

References

Acknowledgement is given to the following publications and articles that were used as reference documents in the compilation of this information:

1. Publication A80-184 (10) FO, "Designing with Kennametal," Kennametal Inc., Latrobe, PA.
2. Publication H-9100B - ENG, "Understanding Cemented Carbide," Sandvik Hard Materials, Sweden.
3. Harry C. Moser, "When Should You EDM?" Charmilles Technologies Corporation and Mikron, Lincolnshire, IL.
4. Carl Sommer, "Understanding the Wire EDM Process," taken from the Nontraditional Machining Handbook, *Tooling & Production*, November 1999.
5. N. Langer, "Where Adhesives beat Mechanical Fasteners," Dymax Corporation, *Machine Design*, August 2005.
6. D. Small and P. Courtney, "Fundamentals of Industrial Adhesives," Henkel Corporation, *Advanced Materials and Processes*, May 2005.

Grade Specifications

	Chemical Composition			Hardness HRA	Density g/cm ³	Average Transverse Rupture Strength (psi)
	Weight Percent WC	Co	Other			
0.6 micron ("submicron")						
GC-012F*	88	12		92.2 - 93.2	14.08 - 14.20	475,000
GC-015F*	85	15		90.8 - 91.8	13.79 - 13.92	560,000
0.8 micron ("submicron")						
GC-005	94.5	5.5		93.4 - 94.2	14.88 - 14.97	445,000
GC-010*	90	10		91.4 - 92.2	14.39 - 14.51	520,000
GC-010CR*	89	10	1	92.3 - 93.3	14.25 - 14.35	530,000
GC-015*	85	15		89.3 - 90.3	13.89 - 14.03	535,000
GC-015CR*	84	15	1	90.4 - 91.4	13.74 - 13.86	550,000
1.0 micron						
GC-103	96.3	3.7		92.7 - 93.5	15.12 - 15.21	480,000
GC-106	94	6		91.9 - 92.7	14.86 - 14.97	510,000
GC-109	91	9		91.0 - 91.8	14.54 - 14.66	525,000
2.0 micron						
GC-206	94	6		91.2 - 92.2	14.86 - 14.97	480,000
GC-209	91	9		90.2 - 91.2	14.53 - 14.65	515,000
GC-211*	89	11		89.4 - 90.4	14.33 - 14.45	530,000
3.0 micron						
GC-310*	90	10		89.3 - 90.3	14.46 - 14.58	510,000
GC-313*	87	13		88.1 - 89.1	14.15 - 14.27	515,000
GC-315*	85	15		87.5 - 88.5	13.95 - 14.09	520,000
GC-320*	80	20		85.6 - 86.6	13.46 - 13.64	470,000
GC-325*	75	25		83.5 - 84.7	13.03 - 13.23	440,000
GC-330*	70	30		81.6 - 82.9	12.61 - 12.82	420,000
6.0 micron						
GC-950*	85	15		86.4 - 87.4	13.95 - 14.09	480,000
GC-618*	82	18		85.2 - 86.2	13.67 - 13.81	450,000
11.0 micron						
GC-915*	85	15		85.6 - 86.6	13.95 - 14.09	440,000
1.0 and 6.0 micron (mixed structure)						
GC-606M	94	6		90.4 - 91.4	14.89 - 15.00	480,000
GC-608M	92	8		89.8 - 90.8	14.66 - 14.78	490,000
GC-610M	90	10		88.8 - 89.8	14.46 - 14.58	500,000
GC-612M	88	12		88.2 - 89.2	14.25 - 14.37	510,000

*Available in Wire EDM Grade

Note: Micron sizes refer to the nominal grain size for all grades

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Grade Specifications, *continued*

	Chemical Composition Weight Percent				Hardness HRA	Nominal Grain Size microns	Density g/cm ³	Average Transverse Rupture Strength (psi)
	WC	Co	TaC	Other				
Corrosion Resistant Specialty Grades								
GC-010CR*	89	10		1	92.3 - 93.3	0.8	14.25 - 14.35	530,000
GC-813CT*	86.5	10.5	2	1	90.5 - 91.5	M	14.24 - 14.36	460,000
GC-411CT*	86	11	2	1	88.5 - 89.5	4.0	14.19 - 14.31	490,000
GC-712C*	87	12		1	88.1 - 89.0	6.0	13.96 - 14.04	480,000
GC-613CT*	83	13	3	1	87.4 - 88.4	6.0	14.13 - 14.25	465,000
GC-015CR*	84	15		1	90.4 - 91.4	0.8	13.74 - 13.86	550,000
GC-415CT*	81	16	2	1	87.4 - 88.4	4.5	13.72 - 13.82	450,000
GC-425CT*	70.5	25	4	0.5	83.5 - 84.5	4.0	12.88 - 13.12	470,000

WC/Co Grades with Tantalum Carbide

	WC	Co	TaC	Other	Hardness HRA	Nominal Grain Size microns	Density g/cm ³	Average Transverse Rupture Strength (psi)
GC-0004*	89	7	4					
GC-813CT*	86.5	10.5	2	1	90.5 - 91.5	M	14.24 - 14.36	460,000
GC-411CT*	86	11	2	1	88.5 - 89.5	4.0	14.19 - 14.31	490,000
GC-313T*	85	13	2		88.5 - 89.5	3.0	14.14 - 14.26	490,000
GC-0014*	73	13	14		88.3 - 89.3	3.0	14.02 - 14.14	470,000
GC-613CT*	83	13	3	1	87.4 - 88.4	6.0	14.13 - 14.25	465,000
GC-315T*	83	15	2		87.5 - 88.5	3.0	13.93 - 14.07	495,000
GC-415CT*	81	16	2	1	87.4 - 88.4	4.5	13.72 - 13.82	450,000
GC-618T*	79	18	3		85.3 - 86.3	6.0	13.65 - 13.79	450,000
GC-320T*	77	20	3		85.8 - 86.8	3.0	13.44 - 13.62	450,000
GC-325T*	72	25	3		83.7 - 84.9	3.0	13.01 - 13.21	430,000
GC-425CT*	70.5	25	4	0.5	83.5 - 84.5	4.0	12.88 - 13.12	470,000

WC/Ni Grades

	WC	Ni	Mo ₂ C	Hardness HRA	Nominal Grain Size microns	Density g/cm ³	Average Transverse Rupture Strength (psi)
GC-N061	92.5	6	1.5				
GC-N101	88.5	10	1.5	89.2 - 90.0	1.0	14.30 - 14.42	425,000
GC-N121	86.5	12	1.5	88.1 - 89.1	1.0	14.11 - 14.23	410,000

*Available in Wire EDM Grade

Note: Micron sizes refer to the nominal grain size for all grades

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Metric Conversion Chart

To Convert U.S. System to Metric System

Pressure

psi	to	kPa	multiply by	6.8948
psi	to	MPa	multiply by	0.00689
psi	to	Gpa	multiply by	0.00000689

Density

lb/in ³	to	g/cm ³	multiply by	27.68
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Mass

pound	to	kilogram	multiply by	0.4536
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Length

inch	to	micron	multiply by	25,400.0
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inch	to	millimeter	multiply by	25.4
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Force

lbf	to	N	multiply by	4.448
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Temperature

in/(in°F)	to	m/(M°C)	multiply by	1.8
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°F	to	°C	multiply by	(°F-32)/(1.8)
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°F	to	°K	multiply by	(°F+459.67)/(1.8)
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To Convert Metric System to U.S. System

Pressure

kPa	to	psi	multiply by	0.145
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MPa	to	psi	multiply by	145
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Gpa	to	psi	multiply by	145,038
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Density

g/cm ³	to	lb/in ³	multiply by	0.03613
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Mass

kilogram	to	pound	multiply by	2.2046
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Length

micron	to	inch	multiply by	0.00004
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millimeter	to	inch	multiply by	0.0394
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Force

N	to	lbf	multiply by	0.225
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Temperature

m/(M°C)	to	in/(in°F)	multiply by	0.556
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°C	to	°F	multiply by	(1.8°C)+32
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°K	to	°F	multiply by	(1.8°K)-459.67
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Grit Size Conversion Table

Grit Size	Average Inches	Microns
8	.1818	4620
10	.1362	3460
12	.1003	2550
14	.0830	2100
16	.0650	1660
20	.0528	1340
24	.0408	1035
30	.0367	930
36	.0280	710
46	.0200	508
54	.0170	430
60	.0160	406
70	.0130	328
80	.0105	267
90	.0085	216

Grit Size	Average Inches	Microns
100	.0068	173
120	.0056	142
150	.0048	122
180	.0034	86
220	.0026	66
240	.00248	63
280	.00161	40
320	.00124	32
400	.00090	23
500	.00065	17
600	.00058	14
800	.00037	9
900	.00029	7
1000	.00021	5
1200	.00012	3



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