

# Niplate® 600 SiC – Electroless Nickel–SiC

Niplate 600 SiC is a composite medium phosphorus (5–9%) electroless nickel plating with silicon carbide grains (SiC) in 20–30% concentration.

## Main properties of SiC nickel SiC

### EXTREME HARDNESS, UP TO 1100 HV

The ceramic particles of SiC and the hardening treatments performed after nickel plating permit increasing the hardness of the layer up to 1100 HV.

### VERY HIGH WEAR RESISTANCE

Thanks to the tenacity of the electroless nickel matrix and to the extreme hardness of the ceramic particles of SiC, the Niplate 600 SiC coating has greater abrasive and adhesive wear resistance than that of hard chrome.

### UNIFORM THICKNESS


Uniform and constant thickness over the entire surface, including holes, ideal for precision mechanical engineering pieces with reduced tolerances.


### APPLICABLE ON VARIOUS METALS

All the most common alloys used in mechanical engineering can be coated – iron, copper and aluminium alloys.

## TECHNICAL SPECIFICATIONS

COMPOSITION		
MATRIX		PARTICLES
Ni	P	SiC 1 ÷ 3 μm
91 ÷ 95%	5 ÷ 9%	20 ÷ 30% vol.
Composite coating with medium phosphorus electroless nickel matrix and silicon carbide particles.		




ROHS CONFORMITY
 RoHS conform. No substances with use restrictions beyond max tolerated concentration.

REACH CONFORMITY
 REACH conform. No SVHC in quantities greater than 0.1% by weight.

COATABLE METALS			
IRON ALLOYS	PRE-TREATMENT	ADHESION	CORROSION RESISTANCE
Carbon steel	–	★★★★★	★★★☆☆
Stainless steel	Sandblasting	★★★★☆	★★★★★
Case-hardened steel	Sandblasting	★★★★☆	★★★☆☆
Nitrided steel	Sandblasting	★★★☆☆	★★★☆☆
COPPER ALLOYS			
Brass, Bronze, Copper	–	★★★★★	★★★★★
ALUMINIUM ALLOYS			
Wrought alloys	–	★★★★☆	★★★★☆
Foundry and die-casting alloys	–	★★★★☆	★★★☆☆
TITANIUM ALLOYS			
Pure titanium and titanium alloys	Sandblasting	★★★★☆	★★★★★

COATING THICKNESS	
NOMINAL THICKNESS, OPTIONAL	TOLERANCE
10÷30µm	±10% (min. ±2µm)
Uniform thickness over entire external and internal surface.	
Absence of point effect typical of galvanic coatings.	

AESTHETIC APPEARANCE
Smokey grey metal appearance due to the high content of SiC particles. Morphology similar to machined piece.
Matt finish option (Sandblasting, shot-peening or shotblasted)
On request, possibility of obtaining a electroless-nickel metal appearance option.
Matt finish option (Sandblasting, shot-peening or shotblasted).
In case of hardening treatment, layer discolouring could occur:
· 270-280°C, white colour with possible yellow halos
· 340°C, iridescent blue-red colouring

HARDNESS	
Niplate 600 SiC has a very high hardness, a combination of electroless nickel matrix and ultra-hard ceramic particles. This varies according to the hardening heat treatment performed after layer deposition.	
HARDNESS VALUE	HEAT TREATMENT
 700±50HV	Dehydrogenation 160-180°C x 4 hrs
 850±50HV	Hardening 270-280°C x 8 hrs
 1050±50HV	Hardening 340°C x 4 hrs

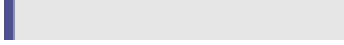

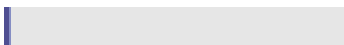
### WEAR RESISTANCE

Niplate 600 SiC has extreme abrasive and adhesive wear resistance, superior to that of hard chrome, thanks to the high content of ultra-hard silicon carbide particles.

#### APPROXIMATE WEAR VALUE, TWI-CS10


#### HEAT TREATMENT

A LOW NUMBER INDICATES A BETTER PERFORMANCE – ASTM B733 X1 – TABER ABRASER WEAR TEST – ABRASIVE WHEELS CS 10 – LOAD 1 KG

	1.0±0.1 mg / 1000 cycles	Dehydrogenation 160–180°C x 4 hrs
	0.8±0.1 mg / 1000 cycles	Hardening 270–280°C x 8 hrs
	0.6±0.1 mg / 1000 cycles	Hardening 340°C x 4 hrs

### FRICITION COEFFICIENT

#### DYNAMIC DRY FRICTION COEFFICIENT VALUE

	0.5 ÷ 0.8 depending on antagonist material
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### CORROSION RESISTANCE

The corrosion protection of Niplate 600 SiC, assessed by means of salt mist test, depends on the base material, piece machining and finishing and the thickness of the applied coating.

#### APPROXIMATE CORROSION RESISTANCE VALUES

#### BASE MATERIAL

NSS ACCORDING TO ISO 9227 – THICKNESS 20 μm – CORRODED SURFACE < 5%










	≥1000 hours	Brass
	≥180 hours	Carbon steel
	≥240 hours	Aluminium 6082

#### CHEMICAL RESISTANCE


For application where high chemical resistance is required Niplate 500 is recommended in place of Niplate 600 SiC. Niplate 600 SiC does in any case have good chemical resistance above all in alkaline environments.

#### CHEMICAL COMPATIBILITY

Approximate values of compatibility with the coating environment **only**, they **do not** indicate corrosion protection of the base material. The overall performance of the coated piece depends to a large extent also on the type and quality of the base material. The actual resistance to the environment must in any case be tested in the field.

-  Hydrocarbons (e.g. petrol, diesel fuel, mineral oil, toluene)
-  Alcohols, ketones (e.g. ethanol, methanol, acetone)
-  Neutral saline solutions (e.g. sodium chloride, magnesium chloride, brine)
-  Diluted reducing acids (e.g. citric acid, oxalic acid)
-  Oxidizing acids (e.g. nitric acid)
-  Concentrated acids (e.g. sulphuric acid, hydrochloric acid)
-  Diluted bases (e.g. diluted sodium hydroxide)
-  Oxidizing bases (e.g. sodium hypochlorite)
-  Concentrated bases (e.g. concentrated sodium hydroxide)




#### WELDABILITY

-  Easily braze weldable using RMA, RA acid flow agents

#### FERROMAGNETISM

##### PRESENCE OF FERROMAGNETISM

##### HEAT TREATMENT

	Ferromagnetic	Dehydrogenation 160-180°C x 4 hrs
	Ferromagnetic	Hardening 270-280°C x 8 hrs
	Ferromagnetic	Hardening 340°C x 4 hrs

#### MELTING POINT, SOLIDUS

870°C

#### DENSITY

6.8 g/cm<sup>3</sup>