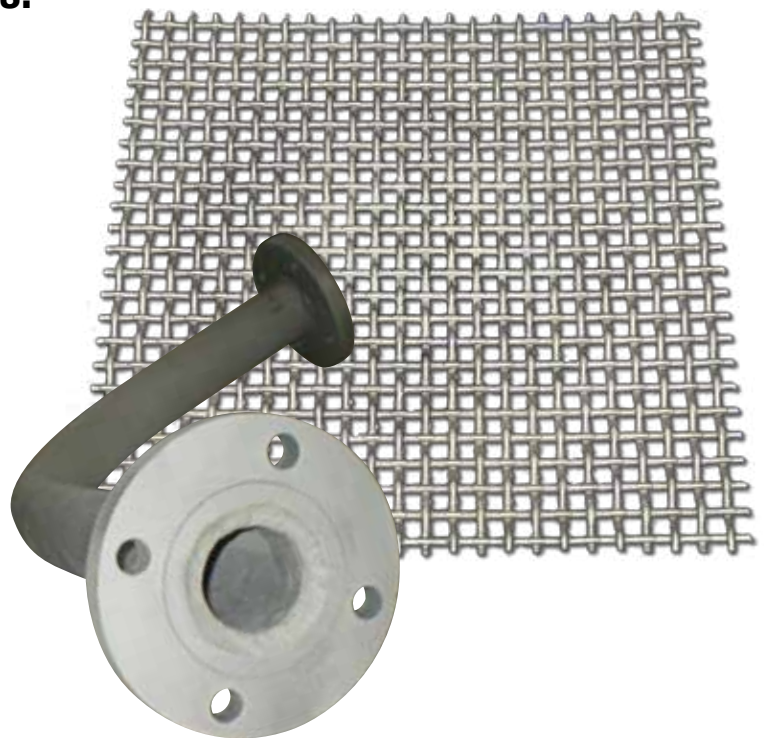




# UltraFlex™ Cladding — Tungsten Carbide Composites

**Superior wear and corrosion resistance for inaccessible surfaces and complex geometries.**

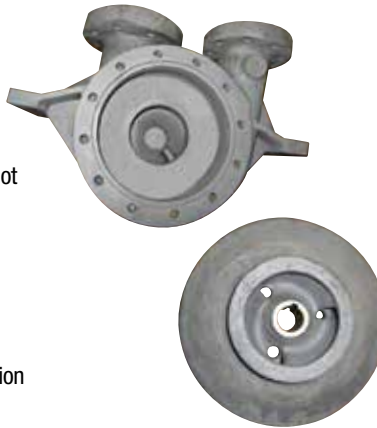
- Proprietary process extends component life by 2–5x over conventional substrates.
- Enables cladding thicknesses from .010–.060".
- Applied on the interior surfaces of components that cannot be seen or reached.
- Metallurgically bonded nickel-chromium super alloy matrix with tungsten carbide wear-resistant particles.
- Reduces maintenance and repair cost by minimizing unscheduled downtime.
- Also available in alloy formulations.



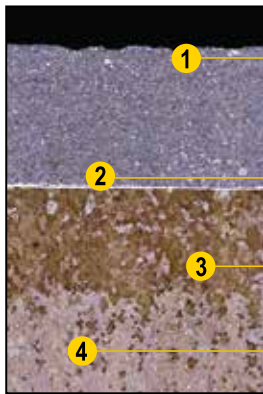
***Lasts 2–5x longer versus competitive materials!***

## Application

- Complex geometry parts like woven and perforated screens, expanded metals, and grating.
- Interior surfaces of pipes, elbows, and tubes that cannot be coated using contemporary technologies.
- Pump components.
- Products requiring thin cladding.
- Fan blades used on conveyance products for combustion in coal-fired plants.



## Cladding Photomicrograph



### CLADDING

**Dense tungsten carbide loading with uniform carbide distribution.** High wear resistance with predictable wear rates and continuous operation up to 1900°F.  
**No interconnected porosity.** Superior corrosion and impact resistance.

### BOND LINE

**True metallurgical bond (>70,000 psi) with high interparticle bond strength.** Provides unsurpassed strength and prevents chipping, flaking, and check-cracking.

### DIFFUSION ZONE

**Minimal dilution.** Substrate retains uniform properties in diffusion zone.

### SUBSTRATE

**Heat treatable.** After cladding process to restore substrate's mechanical properties.

## Cladding Specifications

Cladding Composition (Weight Percentage)	
	UltraFlex™
Tungsten Carbide*	49%
Nickel	37%
Chromium	7%
Other	7%

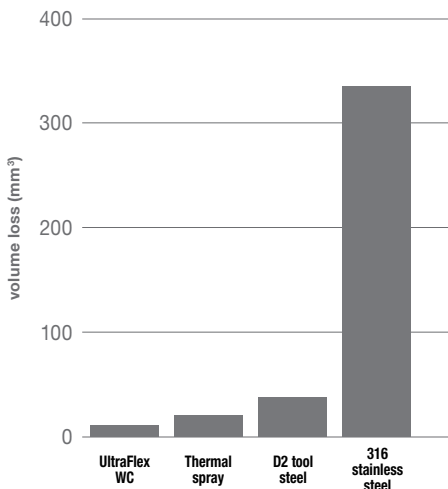
\*Tungsten Carbide (WC) includes cobalt-bonded WC.

Cladding Properties	
	UltraFlex™
Density (lb/in <sup>3</sup> )	0.42
Thermal Conductivity (BTU in/h•ft <sup>2</sup> •°F)	200
Metallurgical Bond Strength (psi)	>70,000
Porosity	<3%
Rockwell Hardness (HRC)**	60–66

\*\*Cladding is a composite of tungsten carbide particles dispersed in a nickel-based alloy matrix. The extremely hard carbide particles, with a Vickers Diamond Pyramid Hardness of about 2000 DPH<sub>50g</sub> [1865 DPH<sub>50g</sub> is equivalent to 80 Rockwell C Hardness (HRC)], are surrounded by a two-phase matrix (300–800 DPH<sub>50g</sub> equivalent to 30–64 HRC). Because of the heterogeneous structure of the cladding, direct Rockwell hardness measurements are an average of the hard particles and matrix and are not representative of the individual components of the composite.

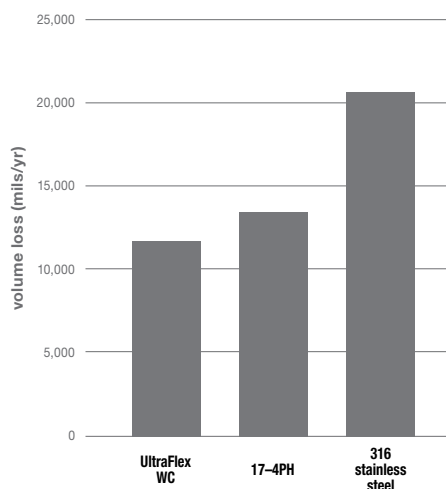
## Performance Data

### ABRASION TEST (ASTM G65)



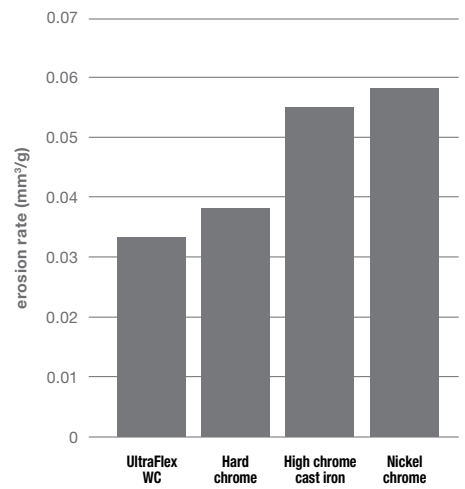
### CORROSION TEST (ASTM G31)

10% Hydrochloric Acid Boiling



### EROSION TEST (ASTM G76)

30° Impingement Angle, 70 m/s, Alumina <63 micron



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## FOR FURTHER INFORMATION

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