



Cemented Carbide Properties

HB Carbide Grade	Applications	US Industry Designation	ISO Code	Average Grain Size (micron)	Density (g/cc)	WC (%)	Co (%)	Hardness Rockwell A	Sinter HIP TRS (psi)
HB-2	Excellent wear properties, abrasion resistant, medium grain size, general purpose grade for cutting tools, drills, endmills, and reamers, for finishing and semi-finishing, and wear parts with little impact, EDM blanks, seal rings, knives	C-2	K20 - K30	1.5	14.9	94	6	92.2	530,000
HB-3	Extremely hard material, high abrasion resistance, micro grain size grade, for finish machining cutting tools, drills, endmills, reamers, and wear parts, with very little or no shock, EDM blanks, wire guides, sand blast nozzles	C-3	K05 - K10	0.8	14.9	94	6	93.0	520,000
HB-110	Excellent wear properties, micro grain size grade, general purpose cutting tool grade for semi-finishing and finishing, drilling, endmills, reamers, stamping dies, punches, knives, and all types of cutting tools, will withstand slight shock, EDM blanks	C-2 C-10	K30 - K40	0.8	14.5	90	10	91.7	550,000
HB-115	High wear, low to medium impact, micro grain size grade, for cutting tools, dies, knives, punches, roughing tools, will withstand slight shock, EDM blanks, crush rolls, form rolls, coining dies	C-12	K40	0.8	14	85	15	90.0	610,000
HB-512	Extremely hard material, high abrasion resistance, ultra-fine grain size grade, for finish machining cutting tools, drills, endmills, reamers, and wear parts, with very little or no shock, EDM blanks, wire guides, sand blast nozzles	C-2 C-3	K 20 - 40	0.6	14.3	88	12	92.5	640,000
HB-312	Low impact, coarse grain size grade, knives, punches, will withstand slight shock	C-12		4.0	14.3	88	12	88.7	490,000
HB-315	Low impact, coarse grain size grade, rough core nibs for header dies, swaging dies, and forming applications	C-12		4.0	14.0	85	15	87.4	470,000
HB-320	Medium impact, coarse grain size grade, rough core nibs for header dies, swaging dies, draw dies, crushing hammers, forming applications	C-13		4.0	13.5	80	20	85.4	455,000
HB-325	Highest impact, coarse grain size grade, rough core nibs for header dies, swaging dies, draw dies, forming applications	C-14		4.0	13.1	75	25	83.3	430,000
HB-411	Multi grain size grade, impact punches, wear parts, plastic injection molding pins	C-12	K 30 - 40	0.8 to 4.0	14.4	88.5	11.5	90.0	530,000

** Data as of 01/17/2017



H.B. Carbide Company
 4210 Doyle Dr., Lewiston, MI 49756
 Phone: 989-786-4223 Email: sales@hbcarbide.com
 www.hbcarbide.com

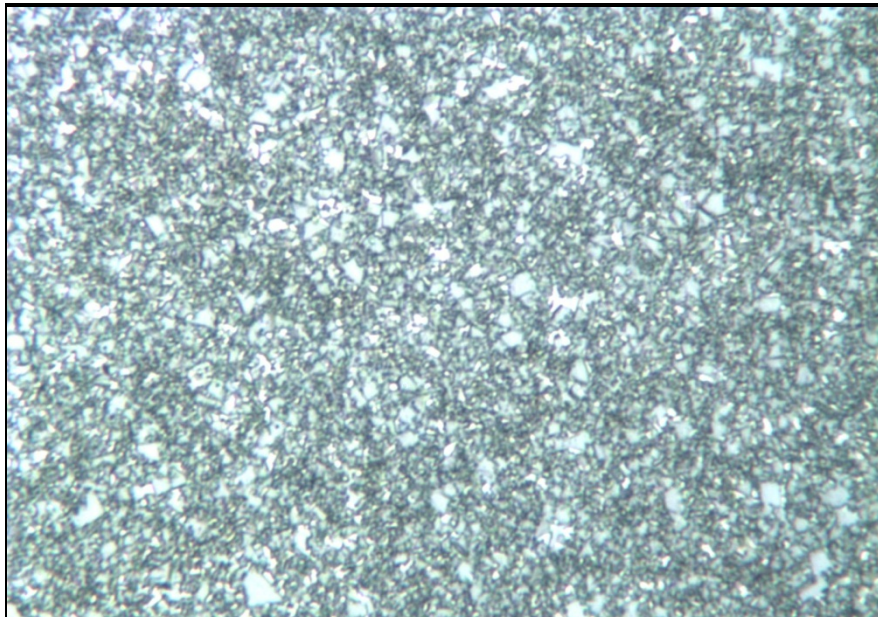


Sold through:
Star SU LLC
 5200 Prairie Stone Pkwy., STE 100, Hoffman Estates, IL 60192
 Phone: 847-649-1450 Email: sales@star-su.com
 www.star-su.com



HB-2

Composition	
Tungsten Carbide, WC	94.0 ± 0.3%
Cobalt, Co	6.0 ± 0.3%
Microstructure Grain Size (ASTM B-390)	1.5 µm
Hardness – Rockwell A (ASTM B-294)	92.2 ± 0.5
Transverse Rupture Strength (ASTM B-406)	530,000 PSI
Apparent Porosity (ASTM B-276)	<A02, B00, C00
Density (ASTM B-311)	14.90 ± 0.05

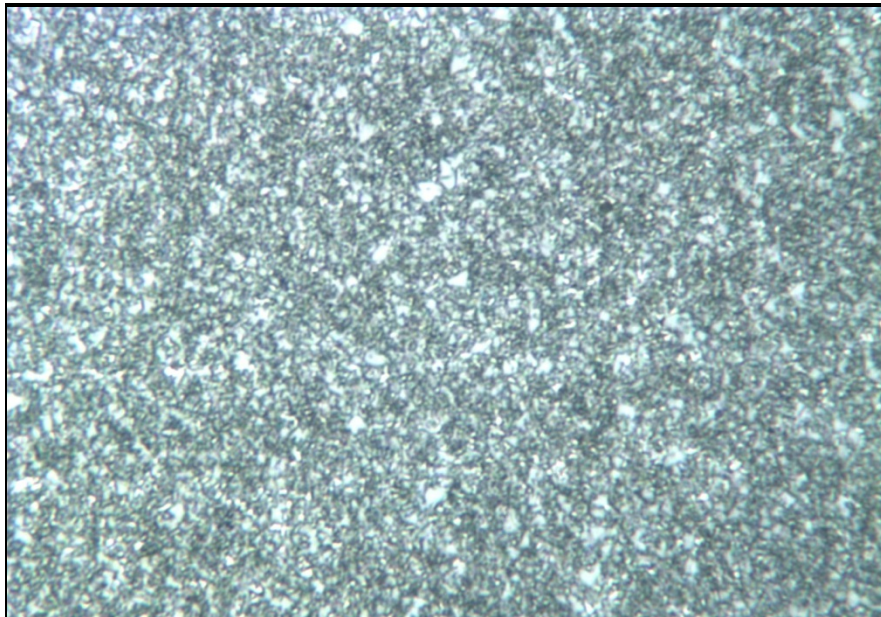


1500X Magnification



HB-3

Composition	
Tungsten Carbide, WC	94.0 ± 0.3%
Cobalt, Co	6.0 ± 0.3%
Microstructure Grain Size (ASTM B-390)	0.8 µm
Hardness – Rockwell A (ASTM B-294)	93.0 ± 0.5
Transverse Rupture Strength (ASTM B-406)	520,000 PSI
Apparent Porosity (ASTM B-276)	<A02, B00, C00
Density (ASTM B-311)	14.90 ± 0.05

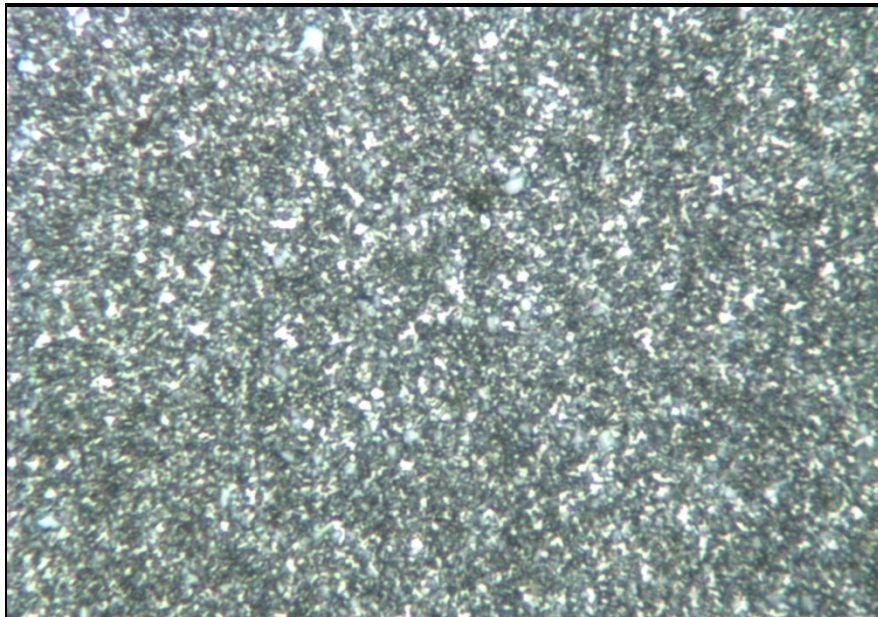


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HB-110

Composition	
Tungsten Carbide, WC	90.0 ± 0.5%
Cobalt, Co	10.0 ± 0.5%
Microstructure Grain Size (ASTM B-390)	0.8 µm
Hardness – Rockwell A (ASTM B-294)	91.7 ± 0.5
Transverse Rupture Strength (ASTM B-406)	550,000 PSI
Apparent Porosity (ASTM B-276)	<A02, B00, C00
Density (ASTM B-311)	14.50 ± 0.05

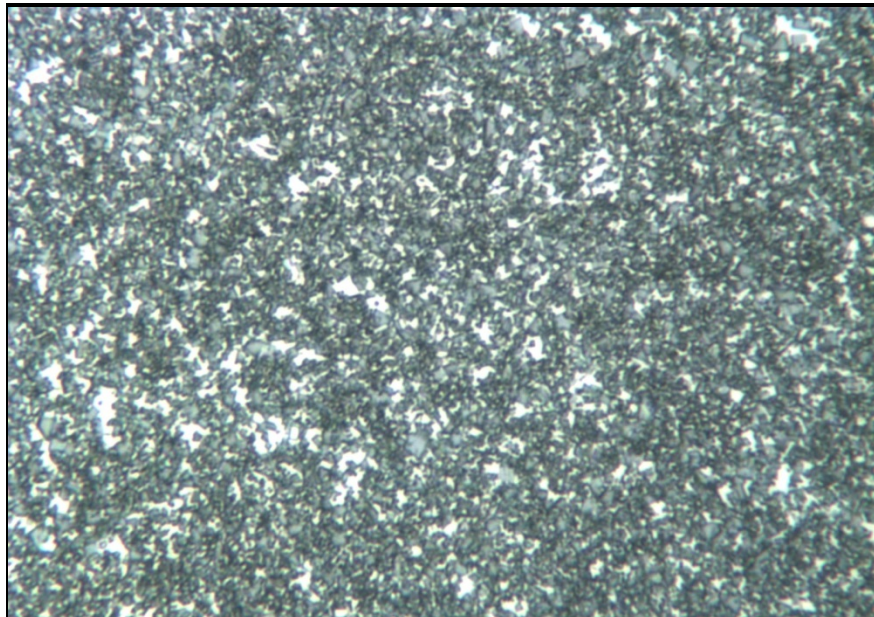


1500X Magnification



HB-115

Composition	
Tungsten Carbide, WC	85.0 ± 0.5%
Cobalt, Co	15.0 ± 0.5%
Microstructure Grain Size (ASTM B-390)	0.8 µm
Hardness – Rockwell A (ASTM B-294)	90.0 ± 0.5
Transverse Rupture Strength (ASTM B-406)	610,000 PSI
Apparent Porosity (ASTM B-276)	<A02, B00, C00
Density (ASTM B-311)	14.0 ± 0.05

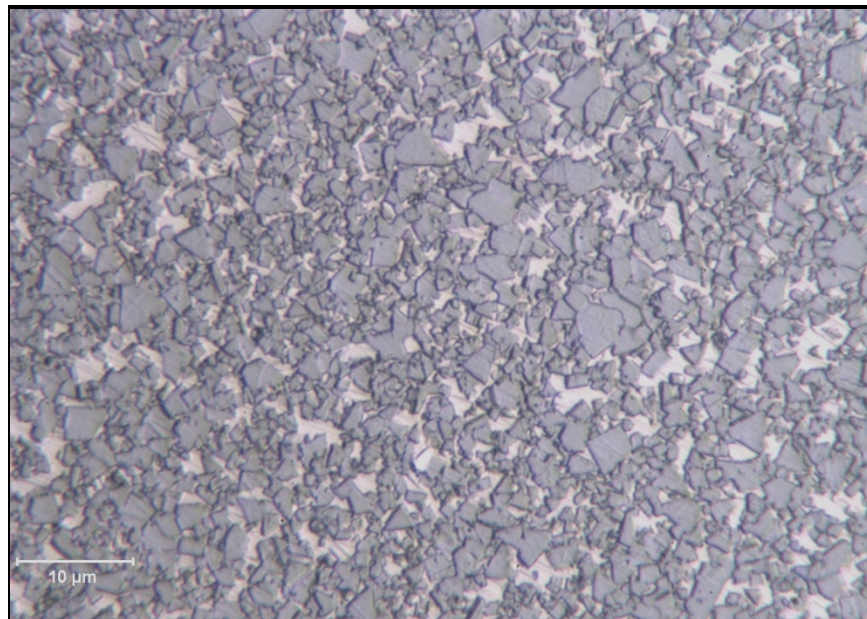


1500X Magnification



HB-312

Composition	
Tungsten Carbide, WC	88.0 ± 0.5%
Cobalt, Co	12.0 ± 0.5%
Microstructure Grain Size (ASTM B-390)	4 μm
Hardness – Rockwell A (ASTM B-294)	88.7 ± 0.5
Transverse Rupture Strength (ASTM B-406)	490,000 PSI
Apparent Porosity (ASTM B-276)	<A02, B00, C00
Density (ASTM B-311)	14.33 ± 0.05

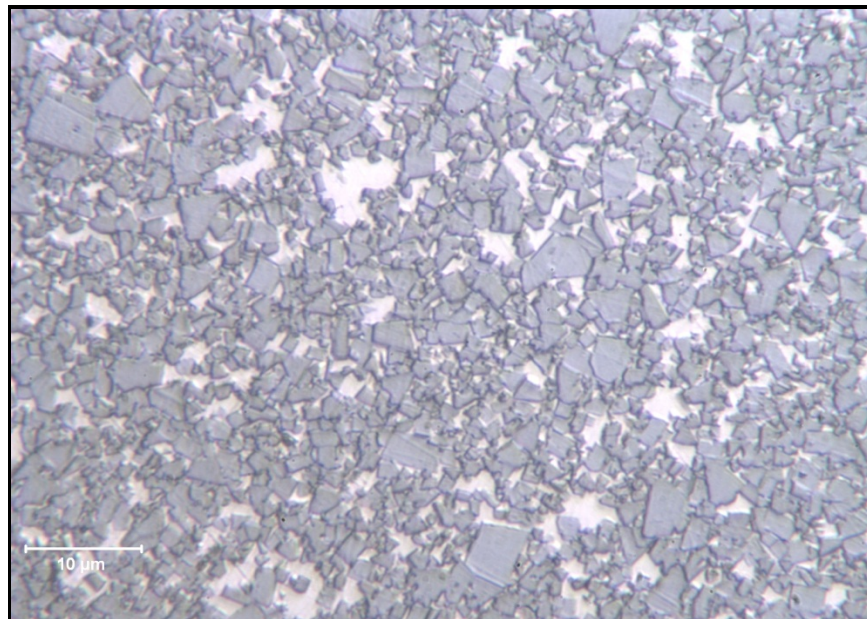


1500X Magnification



HB-315

Composition	
Tungsten Carbide, WC	85.0 ± 0.5%
Cobalt, Co	15.0 ± 0.5%
Microstructure Grain Size (ASTM B-390)	4 µm
Hardness – Rockwell A (ASTM B-294)	87.4 ± 0.5
Transverse Rupture Strength (ASTM B-406)	470,000 PSI
Apparent Porosity (ASTM B-276)	<A02, B00, C00
Density (ASTM B-311)	14.03 ± 0.05

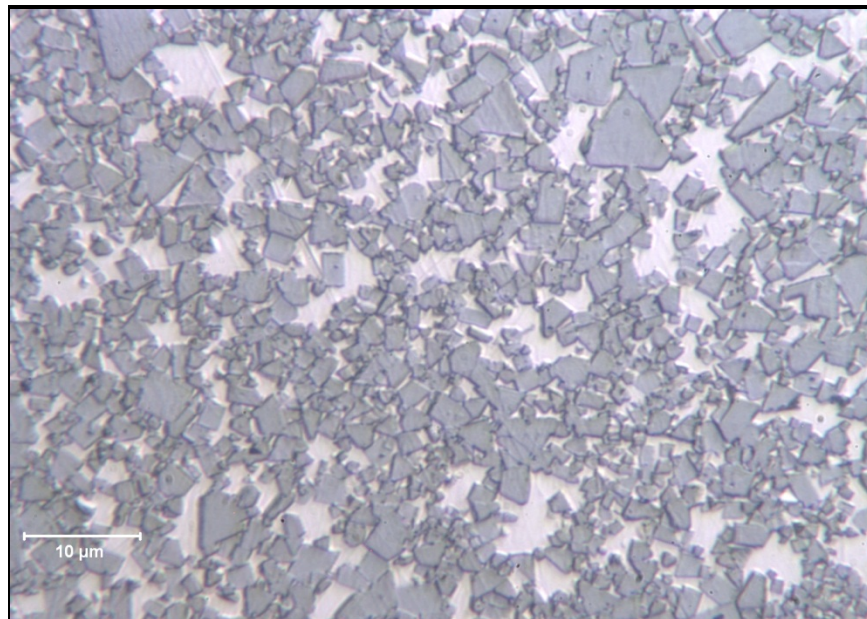


1500X Magnification



HB-320

Composition	
Tungsten Carbide, WC	80.0 ± 0.5%
Cobalt, Co	20.0 ± 0.5%
Microstructure Grain Size (ASTM B-390)	4 μm
Hardness – Rockwell A (ASTM B-294)	85.4 ± 0.5
Transverse Rupture Strength (ASTM B-406)	455,000 PSI
Apparent Porosity (ASTM B-276)	<A02, B00, C00
Density (ASTM B-311)	13.56 ± 0.05

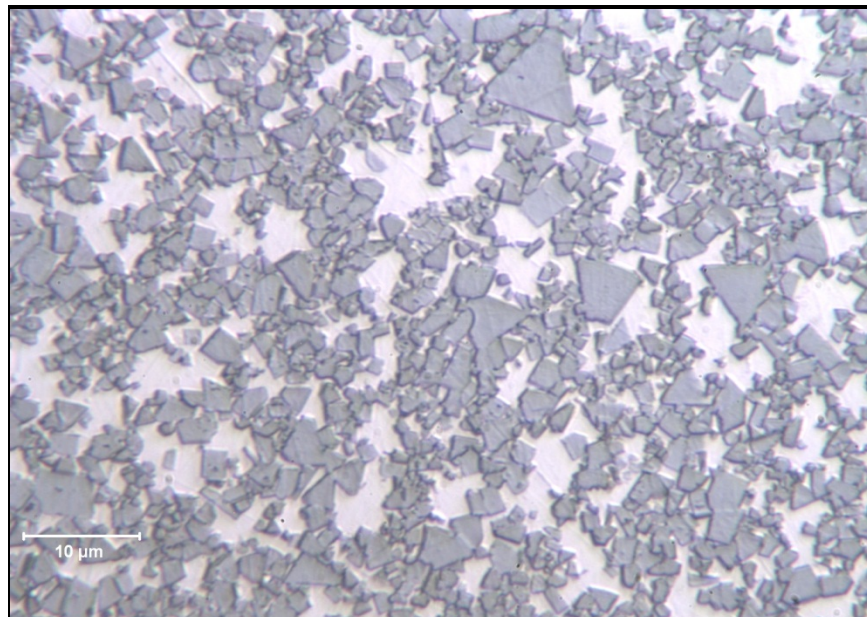


1500X Magnification



HB-325

Composition	
Tungsten Carbide, WC	75.0 ± 0.5%
Cobalt, Co	25.0 ± 0.5%
Microstructure Grain Size (ASTM B-390)	4 μm
Hardness – Rockwell A (ASTM B-294)	83.3 ± 0.5
Transverse Rupture Strength (ASTM B-406)	430,000 PSI
Apparent Porosity (ASTM B-276)	<A02, B00, C00
Density (ASTM B-311)	13.18 ± 0.05

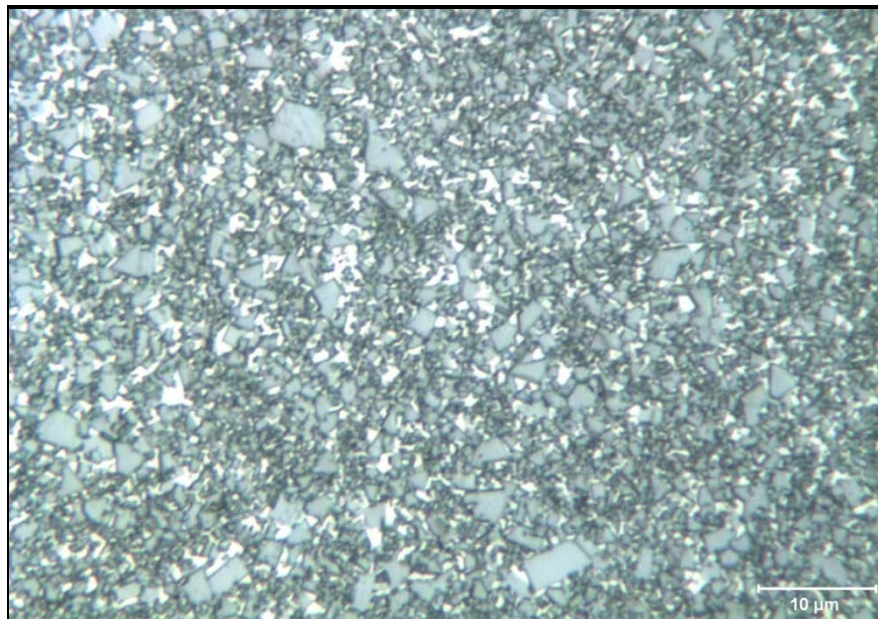


1500X Magnification



HB-411

Composition	
Tungsten Carbide, WC	88.5 ± 0.5%
Cobalt, Co	11.5 ± 0.5%
Microstructure Grain Size (ASTM B-390)	0.8-4.0 μm
Hardness – Rockwell A (ASTM B-294)	90.0 ± 0.7
Transverse Rupture Strength (ASTM B-406)	530,000 PSI
Apparent Porosity (ASTM B-276)	<A02, B00, C00
Density (ASTM B-311)	14.39 ± 0.05

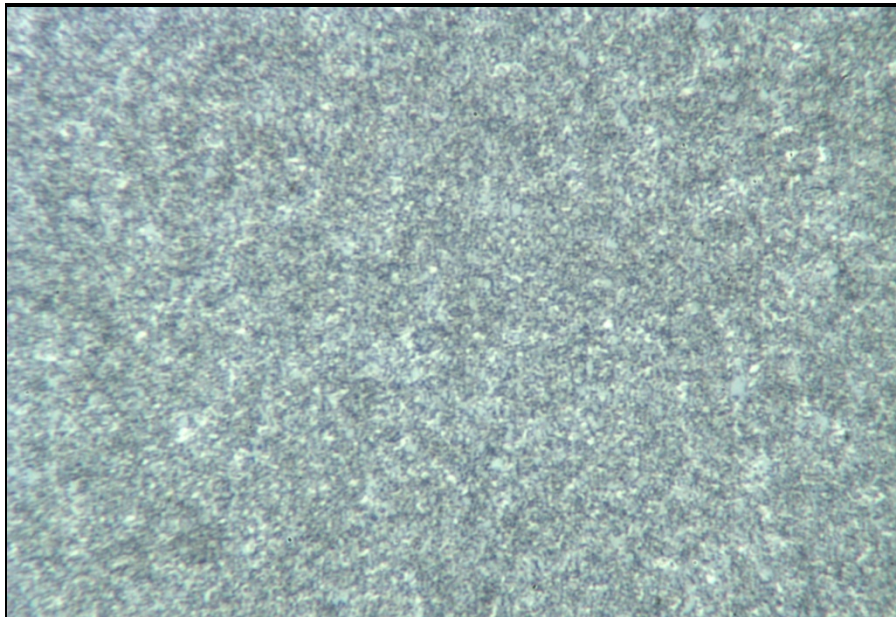


1500X Magnification



HB-512

Composition	
Tungsten Carbide, WC	88.0 ± 0.5%
Cobalt, Co	12.0 ± 0.5%
Microstructure Grain Size (ASTM B-390)	0.6 µm
Hardness – Rockwell A (ASTM B-294)	92.5 ± 0.5
Transverse Rupture Strength (ASTM B-406)	640,000 PSI
Apparent Porosity (ASTM B-276)	<A02, B00, C00
Density (ASTM B-311)	14.20 ± 0.05



1500X Magnification