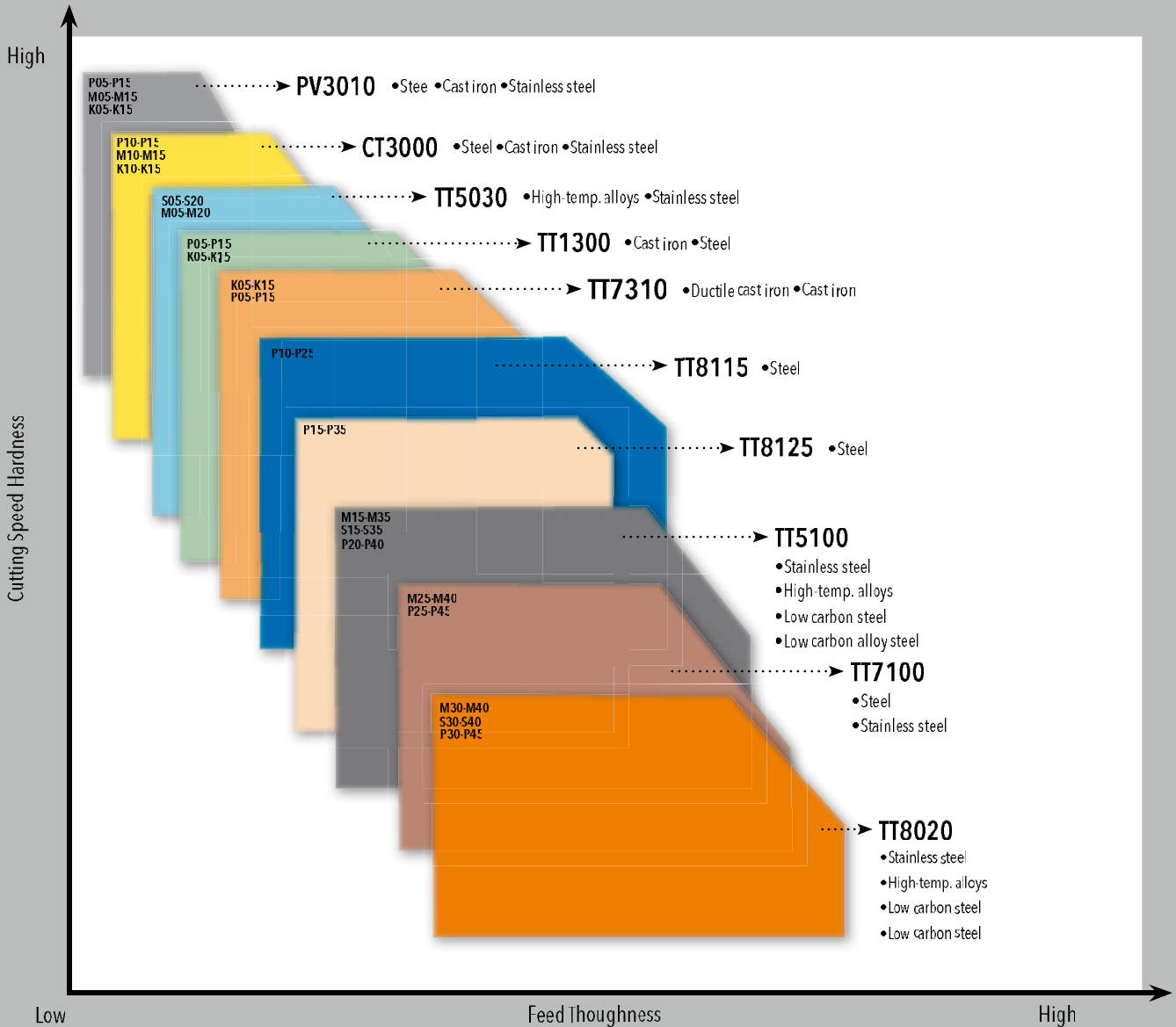


GENERAL TECHNICAL INFORMATION

INSERT GRADES

INSERT GRADES - COATED CARBIDE AND CERMET



- **PV3010**: PVD coated Cermet, **CT3000**: uncoated Cermet
- **TT1300, TT7310, TT8115, TT8125, TT5100, TT7100, TT9215, TT9225, TT9235**: CVD coated carbide
- **TT5030, TT8020**: PVD coated

GENERAL TECHNICAL INFORMATION

INSERT GRADES

COATED CARBIDE, CERMET AND CARBIDE GRADES

Grades	ISO	Application
TT1300 CVD Coated	K05 – K15	<ul style="list-style-type: none"> For high speed turning of cast iron and steel. Thick aluminum oxide coating on a high wear resistant substrate. First choice for machining cast iron (Rough and Finish).
TT7310 CVD Coated	K05 – K15 P05 – P15	<ul style="list-style-type: none"> First choice for machining of ductile cast iron and cast iron. Special coating and tough substrate for the best wear resistance.
TT8115 CVD Coated	P10 – P25	<ul style="list-style-type: none"> High speed turning of steel. Very high wear resistance. First choice for finishing.
TT9215 CVD Coated	M10 – M25	<ul style="list-style-type: none"> For high speed cutting in stainless steel. Very high wear resistance. First choice for finishing, particularly in continuous cuts.
TT8125 CVD Coated	P15 – P35	<ul style="list-style-type: none"> Steel turning application. Very good combination of wear resistance and toughness. For finish to medium turning of steel.
TT9225 PVD Coated	M05 – M35	<ul style="list-style-type: none"> For a wide range of turning in stainless steel. Excellent combination of wear resistance & fracture toughness.
TT5030 PVD Coated	S05 – S20 M05 – M20	<ul style="list-style-type: none"> For a wide range of turning of high-temp alloys. Very hard submicron substrate with good fracture toughness.
TT9020 TT9030 PVD Coated	P15 – P30 S15 – S25 M20 – M30	<ul style="list-style-type: none"> For medium speed turning of stainless steel, exotic alloys and low carbon steel. Good combination of toughness and wear resistance.
TT5100 CVD Coated	M15 – M35 S15 – S35 P20 – P40	<ul style="list-style-type: none"> For a wide range of turning of sticky materials such as stainless steel and low carbon steel. Excellent chipping resistance and sticking resistance. For finish and medium machining on stainless steel and low carbon steel.
TT9235 CVD Coated	M30 – M45	<ul style="list-style-type: none"> For interrupted cutting of stainless steel. Ideal grade for unstable conditions or low cutting speeds. Very good fracture toughness.
TT7100 CVD Coated	M25 – M40 P25 – P45	<ul style="list-style-type: none"> Low speed turning of steel and stainless steel. Very tough substrate. For heavy roughing with interrupted cut.

GENERAL TECHNICAL INFORMATION

INSERT GRADES

grades- carbide and cermet

COATED CARBIDE, CERMET AND CARBIDE GRADES

Grades	ISO	Application									
TT8020 PVD Coated	<table border="0"> <tr><td>M30</td><td>–</td><td>M40</td></tr> <tr><td>S30</td><td>–</td><td>S40</td></tr> <tr><td>P30</td><td>–</td><td>P45</td></tr> </table>	M30	–	M40	S30	–	S40	P30	–	P45	<ul style="list-style-type: none"> • For medium to low speed turning of stainless steel, exotic alloys and low carbon steel. • Toughest grade in turning product line. • For interrupted cut on stainless steel and exotic alloys.
M30	–	M40									
S30	–	S40									
P30	–	P45									
CT3000 CERMET	<table border="0"> <tr><td>P10</td><td>–</td><td>P15</td></tr> <tr><td>M10</td><td>–</td><td>M15</td></tr> <tr><td>K10</td><td>–</td><td>K20</td></tr> </table>	P10	–	P15	M10	–	M15	K10	–	K20	<ul style="list-style-type: none"> • Excellent surface finish turning of steel, stainless steel and cast iron. • Excellent wear resistance and low coefficient of friction
P10	–	P15									
M10	–	M15									
K10	–	K20									
PV3010 PVD Coated Cermet	<table border="0"> <tr><td>P05</td><td>–</td><td>P15</td></tr> <tr><td>K05</td><td>–</td><td>K15</td></tr> <tr><td>M05</td><td>–</td><td>M15</td></tr> </table>	P05	–	P15	K05	–	K15	M05	–	M15	<ul style="list-style-type: none"> • Turning of steel, stainless steel and cast iron with high surface quality. • Longer tool life.
P05	–	P15									
K05	–	K15									
M05	–	M15									
K10 Uncoated	<table border="0"> <tr><td>K10</td><td>–</td><td>K20</td></tr> <tr><td>S10</td><td>–</td><td>S20</td></tr> <tr><td>N10</td><td>–</td><td>N20</td></tr> </table>	K10	–	K20	S10	–	S20	N10	–	N20	<ul style="list-style-type: none"> • General turning of cast iron, exotic alloy and non-ferrous materials including aluminum and copper alloy. • Excellent wear resistant grade.
K10	–	K20									
S10	–	S20									
N10	–	N20									

CUTTING DATA FOR ISO TURNING

ISO	Material	Grades	ISO	Cutting speed SFM	
P	Carbon steel	CVD			
		TT8115	P10 - P25	820 - 1310	
		TT8125	P10 - P25	820 - 1150	
		TT5100	P20 - P40	520 - 850	
		TT7100	P35 - P45	390 - 650	
		PVD			
		TT7220	P20 - P35	490 - 720	
		TT8020	P30 - P45	460 - 650	
		TT9020	P20 - P35	490 - 720	
		TT9030	P15 - P35	850 - 920	
		Cermet			
		CT3000	P05 - P15	980 - 1480	
		PV3010	P05 - P15	780 - 1480	
		Structural steel	CVD		
			TT7310	P05 - P15	590 - 920
	TT8115		P10 - P25	560 - 980	
	TT8125		P10 - P25	490 - 920	
	TT5100		P20 - P40	460 - 720	
	TT7100		P35 - P45	390 - 590	
	PVD				
	TT7220		P20 - P35	490 - 650	
	TT8020		P30 - P45	430 - 590	
	TT9020		P20 - P35	460 - 650	
	TT9030		P15 - P35	560 - 750	
	Cermet				
	CT3000		P05 - P15	820 - 1310	
	PV3010		P05 - P15	820 - 1310	
	High alloyed steel		CVD		
		TT7310	P05 - P15	520 - 820	
		TT8115	P10 - P25	520 - 820	
		TT8125	P10 - P25	460 - 790	
		TT5100	P20 - P40	460 - 720	
		TT7100	P35 - P45	330 - 460	
PVD					
TT7220		P20 - P35	460 - 590		
TT8020		P30 - P45	330 - 520		
TT9020		P20 - P35	390 - 590		
TT9030		P15 - P35	390 - 650		
Cermet					
CT3000		P05 - P15	720 - 1210		
PV3010	P05 - P15	720 - 1210			

The indicated values can vary due to clamping situation, machine stability and quality of material.

CUTTING DATA FOR ISO TURNING

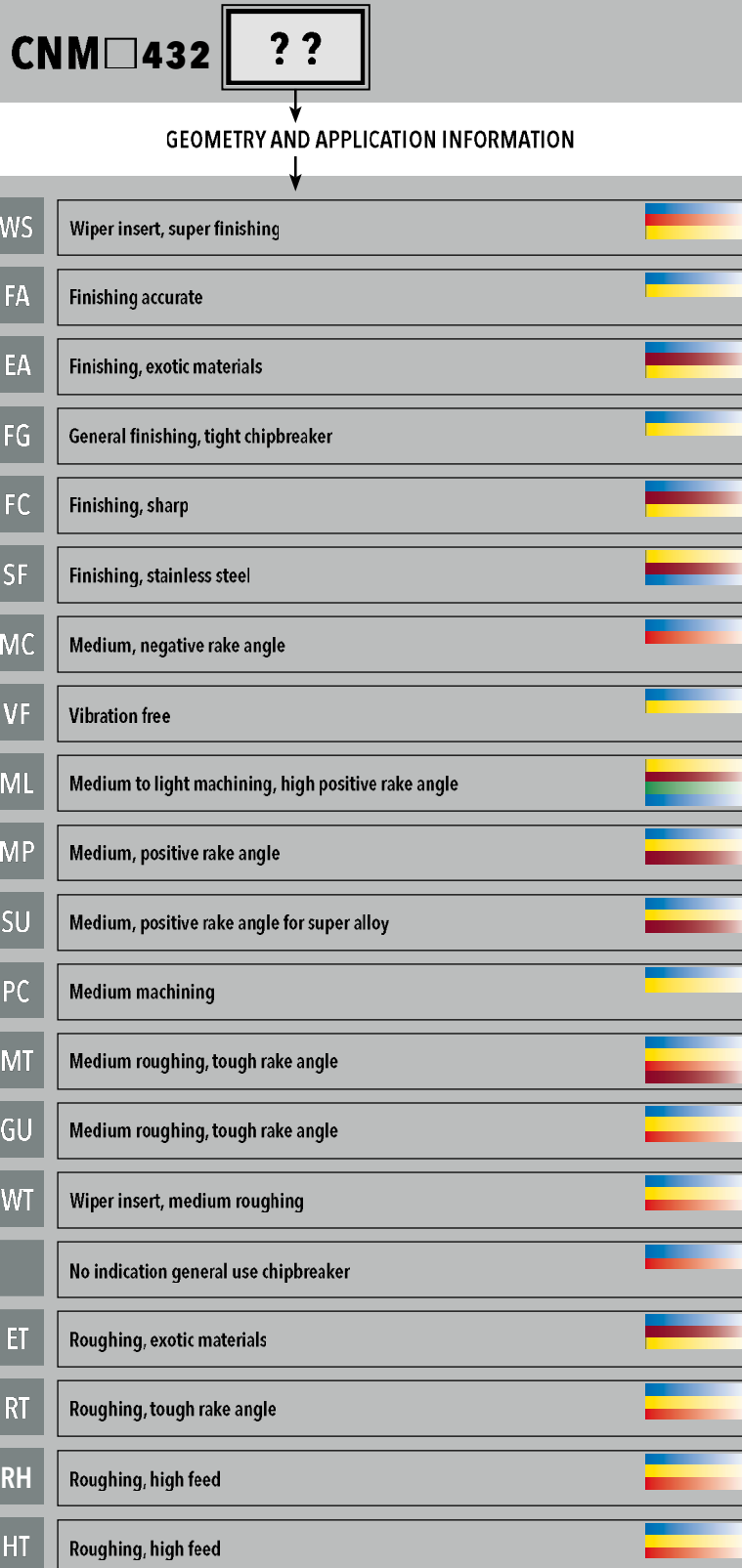
ISO	Material	Grades	ISO	Cutting speed SFM
M	Stainless steel	CVD		
		TT5100	M15 - M35	490 - 650
		TT7100	M25 - M40	390 - 590
		TT9215	M10 - M20	720 - 920
		TT9225	M15 - M30	650 - 820
		TT9235	M25 - M40	590 - 790
		PVD		
		TT5030	M05 - M20	490 - 920
		TT8020	M30 - M40	330 - 590
		TT9020	M15 - 30	390 - 720
		TT9030	M10 - M30	490 - 790
		Cermet		
	CT3000	P05 - P15	720 - 980	
	PV3010	P05 - P15	790 - 1050	
	High alloy stainless steel	CVD		
		TT5100	M15 - M35	390 - 620
		TT7100	M25 - M40	260 - 520
		TT9215	M10 - M20	590 - 820
		TT9225	M15 - M30	520 - 790
		TT9235	M25 - M40	460 - 650
PVD				
TT5030		S05 - S20	490 - 790	
TT8020		M30 - M40	330 - 520	
TT9020		M15 - 30	390 - 620	
TT9030		M10 - M30	390 - 620	
CVD				
CT3000	P05 - P15	650 - 980		
PV3010	P05 - P15	690 - 980		
K	Nodular gray cast iron	CVD		
		TT1300	K05 - K15	650 - 1480
		TT7310	K05 - K15	590 - 1250
		Cermet		
	CT3000	K05 - K15	590 - 1310	
	PV3010	K05 - K15	720 - 1540	
	Gray cast iron	CVD		
		TT1300	K05 - K15	590 - 1310
TT7310		K05 - K15	520 - 1250	
Cermet				
CT3000	K05 - K15	590 - 1150		
PV3010	K05 - K15	720 - 1310		
S	High temp. resisting alloys	CVD		
		TT5100	S15 - S35	130 - 260
		PVD		
		TT5030	S05 - S20	130 - 330
TT8020	S30 - S40	100 - 260		

The indicated values can vary due to damping situation, machine stability and quality of material.

GENERAL TECHNICAL INFORMATION

CHIPBREAKERS

CHIPBREAKER IDENTIFICATION



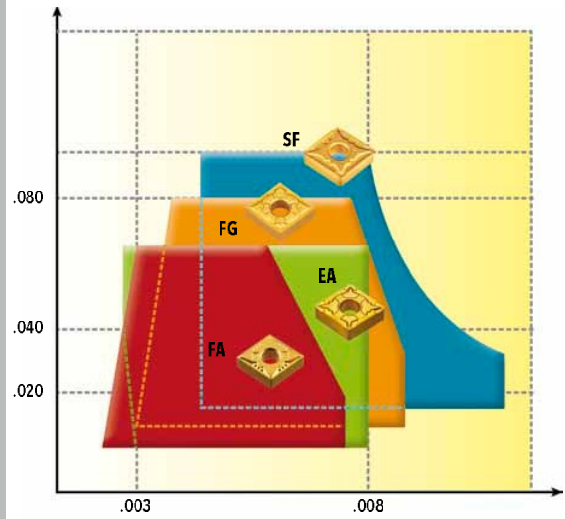
GENERAL TECHNICAL INFORMATION

CHIPBREAKERS

NEGATIVE INSERTS

FOR FINISH APPLICATION

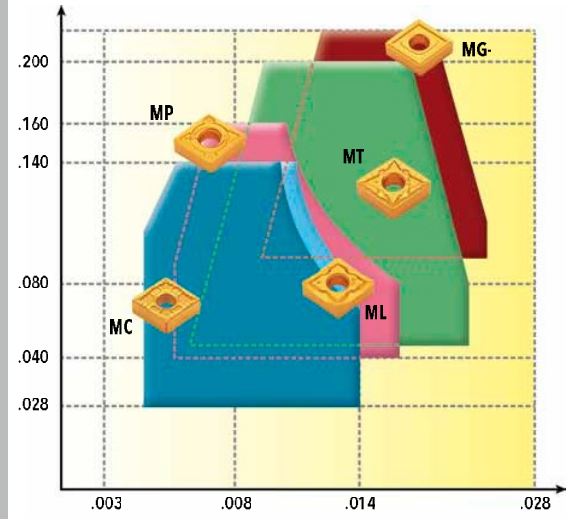
Depth of cut (inch)



Feed (ipr)

FOR MEDIUM APPLICATION

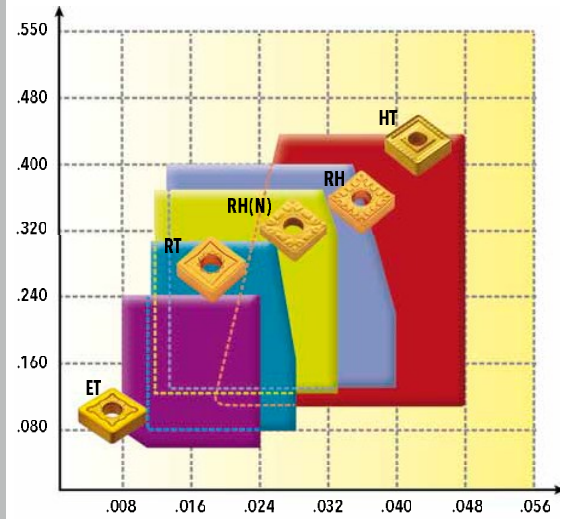
Depth of cut (inch)



Feed (ipr)

FOR ROUGH APPLICATION

Depth of cut (inch)



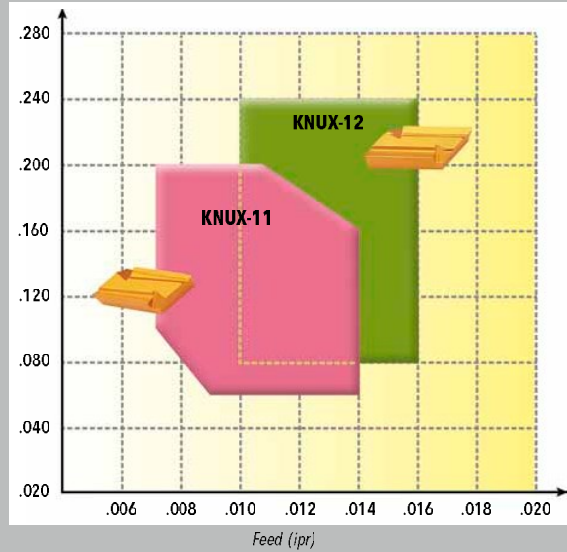
Feed (ipr)

GENERAL TECHNICAL INFORMATION

CHIPBREAKERS

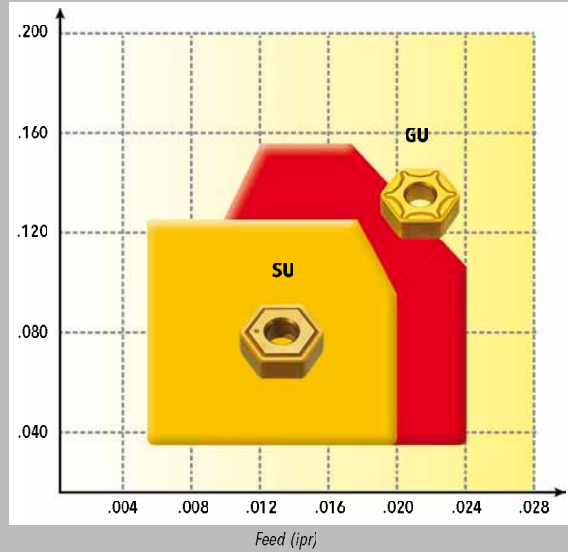
KNUX TYPE

Depth of cut (inch)



HNMG TYPE

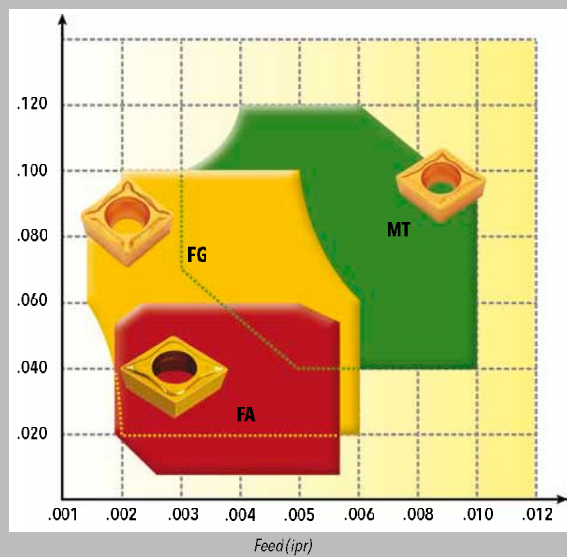
Depth of cut (inch)



POSITIVE INSERTS

FOR FINISH TO MEDIUM APPLICATIONS

Depth of cut (inch)

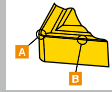


GENERAL TECHNICAL INFORMATION

CHIPBREAKERS

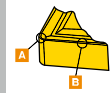
"WS" AND "WT" WIPER INSERTS FOR HIGH FEED TURNING

NEGATIVE INSERTS



Chipbreaker Designation and Geometry				Application and Features
WS		A 6° .0035"	B 6° .0035"	<ul style="list-style-type: none"> For super finish applications Steel, cast iron and stainless steel Excellent chip control and low cutting forces
WT		A 3° .0118"	B 6° .0118"	<ul style="list-style-type: none"> For medium to medium rough applications Steel, cast iron and stainless steel Stable cutting and low cutting forces with high feed rate

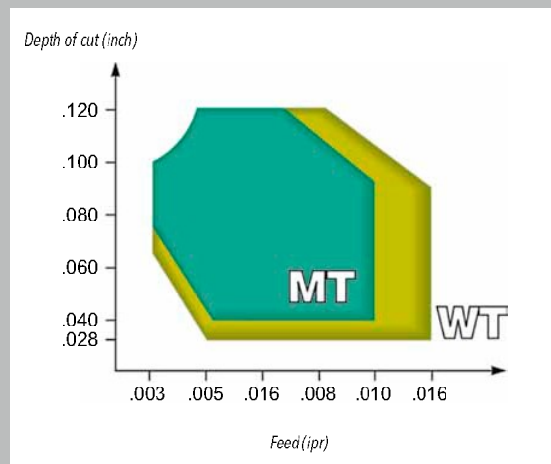
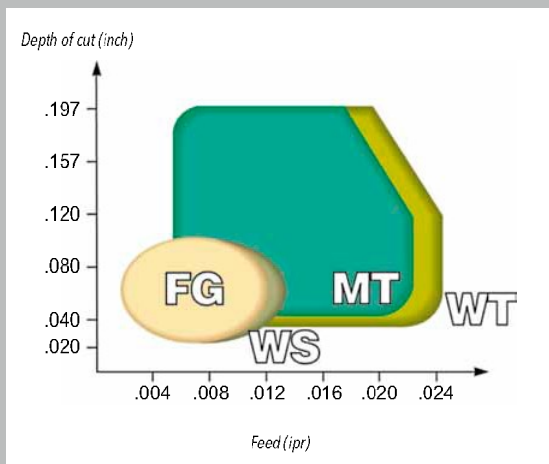
POSITIVE INSERT



Chipbreaker Designation and Geometry				Application and Features
WT		A 6° .0035"	B 6° .0047"	<ul style="list-style-type: none"> For medium to medium rough applications Steel, cast iron and stainless steel Stable cutting and low cutting forces in high feed rate

NEGATIVE INSERTS

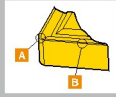
POSITIVE INSERTS



GENERAL TECHNICAL INFORMATION

CHIPBREAKERS


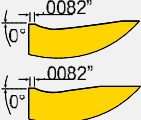
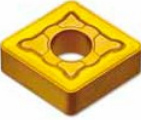
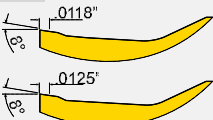

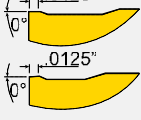

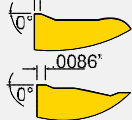

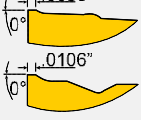


NEGATIVE INSERTS



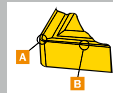
Chipbreaker Designation and Geometry		Application and Features	
FC		CNMG 43_ 	<ul style="list-style-type: none"> For finishing Steel, carbon steel, alloy steel Very good surface finish
FA		CNMG 43_ 	<ul style="list-style-type: none"> For super finish applications Steel, stainless steel and heat resistant alloys Excellent chip control
EA		CNMG 43_ 	<ul style="list-style-type: none"> For finish applications Exotic materials Excellent chip control in low feed and depth of cut
FG		WNMG 33_ 	<ul style="list-style-type: none"> For finish and semi finish applications Steel, stainless steel and cast iron Low cutting forces
SF		CNMG 43_ 	<ul style="list-style-type: none"> For finish applications Stainless steel and heat resistant alloys Low cutting forces
MC		CNMG 43_ 	<ul style="list-style-type: none"> For medium applications / Pour les applications moyennes Steel and cast iron Strong rake geometry Excellent chip control on medium turning applications
VF		DNMG 43_ 	<ul style="list-style-type: none"> For slender workpiece application Vibration free Steel and stainless steel High positive rake geometry to minimize cutting force
ML		CNMG 43_ 	<ul style="list-style-type: none"> For medium light applications Stainless steel, steel and aluminum Very high positive rake geometry to optimize machining in stable conditions
MP		CNMG 43_ 	<ul style="list-style-type: none"> For medium applications Steel and stainless steel High positive rake geometry to optimize machining in stable conditions
PC		CNMG 43_ 	<ul style="list-style-type: none"> For medium application Steel, carbon steel, alloy steel Positive geometry
MT		WNMG 43_ 	<ul style="list-style-type: none"> For medium rough applications Steel, cast iron and stainless steel Tough rake angle for general use


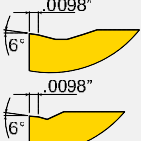


GENERAL TECHNICAL INFORMATION

CHIPBREAKERS

MG		CNMG 43_ 	<ul style="list-style-type: none"> For medium rough applications Steel and cast iron Strong rake geometry Suitable for general machining
ET		CNMG 43_ 	<ul style="list-style-type: none"> For rough applications of exotic materials Low cutting force Wide chip control range of roughing
RT		CNMM 64_ 	<ul style="list-style-type: none"> For rough applications Steel and cast iron Very strong rake geometry
RH(N)		CNMM 64_ 	<ul style="list-style-type: none"> For high feed roughing applications Steel, stainless steel and cast iron Very strong rake geometry
RH		CNMM 64_ 	<ul style="list-style-type: none"> For high feed roughing applications Steel, stainless steel and cast iron Very strong rake geometry
HT		SNMM 64_ 	<ul style="list-style-type: none"> For heavy roughing application Very strong cutting edge with negative rake angle Geometry designed to generate less heat in spite of negative insert

HNMG TYPE INSERTS

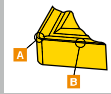



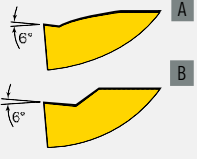

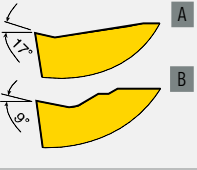

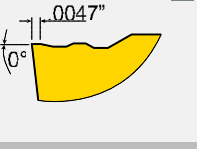

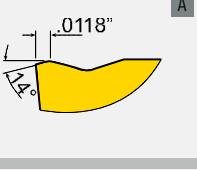

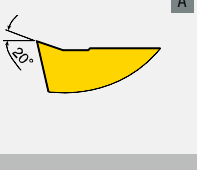
Chipbreaker Designation and Geometry		Application and Features
GU	 HNMG 	<ul style="list-style-type: none"> For medium applications For general turning of steels and cast irons Strong rake geometry
SU	 HNMG 	<ul style="list-style-type: none"> For exotic materials Stainless steels, super alloys, low carbon steels, low carbon alloy steels Sharp geometry to minimize built-up edge

GENERAL TECHNICAL INFORMATION

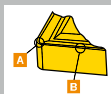
CHIPBREAKERS


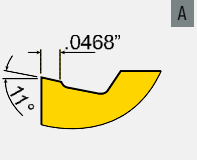

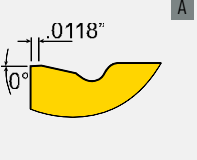
POSITIVE INSERTS



Chipbreaker Designation and Geometry		Application and Features
FA	 <p>DCMT 32.5_</p> 	<ul style="list-style-type: none"> • For super finish applications • Very tight chipbreaker • Excellent chip control
FG	 <p>CCMT 32.5_</p> 	<ul style="list-style-type: none"> • For finish to medium light applications • Steel and stainless steel • Low cutting forces • Excellent chip control
MT	 <p>CCMT 32.5_</p> 	<ul style="list-style-type: none"> • For medium to medium rough applications • Steel, stainless steel and cast iron • Negative rake geometry for general use
CMX-	 <p>RCMX 1204</p> 	<ul style="list-style-type: none"> • For high feed roughing applications • Steel, stainless steel and cast iron • Strong rake geometry
FL	 <p>CCGT 43_</p> 	<ul style="list-style-type: none"> • For finish to medium applications • Aluminum • Very high positive rake geometry to minimize built-up-edge




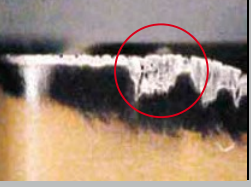




KNUX TYPE INSERTS



Chipbreaker Designation and Geometry		Application and Features
11	 <p>KNUX 333_</p> 	<ul style="list-style-type: none"> • For light to medium applications • Steel and stainless steel • Positive rake geometry to minimize cutting forces • Excellent chip control
12	 <p>KNUX 333_</p> 	<ul style="list-style-type: none"> • For light to medium rough applications • Steel and stainless steel • Strong rake geometry • Wide chip control range

GENERAL TECHNICAL INFORMATION

INSERTS FAILURE TROUBLE SHOOTING

		Cause
Crater Wear		<ul style="list-style-type: none"> Excessive cutting speed or feed rate (alloy steel and over 0.3% carbon steel) Workpiece material contains high hardness chemical elements (tool steel, die steel)
Flank Wear		<ul style="list-style-type: none"> Excessive cutting speed (alloy steel and over 0.3% carbon steel) Workpiece material contains very hard chemical elements (tool steel, die steel) Increase cutting speed if abnormal flank wear caused by very slow cutting speed.
Deformation		<ul style="list-style-type: none"> Excessive cutting speed or feed rate
Chipping		<ul style="list-style-type: none"> Excessive feed rate Interrupted cut
Notching		<ul style="list-style-type: none"> Machining of scale parts High work hardening materials
Built-up edge		<ul style="list-style-type: none"> Slow cutting speed Sticky materials
Mechanical Fracture		<ul style="list-style-type: none"> Excessive feed rate of interrupted cut
Thermal Cracking		<ul style="list-style-type: none"> Thermal shock repeatedly (interrupted cut)

GENERAL TECHNICAL INFORMATION

INSERTS FAILURE TROUBLE SHOOTING

Solution

- Reduce cutting speed or feed rate or use more wear resistant grade
- Use coolant
- Use more positive rake geometry
- Reduce cutting speed or feed rate or use more wear resistant grade
- Use coolant

- Reduce cutting speed or feed rate or use more wear resistant grade
- Use coolant
- Use more positive rake geometry
- Reduce cutting speed or feed rate or use more wear resistant grade
- Use coolant

- Reduce cutting speed or feed rate or use more wear resistant grade
- Use coolant
- Use more positive insert geometry

- Reduce feed rate
- Use tougher grade
- Use more positive insert geometry
- Remove coolant completely or apply coolant correctly

- Use tougher grade
- Use more positive rake geometry
- Increase lead angle
- Use tougher grade
- Use more positive rake geometry
- Increase lead angle

- Increase cutting speed
- Use more positive rake geometry

- Use more positive rake geometry
- Use tougher grade

- Use tougher grade
- Use stronger insert geometry
- Reduce feed rate
- Remove coolant completely or apply coolant correctly
- Increase cutting speed

- Use tougher grade
- Use more positive rake geometry
- Reduce feed rate
- Remove coolant completely or apply coolant correctly

Change Grade

Harder

PV3010 > CT3000 > TT5030 > TT1300 > TT7310 > TT8115 > TT8125 > TT5100 > TT7100 > TT8020

Change Grade

Less ASB*
Less Heat

FA	FG		ET				
FC	ML	MP	MT	MC	MG-	RT	
	WS	VF	WT			RH	
	SF		PC				
	EA						

* ASB = Built-up edge

Change Grade

Tight
Open

FA	FG	MC	ML	MP	MT	MG-	ET	RT	RH
EA	WS			VF	WT				
FC	SF				PC				

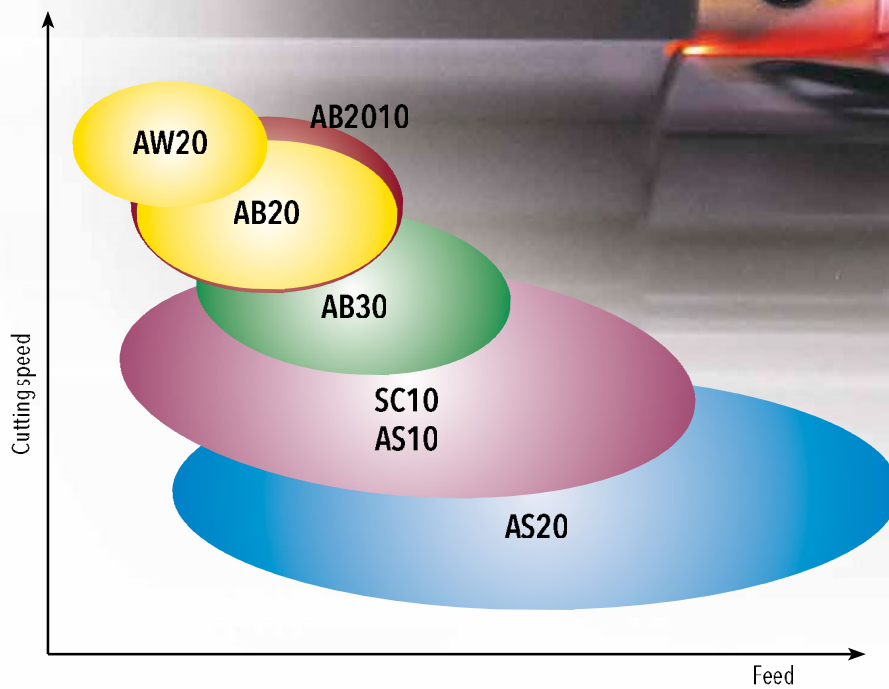
GENERAL TECHNICAL INFORMATION

TOTURN™ CERAMIC INSERTS

PHYSICAL PROPERTIES - CERAMIC GRADES

Grade		AW20	AB20	AB30	AS10	SC10	AS20
Composition		Al ₂ O ₃ - ZrO ₂	Al ₂ O ₃ - Ti(C,N)	Al ₂ O ₃ - TiC	Si ₃ N ₄	CVD- Si ₃ N ₄	Si ₃ N ₄ - TiN
Density (g/cm ³)		4,05	4,30	4,25	3,22	3,22	3,50
Hardness	HRA	94,0	94,5	94,5	93,6	93,6	93,0
	Vickers	1,800	2,050	2,050	1,700	1,700	1,500
Bending Strength (MPa)		600	650	700	900	900	1,000

APPLICATION DIAGRAM OF CERAMIC GRADES



GENERAL TECHNICAL INFORMATION

TOTURN™ CERAMIC INSERTS

AW20 (Al₂O₃+ZrO₂)



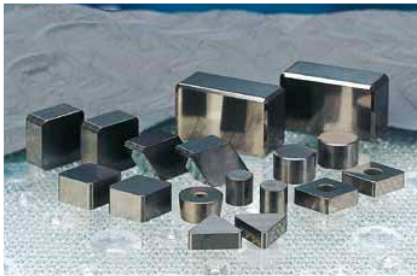
- Excellent wear resistant grade with high chemical stability and temperature resistance.
- For high speed continuous turning of cast iron.
- For finishing applications on hardened steels and other hard materials.

AB2010 (Al₂O₃+TiCN) with TIN PVD Coat



- Excellent wear resistance with extended tool life compared to uncoated ceramic grades.
- TIN coating makes it easy to identify used corners.
- Successful application of ceramic inserts on hard materials can provide significant cost advantage compared to CBN.
- The combination of this ceramic grade with TIN PVD coating provides improved wear resistance and fracture toughness.
- Application area is in the finish machining of hardened steels and cast iron.

AB20 (Al₂O₃+TiCN)

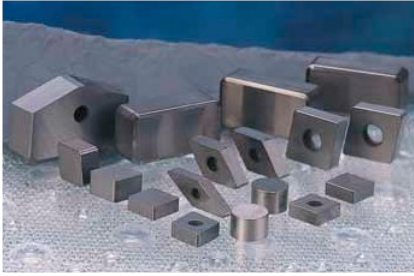


- High wear resistant grade with excellent cutting edge stability.
- For high speed continuous turning of hardened steels and other hard materials.
- For cast iron finishing applications.

GENERAL TECHNICAL INFORMATION

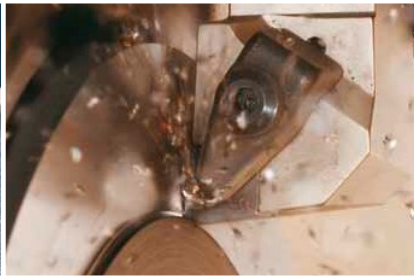
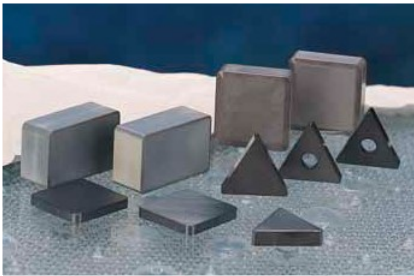
TOTURN™ CERAMIC INSERTS

AB30 (Al₂O₃+TiC)



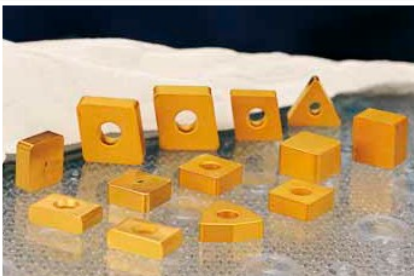
- Mixed ceramic with good toughness and wear resistance.
- For finishing and roughing applications of hard steels, hard materials and cast iron finishing and roughing applications.
- Can be applied for interrupted cutting.

AS10 (Si₃N₄)



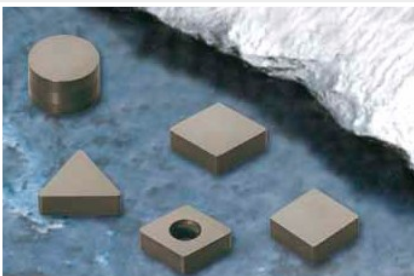
- High wear resistant grade with very good toughness and thermal shock resistance.
- For roughing to finishing cast iron.
- Wet and dry cutting

SC10 (AS10+CVD)



- Excellent wear resistant grade with very good toughness and thermal shock resistance
- For roughing to finishing cast iron.
- Wet and dry cutting

AS20 (Si₃N₄)



- Very tough Si₃N₄ ceramic grade with high cutting edge stability.
- For roughing to finishing applications of nickel based high temperature alloys.
- Wet and dry cutting.

GENERAL TECHNICAL INFORMATION

TOTURN™ CERAMIC INSERTS

RECOMMENDED CUTTING CONDITIONS

Materials	Grade Type	AW20	AB2010	AB20	AB30	SC10	AS10	AS20
	V,f	Cutting Speed: V (SFM), Feed: f (IPR)						
High temp. alloy (200 - 400 HB)	V f	-	-	-	-	-	-	330 - 1150 .004 - .012
Hardened steel (46 - 65 HRC)	V f	330 - 820 .004 - .006	160 - 890 .004 - .008	160 - 890 .004 - .008	160 - 850 .004 - .010	-	-	-
Chilled cast iron (400 HB)	V f	-	160 - 720 .002 - .008	160 - 650 .002 - .008	160 - 490 .002 - .008	-	-	-
Gray cast iron (180 - 230 HB)	V f	1300 - 3280 .002 - .008	980 - 2950 .004 - .012	980 - 2620 .004 - .012	980 - 2620 .004 - .002	980 - 3280 .008 - .031	980 - 3620 .008 - .031	-
Ductile cast iron (200 - 240 HB)	V f	9800 - 1970 .002 - .006	980 - 1970 .004 - .008	980 - 1640 .004 - .008	250 - 1640 .004 - .016	250 - 1970 .008 - .024	250 - 1640 .008 - .024	-

EDGE PREPARATIONS FOR CERAMIC INSERTS

1. Common Style (no designation)

Grade	Land specification	
	Width (in)	Angle (°)
AB2010, AB20, AB30, SC10, AS10, AS20, AW20	.008	25
	.008	20

2. Others (other edge designs)

Designation	Land specification	
	Width (in)	Angle (°)
T2	.004	30
T3	.006	30
T4	.008	30
T5	.012	30
T6	.004	20
T7	.008	20

3. Standard honing size of E type edge preparation is .0015". (only honing without T-land)

4. Many special edge preparations like "Double Land" or "S" can be made upon request.

GENERAL TECHNICAL INFORMATION

TOTURN™ CBN INSERTS

KB50, TB650, KB90, KB90A

PHYSICAL PROPERTIES

Grade	KB50	TB650	KB90	KB90A
TRS (Gpa)	0,9 - 1,1	1,0 - 1,1	1,1 - 1,2	1,1 - 1,2
Hardness (Gpa)	29 - 31	30 - 32	39 - 42	35 - 38

KB50

- High wear resistant cubic boron nitride with low CBN content.
- For precision machining of hardened steels (harder than 45HRC) such as hot and cold working tool steels, die steels, case hardened steels, carburized iron and high speed steel.
- For continuous cut.
- For turning



TB650

- High wear resistant cubic boron nitride with low CBN content.
- Designed for finishing to roughing applications on hardened steels (harder than 45HRC).
- Can be applied to light interrupted cutting applications.
- For turning / Pour tournage



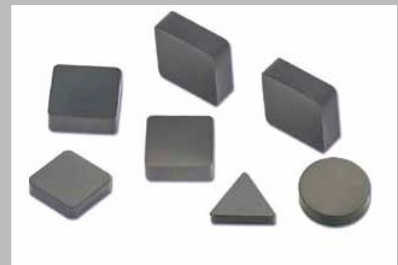
KB90

- Tough cubic boron nitride with high CBN content.
- For high speed machining of cast iron.
- Suitable for machining cemented tungsten carbide, sintered metal and heavy alloys.
- Excellent for interrupted cutting of hardened steel.



KB90A

- Solid CBN with excellent impact resistance.
- For high speed machining of cast iron.
- Can be applied for rough to medium machining of hardened steel.



GENERAL TECHNICAL INFORMATION



RECOMMENDED CUTTING CONDITIONS

Materials	Grade	KB50	TB650	KB90	KB90A
	V, f, ap	Cutting Speed: V (SFM), Feed: f (IPR), Depth of cut: ap (inch)			
Hardened steel (46 - 68 HRC)	V	330 - 820	260 - 650	200 - 490	200 - 490
	f	.004 - .007	.004 - .009	.004 - .012	.004 - .012
	ap	.004 - .020	.004 - .008	.008 - .039	.008 - .080
Chilled cast iron (400 HB)	V			260 - 490	260 - 490
	f			.004 - .012	.004 - .012
	ap			.008 - .060	.008 - .080
Gray cast iron (180 - 230 HB)	V			1640 - 3930	1640 - 3930
	f			.004 - .012	.004 - .012
	ap			.004 - .080	.004 - .080
Sintered metal	V			330 - 660	
	f			.002 - .008	
	ap			.008 - .040	
DCI rolled, HSS roll	V	980 - 1970	650 - 1640		
	f	.002 - .008	.002 - .008		
	ap	.008 - .020	.008 - .020		
High temp. alloy (200 - 400 HB)	V			330 - 980	330 - 980
	f			.002 - .008	.002 - .008
	ap			.004 - .020	.004 - .080

EDGE PREPARATIONS FOR CBN INSERTS

1. Common style (no designation)

Grade	Land specification		
	Width (in)	Angle (°)	Honing (in)
KB50, TB650	.005	20	.0006
KB90	.005	20	-
KB90A	.008	20	.0006

Technical information for CBN inserts

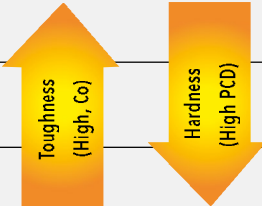
- CNMA 120408 LN : Regular Size CBN Tip
- CNMA 120408 LS : Small Size CBN Tip
- CNMA 120408 LS2 : Small Size CBN Tip with two corners
- RCGX 090300 FT : Full Top CBN
- CNMN 090308 SD : Solid CBN

GENERAL TECHNICAL INFORMATION

TOTURN™ PCD INSERTS

KP500, KP300, KP100

PHYSICAL PROPERTIES

Grade	Feature	PCD (μm)	TRS (GPa)	Hardness (GPa)
KP100		4	2,0 - 2,2	80 - 100
KP300		10	1,8 - 2,0	90 - 110
KP500		25	1,0 - 1,2	100 - 120

KP500

- Superabrasion resistant grade.
- Designed for fine finishing cuts with less or no interruptions.
- For high Si aluminum alloy (Si > 12.2%), meta matrix composite and sintered tungsten carbide.

KP300

- This KP300 is for general machining.
- Well combined wear resistance and toughness.
- For low to medium Si aluminum alloy (Si < 12.2%), copper alloy and non-ferrous metal.

KP100

- Low content poly-crystalline diamond with fine grain.
- High edge strength and good surface finish.
- For plastic, wood and pure aluminum.



GENERAL TECHNICAL INFORMATION

GRADES CROSSOVER INFORMATION

GRADES COMPARISON TABLE - COATED CARBIDE

ISO	INGERSOLL	Sandvik	Walter	SECO	Kennametal	Mitsubishi	Sumitomo	Tungaloy	Kyocera	Valenite	Korloy	Iscar
P	TT8115	GC4205 GC4215 GC4015	WPP10 WAP10	TP1000 TP1500	KCP05 KCP10 KC9110	UE6105 UE6110	AC1000 AC700G	T9005 T9015	CA5505 CA5515 CR7015	VP5515 VP5615	NC3010	IC8150 IC9150
	TT8125 TT5100	GC4225 GC4025	WPP20 WAP20	TP2000 TP2500	KCP25 KC9125	UE6020	AC820P AC2000	T9025	CA5525 CR7025	VP5525 VP5625	NC3015 NC3120 NC3020	IC8250 IC9250
	TT7100	GC4235 GC4035	WPP30 WAP30	TP3000 TP400	KCP35 KCP40 KC9040	UE6035 UH6400	AC830P AC3000	T9035	CA5535 CR9025	VP5535 VP5635	NC3030 NC500H	IC8350 IC9350
M	TT9215	GC2015	WAM10	TM2000 TP200	KCM15	US7020 VP05RT	AC610M EH10Z	T6020	CA6515	VP8515	PC8110 NC9020	IC907
	TT9225	GC2025	WAM20	CP500	KCM25	US735	AC630M AC304	T6030	CA6525	VP8525	NC9025	IC9300
	TT9235 TT8020	GC2035	WAM30	TM4000 TP400	KCM35	UH6400	AC3000		PR630	VP8535	PC9030 PC230	IC3028
K	TT1300	GC3205	WAK10	TK1000	KCK05 KC9315	UC5105	AC410K AC300G	T5105 T5010	CA4010	VP1505	NC305K	IC5005 IC4028
	TT7310	GC3210	WAK20	TK2000	KCK15 KC9325	UC5115	AC700G	T5115 T5020	CA4115 CA4120	VP1510	NC6110 NC6010	IC5010
		GC3215			KCK20		AC2000	T5125			NC315K	
S, H	TT5030	GC1105		TS2000 TS2500	KC5510	VP05RT VP10RT	AC510U	AH110	PR1005 PR930	VP1510 VPUS10	PC8110	IC807 IC907
	TT9030	GC1125	WSM30	CP500	KC5525	VP15TF	AC520U	AH120	PR1025 PR1125	VP7615	PC9530	IC808 IC908

GENERAL TECHNICAL INFORMATION

GRADES

UNCOATED CARBIDE

ISO Classification	INGERSOLL	SANDVIK	SECO	SUMITOMO	MITSUBISHI	TOSHIBA	ISCAR	
P	P01	CT3000	S1P	F1F		NS530	IC20N	
	P10	P10	S10T	S1F, S10M	ST10P	STI10T	TX10D TX10S	
	P20	P20	SMA	S25M	ST20E	STI20	TX20 TX25 UX25	IC70
	P30	P30	S30 SM30	S375 S35M	A30N A30		TX30 UX30	IC50M
	P40	P40	S6 R4, SMA	S60M	ST40E		TX40	IC54
M	M10	M10	S1P, H10A	SM10	U10E		TU10	IC70
	M20	M20	H13A	HX, S25M	U2	UTI20T	TU20 / UX25	IC08
	M30		H10F	HX, S35M	A30, A30N	UTI20T	UX30	
	M40	M40	R4	S60M	A40		TU40	IC28
K	K01	UF1	H1P		H2	HTI05T	TH03	IC07
	K10	K10	HM H10, H10A	HX	H1 EH10	HTI10	G1F H10T TH10	IC20
	K20	K20	H13A	H15 HK 883	EH20 G10E	HTI20T	G2F KS20 G2	IC10
	K30	K30			G3			

CERMET

ISO Classification	INGERSOLL	SANDVIK	KYOCERA	SUMITOMO	MITSUBISHI	TOSHIBA	DIJET	KENNAMETALL	HITACHI	ISCAR	
P	P01	PV3010 PV3030 CT3000	CT5005 CT5015	TN30 PV30	T110A	NX1010 AP25N	NS520 AT520 GT520	LN10 CX50	KT125	CH350	IC20N
	P10	PV3010 PV3030 CT3000	CT5015	TN60 PV60 TN6020 PV7020	T1200A T2000Z	NX1010 NX2525 AP25N UP35N	NS520 AT520 AT530	LN10 CX50 NIT CX75	KT315 KT175 HT2	CH350 CH550 CH7030 CZ1025	IC20N
	P20	PV3010 CT3000 CT5000	GC1525	TN6020 TN90 TN100M PV90 PV7020	T1200A T2000Z T3000Z	NX2525 NX4545 UP35N	NS530 AT530 GT530	CX50 CX75 CX90 NAT	P55	CH7030 CH7035 CZ1025 CZ25	IC20N IC30N
	P30	CT5000	CT530		T130A T3000Z	NX4545	NS530 NS540 NS740	CX90 CX99 SUZ		CH7035 CZ25	IC30N
M	M10	PV3010 PV3030 CT3000	CT525	TN60 PV60 TN6020 PV7020	T1200A T2000Z	NX2525	NS520 AT530 GT530	LN10	KT315 KT125	CH550 CH7030 CZ1025	IC20N
	M20	PV3010 PV3030 CT3000 CT5000	GC1525		T1200A T2000Z T3000Z	NX2525	NS530	CX50 CX75 NIT	KT175 HT2 P55	CH7030 CH7035 CZ1025 CZ25	IC20N IC30N
	M30	CT5000	CT530	TN30 PV30		NX4545	NS540 NS740	CX75 CX90 CX99 SUZ		CH7035 CZ25	IC30N
K	K01	PV3010 PV3030 CT3000	CT5015 CT515		T110A	NX1010 AP25N	NS520 AT520 GT520	LN10		CH550	IC20N
	K10	PV3030 CT3000		PN60 PV60 TN6020 PV7020	T110A	NX2525 AP25N	NS530 AT530 GT530	LN10	KT315 HTX	CH7030 CH7035 CZ1025 CZ25	IC20N
	K20	CT5000				NX2525 AP25N		NIT	KT315	CH7035 CZ25	

INGERSOLL

GENERAL TECHNICAL INFORMATION

GRADES

CERAMIC

Application		INGERSOLL	ISCAR	KENNAMETAL	KYOCERA	NTK	SANDVIK	SUMITOMO	TOSHIBA	SSANGYOUNG
Cast iron	Finishing	AW20	IN11	KW80	KA30	HW2 HC1	CC620			SZ200
	General	AB30	IN23	KY1615	A65	HC2 HC5 HC6	CC650	NB90S NB90M	LX21	ST100
	Roughing	AS500 AS10 SC10	IS8 IS80	KY1310 KY3000 KY3500 KY3400	KS500 KS6000	SX1 SX8 SP2	CC690 CC6090 GC1690	NS260 NS260C	FX105 CX710	SN26 SN300 SN500
Hardened steel		AB2010 AB20	IN22	KY4300	A66N	HC4 XC4	CC650	NB100C	LX11	ST300
Heat resistant alloy		AS20	IS16	KY2000 KY2100 KY1540		WA1	CC670		WG300	SN700

CBN

Application		INGERSOLL	KENNAMETAL	KYOCERA	NTK	SANDVIK	SECO	SUMITOMO	TOSHIBA
Cast iron	Finishing	TB850	KD120	KBN65B	B20	CB7050	CBN20	BN500	BX930
	General	KB90 KB90A	KD120	KBN410 KBN900	B22	CB50	CBN300	BN600 BN700	BX950
Hardened steel	Finishing	KB50	KD050 KD120 KB1615	KBN10B KBN10N	B24	CB7020	CBN100	BNX10 BNC80 BNC150	BX310
	General	TB650	KB1340 KB5625	KBN25B KBN525 KBN25N	B26	CB20	CBN150 CBN200	BNX20 BN250 BNX25 BN300 BN350 BNC200 BNC300	BX330 BX360 BX380 BXC5

PCD

Grade	INGERSOLL	KENNAMETAL	KYOCERA	NTK	SANDVIK	MITSUBISHI	SUMITOMO	TOSHIBA
Fine	KP100	PD100	KPD001			PD10	DA2200 DA90	DX180
Medium	KP300	KD300	KPD010	PD1	CD10	PD20	DA150	DX160 DX140
Coarse	KP500	KD1415	KPD025			PD30	DA200	DX120

GENERAL TECHNICAL INFORMATION

CHIPBREAKERS

CHIPBREAKER COMPARISON TABLE



Description	Ingersoll	Kyocera	Sandvik	Kennametal	Seco	Walter	Valenite	Mitsubishi	Sumitomo	Tungaloy	Korloy	Iscar	
For Steel (NEGATIVE INSERTS) Double Sided Single Sided	WS	WP	WF, WL	FW	W-MF2	NF	W3	SW	LUW	AFW	LW		
	WT	WQ	WMX, WM	MW	W-M3	NM	W6	MW	GUW	ASW	VW, HW	WG	
	FA	GP, DP		FF FS	FF1		F2	FH	FL, FA	TF	HU	SF	
	FG		QF	FP FN	MF2	MF3		SH	SU	TSF, ZF ZM, TS, NS, NM	VG, HF, GF	NF	
	FC	CQ, CJ	PF, LC			NS6		FY, SA	LU		VF, VF, HC		
	VF		K		95			ES	GX, HM	S			
	ML	A3, AH	GP-	GP-K, MS- MS GP		NS4 NS5, G1		EJ, SY		CB, 17	HA	12 PP	
	SU		MX-SM, SR, 23						UP	SA			
	MP		QM	P	MF3	NM4	M2				HS, GS	TF VL	
	MC	GS	SM	MN	MR3	NM4				AS	HC		
	PC	PS	PM		M3	NM6		MP, MV	GU	TM	VM		
	MT	HS CS		MP			M3	MA	UX, UG		HM, GM	GN	
	MG-	MG- C		UN	M4	MG-		MG-	UZ	38 DM, MG- 33, 37	B20, B25	MG-	
	RT	ZS, GC GT, PT PH, HT	PR HM	UM RN, MG-	M5 MR7	NM5, NM7 NM6, NM9	R3	MH, GJ GH HAS, HDS	MU, MX		TH	HR, GR	NR
	RH	PX HX	PR QR MR	RM RP	R6, RR9 R5, R4, 37 RR6	NR6 NR5, NR8 NR7	R6	HZ HA HH	MP HG HP	TRS 57	GH	RP NM	
	HT		HR, 31	RH	R8, 56, 57 R7			HCS HX, HBS	HU	65 TU	VT, HH		
	HY							HV, HDS, HXD	HW		VH, B40		
	Stainless Double Sided	EAS, F	MQ, GU	MF	FP	MF1	NF4	F5	FS	SU		HA	
ET		HU	MR MN-MR	RP	MR6, MF5 MM-RR6	NR4	M5		GU	SM	VM	TNM	
Cast Iron Double Sided	MT	MG-	KF, KM	FN				MA	UZ	CF			
	MG-	C		RP		NM5		MG-		CM	B25		
	RT	ZS, GC	KR	UN				GH	GZ	CH	GR		
(POSITIVE INSERTS) For Steel	(WS)		WF	FW	W-F1			SW	LUW			WF	
	WT		WM	MW	W-F2			MW				WG	
	FA	CF GK, GP, DP	PF, UF	UF, 11, GM	FF1	PF4 PF5		FV	LU FP	01, PF	HFP	38, PF	
	FG	HQ	UM	FP LF	F1	PS4 PS5	PM3, PM4		FK SU SC, SK	PS	HMP, CO5	SM 16, GT-	
	(PC)		PM	MP				SQ, SV					
	MT	MT-	PR, UR	MF	F2	PM5 MT-	PM5	MQ, MV MT- G	SF, MU	PM	C25	14, 17 19, MT-	
	PMR-	GP, HQ G, PMR-	PMR-	PMR-		PMR-		PMR-	UJ				
For Aluminum	FL	AH	AL	HP	AL	PM2	IL	AZ	AG	AL	AK, TA	AFAS	
Description	Ingersoll	Kyocera	Sandvik	Kennametal	Seco	Walter	Valenite	Mitsubishi	Sumitomo	Tungaloy	Korloy	Iscar	