WCD4™

TECHNICAL DATA (AS CAST)

WILFLEY®
HEAVY DUTY
CENTRIFUGAL PUMPS

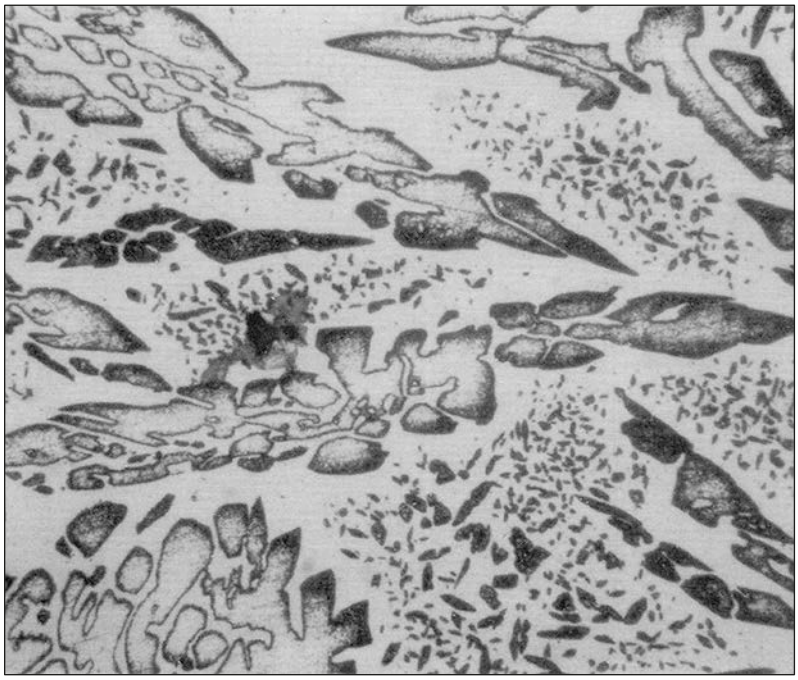
Wilfley's WCD4™ is ideal for erosion-corrosion applications in extremely corrosive environments. Pump wear parts made from WCD4™ are expected to have better wear life due to increased hardness and improved corrosion resistance.

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
Wilfley WCD4™	ASTM A890 Grade 1B	345 HBN	164,000 psi (1,131 MPa)	113,000 psi (779 MPa)	16%
Standard CD4MCuN	ASTM A890 Grade 1B	250 HBN	100,000 psi (689 MPa)	70,000 psi (483 MPa)	16%
	Improvement	**38%**	**64%**	**61%**	

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 causes an increase in corrosion resistance due to austenite being 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

Microhardness testing was performed on samples of WCD4™ and standard CD4MCuN to calculate the average hardness of the austenite and ferrite. The average hardness of the ferrite was **48% higher** in WCD4™ than standard CD4MCuN.

Material	Austenite	Ferrite
Wilfley WCD4™	**255 HBN**	**378 HBN**
Standard CD4MCuN	251 HBN	255 HBN

Wear testing (per ASTM G99) was carried out with a pin-on-disk apparatus using a 0.5 inch diameter alumina ball. The wear rate of WCD4™ was **42% lower** than standard CD4MCuN.

Material	Average
Wilfley WCD4™	**$7x10^{-3}$ $mm^3/N/m$**
Standard CD4MCuN	$12x10^{-3}$ $mm^3/N/m$

A **Huey test** (per ASTM A262) established the corrosion rates of WCD4™ and standard CD4MCuN in 80% boiling phosphoric acid. The corrosion rate of WCD4™ was **13% lower** than standard CD4MCuN.

Material	After 72 Hours
Wilfley WCD4™	**44.2 MPY**
Standard CD4MCuN	51 MPY

A similar **Huey test** (per ASTM A262) determined the corrosion rates of WCD4™ and standard CD4MCuN in 65% boiling nitric acid. The corrosion rate of WCD4™ was **18% lower** than standard CD4MCuN.

Material	After 48 Hours	After 96 Hours
Wilfley WCD4™	**5.6 MPY**	**5.95 MPY**
Standard CD4MCuN	6.15 MPY	7.85 MPY