

WCD4™

TECHNICAL DATA (AS CAST)

WCD4MCu™ is a superior stainless steel with corrosion resistance equal to or better than 316L, but with almost double the hardness. It's a duplex (two phase) stainless steel, while common grades of stainless steel, such as 316L, are single phase. This provides the corrosion resistance of 300 series stainless steel with the strength and hardness of 400 series stainless steel

WCD4™ is chemically identical to standard CD4MCuN but has significantly improved mechanical properties and corrosion resistance. These improvements are achieved through proprietary manufacturing processes developed at Wilfley.

Classification and Mechanical Properties

Material	Specification	Average Hardness	Minimum Tensile Strength	Minimum Yield Strength	Minimum Elongation
WCD4™	ASTM A890 Grade 1B	345 WBN	164,000 psi (1,131 MPa)	113,000 psi (779 MPa)	16%
316L	ASTM A743 Grade CF-3M	180 WBN	70,000 psi (483 MPa)	20,000 psi (138 MPa)	30%

Improvement

91%

234%

565%

Microstructure



This photo is an optical microscopic view of WCD4™ at x250 magnification. The microstructure consists of primary and secondary austenite grains embedded into the ferritic matrix.

The austenitic grain count is 45% higher with 27% smaller grains than standard CD4MCuN. This provides an increase in corrosion resistance as austenite is more noble than ferrite.

The jagged grain boundary lines show the excellent mixture between the austenitic and ferritic phases. This produces increased hardness while maintaining the corrosion resistance of the WCD4™.

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Chemical Composition

C Carbon	Mn Manganese	Si Silicon	P Phosphorus	S Sulfur	Cr Chromium	Ni Nickel	Mo Molybdenum	Cu Copper	N Nitrogen	Fe Iron
0.04 max.	1.0 max.	1.0 max.	0.04 max.	0.04 max.	24.5 - 26.5	4.75 - 6.0	1.75 - 2.25	2.75 - 3.25	0.1 - 0.25	Balance

Corrosion and Erosion Properties: Laboratory Testing Methods and Results

Wear testing (per ASTM G99) was carried out with a pin-on-disk apparatus using a 0.5 inch diameter alumina ball. The wear resistance of **WCD4™** was **84.15% better than 316L**

Material	Average
Wilfley WCD4™	7x10 ⁻³ mm ³ /N/m
316SS (CF3M)	44.19x10 ⁻³ mm ³ /N/m

Corrosion testing 1. A Huey test (per ASTM A262) established the corrosion rates of WCD4™ and standard 316SS in 80% boiling phosphoric acid. **The corrosion resistance of WCD4™ was 88.7% better than 316L.**

Material	After 72 Hours
Wilfley WCD4™	44.2 MPY
316SS (CF3M)	393.4 MPY

Corrosion testing 2. A similar Huey test (per ASTM A262) determined the corrosion rates of WCD4™ and 316L in 65% boiling nitric acid. **The corrosion resistance of WCD4™ was 68.80% better than standard 316L.**

Material	After 72 Hours
Wilfley WCD4™	3.65 MPY
316SS (CF3M)	11.7 MPY