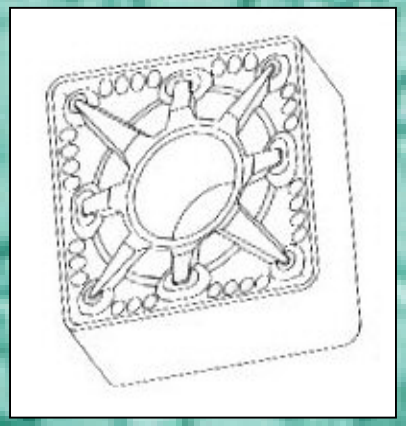
American National Carbide

Technical Information and Crossover Charts for Metalworking Inserts



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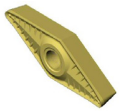
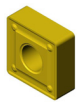
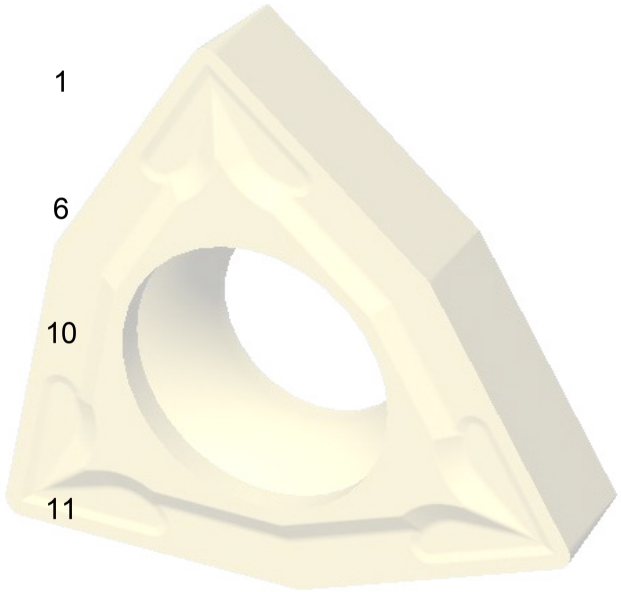
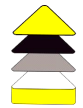
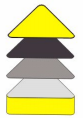






American National Carbide has been a leading manufacturer of cemented carbide products for the metalworking, rock drilling, construction, and wear part industries since 1970. Headquartered in the Houston area for over 35 years, ANC has been recognized time and time again as an example of American manufacturing excellence. Investment in modern equipment allows ANC to maintain close quality control throughout its powder production, pressing, sintering, grinding, and coating operations. Our confidence in our quality is such that our ANC Guarantee™ provides you with the assurance that any product not meeting specification will be replaced free of charge. ANC's team of in-house customer service and technical support personnel are ready to answer your questions. Sales representatives and application specialists are located throughout the United States to provide field support. ANC has a long established reputation of providing exceptional value to its customers based on its principles of quality, performance and service.

SEMI-FINISHING / FINISHING GRADES					
Grade	**Operation**	**Industry Class & ISO Class**	**Material**	**Description**	**Coating**
AN4 Fine Finishing	Boring	C2 K05-K10 H01-H05	Cast Irons	AN4 is an uncoated, unalloyed grade designed specifically for fine finishing of cast irons at medium speeds and feed rates.	Uncoated
AN23 Semi-Finishing to Finishing	Turning Milling Boring	C3 K05-K20 N01-N10 S05-S15	Heat Resistant Alloys,Titanium, Aluminum and Non-Metals	AN23 is an uncoated, hard, unalloyed sub-micron grain grade. Exhibits excellent edge wear resistance combined with very high strength for machining at high speeds and low feeds.	Uncoated
AN3005 Semi-Finishing to Finishing	Turning	C2 K05-K20	Cast and Malleable Irons	AN3005 is a CVD coated grade with thick layers of TiCN, Al_2O_3, and TiN for wear resistance. Recommended for semi-finishing and finishing where wear resistance is required instead of toughness.	 TiN Al_2O_3 TiCN Substrate
AN3015 Semi-Finishing to Finishing	Turning	C2, C6 P05-P25 M05-M25 K05-K25 N01-N15 S05-S25	Most Steels and Irons	Offered exclusively for the American Performance™ Series, AN3015 is based on a hard, cobalt-enriched substrate with a thick CVD coating of TiCN, Al_2O_3, and TiN that provides excellent resistance to the flank wear and plastic deformation that result from high cutting data.	 TiN Al_2O_3 TiCN Substrate
AN3020 Semi-Finishing to Finishing	Turning Milling	C2, C6 P15-P30 M10-M30 K10-K30	Cast Iron and Alloy Steels 25 to 40 HRc	AN3020 is based on a hard substrate with good resistance to plastic deformation due to high hot hardness. A CVD coating of TiCN and Al_2O_3 provides excellent flank wear resistance. Can withstand light interruptions.	 Al_2O_3 TiCN Substrate

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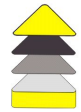
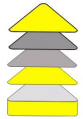
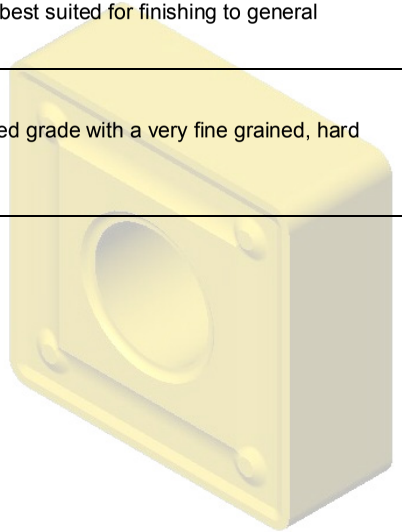
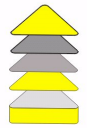
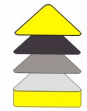
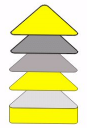
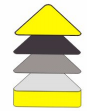
LIGHT ROUGHING / SEMI-FINISHING GRADES					
Grade	**Operation**	**Industry Class & ISO Class**	**Material**	**Description**	**Coating**
AN67 Light Roughing to Finishing	Boring	C7 P05-P15	Carbon and Alloy Steels	AN67 is a very hard, uncoated alloyed grade with very high abrasion resistance. Designed for finishing to general purpose operations.	Uncoated
AN3030 Light Roughing to Finishing	Milling	C2, C5-C6 P15-P40 M15-M40 K15-K30 H15-H30	Steels, Stainless Steels, and Cast Iron	AN3030 is based on a tough, high wear-resistant substrate with a TiCN/Al_2O_3/TiN coating. Specially developed for milling operations, AN3030 can be used on a wide variety of materials at medium to high speeds.	 TiN Al_2O_3 TiCN Substrate
AN4040 Light Roughing to Finishing	Milling	C5-C6 P25-P40 M20-M35	Steels, Stainless Steels, and Cast Iron	AN4040 is a tough, unalloyed substrate coated with a multi-layered TiN/TiC/TiCN/TiN coating. Fine grain structure offers good wear resistance. Preferred choice for drilling.	 TiN TiCN TiC TiN Substrate
AN4105 Light Roughing to Finishing	Boring	C7 P05-P15	Carbon and Alloy Steels	AN4105 is based on a micro-grain, alloyed substrate and has a PVD coating of TiN to enhance lubricity. AN4105 has very high abrasion resistance and is best suited for finishing to general purpose operations.	 TiN Substrate
AN6115 Light Roughing to Finishing	Turning Milling	C3 N05-N15 S10-S25	Aluminum, High-Temp Alloys, and Non-Ferrous Materials	AN6115 is a PVD TiN coated grade with a very fine grained, hard substrate.	 TiN Substrate



ROUGHING / SEMI-FINISHING GRADES

Grade	Operation	Industry Class & ISO Class	Material	Description	Coating
AN2 Roughing to Semi-Finishing	Turning Milling Boring	C2 K10-K25 N05-N15 S10-S20	Cast Iron, High-Temp Alloys, and Non-Ferrous Metals	AN2 is an uncoated, unalloyed grade with good abrasive wear resistance. Designed for medium to rough milling and drilling.	Uncoated
AN6 Roughing to Semi-Finishing	Turning Milling	C5-C6 P25-P35	Steels	AN6 is an uncoated, alloyed grade for general purpose machining of steels. Good balance of wear resistance and toughness. Designed for medium cutting speeds and feed rates with medium interrupted cuts.	Uncoated
AN28 Roughing to Finishing	Milling Parting	C2 K15-K30 N10-N20	Nodular Cast Iron and Non-Ferrous Materials	AN28 is an uncoated, alloyed substrate specifically designed for roughing to finishing operations.	Uncoated
C2VAL Roughing to Semi-Finishing	Turning	C2 K10-K25 N05-N15 S10-S20	Cast Iron, High-Temp Alloys, and Non-Ferrous Materials	C2VAL is an uncoated, unalloyed grade with good abrasive wear resistance. Designed for medium to rough turning.	Uncoated
C5CVAL Roughing to Semi-Finishing	Turning	C5-C6 P20-P35	Carbon and Alloy Steels	C5CVAL has a multi-layered TiN/TiC/TiCN/TiN coating over an alloyed, cobalt-rich substrate. Offers a good balance of wear resistance and toughness. For general purpose to heavy roughing. Can withstand light interruptions.	
AN2015 Roughing to Semi-Finishing	Turning Milling Boring	C2, C6 P10-P40 M10-M30 K10-K30	Steels, Stainless Steels, and Cast Iron	AN2015 is based on a hard, cobalt-enriched substrate with good resistance to plastic deformation due to high hot hardness. A CVD coating of TiCN, Al_2O_3, and TiN gives it excellent shock and abrasive wear resistance.	
AN2020 Roughing to Semi-Finishing	Turning Milling Boring	C6 P15-P30 M15-M30	Carbon and Alloy Steels	AN2020 is based on a hard, cobalt-enriched substrate and has a multi-layered gold coating to provide excellent thermal, wear, and mechanical shock resistance. Perfect general purpose grade for medium speeds and feeds.	
AN2025 Roughing to Semi-Finishing	Turning Boring	C5 P15-P35 M15-M25	Stainless Steels	AN2025 has a tough, cobalt-enriched substrate with a multi-layer TiCN/Al_2O_3/TiN coating to enhance edge strength. This is the preferred grade for high speed machining of stainless steels and most steels.	

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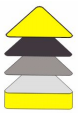
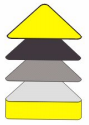
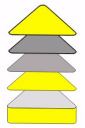
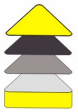
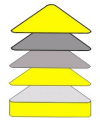
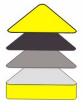
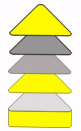
ROUGHING / SEMI-FINISHING GRADES - CONTINUED

Grade	Operation	Industry Class & ISO Class	Material	Description	Coating
AN2120 Roughing to Semi-Finishing	Parting	C5 P30-P40 M25-M35	Steels, Stainless Steels, and Cast Irons	AN2120 is based on a very tough alloyed substrate with a thin PVD coating of TiN. Suitable for parting off at low to medium cutting speeds in unfavorable conditions.	 TiN Substrate
AN3010 Roughing to Semi-Finishing	Turning Parting	C2 K10-K25 N10-N20 H20-H30	Cast Iron	AN3010 is based on a tough, alloyed substrate CVD coated with a TiCN and Al_2O_3 coating. This combination makes AN3010 the preferred grade for high speed operations on all cast irons.	 Al_2O_3 TiCN Substrate
AN3025 Roughing to Semi-Finishing	Turning	C2, C5-C6 P10-P35 M10-M35 K10-K25 S10-S30	Steels and Irons	Offered only in American Performance™ inserts, AN3025 has a tougher substrate than AN3015 with a cobalt-enriched layer under a CVD coating of TiCN, Al_2O_3, and TiN. Excellent wear resistance. AN3025 is an excellent general purpose grade for most steels and irons.	 TiN Al_2O_3 TiCN Substrate
AN4010 Roughing to Semi-Finishing	Drilling Milling Boring	C7 P05-P20	Carbon and Alloy Steels	AN4010 has a micro-grain, alloyed substrate with a multi-layered gold coating, which includes a layer of aluminum oxide to allow it to run at much faster speeds than uncoated grades. AN4010 has excellent abrasion resistance and is best applied in general purpose machining of a wide variety of carbon and alloy steels.	 TiN Al_2O_3 TiCN Substrate
AN4030 Roughing to Semi-Finishing	Drilling Milling Parting	C5 P30-P40 M25-M35	Steels, Stainless Steels, and Cast Iron	AN4030 has a very tough alloyed, cobalt-enriched substrate with a multi-layered TiN/TiC/TiCN/TiN coating. The preferred general purpose grade for parting and grooving at medium to high cutting speeds.	 TiN TiCN TiC TiN Substrate
AN4035 Roughing to Semi-Finishing	Turning	C5 P25-P45 M25-M35	Steels and Stainless Steels	AN4035 has a CVD coating of TiCN, Al_2O_3, and TiN over a very tough, cobalt-enriched substrate. This combination gives it excellent wear resistance and edge strength.	 TiN Al_2O_3 TiCN Substrate
AN4120 Roughing to Semi-Finishing	Milling	C5 P30-P40 M25-M40	Steels and Stainless Steels	AN4120 has a very tough cobalt-enriched substrate that is PVD coated with a thin layer of TiCN to provide abrasion resistance and edge strength. Preferred grade for rough milling steels and stainless steels.	 TiCN Substrate

ROUGHING GRADES

Grade	Operation	Industry Class & ISO Class	Material	Description	Coating
AN20 Roughing to Medium Machining	Milling	C1 K25-K40 N20-N35 S20-S35	Cast Iron, High-Temp Alloys, and Non-Ferrous Materials	AN20 is an uncoated, unalloyed micro-grain grade with medium abrasion resistance and high fracture toughness. Designed for rough milling and drilling.	Uncoated
AN50 Roughing, Interrupted Cuts	Turning Parting	C5 P30-P40 M25-M35	Steels	AN50 is a very tough uncoated alloyed grade suitable for roughing operations. Performs well at low to medium cutting speeds with medium to high feed rates and handles severe interrupted cuts.	Uncoated
AN2035 Roughing, Interrupted Cuts	Turning Milling	C5 P25-P40 M20-M35	Steels and Cast Iron	AN2035 has a very tough, cobalt-enriched substrate with a four-layer coating of TiN, TiC, TiCN, and TiN. Designed for general purpose machining and roughing at low to medium speeds and medium to high feed rates. Can withstand severe interruptions.	
AN3035 Roughing, Interrupted Cuts	Turning	C2, C5 P20-P40 K15-K30 H10-H20	Steels and Cast Iron	Offered exclusively in American Performance™ inserts, AN3035 has a very tough, cobalt-enriched substrate with a thick CVD coating of TiCN, Al_2O_3, and TiN. Preferred grade for machining in unfavorable conditions or with low speeds, high feeds, and heavy depths of cut.	
AN4045 Roughing, Interrupted Cuts	Turning Milling Drilling Parting	C5 P30-P45 M25-M40	Steels and Stainless Steels	AN4045 is an extremely tough grade with a four-layer coating of TiN, TiC, TiCN, and TiN. This is an excellent grade for machining at low cutting speeds and very high feed rates in severe interrupted cuts. Designed for heavy roughing cuts.	

GRADE COMPARISON CHART – CVD COATED GRADES (ISO CLASS P)

ISO CLASS	INDUSTRY CLASS	ANC GRADE	ISCAR	KENNAMETAL	KORLOY	KYOCERA	MITSUBISHI	NEWCOMER	RTW	TUNGALOY	SANDVIK	SECO CARBOLOY	STELLRAM	SUMITOMO	VALENITE
P05 - P10	C8	AN3015 AN4010	IC8005 IS520N			CA5505 CA5515 CR7015	UE6005	NN70 NN72	RC807 RC8010	T9005	GC4015 GC4005	TX100	NL25 MP37	AC700C	SV305 SV405 SV310 SV510
P10 - P20	C7	AN2015 AN2020 AN2025 AN3015 AN3020 AN3025 AN3030 AN4010	IC805 IC8048 IC9015	KC8050 KC9110	NC310	CA5525 CR7015 CR7025 CR9025	UE6005 UE6010 UE6020	NN55 NN60 NP1000 NP1100 NP4000 NP4100	RC807 RC906 RC8010 RC8025	T9015	GC4005 GC4015 GC4025	TP1000 TX150	NL25 NL30 MP37	AC2000 AC3000	SV310 SV315 SV320 SV325 SV410 SV415 SV510 SV515
P20 - P30	C6	AN2015 AN2020 AN2025 AN2035 AN3015 AN3020 AN3025 AN3030 AN3035 AN4035 AN4040 C5CVAL	IC825 IC9025 IC50M	KC8050 KC9040 KC9015 KU30T	NC320	CA5525 CR9025	UE6025	NN5CP NN6CP NN51 NN52 NN60 NN94	RC706 RC906 RC8025 RC8040	T9025	GC2015 GC4015 GC4025 GC4035	TP2000	MP37 NL25 NL30	AC2000 AC3000	SV230 SV235 SV315 SV325 SV415 SV515 SV525
P30 - P50	C5	AN2015 AN2025 AN2035 AN3025 AN3030 AN3035 AN4030 AN4035 AN4040 AN4045 C5CVAL	IC540 IC656 IC825	KC850 KC9040 KC30T	NC330 NCM325	CA5535	UE6035	NK94 NK620 NN51 NP94	755 RC706 RC906 RC8040	T9035	GC235 GC2025 GC4035	TP3000 TP400	NL30 NL92	AC3000	SV230 SV235 SV325 SV330 SV515 SV525

Comparisons based on published grade information from each indicated brand.

GRADE COMPARISON CHART – CVD COATED GRADES (ISO CLASS M AND K)

ISO CLASS	INDUSTRY CLASS	ANC GRADE	ISCAR	KENNAMETAL	KORLOY	KYOCERA	MITSUBISHI	NEWCOMER	RTW	TUNGALOY	SANDVIK	SECO CARBOLOY	STELLRAM	SUMITOMO	VALENITE
M05 - M25		AN2015 AN2020 AN2025 AN2035 AN3015 AN3020 AN3025 AN3030 AN4040		KC8050 KC9225 KU30T	NC3255	CA6015 CR7015 CR9025	US7020	NA02 NK02 NK4000 NN55 NN60 NP1000 NP4000		T6020		TP30 TP2000 TP3000	NL25 NL30		SV310 SV315 SV325 SV405 SV410 SV515 SV525
M25 - M50		AN2015 AN2020 AN2035 AN3020 AN3025 AN3030 AN4030 AN4035 AN4040 AN4045	IC3028	KC8050 KC9225 KC9240 KC9245 KU30T	NC330		US735	NK94 NK620 NN51 NN52 NP94		T6030	GC2025 GC4035	TP40 TP400	NL30 NL92	AC304 AC3000	SV230 SV235 SV320 SV330 SV415
K05 - K25	C3-C4	AN2015 AN3005 AN3010 AN3015 AN3020 AN3025 AN3030 AN3035	IC428 IC4028 IC9007	KC9110 KC9315 KC9325	NC305K NCM31K	CA4010 CA4115 CA4120 CR7015	UC5005 UC5015 UC5105 UC5115	NN21 NE02 NA02	RC807 RC8010 RC8025	T5010	GC3005 GC3015	TX100 TX150	NL25 NL30	AC300G AC700G	SV305 SV310 SV315 SV510 SV515
K25 - K50	C1-C2	AN2015 AN3020 AN3030 AN3035	IC428 IC4050	KC9110 KC9125 KC9325	NC315K NCM20K	CA4120	UC5115	NN10 NN311	955 RC706 RC906 RC8025	T5020	GC3005 GC3025	TX150	NL25 NL30	AC700G	SV230 SV325 SV525

Comparisons based on published grade information from each indicated brand.

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GRADE COMPARISON CHART – CVD COATED GRADES (ISO CLASS N, S AND H)

ISO CLASS	INDUSTRY CLASS	ANC GRADE	ISCAR	KENNAMETAL	KORLOY	KYOCERA	MITSUBISHI	NEWCOMER	RTW	TUNGALOY	SANDVIK	SECO CARBOLOY	STELLRAM	SUMITOMO	VALENITE
N	C3	AN3010 AN3015			NC305K			NE02 NA02							
S	C2-C3 C6-C7	AN3015 AN3025		KU30T		CA6015 CR7015		NN21 NN22			GC1015 GC1025				
H		AN3010 AN3030 AN3035										TP1000 TX100 TX150			

GRADE COMPARISON CHART – PVD COATED GRADES

ISO CLASS	INDUSTRY CLASS	ANC GRADE	ISCAR	KENNAMETAL	KORLOY	KYOCERA	MITSUBISHI	NEWCOMER	RTW	TUNGALOY	SANDVIK	SECO CARBOLOY	STELLRAM	SUMITOMO	VALENITE
P		AN2120 AN4105		K725M KC5010 KC5025	PC130 PC230 PC3530	PR630 PR660 PR730 PR830 PR915 PR930	VP15TF UP20M	PV52 PA52 PV60 PV72 PA72	R541	AH330 GH330	GC4125 GC2145 GC1025 GC1020	CP200 CP250 CP500	SFZ		VC935
M		AN2120		K725M KC5010 KC5025	PC9030	PR630 PR660 PR730 PR830 PR915 PR925 PR930	VP15TF UP20M				GC4125 GC2145 GC1025 GC1015 GC1020 GC2035	CP200 CP250 CP500	SFZ		VC901 VC902 VC928 VC929
N	C3	AN6115		K410M KC5010	PC205K PC215K			PV32 PA32							
S	C2-C3 C6-C7	AN6115		K410M KC5010 KC5025 KC5510		PR905 PR915 PR660	VP05RT VP10RT VP15TF	PV22 PA22		AH110 AH120	GC4125 GC2145 GC1015 GC1025	CP200 CP250 CP500		EH510Z EH520Z	

Comparisons based on published grade information from each indicated brand.

GRADE COMPARISON CHART – UNCOATED GRADES

ISO CLASS	INDUSTRY CLASS	ANC GRADE	ISCAR	KENNAMETAL	KORLOY	KYOCERA	MITSUBISHI	NEWCOMER	RTW	TUNGALOY	SANDVIK	SECO CARBOLOY	STELLRAM	SUMITOMO	VALENITE
P05 - P20	C7 – C8	AN67	IC70	K45 K7H	ST10 ST15		STi10T UTi10T	N70 N72	CY14 CY2 CY9	TX10S TX10D TU10	S10 S20 HM	S1F	T24 T25	ST05E ST10P	VC7 VC76
P20 - P30	C6	AN6		K125M K40 K216	ST20 ST30A MA2	PW30	UTi20T STi20	N60 5602 N6CP	CY11 CY7 CY25	TU20 TX25 UX25	SH SM	S2	T22 TXH TXL	ST20E U10E H10E	VC27
P30 – P50	C5	AN6 AN50	IC50M IC54	K420 K21 K82 K29 K84	MA2 ST30A	PW30	UTi20T STi40T STi30	N51 N52 N55 N5CP	CY16 CY55 CY30M	UX30 TX30 TX40	S4 S6 SM30 SMA	S4 S6 S10M S60M	T04 T12 T14 S3X7	ST30E A30N A40 U2	VC5 VC35M VC135 VC56
M		AN50			U10		UTi20T			TU10 UX30 TU40	H13A	890 HX 883	S3X7		VC29 VC101
K05 - K20	C3 – C4	AN23 AN4 AN2 AN28 C2VAL	IC20 IC08 IC4	K313 K68 K11 K8	H01	KW10	HTi10 GTi05 HTi05T	NP32 NP34 N40	CQ3 CQ4 CQ6 CQ23	F TH03 KS0SF	H10 H1P	H15 890 895	HF HA HU6	H3 EH10 EH510	VC3 VC29
K20 – K50	C1 - C2	AN2 AN20 AN28 C2VAL	IC2 IC28	K1 K9 K10 K110M K6 K8735	H05 H10 G10		GTi10 GTi20 TF15 HTi20T RT9010	N21 N22 N25 N10 N311 N406	CQ2 CQ10 CQ22 CQ24 CQ28	M TH10 KS20 G2 G3	H10A H13A R1P R4	HX H20 H25 H30 883	H21 HAR HTA H22 K20	A1 G10E EH20 EH520	VC28 VC2 VC121 VC111 VC101
N	C3	AN2 AN20 AN23 AN28 C2VAL		K313 K68	H01	KW10	HTi10 GTi05	NP32 NP34	CQ3 CQ4	F TH03	H10 H13A	H15 890 895	HA HU6	H1 H2	VC29
S	C2-C3 C6-C7	AN2 AN20 AN23 C2VAL		K313 K68		KW10	RT9005 RT9010 TF15	N25 NP32 N70			H10A H10F H13A	890		H1 EH10 EH510	
H		AN4							CQ4		H13A	890 HX			

Comparisons based on published grade information from each indicated brand.

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CHIP CONTROL COMPARISON CHARTS

NEGATIVE RAKE CHIP CONTROL CHART

	ANC	ISCAR	KENNAMETAL	KORLOY	KYOCERA	MITSUBISHI	NEWCOMER	RTW	TUNGALOY	SANDVIK	SECO CARBOLOY	STELLRAM	SUMITOMO	VALENITE
FINISHING	P2 GF	SF NF	FF UF	HU HF	GP, DP, XP XP-T, GU	FS	MR, MT MX, F	FF PL	TF, SS TS, 01, ZF	MF, PF QF	MF2 FF1	2B	EFA, EFL EGU	LF, PF, MF GF, UF, HF
LIGHT MACHINING	P2 FM	PP LF	FN FP	HS	CQ HQ	C, SA SH	GZ, MZ FS	P Z	TM	QM	MF1	3G	ESA, ELU, ESX EEX, EUP	MM, LM TM
MEDIUM MACHINING	P3, MM HM, GM	GN	MN, MF, MP GP, MS	HM	GS, VF XQ, HU	MV, MA MH, MS	MG R	GA PG	TM, SM, AR, ZM, DM	PM, MM KM, SM	M3, MF3 M1	2N 4T	EGU, EG EUX, ENG	RM, UM SL, GM
ROUGHING	P3, P4 LR, KR, GR	TNM NR	RN, UN T-20, RP	HR	PS, PT, HS HT, CS, XS ZS, GC, SU, ST	GH	71, 74 63, R	GR PH	TH	PR, MR, KR QR, 23	M1, M5 MR3, R6	4T, 4M 5V	EMU, EMX EENZ	RH GR
HEAVY ROUGHING	P4, P5 HR, XR	NM	RM, RP P, MA	GH	HX	H2 HV	MN, MM H	HR	TU	HR 31	MR4, MR7, R4 R7, 56, 57, RR9	4M 5V	EHG, ENP EHP	UR HS

POSITIVE RAKE CHIP CONTROL CHART

	ANC	ISCAR	KENNAMETAL	KORLOY	KYOCERA	MITSUBISHI	NEWCOMER	RTW	TUNGALOY	SANDVIK	SECO CARBOLOY	STELLRAM	SUMITOMO	VALENITE
FINISHING	FF HF	17 MR, MT	11 UF	HFP	CF, XP, GP DP, CK	FV SV	MR MT		PF	PF, UF MF, KF	FF1	61	EFP, EFK FW, FX, FY	CP, FL, 2A FM, FH, FF
LIGHT MACHINING	LM	19	LF GT-LF		XQ			G			F1	62, 64 73	R/L, ESU EFM, ENK	FR
MEDIUM MACHINING	HP SM	14 SM	MF, T-20 GT-HP	HMP B25	GK, HQ, G	MV	MT MM	GP	PS, CM 24	PM, UM MR, KR	F2		EMU ENF	RP
ROUGHING	AR MR	MX		C25						PR, UR MR, KR				

Comparisons based on published chip control information from each indicated brand.

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Cutting Data, Geometry and Grade Recommendations - *American Performance Turning Inserts*

ISO Code	Ind. Code	Brinell Hardness	Material	Application	Feed (inches/rev)	Speed (surface feet/min)	D.O.C. (inches)	Negative Rake Inserts				
								Choice 1 Geometry	Choice 2 Geometry	Choice 1 Grade	Choice 2 Grade	Radius (1/32")
P	C5-C8	150	Non-alloy carbon steel	*Fine Finishing*	.002-.006	1400	.010-.079	xNMG-P2		AN3015		1
				Light Machining	.004-.012	1290	.020-.079	xNMG-P2	xNMG-P3	AN3015	AN3025	1,2
				Medium Machining	.008-.020	1050	.059-.157	xNMG-P3		AN3025		2
				Light Roughing	.016-.039	940	.118-.394	xNMG-P3	xNMG-P4	AN3025	AN3035	2,3
				Roughing	.020-.059	850	.236-.591	xNMG-P4		AN3035		3,4
				Heavy Roughing	>.028	650	.315-.787	xNMG-P5		AN3035		6
		180	Low-alloy steel	*Fine Finishing*	.002-.006	1510	.010-.079	xNMG-P2		AN3015		1
				Light Machining	.004-.012	1390	.020-.079	xNMG-P2	xNMG-P3	AN3015	AN3025	1,2
				Medium Machining	.008-.020	1070	.059-.157	xNMG-P3		AN3025		2
				Light Roughing	.016-.039	950	.118-.394	xNMG-P3	xNMG-P4	AN3025	AN3035	2,3
				Roughing	.020-.059	860	.236-.591	xNMG-P4		AN3035		3,4
				Heavy Roughing	>.028	680	.315-.787	xNMG-P5		AN3035		6
		200	High-alloy steel, annealed	*Fine Finishing*	.002-.006	1110	.010-.079	xNMG-P2		AN3015		1
				Light Machining	.004-.012	950	.020-.079	xNMG-P2	xNMG-P3	AN3015	AN3025	1,2
				Medium Machining	.008-.020	700	.059-.157	xNMG-P3		AN3025		2
				Light Roughing	.016-.039	630	.118-.394	xNMG-P3	xNMG-P4	AN3025	AN3035	2,3
				Roughing	.020-.059	580	.236-.591	xNMG-P4		AN3035		3,4
				Heavy Roughing	>.028	470	.315-.787	xNMG-P5		AN3035		6
		200	Low-alloy steel castings	*Fine Finishing*	.002-.006	700	.010-.079	xNMG-P2		AN3015		1
				Light Machining	.004-.012	650	.020-.079	xNMG-P2	xNMG-P3	AN3015	AN3025	1,2
				Medium Machining	.008-.020	570	.059-.157	xNMG-P3		AN3025		2
				Light Roughing	.016-.039	440	.118-.394	xNMG-P3	xNMG-P4	AN3025	AN3035	2,3
				Roughing	.020-.059	390	.236-.591	xNMG-P4		AN3035		3,4
				Heavy Roughing	>.028	300	.315-.787	xNMG-P5		AN3035		6

The recommended cutting data above represents suggested starting values and can be changed during application depending on the workpiece material being machined.

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Cutting Data, Geometry and Grade Recommendations - *American Performance Turning Inserts*

ISO Code	Ind. Code	Brinell Hardness	Material	Application	Feed (inches/rev)	Speed (surface feet/min)	D.O.C. (inches)	Negative Rake Inserts				
								Choice 1 Geometry	Choice 2 Geometry	Choice 1 Grade	Choice 2 Grade	Radius (1/32")
M		180	Stainless steel, austenitic, bar forgings	*Light Machining*	.004-.012	800	.020-.079	xNMG-P2	xNMG-P3	AN3015		1,2
				Medium Machining	.008-.020	580	.059-.157	xNMG-P3		AN3025	AN3035	2
				Light Roughing	.016-.039	530	.118-.394	xNMG-P3	xNMG-P4	AN3025	AN3035	2,3
				Roughing	.020-.059	440	.236-.591	xNMG-P4		AN3035		3,4
				Heavy Roughing	>.028	300	.315-.787	xNMG-P5		AN3035		6
		180	Stainless steel, austenitic/ferritic, bar forgings	*Light Machining*	.004-.012	730	.020-.079	xNMG-P2	xNMG-P3	AN3015		1,2
				Medium Machining	.008-.020	500	.059-.157	xNMG-P3		AN3025	AN3035	2
				Light Roughing	.016-.039	390	.118-.394	xNMG-P3	xNMG-P4	AN3025	AN3035	2,3
				Roughing	.020-.059	370	.236-.591	xNMG-P4		AN3035		3,4
				Heavy Roughing	>.028	300	.315-.787	xNMG-P5		AN3035		6
K	C1-C4	260	Gray cast iron, high tensile	*Light Machining*	.004-.012	810	.020-.079	xNMG-P2	xNMG-P3	AN3015		1,2
				Medium Machining	.008-.020	730	.059-.157	xNMG-P3		AN3025	AN3035	2
				Light Roughing	.016-.039	650	.118-.394	xNMG-P3	xNMG-P4	AN3025	AN3035	2,3
				Roughing	.020-.059	620	.236-.591	xNMG-P4		AN3035		3,4
				Heavy Roughing	>.028	590	.315-.787	xNMG-P5	xNMG-P4	AN3035	AN3025	6
		250	Nodular cast iron, pearlitic	*Light Machining*	.004-.012	760	.020-.079	xNMG-P2	xNMG-P3	AN3015		1,2
				Medium Machining	.008-.020	650	.059-.157	xNMG-P3		AN3025	AN3035	2
				Light Roughing	.016-.039	610	.118-.394	xNMG-P3	xNMG-P4	AN3025	AN3035	2,3
				Roughing	.020-.059	580	.236-.591	xNMG-P4		AN3035		3,4
				Heavy Roughing	>.028	550	.315-.787	xNMG-P5	xNMG-P4	AN3035	AN3025	6
N	C3	90	Aluminum alloys	*Fine Finishing*	.002-.006	650	.010-.079	xNMG-P2		AN3015		1
				Light Machining	.004-.012	600	.020-.079	xNMG-P2	xNMG-P3	AN3015		1,2
				Medium Machining	.008-.020	550	.059-.157	xNMG-P3		AN3015		2
S	C2/C6	R_m 1050	Titanium alloys	*Fine Finishing*	.002-.006	210	.010-.079	xNMG-P2		AN3015		1
				Light Machining	.004-.012	170	.020-.079	xNMG-P2	xNMG-P3	AN3015	AN3025	1,2
				Medium Machining	.008-.020	160	.059-.157	xNMG-P3		AN3025		2
	C3/C7	350	Heat-resistant alloys, nickel-based	*Fine Finishing*	.002-.006	125	.010-.079	xNMG-P2		AN3015		1
				Light Machining	.004-.012	60	.020-.079	xNMG-P2	xNMG-P3	AN3015	AN3025	1,2
				Medium Machining	.008-.020	60	.059-.157	xNMG-P3		AN3025		2
H		HrC 60	Hard steel, chilled cast iron	*Medium Machining*	.008-.020	320	.059-.157	xNMG-P3	xNMG-P4	AN3035		2
				Light Roughing	.016-.039	280	.118-.394	xNMG-P3	xNMG-P4	AN3035		2,3
				Roughing	.020-.059	220	.236-.591	xNMG-P4		AN3035		3,4
				Heavy Roughing	>.028	180	.315-.787	xNMG-P5	xNMG-P4	AN3035		6

The recommended cutting data above represents suggested starting values and can be changed during application depending on the workpiece material being machined.

Cutting Data, Geometry and Grade Recommendations - *American Standard Turning Inserts*

ISO Code	Ind. Code	Brinell Hardness	Material	Application	Feed (inches/ rev)	Speed (surface feet/min)	D.O.C. (inches)	Negative Rake Inserts					Positive Rake Inserts			
								Choice 1 Geometry	Choice 2 Geometry	Choice 1 Grade	Choice 2 Grade	Radius (1/32")	Geometry	Choice 1 Grade	Choice 2 Grade	Radius (1/32")
P	C5-C8	150	Non-alloy carbon steel	*Fine Finishing*	.002-.006	1400	.010-.079	xNMG-FF		AN2020		1	xCGT, xPGR	AN2020	AN2015	0
				Light Machining	.004-.012	1290	.020-.079	xNMG-LM	xNGM	AN2020	AN6	1	xPGH-HF	AN2025		1
				Medium Machining	.008-.020	1050	.059-.157	xNMG-GM	xNMP	AN2020	AN2015	2	xPGH, xPGT	AN2020	AN2015	2
				Light Roughing	.016-.039	940	.118-.394	xNMG-LR	xNMG-GM	AN4035	AN2020	2	xPGH, xPGT	AN2020	AN2015	2
				Roughing	.020-.059	850	.236-.591	xNMG-GR	xNMG-LR	AN2035	AN6	3				
				Heavy Roughing	>.028	650	.315-.787	xNMM-HR	xNMM-XR	AN4035	AN2015	4				
		180	Low-alloy steel	*Fine Finishing*	.002-.006	1510	.010-.079	xNMG-FF		AN2020		1	xCGT, xPGR	AN2020	AN2015	0
				Light Machining	.004-.012	1390	.020-.079	xNMG-LM	xNGM	AN2020	AN6	1	xPGH-HF	AN2025		1
				Medium Machining	.008-.020	1070	.059-.157	xNMG-GM	xNMP	AN2020	AN2015	2	xPGH, xPGT	AN2020	AN2015	2
				Light Roughing	.016-.039	950	.118-.394	xNMG-LR	xNMG-GM	AN4035	AN2020	2	xPGH, xPGT	AN2020	AN2015	2
				Roughing	.020-.059	860	.236-.591	xNMG-GR	xNMG-LR	AN2035	AN6	3				
				Heavy Roughing	>.028	680	.315-.787	xNMM-HR	xNMM-XR	AN4035	AN2015	4				
		200	High-alloy steel, annealed	*Fine Finishing*	.002-.006	1110	.010-.079	xNMG-FF		AN2020		1	xCGT, xPGR	AN2020	AN2015	0
				Light Machining	.004-.012	950	.020-.079	xNMG-LM		AN2020		1	xPGH-HF	AN2025		1
				Medium Machining	.008-.020	700	.059-.157	xNMG-GM	xNMP	AN2020	AN2015	2	xPGH, xPGT	AN2020	AN2015	2
				Light Roughing	.016-.039	630	.118-.394	xNMG-LR	xNMG-GM	AN4035	AN2020	2	xPGH, xPGT	AN2020	AN2015	2
				Roughing	.020-.059	580	.236-.591	xNMG-GR	xNMG-LR	AN2035	AN6	3				
				Heavy Roughing	>.028	470	.315-.787	xNMM-HR	xNMM-XR	AN4035	AN2015	4				
		200	Low-alloy steel castings	*Fine Finishing*	.002-.006	700	.010-.079	xNMG-FF		AN2020		1	xCGT, xPGR	AN2020	AN2015	0
				Light Machining	.004-.012	650	.020-.079	xNMG-LM		AN2020		1	xPGH-HF	AN2025		1
				Medium Machining	.008-.020	570	.059-.157	xNMG-GM	xNMP	AN2020	AN2015	2	xPGH, xPGT	AN2020	AN2015	2
				Light Roughing	.016-.039	440	.118-.394	xNMG-LR	xNMG-GM	AN4035	AN2020	2	xPGH, xPGT	AN2020	AN2015	2
				Roughing	.020-.059	390	.236-.591	xNMG-GR	xNMG-LR	AN2035	AN6	3				
				Heavy Roughing	>.028	300	.315-.787	xNMM-HR	xNMM-XR	AN4035	AN2015	4				

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Cutting Data, Geometry and Grade Recommendations - *American Standard Turning Inserts*

ISO Code	Ind. Code	Brinell Hardness	Material	Application	Feed (inches/rev)	Speed (surface feet/min)	D.O.C. (inches)	Negative Rake Inserts					Positive Rake Inserts			
								Choice 1 Geometry	Choice 2 Geometry	Choice 1 Grade	Choice 2 Grade	Radius (1/32")	Geometry	Choice 1 Grade	Choice 2 Grade	Radius (1/32")
M		180	Stainless steel, austenitic, bar forgings	*Light Machining*	.004-.012	800	.020-.079	xNMG-LM	xNGM	AN2020	AN6	1	xPGH-HF	AN2025		1
				Medium Machining	.008-.020	580	.059-.157	xNMG-MM	xNMG-HM	AN2025	AN2020	2	xPGH	AN2015		2
				Light Roughing	.016-.039	530	.118-.394	xNMG-MM	xNMG-LR	AN2025	AN4035	2	xPGH	AN2015		2
				Roughing	.020-.059	440	.236-.591	xNMG-GR		AN2035		3				
				Heavy Roughing	>.028	300	.315-.787	xNMM-HR	xNMM-XR	AN4035		4				
		180	Stainless steel, austenitic/ferritic, bar forgings	*Light Machining*	.004-.012	730	.020-.079	xNMG-LM	xNGM	AN2020	AN6	1	xPGH-HF	AN2025		1
				Medium Machining	.008-.020	500	.059-.157	xNMG-MM	xNMG-HM	AN2025	AN50	2	xPGH	AN2015		2
				Light Roughing	.016-.039	390	.118-.394	xNMG-MM	xNMG-LR	AN2025	AN4035	2	xPGH	AN2015		2
				Roughing	.020-.059	370	.236-.591	xNMG-GR		AN2035		3				
				Heavy Roughing	>.028	300	.315-.787	xNMM-HR	xNMM-XR	AN4035		4				
K	C1-C4	260	Gray cast iron, high tensile	*Light Machining*	.004-.012	810	.020-.079	xNMG-LM	xNMG-FF	AN2	AN23	1	xPGB, xPGW	AN3005	AN2	.002-.007
				Medium Machining	.008-.020	730	.059-.157	xNMA	xNMG-GM	AN2	AN2015	2	xPGB, xPGW	AN3005	AN2	2
				Roughing	.020-.059	620	.236-.591	xNMA-KR	xNMG-LR	AN2015	AN3005	2	xPGB, xPGW	AN3005	AN2	2-4
				Heavy Roughing	>.028	590	.315-.787	xNMM-HR	xNMM-XR	AN2015	AN3005	3				
		250	Nodular cast iron, pearlitic	*Light Machining*	.004-.012	760	.020-.079	xNMG-LM	xNMG-FF	AN2	AN23	1	xPGB, xPGW	AN3005	AN2	.002-.007
				Medium Machining	.008-.020	650	.059-.157	xNMA	xNMG-GM	AN2	AN2015	2	xPGB, xPGW	AN3005	AN2	2
				Roughing	.020-.059	600	.236-.591	xNMA-KR	xNMG-LR	AN2015	AN3005	2	xPGB, xPGW	AN3005	AN2	2-4
				Heavy Roughing	>.028	570	.315-.787	xNMM-HR	xNMM-XR	AN2015	AN3005	3				
N	C3	90	Aluminum alloys	*Medium Machining*	.008-.020	650	.059-.157						xCGT-HP	AN6115		2
				Roughing	.020-.059	550	.236-.591						xPGM-AR	AN6115		3
S	C2/C6	R_m 1050	Titanium alloys	*Light Machining*	.004-.012	210	.020-.079	xNGP	xNMG-SM	AN23	AN2	1	xPGB, xPGW	AN2		1
				Medium Machining	.008-.020	170	.059-.157	xNMG-HM	xNMG-MM	AN2		2	xPGB, xPGW	AN2		2
				Roughing	.020-.059	160	.236-.591	xNMM-MR		AN2						
	C3/C7	350	Heat-resistant alloys, nickel-based	*Light Machining*	.004-.012	125	.020-.079	xNGP	xNMG-SM	AN23	AN2	1	xPGB, xPGW	AN2		1
				Medium Machining	.008-.020	60	.059-.157	xNMG-MM	xNMG-HM	AN2		2	xPGB, xPGW	AN2		2
				Roughing	.020-.059	60	.236-.591	xNMM-MR		AN2						

The recommended cutting data above represents suggested starting values and can be changed during application depending on the workpiece material being machined.

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MILLING INSERT - EQUIVALENT CHART

ANC INSERT STYLE	MILLING CATALOG PAGE	CARBOLOY	INGERSOLL	ISCAR	K-TOOL	KENNAMETAL	MILLING SPEC.	MILLTECH	SANDVIK	STELLRAM	VALENITE	WAUKESHA	ANC INSERT STYLE	MILLING CATALOG PAGE	CARBOLOY	INGERSOLL	ISCAR	K-TOOL	KENNAMETAL	MILLING SPEC.	MILLTECH	SANDVIK	STELLRAM	VALENITE	WAUKESHA
2T100	17						X						OFCX	13							X				
3T50	30						X						OFEN	19	X										
4.21-611	10					X							OFER-13M	19	X										
4.21-616	10					X							OFET-13M	13	X										
4T75Q	17						X						OFEW	13	X										
4T75QD	17						X						S2100	20						X					
ADCB	10			X									SCCT	14									X		
ADCH	10			X									SCGW	14									X		
APEH	10	X											SDCR-08	20	X										
APFT	10	X											SEKR	21	X										
APKT	10			X									SEKR-08	22	X										
APKW	11	X											SM	22											X
CDE	11		X										SNCC	14					X						
EMB	17	X											SNMC	14				X							
LNE	11		X										SNUN-RC	25	X										
LSE	12		X										SPEX	26									X		
MDGH	12											X	TEGX-BN	15											X
OECW	12							X					TNHF-GP	28					X				X		
OECX	12							X					TNHF-PC	28					X				X		
OFCW	13							X					TNHN	28					X				X		

The ANC insert style indicated in the chart is designed to fit the pockets of toolholding systems, including milling cutters and end mills, which hold the equivalent competitive inserts. Chip control configurations of ANC inserts may vary from competitive styles.

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Turning Formulas

Feed Rate:
The rate of insert travel through the workpiece measured in inches per minute.

Feed Rate (inches per minute) = Feed (inches per revolution) x RPM

Cutting Speed:
The velocity of the workpiece as it passes the insert measured in surface feet per minute.

Cutting Speed (SFM) = Workpiece Diameter x .262 x RPM

Revolutions Per Minute:
The rotating velocity of the machine spindle.

RPM = Cutting Speed (SFM) ÷ Workpiece Diameter x 3.82

Metal Removal Rate:
The speed, measured in cubic inches per minute, that stock is removed from the part being machined.

MRR = Depth of Cut x Feed x Cutting Speed x 12

Milling Formulas

Feed Rate:
The rate of insert travel through the workpiece measured in inches per minute.

Feed Rate (inches per minute) = Chip load x Number of teeth x RPM

Cutting Speed:
The velocity of the workpiece as it passes the insert measured in surface feet per minute.

$$\text{Cutting Speed (SFM)} = \frac{\text{Cutter Diameter} \times \text{RPM} \times 3.1416}{12}$$

Revolutions Per Minute:
The rotating velocity of the machine spindle.

$$\text{RPM} = \frac{\text{Cutting Speed} \times 12}{\text{Cutting Diameter} \times 3.1416}$$

Metal Removal Rate:
The speed, measured in cubic inches per minute, that stock is removed from the part being machined.

MRR = Depth of Cut x Width of Cut x Feed

Chip Load:
Inches Per Tooth

$$\text{Chip Load} = \frac{\text{Feed Rate}}{\text{Number of Teeth} \times \text{RPM}}$$

Phone: (800) 331-7585 **Fax: (281) 255-9333** **www.anconline.com**

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