



# Nickel-Tungsten 5711

## INTRODUCING NICKEL-TUNGSTEN

SIFCO ASC is continuously developing and refining new deposits and coatings, providing the highest quality surface enhancement materials that meet industry's ever changing requirements.

SIFCO ASC's Nickel-Tungsten deposit is the perfect green alternative to chromium for repair and OEM applications that require exceptionally hard plating. The deposit was developed for aerospace, automotive, oil and gas, and any other industry where the hardness of the surface is critical.



## APPLICATIONS

For OEM or dimensional repair applications that require the enhancement of localized areas to improve surface properties including hardness, wear resistance and coefficient of friction.

Composition	60% Ni; 40% W
Structure	Micro-cracked
Corrosion Resistance	>500 hours with a 0.0005" thick copper preplate
Coefficient of Friction	0.35 – 0.55
Average Hardness	660 – 690 VHN as plated 835 VHN (heat treated at 375° F for 23 hours) 1060 – 1150 VHN (heat treated at 923° F for 2 hours)
Wear Resistance (Taber)	14
Hydrogen Embrittlement (ASTM F 519)	Passes without bake
Maximum Thickness	0.007"
Plating Rate	0.002"/hour

## WHY NICKEL-TUNGSTEN?

- ▶ Free of hexavalent chromium
- ▶ One of the hardest chromium alternatives available today
- ▶ Ten times lower wear rate than hard chromium
- ▶ Meets the hydrogen embrittlement characteristics of ASTM F519 without a relief bake

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## A COMPARISON OF EHC and Ni-W PROPERTIES

(Electrodeposited Hard Chrome, Nickel-Tungsten)

	Test Method	Applicable Standard	EHC	Ni-W
<b>Appearance</b>	Microscopy		Micro-cracked	Micro-cracked
<b>Microstructure</b>	XRD			Nanocrystalline (crystallite size 2 nm)
<b>Hardness</b>	Vickers Microhardness	ASTM B578	800 – 1200 VHN 790 VHN (375° F/20 hour)	660 – 690 VHN 835 VHN (375° F/23 hr) 1060 – 1150 VHN (heat treated 932° F/2 hr)
<b>Adhesion</b>	Bend	ASTM B 571	Pass	Pass
<b>Ductility</b>	Bend Test	ASTM B 489	<1%	<1.6%
<b>Wear Volume Loss</b>	Pin-on-disc	ASTM G 99	$9 - 11 \times 10^{-6}$ mm <sup>3</sup> /Nm	$5.0 \times 10^{-7}$ mm <sup>3</sup> /Nm
<b>Wear Abrasive</b>	Taber	ASTM D 4060	3 – 6	14
<b>Coefficient of Friction</b>	Pin-on-disc	ASTM G 99	0.7	0.35 – 0.55
<b>Pin Wear</b>	Pin-on-disc	ASTM G 99	Severe	Mild
<b>Corrosion Resistance</b>	Salt Spray	ASTM B 117 ASTM B 537 Rating	Protection Rating 2 (1000 hr salt spray)	> 500 hours with a 0.0005" thick preplate
<b>Hydrogen Embrittlement</b>	Notched Bar	ASTM F 519	Pass with bake	Pass without bake
<b>Fatigue</b>	Axial	ASTM E 466	Significant debit	Debit
<b>Thermal Stability</b>	Air Oven		400° C	500° C
<b>Internal Stress</b>	Bent Strip			12 – 16 kpsi tensile
<b>Current Efficiency</b>			15 – 35%	35 – 40%
<b>Deposition Rate</b>			0.0005" – 0.001"/hr	0.002"/hr
<b>Process Stability using Insoluble Anode</b>			Good	Good