

Grade	Average WC Grain Size (µm)	Industry Classification	Binder Content (wt. %)	Hardness (HRA)	Density (g/cm ³)	TRS (1000 psi)	Typical Applications	
Grades for Machining Cast Irons and Non-Ferrous Alloys, Woodworking, etc.	HU6C	< 1.0	C2 K05 – K20 M10 – M20	6.0 Co	92.7	14.90	500	Turning of high strength aerospace alloys (nickel-, iron-, and cobalt-based high temperature alloys, titanium alloys), turning of refractory metals (tungsten, molybdenum, zirconium), turning of gray cast iron, turning and milling aluminum alloys. PWA approved.
	HTA	1 - 2	C2 K10 – K30	5.5 Co 4.0 (Ta,Nb)C	92.3	14.90	300	Turning, facing, boring, and milling of high temperature alloys
	HA	1 - 2	C2 K10 – K30	5.5 Co 1.0 (Ta,Nb)C	92.4	14.90	275	General purpose C2 grade for machining cast iron, non-ferrous alloys, wear applications.
	H21 (FK20M)	1 - 2	C2 K10 – K35	6.0 Co	92.0	14.90	325	General purpose C2 grade. Recommended for brazed tool applications in non-ferrous machining and woodworking. C2 milling substrate.
	HU8 (FK20F)	< 1.0	C2 K05 – K30	8.0 Co	92.9	14.70	510	Turning and milling of gray cast iron, aluminum- and titanium-based alloys
	FR10	<1.0	C2 K20 – K30 M25 – M40	10.0 Co	91.9	14.45	540	Premium round tool grade for machining high strength aerospace alloys. Meets GEAE Spec. # 4013366-188.
	H17	<1.0	C2 K20 – K35 M25 – M40	10.0 Co	91.7	14.45	550	Premium general purpose grade for round tools (drills, endmills, etc.). PWA approved.
	H91 (FK40B)	1 - 3	C1 / C11 K35 – K50	11.0 Co	89.7	14.30	380	Heavy duty milling grade for machining at low speeds and interrupted cuts.
	FR12	0.5	C3 K15 – K25 M10 – M25	12.0 Co	92.7	14.25	575	Ultrafine submicron grade for machining high strength materials. Tougher version of FR8.
	HU12	<1.0	C2 K30 – K50 M25 – M40	12.0 Co	91.8	14.25	525	Rough turning and milling gray cast iron, turning steels at slow speeds
H81	1 - 2	C1 / C11	13.0 Co	88.6	14.15	450	Tougher version of H91	
FR15	<1.0	C2 K40 – K50	15.0 Co	90.8	14.00	560	High strength, high toughness grade for round tools (substitute for high speed steel)	
Steel Cutting Grades	T25	1 - 2	C7 P01 – P15	5 Co, 26 TiC & (Ta,Nb)C	92.5	11.80	225	Railroad wheels and axles, finishing cuts on steels and ductile cast iron
	T22 (FP20M)	1 - 2	C6 P10 – P20	7 Co, 12TiC & (Ta,Nb)C	92.0	12.75	270	Threading and milling steel alloys
	TH26 (FM10B)	1 - 3	C6 P15 – P30	5.5 Co, 8 TiC & (Ta,Nb)C	91.5	13.90	275	Substrate for high speed finishing
	NTA	1 - 3	C5 P15 – P35	8.5 Co, 18 TiC & (Ta,Nb)C	91.4	12.15	275	Broad range of machining operations for a variety of steels
	T14 (FP30M)	1 - 3	C5 P20 – P40	9.9 Co, 19 TiC & (Ta,Nb)C	91.2	12.30	300	Premium milling grade
	TH16 (FP25B)	1 - 3	C5 P25 – P40	7 Co, 8 TiC & (Ta,Nb)C	91.1	13.75	300	General purpose substrate for multiphase coatings
	TH76 (FP30B)	1 - 3	C5 / C6 P25 – P 45	8.5 Co, 8 TiC & (Ta,Nb)C	90.5	13.60	350	Broad range of machining operations for a variety of steels
	TO4	1 - 3	C5 P25 – P45	11 Co, 9 TiC & (Ta,Nb)C	90.5	12.95	310	High toughness grade for rough turning, facing, boring, chamfering, and scarfing.

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Metalforming Grades	H91 (FK40B)	1 - 3	C1 / C11 K35 - K50	11.0 Co	89.7	14.30	380	Draw dies and extrusion tooling.
	CE302	3 - 5	C11	12.25 Co	87.8	14.25	400	Dies and extrusion punches
	R61	3 - 5	C12	15.0 Co	86.0	14.00	390	Rod mill rolls, heading dies, wear parts subject to heavy impact
	H71	2 - 4	C12	16.0 Co	87.2	13.90	400	Swaging dies, wear parts, wire flattening rolls
	R52	3 - 5	C13	18.0 Co	84.0	13.75	360	Rod mill rolls
	H20	3 - 5	C14	20.0 Co	84.5	13.50	350	Heading and blanking dies, extrusion tooling, rod mill rolls, wear parts subject to extreme impact
	ND20	3 - 5	C14	20.0 Co, 5 (Ta,Nb)C	86.0	13.40	350	
	H25	3 - 5	C14	25.0 Co	83.0	13.05	350	
	ND25	3 - 5	C14	25.0 Co, 5 (Ta,Nb)C	83.0	13.00	350	
	ND30	3 - 5	C14	30.0 Co	81.0	12.70	325	
Grades for Mining and Construction	P40	1 - 3	C9	6.0 Co	91.2	14.90	420	<ul style="list-style-type: none"> Grades with high abrasion resistance and moderate toughness DTH bit inserts AF63 used in long dome extensions for conical and ballistic shapes Wear applications
	H6	1 - 3	C9	6.0 Co	91.0	14.90	440	
	295	2 - 3	C9	6.0 Co	90.7	14.90	475	
	671	2 - 4	C10	6.0 Co	90.6	14.90	460	
	290	2 - 4	C10	6.0 Co	90.3	14.90	480	
	AF63	3 - 5	C10	6.0 Co	89.5	14.90	450	
	307	1 - 3	C9	7.0 Co	91.3	14.80	490	Mining applications requiring more toughness than the 6% Co grades
	HB72	2 - 4	C9	7.0 Co	90.2	14.80	475	Various mining and construction applications
	H8	1 - 3	C9	8.0 Co	90.5	14.65	480	
	GWC11	1 - 3	C9	8.0 Co	90.3	14.65	475	
	91	2 - 4	C10	8.5 Co	89.3	14.60	475	
	779	2 - 4	C10	9.0 Co	89.5	14.55	460	
	M81	3 - 5	C12	10.0 Co	87.9	14.50	350	Buttons for rotary tricon bits, inserts for percussive bits, geophysical tips for drag bits, etc.
	MPD10	2 - 4	C10	10.0 Co	89.1	14.50	375	
	MPD11	3 - 5	C11	11.0 Co	88.3	14.40	375	
MPD2C	3 - 5	C11	11.5 Co	88.2	14.30	375		
MPD2	3 - 5	C11	12.0 Co	87.8	14.25	400		
Special Wear Applications	HAB3	1 - 3		Proprietary	91.0	14.30	300	Burr blanks
	HAN6	<1.0		6.0 Ni	90.5	15.00	250	Seal rings, valves, nozzles, sleeves, bearings, coal processing, food processing
	HAN10	<1.0		10.0 Ni	90.0	14.50	300	Tougher version of HAN6
	HAR	1 - 3		7.5 Co	91.2	14.50	280	Light impact wear grade for ore handling, coal crushing, pump liners, pug mill paddles, plow blades, etc.
	HAR7	1 - 3		Proprietary	93.3	13.00	220	High wear and corrosion applications, tiles for centrifuges
	NM3	1 - 3		9.0 Co	90.0	13.60	325	Nozzles
	NM15	1 - 3		Proprietary	90.5	9.10	200	Low density grade for impact and wear applications
	HAR100	1 - 3		Proprietary	93.9	14.90	200	High wear and corrosion resistance applications

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Grades for Oil/ Gas Exploration and Mining	90	2-4		10.0 Co	89.1	14.50	470	Grades having the highest levels of toughness and thermal cracking resistance for a given level of abrasion resistance. Specifically designed for use as cutting elements of rotary-cone bits employed for oil and gas exploration and mining. In general, abrasion resistance increases with lower binder content and higher hardness, while toughness and thermal cracking resistance increases with higher binder content.
	251	2-4		10.0 Co	88.9	14.50	460	
	241	2-4		10.0 Co	88.5	14.50	450	
	231	3-5		10.0 Co	87.8	14.50	450	
	222	3-5		10.0 Co	87.5	14.50	435	
	240	2-4		10.25 Co	88.5	14.45	480	
	248	1-3		11.0 Co	89.8	14.40	460	
	284	1-3		11.0 Co	89.4	14.40	460	
	635	2-4		11.0 Co	88.8	14.40	450	
	941	2-4		11.0 Co	88.5	14.40	440	
	931	3-5		11.0 Co	87.8	14.40	420	
	922	3-5		11.0 Co	87.3	14.40	420	
	920	2-4		11.5 Co	87.0	14.35	440	
	906	2-4		11.5 Co	87.8	14.35	450	
	MPD51	1-3		12.0 Co	90.2	14.30	475	
	122	2-4		12.0 Co	87.9	14.30	450	
	120	3-5		12.0 Co	86.6	14.30	410	
	M13	2-4		13.0 Co	88.3	14.20	450	
	147	3-5		14.0 Co	86.0	14.10	450	
	60B	2-4		15.0 Co	87.5	14.00	430	
	RB52	2-4		15.0 Co	87.5	14.00	420	
	DS53	2-4		15.0 Co	86.2	14.00	420	
	50B	2-4		15.0 Co	86.1	14.00	410	
GWC60	2-4		15.0 Co	86.0	14.00	400		
55B	2-4		16.0 Co	86.7	13.90	420		
45B	3-5		16.0 Co	85.5	13.90	420		
40B	3-5		16.0 Co	85.0	13.90	400		
239	2-4		18.0 Co	86.0	13.70	410		

1297 County Line Road
 Madison, Alabama 35756
 Tel: 800-221-4273
 Local: 256-464-7500
 Fax: 800-221-1895
sales@firthsterling.com
www.atifirthsterling.com