

Product Data Sheet



Surface Engineering & Alloy Company

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NiBoride

The Hard Chrome Replacement

For Outstanding Hardness *and* Increased Lubricity

Description: *NiBoride*[™] is a proprietary aqueous autocatalytic plating system that produces a very hard wear resistant surface with a low coefficient of friction. NiBoride is ideal for depositing a smooth and uniform plating barrier on inside diameters and on complex configurations of parts. The plating is heat treated after application to increase the hardness to over 1500 Vickers microhardness.

NiBoride plating outwears hard chrome and nickel plating and in some instances can out perform tungsten carbide because of its hardness and low coefficient of friction. NiBoride can be used in numerous areas to reduce wear and improve performance, including all types of bearing applications, automotive, aerospace, manufacturing, textile equipment, and military applications.



Plating Thickness: .0005 to .005

Properties:

- Excellent adhesion on most alloys including titanium
- Ductile at high hardness levels
- Outwears hard chrome 1.5 -3 times
- Outwears electroless nickel phosphorous 6-10 times
- Re-workable and solderable with no effect to most alloys
- Good impact resistance
- Non-fatiguing on high strength alloys
- Greatly reduces fretting and galling
- Non-embrittling
- Cost competitive with hard chrome

Hardness:	As plated	62 to 66 Rc	776 to 870 HK	746 to 865 HV
	Heat treated	70 to 74 Rc	972 to 1082+ HK	1076 to 1400HV

Dry Static Coefficient of Friction:

Hard Steel	.78	Tool Steel w/ NiBoride	.44
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Effective Operating Temperature Range: -66 to 1000^o F

Melting Temperature: 2100-2500^o F

Hydrogen Embrittlement: None per ASTM 519

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Typical Properties of Coating Deposited by NiBoride Plating Process

HARDNESS (heat treated)		DENSITY	
Knoop Hardness, 50 g load	972-1082	g/cc	7.8
Rockwell C Equivalent	70-74	lb./cu in.	0.28
MELTING POINT		LINEAR EXPANSION	
	1200-1400 C	0°-300° C, av. cm/cm°C	12 x 10 ⁻⁶
	2192-2252 F	320-572°F, av. in./in.°F	6.7 x 10 ⁻⁶

SUBSTRATE SURFACE CONFORMITY

SURFACE FINISH, AA

Substrate	Before Plating	As Plated (1 mil)
D-2 Tool Steel, smooth	3	3
D-2 Tool Steel, rough	53	54

STATIC COEFFICIENT OF FRICTION

Material	Contact	Dry	Lubricated
Hard Steel	Hard Steel	0.78	0.11
Tool Steel coated with NiBoride	Tool Steel	0.44	0.10
Cast Iron	Cast Iron	1.10	-
Cast Iron coated with NiBoride	Cast Iron	0.38	0.12
Copper coated with NiBoride	Copper	0.70	0.10
Bronze coated with NiBoride	Bronze	0.70	0.09

WEAR RESISTANCE

Wear Scar Area, sq. mils

Sample	25,000 Cycles	100,000 Cycles	1,000,000 Cycles
Uncoated Block (control)	300	Fail	-
Nickel-Phosphorus Alloy Coated	50	Fail	-
Hard Chromium Coated	35	45	90
NiBoride Coated	5	10	30

Taber Abrasion Test

Sample	Wear Loss mg/1000 cycles	Wear Index
Standard Steel Panel (uncoated)	10.5	6.5
Nickel-Phosphorus alloy coated	4.3	2.5
Hard Chromium coated	2.1	1.25
NiBoride Coated	1.6	1

Samples subjected to Standard Taber Test, 1000 g load, CS-10 abrasive wheel, without lubrication.

Samples evaluated by means of Standard Alpha Test ASTM D2714. Coated block, hardened steel ring using 600lb. load with mineral oil lubrication.

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