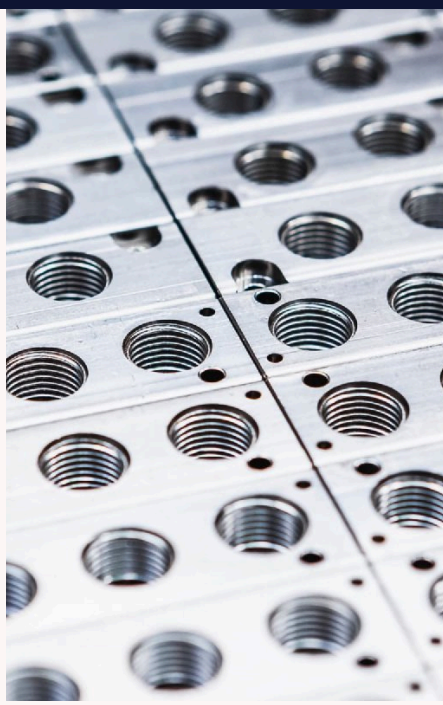
NIPLATE® 500
HIGH PHOSPHORUS ELECTROLESS NICKEL PLATING



Niplate 500 is a high-phosphorus (10-13% in P) electroless nickel plating. Among electroless nickel platings, Niplate 500 offers the best chemical and corrosion resistance and should be chosen over the other Niplate coatings for food contact applications.

Thanks to its high phosphorus contents, the high-phosphorus electroless nickel plating alloy has an amorphous structure. This property imparts high chemical resistance in respect of highly aggressive agents such as oxidizing acids. The amorphous structure means that the alloy is non-ferromagnetic and thus not attracted by magnetic fields.

Hardening treatments transform the film structure from amorphous to microcrystalline. They increase film hardness up to 1000 HV, but they reduce chemical resistance slightly and make the layer ferromagnetic.

Niplate 500 features very low porosity, even with thin coatings. This allows effective corrosion protection of the substrate material, especially in the case of parts made of iron or aluminium alloys.

EXCELLENT CHEMICAL AND CORROSION RESISTANCE

Thanks to the high chemical resistance and absence of coating porosity, parts treated with Niplate 500 offer high salt spray corrosion resistance and blackening resistance.

UNIFORM THICKNESS

Uniform and constant coating thickness over the entire surface, including holes; ideal for precision machined parts with tight tolerances and complex geometries.

CAN BE APPLIED ON VARIOUS METALS

All metals commonly used in mechanical engineering practice can be coated: alloys of iron, copper, and aluminium.

TECHNICAL SPECIFICATIONS

COMPOSITION AND APPLICABLE STANDARDS	
COMPOSITION	
Ni	P
87÷90%	10÷13%
Ni-P alloy, high phosphorus electroless nickel plating	
TECHNICAL STANDARDS	
ISO 4527 I NiP(11)	
ASTM B733 I Type V	
NSF 51 CERTIFICATION	
NSF 51 certification - Food equipment material.	

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ROHS COMPLIANCE
RoHS compliant. No restricted substances present in amounts greater than the maximum tolerated concentrations.

REACH COMPLIANCE
REACH compliant. No SVHCs present in amounts higher than 0.1% by weight.

COATABLE METALS

IRON ALLOYS		CHARACTERISTICS
Carbon steel	Adhesion	★★★★★
	Corrosion resistance	★★★★☆
Stainless steel	Pre-treatment	Sand blasting
	Adhesion	★★★★☆
	Corrosion resistance	★★★★★
Case hardened steel	Pre-treatment	Sand blasting
	Adhesion	★★★★☆
	Corrosion resistance	★★★☆☆
Nitrided steel	Pre-treatment	Sand blasting
	Adhesion	★★★☆☆
	Corrosion resistance	★★★☆☆

COPPER ALLOYS		CHARACTERISTICS
Brass, Bronze, Copper	Adhesion	★★★★★
	Corrosion resistance	★★★★★

ALUMINIUM ALLOYS		CHARACTERISTICS
Machining alloys	Adhesion	★★★★☆
	Corrosion resistance	★★★★☆
Foundry alloys	Adhesion	★★★★☆
	Corrosion resistance	★★★☆☆

TITANIUM ALLOYS		CHARACTERISTICS
Pure titanium and titanium alloys	Pre-treatment	Sand blasting
	Adhesion	★★★★☆
	Corrosion resistance	★★★★★

COATING THICKNESS AND AESTHETIC APPEARANCE

COATING THICKNESS	
NOMINAL THICKNESS, AS REQUIRED	TOLERANCE
3÷50µm	±10% (min. ±2µm)
Uniform thickness over the entire external and internal surface	
Absence of tip effect typical of galvanic coatings	

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AESTHETIC APPEARANCE
Bright stainless steel metallic appearance that reproduces the morphology of the machined part
Option of matt finish (sand blasted, shoot peened, or grit blasted)
Hardening treatments may result in discoloration of the coating: • 340°C, iridescent blue-red coloring

TRIBOLOGICAL PROPERTIES

HARDNESS

The surface hardness of Niplate 500 varies in relation to the hardening heat treatment carried out after deposition of the coating.

HARDNESS VALUE	HEAT TREATMENT
550±50HV	Hydrogen embrittlement relief at 160-180°C for 4h
1000±50HV	Hardening at 340°C for 4h

WEAR RESISTANCE

For applications in which the part is subject to wear, the use of Niplate 600 is recommend in place of Niplate 500. Niplate 500 anyway offers a good level of wear resistance, depending on the heat treatment carried out.

GUIDELINE WEAR VALUE, TWI-CS10	HEAT TREATMENT
THE LOWER THE NUMBER, THE HIGHER THE PERFORMANCE - ASTM B733 X1 - TABER ABRASER WEAR TEST - CS 10 ABRASIVE WHEELS - 1 KG LOAD	
20±2 mg / 1000 cycles	Hydrogen embrittlement relief at 160-180°C for 4h
12±2 mg / 1000 cycles	Hardening at 340°C for 4h

FRICTION COEFFICIENT

DYNAMIC DRY FRICTION COEFFICIENT VALUE	
	0.4 ÷ 0.6 depending on the antagonist material

CHEMICAL PROPERTIES

CORROSION RESISTANCE

The corrosion protection of Niplate 500, measured by the salt spray test, depends on the substrate metal, machining and finish of the part, and on the applied coating film thickness.

GUIDELINE CORROSION RESISTANCE VALUES	SUBSTRATE MATERIAL
NSS TO ISO 9227 - THICKNESS 20 µm - CORRODED SURFACE < 5%	
≥1000 hours	Brass
≥240 hours	Carbon steel
≥240 hours	Aluminium 6082

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CHEMICAL RESISTANCE
Excellent chemical and oxidation resistance in highly aggressive saline environments. Passes the concentrated nitric acid immersion test (RCA nitric acid test: 42 degree Bé concentrated nitric acid, 30 seconds, ambient temperature).

CHEMICAL COMPATIBILITY	
Chemical compatibility values are referred **exclusively** to the coating and **do not** define the corrosion protection of the substrate material. The overall performance of the coated part is highly dependent also on the type and quality of the substrate material. The actual environmental resistance must anyway be tested in the field.	
✓	Hydrocarbons (e.g. petrol, diesel, mineral oil, toluene)
✓	Alcohol, ketones (e.g. ethanol, methanol, acetone)
✓	Neutral saline solutions (e.g. sodium chloride, magnesium chloride, seawater)
✓	Dilute reducing acids (e.g. citric acid, oxalic acid)
✕	Acid oxidizing agents (e.g. nitric acid)
✕	Concentrated acids (e.g. sulphuric acid, hydrochloric acid)
✓	Dilute bases (e.g. dilute sodium hydroxide)
✕	Base oxidizing agents (e.g. sodium hypochlorite)
✕	Concentrated bases (e.g. concentrated sodium hydroxide)

PHYSICAL PROPERTIES

WELDABILITY
Easily brazed using RMA, RA acid fluxes

FERROMAGNETISM	HEAT TREATMENT
Non-ferromagnetic	Hydrogen embrittlement relief at 160-180°C for 4h
Ferromagnetic	Hardening at 340°C for 4h

FUSION POINT, SOLIDUS
870°C

DENSITY
7.9 g/cm^3

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