

# CEMENTED CARBIDE

## Metal Forming Grade and Application Information

TECHNICAL DATA

### Cemented Tungsten Carbide Grades Used in Metal Stamping, Forming, Cutting, and General Wear Applications

Kennametal Grade Name	Alternate or Legacy Name	Grain Family	Industry Classification		Cobalt Binder (wt. %)	Hardness (HV30 estimated)		Density (g/cm <sup>3</sup> )	TRS (1000 psi)
			C Code	ISO Code		HRA	HV30		
KFF05	K96	Fine	C2	K20	5.5	92.2	1620	14.90	310
KFS06	CD630	Submicron	C4	K05	6.0	93.3	1840	14.90	500
KFS33	K313 HU6C	Submicron		K05-K10	6.0	93.0	1790	14.90	450
KFF24	CD30	Fine/Medium	C2/C9	K20 G10	6.0	91.9	1590	14.87	325
KFM28	CD35 CD36 K322 K95	Medium	C10		9.8	90.8	1440	14.60	400
KFS64	CD636 2210 KMS S105	Submicron		K30	10.0	91.8	1590	14.40	625
KR855		Submicron			10% Mixed Binder	91.8	1590	14.40	420
KFM65	CD18 K94 H91 FK40B	Medium	C11	G20	11.5	89.8	1320	14.30	380
KR466		Fine/Medium			12% Mixed Binder	90.0	1360	14.15	480
K3109	CD337 BT30	Coarse	C12	G25	12.1	88.2	1160	14.20	420
KFM67	CD40 H81	Medium	C11/C12		13.0	88.6	1220	14.15	450
KHC68	CD50 387	Coarse	C13	G30	14.0	88.0	1155	14.13	515
CD650	KFS69 KF315	Submicron	C1	K40	15.0	90.2	1380	13.96	530
KR887		Submicron			15% Mixed Binder	90.2	1380	13.90	435
KHC69	K3150 R61 K92	Coarse	C14	G35	15.0	86.0	990	13.95	425
CD750	2216	Submicron			15.5	90.7	1440	13.82	625
K3520	CD60 H20 K91	Coarse	C14	G40	20.0	84.1	870	13.55	425
GT55	CD70 H25 K90	Coarse	C17	G55	25.0	82.7	805	13.20	465

\*Kennametal application specialists should be consulted to assist in grade selection. Application suitability should be evaluated from initial field performance.

\*CD750 only available as Standard EDM block. Grade properties listed are nominal values and are subject to change or upgrade without notice.

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## Preform Blanks and Wear Components

Grades	Description	Applications
KFS06 KFS33	<b>High wear</b> <b>Lower shock</b>	Used in high-abrasion, high-wear applications for: light draw dies, fine blanking dies, stamping dies for mylar, fine wire draw dies, compacting dies, nozzles, and abrasive waterjet wear parts.
KFF05 KFF24	<b>High wear</b> <b>Light shock</b>	Draw dies, seal rings, compacting dies, wear pads, burnishing tools, paper slitter rings, plainer knives, drills, reamers, saw tips, spray nozzles, floor tile dies, scrapper blades, router bits, wood working tools, stamping dies for light blanking, rubber, abrasive paper, and mylar.
KFM28	<b>Good wear</b> <b>Light shock</b>	Valve lifter discs, knurling wheels, bandsaw guides, draw dies, bar and tube dies, powder metal compacting dies (normal), stamping dies, and medium-size wire bending.
KFS64 KR855	<b>Very good wear</b> <b>Light shock</b>	Coining brass (.010" thick), can die ironing rings, drills (mica), non-gummy steels, rotary drills, crush rolls, compacting dies, stamping dies for razor blades, lead frames (thin copper .030"), annealed copper, and draw dies (300 series stainless).
K3109	<b>Very high strength</b> <b>Heavy impact</b> <b>Low wear</b>	Impacting punches, coining dies, forming dies, can die punches, swaging dies, cold forming, back extrusion punches and dies, high-impact extrusion dies, nail grip dies, very severe draw dies (thick cold-rolled steel .075"), and piercing punches (305 stainless). Works well on gummy steel.
KFM65 KR466	<b>Good wear</b> <b>Medium shock</b> <b>High abrasion resistance</b>	Light blanking dies (silicon steel up to .020"), medium blanking dies (mild steel up to .030"), lamination dies (silicon steel), burnishing rolls, and backward and forward extrusion dies (light impact).
KFM67	<b>Medium impact</b>	Stamping dies, compacting dies (severe), bronze, copper, can die rings, metal-forming dies, draw dies (severe), slitter rings, razor blade dies, coining dies, and drill bits.
CD650 KR887	<b>Low impact</b> <b>Very good wear</b> <b>Very high strength</b>	Stamping dies for razor blades, electronic stamping, lead-frame dies, laminations, spring-steel stampings, crush rolls, and coining dies (hard metal). Not good for stamping thick stainless.
KHC68	<b>Medium impact</b> <b>Good wear</b>	Lamination dies (silicon steel .004" to .040"), blanking dies (mild steel up to .040"), forming dies, scroll dies, mandrels, cut-off knives, compacting dies, boring bars, deep-draw dies for oil filters, pulverizing blades, stamping dies, chain saw teeth, light cold heading dies, gripper jaws, and swaging dies (aluminum).
KHC69 K3520	<b>Heavy shock</b> <b>Heavy impact</b>	Heavy metal-forming applications, such as: swaging dies for gun barrels, header dies, washer dies, light to heavy blanking (up to .062" steel), crushing hammers, rivet sets, backward and forward extrusion dies, and heavy piercing punches.
GT55	<b>Heavy shock</b> <b>Heavy impact</b>	Used in hot and cold metal-forming applications where very severe shock loads are applied, such as: hot forming dies, swaging dies, hex dies, trapped extrusion dies, very heavy blanking dies up to .188" steel, very heavy piercing punches, cold heading dies, nail heading dies, coiling dies, shears, and cutoff dies.

## EDM Block Grades

Corrosion-resistant binder grades optimized for the wire EDM process

Grades	Description	
KR855	<b>Composition:</b>	10% corrosion-resistant binder with submicron grain structure. Very good wear resistance with high edge sharpness but less shock resistance than higher binder grades. Excellent for EDM operations and good for non-ferrous applications.
	<b>Application:</b>	An upgrade to standard 10% submicron grades, KR855 presents ideal wear in high-speed stamping (medium to thin sheets), coining brass (.010" thick), can die ironing rings, non-gummy steels, compacting dies, stamping dies for razor blades, lead frames (thin copper .030"), annealed copper, and draw dies (300 series stainless steel).
KR466	<b>Composition:</b>	12% corrosion-resistant binder with medium/fine-grain structure. Very high strength for medium impact with low wear properties.
	<b>Application:</b>	Light blanking dies (silicon steel, up to .020"), medium blanking dies (mild steel, up to .030"), lamination dies (silicon steel), scroll dies, burnishing rolls, and backward and forward extrusion dies (light impact).
KR887	<b>Composition:</b>	15% corrosion-resistant mixed binder with submicron grain structure for lead-frame and connector stamping. Very high strength and excellent wear resistance for medium-impact applications.
	<b>Application:</b>	Stamping dies for razor blades, electronic stamping, lead-frame dies, laminations, spring-steel stampings, and coining dies (hard metal). Not recommended for stamping thick stainless steel. Use in place of CD650 for difficult to EDM parts, or if corrosive die lubricants are used.

Cobalt binder grades optimized for the wire EDM process

Grades	Description	
CD650	<b>Composition:</b>	Conventional 15% cobalt binder with submicron grain structure for lead-frame and connector stamping. Very high strength and excellent wear resistance for medium-impact applications. Our most popular grade for general-purpose stamping.
	<b>Application:</b>	Stamping dies for razor blades, electronic stamping, lead-frame dies, laminations, spring-steel stampings, and coining dies (hard metal). Not recommended for stamping thick stainless steel.
CD750	<b>Composition:</b>	Conventional 15.5% cobalt binder with ultrafine submicron grain structure for lead-frame and connector stamping. Very high strength and excellent wear resistance for low-impact applications.
	<b>Application:</b>	Extremely thin punches or tools with very fine features will benefit from the ultrafine submicron grain structure, which helps to prevent premature corner washout and maintain edge strength. Also, may be used as an upgrade to CD650 due to increased hardness.

\*This is a reference guide only. Please consult with a Kennametal application specialist prior to choosing a grade.

