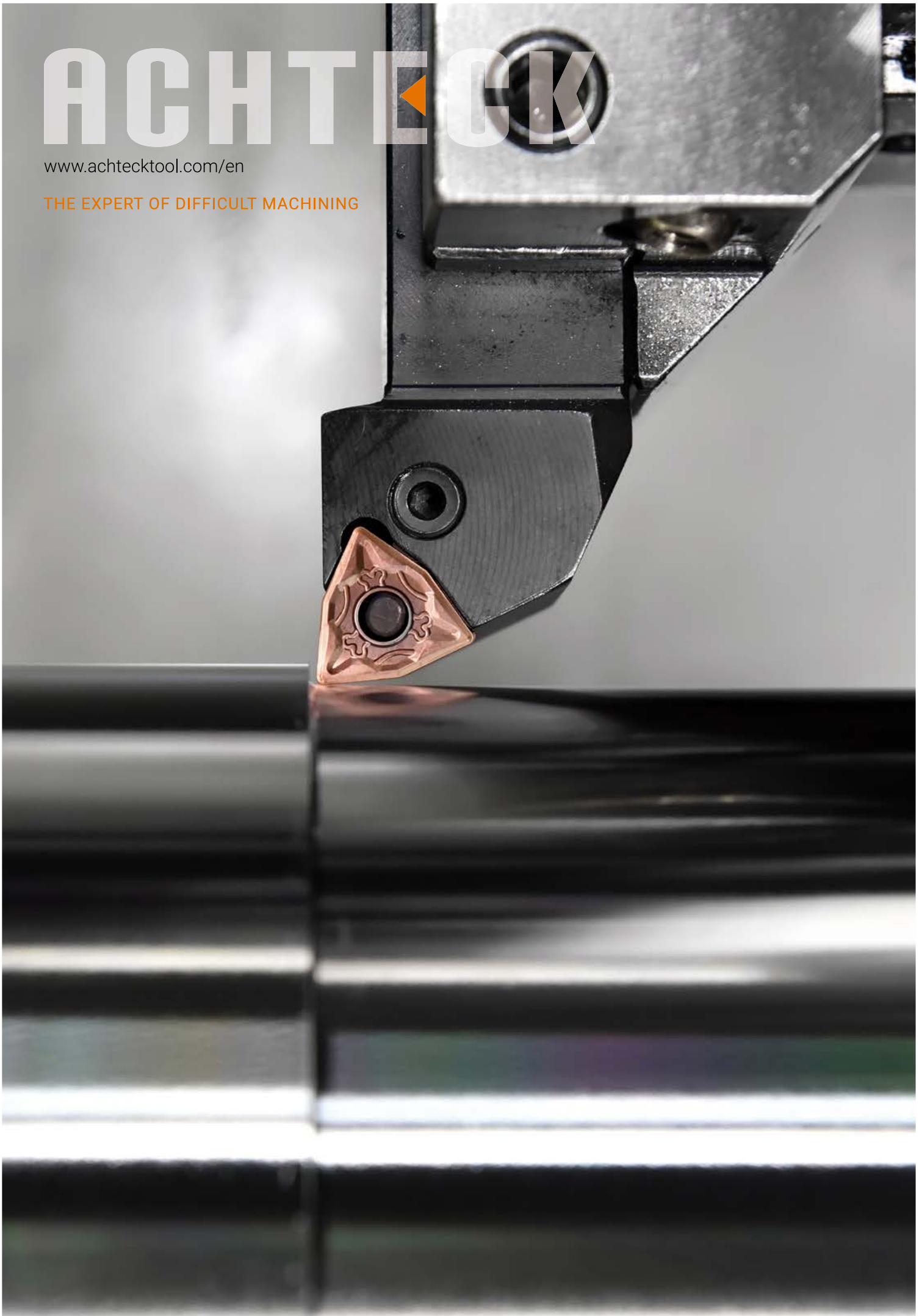


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CUTTING TOOL CATALOGUE

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ISO Turning Insert Denomination System

C
1

N
2

M
3

G
4

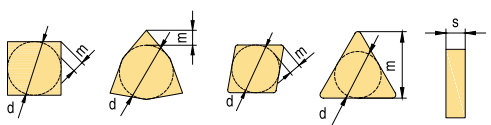
1-Shape/Code

A	B	C	D	E
H	K	L	M	O
P	R	S	T	V
W	Z	Others		

2-Clearance Angle

A	B	C	D
E	F	G	N
P	O	Others clearance angle	

3-Tolerance



Class	Unit	In.Circle dimension d	Nose height m	Thickness s
A	mm	± 0,025	± 0,005	± 0,025
C	mm	± 0,025	± 0,013	± 0,025
E	mm	± 0,025	± 0,025	± 0,025
F	mm	± 0,013	± 0,005	± 0,025
G	mm	± 0,025	± 0,025	± 0,130
H	mm	± 0,013	± 0,013	± 0,025
J	mm	*	± 0,005	± 0,025
K	mm	*	± 0,013	± 0,025
L	mm	*	± 0,025	± 0,025
M	mm	*	*	± 0,127
U	mm	*	*	± 0,127
N	mm	*	*	± 0,025

* For details refer to right and below tables

IC	Shape: C, E, H, M, O, P, S, T, R, W			
	d		m	
	J,K,L,M,N	U	M, N	U
4.76	± 0,05	± 0,08	± 0,08	± 0,13
5.56	± 0,05	± 0,08	± 0,08	± 0,13
6	± 0,05	± 0,08	± 0,08	± 0,13
6.35	± 0,05	± 0,08	± 0,08	± 0,13
7.94	± 0,05	± 0,08	± 0,08	± 0,13
8	± 0,05	± 0,08	± 0,08	± 0,13
9.525	± 0,05	± 0,08	± 0,08	± 0,13
10	± 0,05	± 0,08	± 0,08	± 0,13
12	± 0,08	± 0,13	± 0,13	± 0,2
12.7	± 0,08	± 0,13	± 0,13	± 0,2
15.875	± 0,1	± 0,18	± 0,15	± 0,27
16	± 0,1	± 0,18	± 0,15	± 0,27
19.05	± 0,1	± 0,18	± 0,15	± 0,27
20	± 0,1	± 0,18	± 0,15	± 0,27
25	± 0,13	± 0,25	± 0,18	± 0,38
25.4	± 0,13	± 0,25	± 0,18	± 0,38
31.75	± 0,15	± 0,25	± 0,2	± 0,38
32	± 0,15	± 0,25	± 0,2	± 0,38

M&N class	D shape		V shape	
	d	m	d	m
5.56	± 0,05	± 0,11		
6.35	± 0,05	± 0,11	± 0,05	± 0,16
7.94	± 0,05	± 0,11	± 0,05	± 0,16
9.525	± 0,05	± 0,11	± 0,05	± 0,16
12.7	± 0,08	± 0,15	± 0,08	± 0,2
15.875	± 0,10	± 0,18	± 0,10	± 0,27
19.05	± 0,10	± 0,18	± 0,10	± 0,27

4-Type of Insert

A	B	C	F	G
H	J	M	N	Q
R	T	U	W	Z
				Special

12
5

04
6

5-Cutting Edge Length								
In.Circle Dimension (mm)	Insert shape							
	C	D	R	S	T	V	W	K
3.97					06			02
5.0			05					
5.56					09			
6.0		06						
6.35	06	07			11	11	04	
8.0			08					
9.525	09	11	09	09	16	16	06	16
10.0			10					
12.0			12					
12.7	12	15	12	12	22	22	08	
15.875	16		15	15	27			
16.0			16					
19.05	19		19	19	33			
20.0			20					
25.0			25					
25.4	25		25	25				
31.75			31					
32			32					

6-Thickness		
Round down plus zero or T		
A, B, C, N, O, W		Example: 01 = 1.59 T1 = 1.98 02 = 2.38
H, M, R, T		03 = 3.18 T3 = 3.97 04 = 4.76 05 = 5.56 06 = 6.35 07 = 7.94
F, G, J, U		09 = 9.525 11 = 11.11 12 = 12.70 14 = 14.29 15 = 15.88

08
7

E
8

-
-

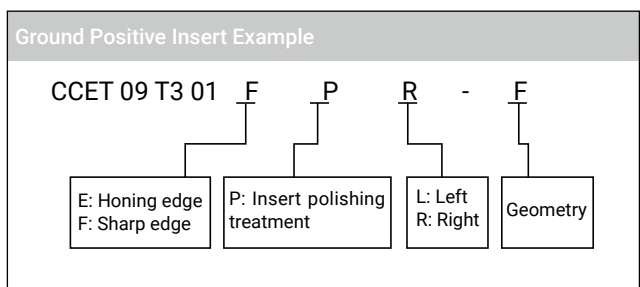
KC4
9

7-Nose Radius			
Corner radius			
Example			
MO = Round insert (metric)			
00 = Sharp	20 = 2.0		
003 = 0.03	24 = 2.4		
005 = 0.05	28 = 2.8		
01 = 0.1	32 = 3.2		
02 = 0.2	40 = 4.0		
04 = 0.4	48 = 4.8		
08 = 0.8	56 = 5.6		
12 = 1.2	64 = 6.4		
16 = 1.6	X = Others		
Wiper			
Approaching angle (kr)	Wiper clearance angle (an)		
A = 45	A = 3°		
D = 60	B = 5°		
E = 75	C = 7°		
F = 85	D = 15°		
G = 87	E = 20°		
P = 90	F = 25°		
Z = Others	G = 30°		
	N = 0°		
	P = 11°		
	Z = Others		

8-Edge Preparation		
Code	Edge shape	Description
F		Sharp cutting edge
E		Honed cutting edge
T		T-land
S		T-land+Honed cutting edge

9-Chip Breaker Description

Refer to page: P28-43



ISO Turning Insert

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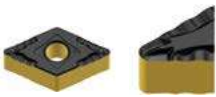
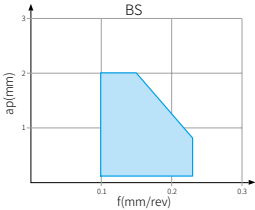
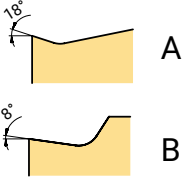

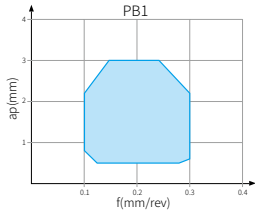
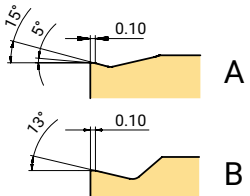

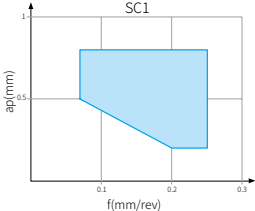
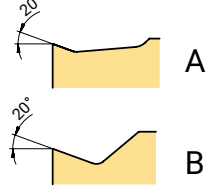

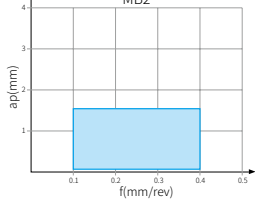
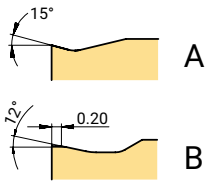

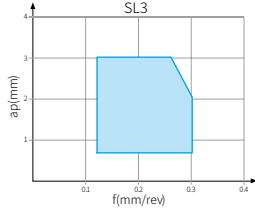
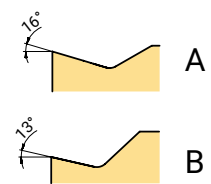
Turning and Grooving Grade Application Guide
















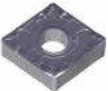
















Material Group	ISO	Turning						Grooving/ Parting off			ISO
		Coated		Cermet	Uncoated	PCBN	PCD	Coated		Uncoated	
		CVD	PVD					CVD	PVD		
P Non-alloy steels/ Alloyed steels	P01	AC052P									P01
	P10	AC150P			AT202			AC230P	AP301U		P10
	P20	AC250P		AP200U				AP301U	AP330M		P20
	P30	AC350P									P30
	P40										P40
	P50										P50
M Stainless steels	M01			AP100S							M01
	M10	AC100M		AP301M				AP301U			M10
	M20	AC200M		AP200U				AP330M			M20
	M30										M30
	M40										M40
	M50										M50
K Cast iron	K01	AC100K	AC102K								K01
	K10	AC202K			AT202		PB90	AC230P	AP301U		K10
	K20										K20
	K30										K30
	K40										K40
	K50										K50
N Aluminum/Aluminum alloys	N01										N01
	N10				AW100K		PD20			AW100K	N10
	N20										N20
	N30										N30
S Heat resistant alloys	S01			AP100S							S01
	S10	AC100M		AP301M							S10
	S20	AC200M		AP200U							S20
	S30										S30
	S40										S40
	S50										S50
H Hardened steels/ Chilled cast iron	H01						PB30				H01
	H10						PB60				H10
	H20										H20
	H30										H30



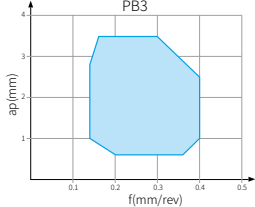
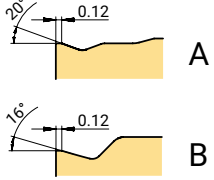
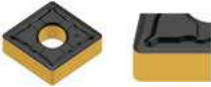
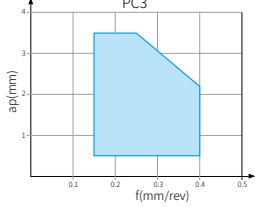
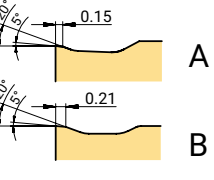
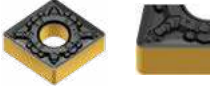
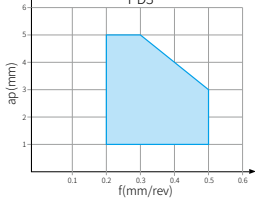
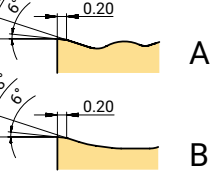
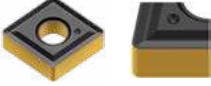
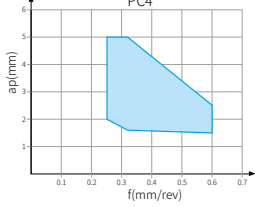
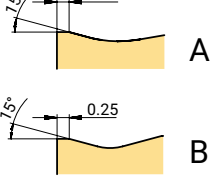

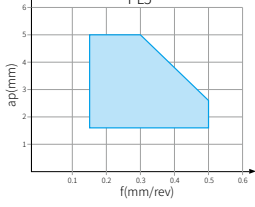
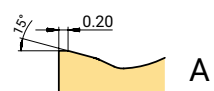
ISO Turning Insert













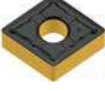
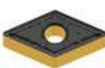




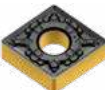





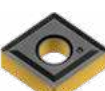








Overview of Turning Insert Geometries

Negative Inserts



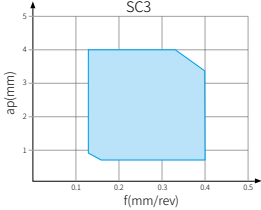
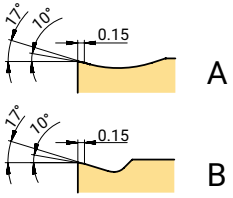

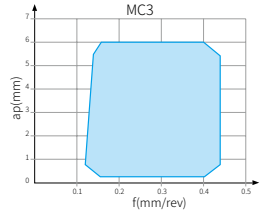
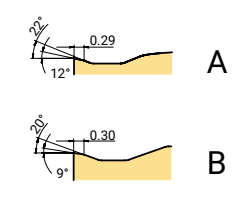

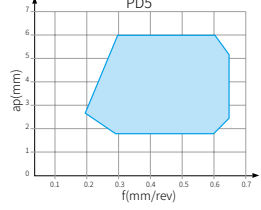
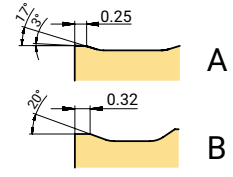
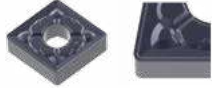
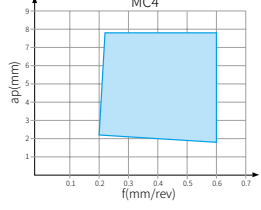
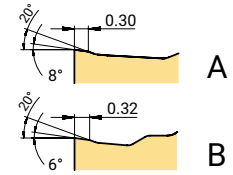

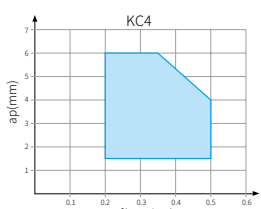
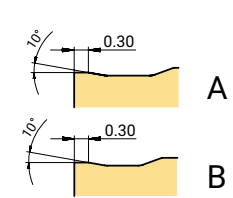

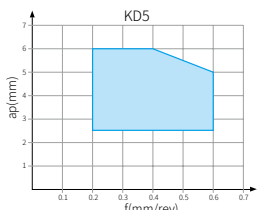
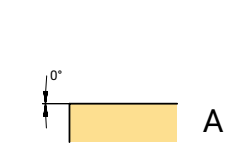
Application	Chip breaker	Features	Chip breaking range	Cross section geometry 
Profiling	BS 	Finishing and semi-finishing profile turning Suitable for turning with changing depth of cut. Smooth chip evacuation		
Finishing	PB1 	1st choice for stainless steel finish turning Light cutting chip breaker, low cutting force, suitable for machining slender shaft, thin wall and unstably clamped parts, good cutting performance		
	SC1 	1st choice for heat resistant alloy finish turning Excellent performance at low depth of cut.		
	MB2 	1st choice for stainless steel finish turning High positive rake angle reduced cutting force and built-up edge, can obtain much better surface quality. Very good chip breaking at low feed and cutting depth.		
Light cutting	SL3 	Recommended for heat resistant alloy light turning. Suitable for heat resistant alloy, Ti-alloy. Sharp and wavy cutting edge can get good surface finish and good chip breaking results.		






























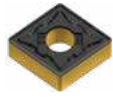
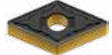




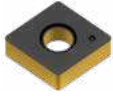




	80° Rhombus 	55° Rhombus 	90° Square 	60° Triangle 	35° Rhombus 	80° Trigon 	Round 
		DNMG-BS  P54			VNMG-BS  P63		
	CNMG-PB1  P50	DNMG-PB1  P54	SNMG-PB1  P57	TNMG-PB1  P60	VNMG-PB1  P63	WNMG-PB1  P65	
	CNMG-SC1  P50	DNMG-SC1  P54		TNMG-SC1  P60	VNMG-SC1  P63	WNMG-SC1  P65	
	CNMG-MB2  P50	DNMG-MB2  P54	SNMG-MB2  P57	TNMG-MB2  P60	VNMG-MB2  P63	WNMG-MB2  P65	
	CNMG-SL3  P50	DNMG-SL3  P54	SNMG-SL3  P57	TNMG-SL3  P60	VNMG-SL3  P63	WNMG-SL3  P65	

Application	Chip breaker	Features	Chip breaking range	Cross section geometry 
Semi-finishing	<p>PB3</p> 	<p>1st choice for steel semi finish turning</p> <p>The positive rake angle combined with small land guaranteed edge strength and sharpness, reduced the cutting force. The wavy side edge design has a good chip breaking result in out-copying turning on the shoulder, and in profile turning at different cutting depths.</p>		
	<p>PC3</p> 	<p>Alternative chipbreaker for steel semi-finish turning</p> <p>Unique geometry design offers wider chip breaking range. Double rake angle makes the cutting smoothly. Enhanced insert tip reduced crater wear.</p>		
Medium	<p>PD3</p> 	<p>1st choice for steel medium turning</p> <p>It has a strong chip control ability at low feed and cutting depth, and reduces crater wear. The chip breaking is also very good at high feed and cutting depth due to the geometry design. Double rake angle design makes sharp cutting edge and reduces cutting force.</p>		
	<p>PC4</p> 	<p>1st choice for cast iron medium turning</p> <p>Alternative chipbreaker for carbon steel and alloy steel medium turning</p> <p>Flat T-land guarantee the strength of cutting edge. This multi-purpose geometry can be used in universal applications.</p>		
	<p>PL5</p> 	<p>1st choice for steel slender bar turning</p> <p>Open chip breaker leads to smooth cutting with low cutting force, which is suitable for slender shaft turning.</p>		



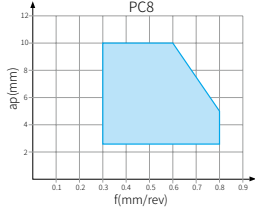
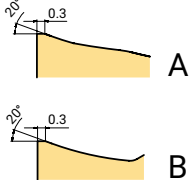

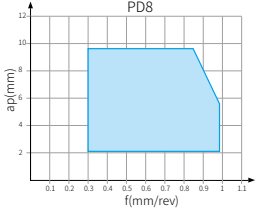
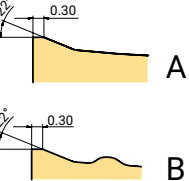

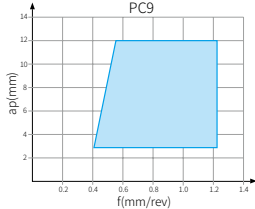
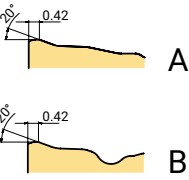

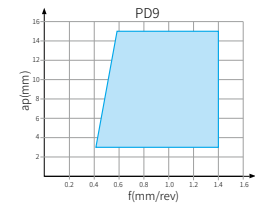
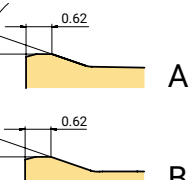
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	<p>CNMG-PC3</p>  <p>P50</p>	<p>DNMG-PC3</p>  <p>P55</p>	<p>SNMG-PC3</p>  <p>P57</p>	<p>TNMG-PC3</p>  <p>P60</p>	<p>VNMG-PC3</p>  <p>P63</p>	<p>WNMG-PC3</p>  <p>P65</p>	
	<p>CNMG-PD3</p>  <p>P50</p>	<p>DNMG-PD3</p>  <p>P55</p>	<p>SNMG-PD3</p>  <p>P57</p>	<p>TNMG-PD3</p>  <p>P60</p>	<p>VNMG-PD3</p>  <p>P64</p>	<p>WNMG-PD3</p>  <p>P66</p>	
	<p>CNMG-PC4</p>  <p>P51</p>	<p>DNMG-PC4</p>  <p>P56</p>	<p>SNMG-PC4</p>  <p>P58</p>	<p>TNMG-PC4</p>  <p>P61</p>	<p>VNMG-PC4</p>  <p>P64</p>	<p>WNMG-PC4</p>  <p>P66</p>	
		<p>DNMG-PL5</p>  <p>P55</p>		<p>TNMG-PL5</p>  <p>P60</p>		<p>WNMG-PL5</p>  <p>P66</p>	








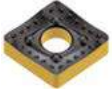



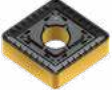

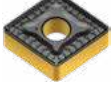

ISO Turning Insert

Application	Chip breaker	Features	Chip breaking range	Cross section geometry 
Medium	<p>SC3</p> 	<p>1st choice for heat resistant alloy medium turning</p> <p>Used in heat resistant alloy and titanium alloy medium turning. Large rake angle + small land width design, easy cutting, is also suitable for soft steel turning.</p>		
	<p>MC3</p> 	<p>1st choice for stainless steel medium turning</p> <p>Sharp cutting edge, low cutting force, wide chip breaking range and good chip removal ability.</p>		
Roughing	<p>PD5</p> 	<p>Alternative chipbreaker for steel rough turning</p> <p>A strong cutting edge. Double rake angle design effectively reduces the cutting force, can still have good chip breaking at small cutting depth.</p>		
	<p>MC4</p> 	<p>Alternative chipbreaker for stainless steel and heat resistant alloy rough turning</p> <p>Large chip breaker design, smooth chip evacuation, good chip breaking, with high metal removal rate.</p>		
	<p>KC4</p> 	<p>1st choice for cast iron turning</p> <p>It has strong cutting edge, reliable and stable performance.</p>		
	<p>KD5</p> 	<p>1st choice for cast iron rough turning</p> <p>High cutting edge strength, suitable for interrupt cutting and unstable cutting.</p>		

	80° Rhombus 	55° Rhombus 	90° Square 	60° Triangle 	35° Rhombus 	80° Trigon 	Round 
	<p>CNMG-SC3</p>  <p>P51</p>	<p>DNMG-SC3</p>  <p>P55</p>	<p>SNMG-SC3</p>  <p>P57</p>	<p>TNMG-SC3</p>  <p>P60</p>	<p>VNMG-SC3</p>  <p>P64</p>	<p>WNMG-SC3</p>  <p>P66</p>	
	<p>CNMG-MC3</p>  <p>P51</p>	<p>DNMG-MC3</p>  <p>P55</p>	<p>SNMG-MC3</p>  <p>P57</p>	<p>TNMG-MC3</p>  <p>P61</p>	<p>VNMG-MC3</p>  <p>P64</p>	<p>WNMG-MC3</p>  <p>P66</p>	
	<p>CNMG-PD5</p>  <p>P52</p>	<p>DNMG-PD5</p>  <p>P56</p>	<p>SNMG-PD5</p>  <p>P58</p>	<p>TNMG-PD5</p>  <p>P61</p>		<p>WNMG-PD5</p>  <p>P67</p>	
	<p>CNMG-MC4</p>  <p>P51</p>	<p>DNMG-MC4</p>  <p>P56</p>	<p>SNMG-MC4</p>  <p>P58</p>	<p>TNMG-MC4</p>  <p>P61</p>		<p>WNMG-MC4</p>  <p>P67</p>	
	<p>CNMG-KC4</p>  <p>P52</p>	<p>DNMG-KC4</p>  <p>P56</p>	<p>SNMG-KC4</p>  <p>P58</p>	<p>TNMG-KC4</p>  <p>P61</p>	<p>VNMG-KC4</p>  <p>P64</p>	<p>WNMG-KC4</p>  <p>P67</p>	
	<p>CNMA-KD5</p>  <p>P52</p>	<p>DNMA-KD5</p>  <p>P56</p>	<p>SNMA-KD5</p>  <p>P59</p>	<p>TNMA-KD5</p>  <p>P62</p>		<p>WNMA-KD5</p>  <p>P67</p>	



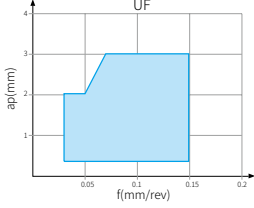
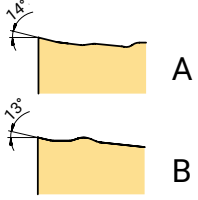

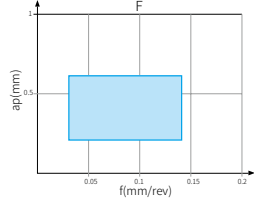


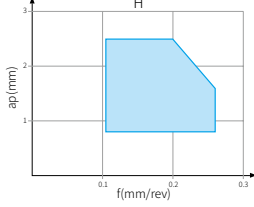
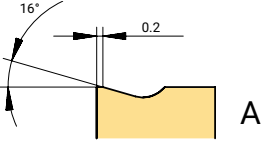
ISO Turning Insert












Application	Chip breaker	Features	Chip breaking range	Cross section geometry 
Heavy roughing	<p>PC8</p> 	<p>Light cutting geometry for heavy turning Positive rake angle and curved cutting edge design, low cutting force.</p>		
	<p>PD8</p> 	<p>Heavy turning geometry for soft steel and stainless steel The geometry design ensures low cutting force. Suitable for low power machine tools. Applied in steel, stainless steel and cast iron heavy turning.</p>		
	<p>PC9</p> 	<p>1st choice for steel heavy rough turning Wavy geometry is good for chip breaking. The geometry has a big space for chips, which is suitable for high metal removal rate.</p>		
	<p>PD9</p> 	<p>Alternative chipbreaker for steel heavy rough turning High edge strength is suitable for big cutting depth and high feed turning. High machining reliability.</p>		

	80° Rhombus 	55° Rhombus 	90° Square 	60° Triangle 	35° Rhombus 	80° Trigon 	Round 
	CNMM-PC8  P53						
	CNMM-PD8  P53		SNMM-PD8  P59	TNMM-PD8  P62			
	CNMM-PC9  P53		SNMM-PC9  P59				
	CNMM-PD9  P53		SNMM-PD9  P59				

ISO Turning Insert

Negative Ground Insert



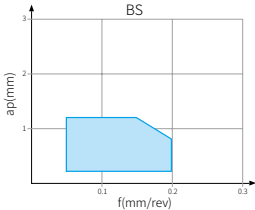
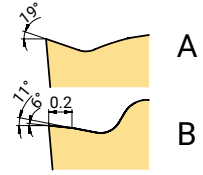

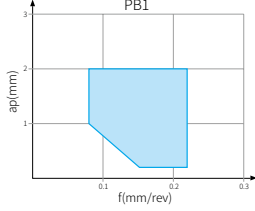
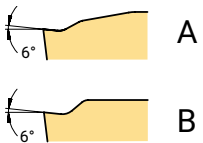

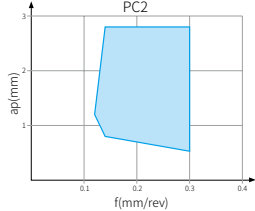
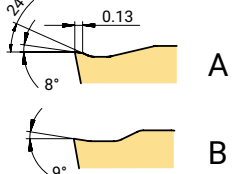
Application	Chip breaker	Features	Chip breaking range	Cross section geometry 	
Finishing	<p>UF</p> 	<p>Suitable for precision turning Low cutting forces, good chip breaking, suitable for finish turning.</p>			
	<p>F</p> 	<p>Finish turning Low cutting force, good chip control. The sharp edge produces a good surface finish.</p>			
Semi-finishing-Rough machining	<p>H</p> 	<p>Light turning Excellent chip control at low to medium feed rates. Strong edge strength.</p>			









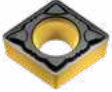




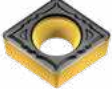




80° Rhombus 	55° Rhombus 	90° Square 	60° Triangle 	35° Rhombus 	80° Trigon 	Round 
			TNGG-UF  P62	VNGG-UF  P64		
			TNGG-F  P62			
			TNGG-H  P62			

ISO Turning Insert



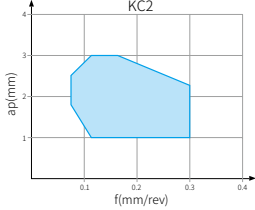
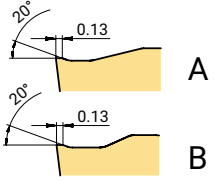
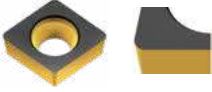
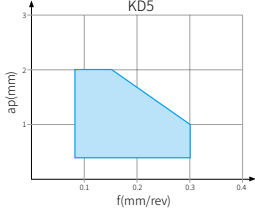
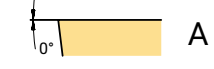

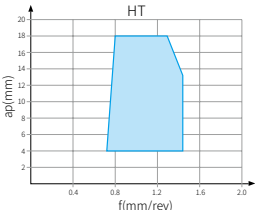
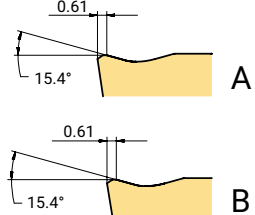

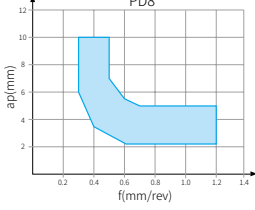
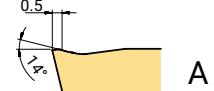

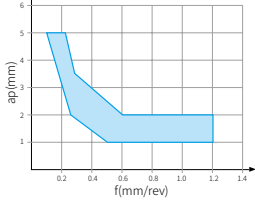
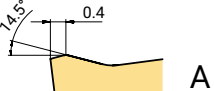
Overview of Turing Insert Geometry













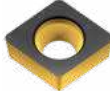






Positive Pressed Insert

Application	Chip breaker	Features	Chip breaking range	Cross section geometry 
Profiling	<p>BS</p> 	<p>Finish turning Profile turning or turning with changing depth of cut, smooth chip evacuation.</p>		
Finishing	<p>PB1</p> 	<p>1st choice for steel finish turning Positive rake angle reduces cutting force and built-up edge, and obtains better surface finish and longer tool life. Also can be used in stainless steel turning.</p>		
Semi-finishing	<p>PC2</p> 	<p>1st choice for steel and stainless steel semi-finish turning Sharp geometry design ensures low cutting force, less built-up edge and excellent chip control.</p>		

	80° Rhombus 	55° Rhombus 	90° Square 	60° Triangle 	35° Rhombus 	80° Trigon 	Round 
					VBMT-BS  P85		
	CCMT-PB1 CPMT-PB1  P71	DCMT-PB1  P75	SCMT-PB1  P78	TCMT-PB1 TPMT-PB1  P80	VBMT-PB1 VCMT-PB1  P86		
	CCMT-PC2 CPMT-PC2  P71	DCMT-PC2  P75	SCMT-PC2  P78	TCMT-PC2 TPMT-PC2  P80	VBMT-PC2 VCMT-PC2  P86		



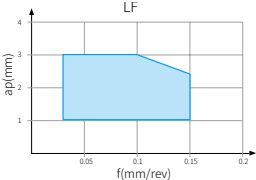
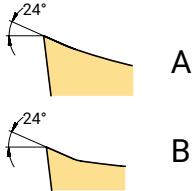

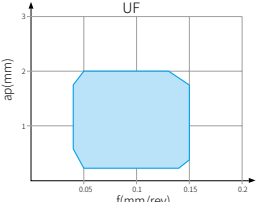
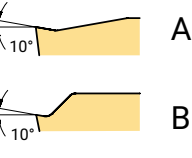

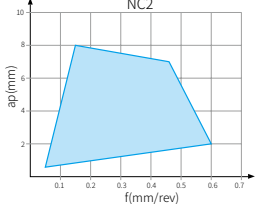
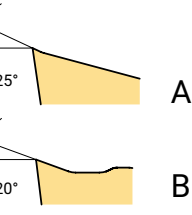

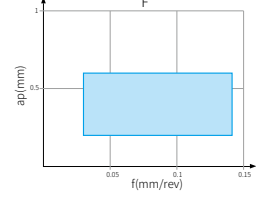
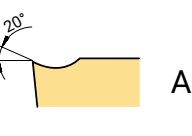
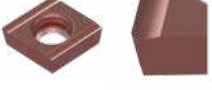
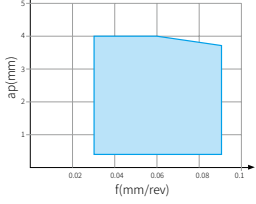


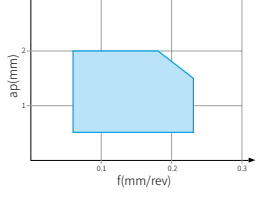
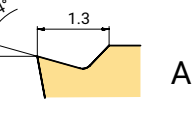
ISO Turning Insert
































Application	Chip breaker	Features	Chip breaking range	Cross section geometry 
Medium	KC2 	General purpose geometry for steel, stainless steel and cast iron turning Suitable for medium and rough turning. Simple and durable chip breaker design, very good versatility and wide application range.		
Roughing	KD5 	Geometry for cast iron rough turning Suitable for unstable machining due to its strong cutting edge. Reduced chipping.		
	HT 	Geometry for steel turning with large cutting depth Open chip breaker is suitable for large cutting depth with smooth chip evacuation. Good cost efficiency.		
Semi-finishing	PD8 	Geometry for carbon steel and alloy steel heavy turning A wide chipbreaker avoid chip jam at big cutting depth. Chip control can be also good at small cutting depth.		
Medium	No code 	Alternative chipbreaker for cast iron and alloy steel medium turning Negative land and big rake angle design ensure cutting edge strength and sharpness.		

80° Rhombus 	55° Rhombus 	90° Square 	60° Triangle 	35° Rhombus 	80° Trigon 	Round 
<p>CCMT-KC2</p>  <p>P72</p>	<p>DCMT-KC2</p>  <p>P75</p>	<p>SCMT-KC2</p>  <p>P78</p>	<p>TCMT-KC2</p>  <p>P81</p>	<p>VBMT-KC2</p>  <p>P86</p>		
<p>CCMW-KD5</p>  <p>P72</p>	<p>DCMW-KD5</p>  <p>P76</p>	<p>SCMW-KD5</p>  <p>P78</p>	<p>TCMW-KD5</p>  <p>P81</p>			
		<p>SCMT-HT</p>  <p>P78</p>				
						<p>RCMX-PD8</p>  <p>P90</p>
						<p>RCMX</p>  <p>P90</p>

ISO Turning Insert

Positive Ground Insert

Application	Chip breaker	Features	Chip breaking range	Cross section geometry 
Finishing	<p>LF</p> 	<p>Finish turning Sharp cutting edge, low cutting force, suitable for Swiss-type automatic lathe with 2 direction machining.</p>		
	<p>UF</p> 	<p>1st choice for heat resistant alloy turning Peripheral ground finish turning inserts. High repeatability on insert positioning. Sharp cutting edge can achieve good machining tolerance.</p>		
Semi-finishing	<p>NC2</p> 	<p>Choice for aluminium alloy turning Very positive rake angle is designed for non-ferrous metal finish and semi-finish turning. It reduces the cutting force and make smooth chip evacuation. The polished rake surface, with reduced friction and built-up edge.</p>		
Finishing	<p>F</p> 	<p>Choice for finish turning Excellent chip control at low feed rate. Very low cutting force.</p>		
Low feed	<p>M</p> 	<p>Suitable for medium turning in automatic lathes Excellent chip control at low to medium feed rate. Reliable machining. Big rake angle avoid work hardening.</p>		
Semi-finishing	<p>Y</p> 	<p>Choice for semi-finish rough turning in automatic lathe The strong edge can be used in rough turning. Good chip control for low to medium feed rate</p>		

	80° Rhombus 	55° Rhombus 	90° Square 	60° Triangle 	35° Rhombus 	80° Trigon 	Round 
	<p>CCGT-LF</p>  <p>P70</p>	<p>DCGT-LF</p>  <p>P74</p>		<p>TCGT-LF</p>  <p>P79</p>	<p>VBGT-LF VCGT-LF VPGT-LF</p>  <p>P84</p>		
	<p>CCGT-UF</p>  <p>P70</p>	<p>DCGT-UF</p>  <p>P74</p>		<p>TCGT-UF</p>  <p>P79</p>	<p>VBGT-UF VCGT-UF VPGT-UF</p>  <p>P84, 85</p>		
	<p>CCGT-NC2</p>  <p>P71</p>	<p>DCGT-NC2</p>  <p>P75</p>	<p>SCGT-NC2</p>  <p>P78</p>	<p>TCGT-NC2</p>  <p>P79</p>	<p>VCGT-NC2</p>  <p>P85</p>	<p>RCGT-NC2</p>  <p>P90</p>	
	<p>CCET-F</p>  <p>P73</p>	<p>DCET-F</p>  <p>P76</p>		<p>TBET-F TCET-F TPEH-F</p>  <p>P81, 82, 83</p>	<p>VBET-F VCET-F VPET-F</p>  <p>P86, 87</p>	<p>WBET-F</p>  <p>P89</p>	
	<p>CCET-M</p>  <p>P73</p>	<p>DCET-M</p>  <p>P77</p>		<p>TCET-M</p>  <p>P83</p>	<p>VBET-M VPET-M</p>  <p>P87, 88</p>		
					<p>VBET-Y</p>  <p>P88</p>		

ISO Turning Insert

Turning Grade Description

Basic Grades for Turning

P Steel, cast steel, ferrite/martensite stainless steel and malleable cast iron

Basic grade

AC052P P05(P01-P15)

CVD coated grade, has good crater resistance and chipping resistance, which is recommended for high productivity medium and rough turning in stable condition, can keep edge reliability in dry or wet machining with high temperature.

AC150P P15(P10-P25)

CVD coated grade, can be used in finish to rough turning on steel and cast steel, and is recommended in continuous and light interrupted cutting where it can keep high metal removal rate.

AC250P P25(P20-P35)

CVD coated grade, 1st choice for steel turning, used in finish to rough turning on steel and cast steel. It's recommended for continuous and interrupted machining.

AC350P P35(P25-P45)

CVD coated grade, can be used in rough turning on steel and cast steel under poor conditions. Reliable cutting edge made this grade good for interrupted machining with high metal removal rate.

Supplemental grade

AP200U P25(P15-P35)

PVD coated grade, recommended for finish turning on low carbon steel with low cutting speed or low feed.

AC200M P35(P25-P40)

CVD coated grade. Supplemental grade for steel turning with high toughness requests.

AT202 P15(P10-P20)

Uncoated cermet grade. It has excellent built-up edge resistance and chipping resistance which can be used in finish turning with good surface quality or low cutting force requests.

M Austenitic stainless steel, cast steel, manganese steel, alloyed cast iron, malleable cast iron and free cutting iron.

Basic grade

AC100M M15(M05-M20)

CVD coated grade. It's recommended for finish machining and light rough machining. It's suitable for machining at medium to high cutting speed due to its heat resistance feature of wear resistant coating.

AC200M M25(M15-M30)

CVD coated grade, optimised for semi-finish to rough turning, can be used in interrupted machining in which it can keep edge reliability due to good thermal shock stability and mechanical shock resistance.

AP200U M25(M15-M35)

PVD coated grade, used in finish turning at low to medium speed and also in interrupted turning due to excellent thermal stability, outstanding performance in machining when sharp edge and edge toughness or good surface quality are requested.

AP301M M25(M15-M35)

PVD coated grade. Mainly used in machining steel and stainless steel small parts. It has excellent built-up edge resistance, good machining stability, can obtain good surface quality, and achieve longer tool life.

Supplemental grade

AP100S M15(M05-M25)

PVD coated grade, recommended for finish turning due to its high hardness and resistance to plastic deformation.

K**Cast iron, chilled cast iron and short chip malleable cast iron****Basic grade****AC100K K05(K01-K15)**

CVD coated grade, has thick and smooth wear resistant coating and hard substrate, recommended for grey cast iron high speed turning.

AC102K K05(K01-K15)

CVD coated grade, has thick and smooth wear resistant coating and hard substrate, recommended for nodular cast iron high speed turning.

AC202K K15(K10-K30)

1st choice for cast iron turning. It can deal with interrupted cutting due to its high wear-resistant CVD coating, used in finish to rough turning on cast iron at low to medium cutting speed.

Supplemental grade**PB60 K15(K10-K30)**

CBN grade. 1st choice for grey cast iron continuous and interrupted finish turning at high speed due to its good edge strength and wear resistance.

PB90 K10(K01-K20)

CBN grade. Suitable for grey cast iron and chilled cast iron interrupted finish turning due to its good edge strength and wear resistance.

AT202 K15(K10-K20)

Uncoated cermet grade. It has excellent built-up edge resistance and good plastic deformation resistance. It can be used in nodular cast iron finish turning when surface quality, small tolerance or low cutting force are requested..

N**Non-ferrous metals****Basic grade****AW100K N15 (N05-N15)**

Uncoated grade. It has both excellent wear resistance and sharp edge. Used in Al alloy rough to finish machining.

PD20 N10 (N01-N20)

PCD grade, used in non-ferrous material and non-metal material machining which can have longer tool life, completely clean cutting and good surface quality.

S**Heat resistant alloys****Basic grade****AP100S S15(S05-S25)**

1st choice for heat resistant alloy. PVD coated grade has high hardness and plastic deformation resistance, can keep high performance and good wear resistance.

AP200U S25(S15-S35)

PVD coated grade. Used in low cutting speed or light interrupted cutting. Suitable for semi-roughing or continuous machining for a short time due to its good notch wear resistance and anti-heat shock capability.

Supplemental grade**AC100M S15(S05-S20)**

CVD coated grade, suitable for heat resistant alloy continuous high speed machining .

AC200M S25(S15-S35)

CVD coated grade, suitable for heat resistant alloy general machining.

H**Hardened materials****Basic grade****PB30 H10(H05-H15)**

CBN grade with low CBN content, is used in hardened steel continuous machining at high speed and light interrupted machining.

PB60 H15(H10-H25)

1st choice of CBN grade medium CBN content for hardened steel interrupted machining and continuous machining at medium speed.

PB90 H25 (H20-H30)

Extra-hard CBN grade. Supplemental choice for hardened steel interrupted machining due to its good edge toughness.

Cutting Data Recommendation--Negative Insert

ISO		Materials		Workpiece Materials													
				Brinell Hardness (HB)	Tensile strength (N/mm ²)	AT202			AC052P			AC150P			AC250P		
						f (mm/rev)			f (mm/rev)			f (mm/rev)			f (mm/rev)		
						0.1	0.4	0.6	0.1	0.4	0.6	0.1	0.4	0.6	0.1	0.4	0.6
P	Unalloyed steel	C ≤ 0.25%	Annealed	125	428	200	100	70	620	450	330	485	360	270	380	260	210
		0.25 < C ≤ 0.55%	Annealed	190	639	200	100	70	560	405	295	370	270	210	280	200	150
		0.25 < C ≤ 0.55%	Heat-treated	210	708	200	80	50	400	280	200	260	220	170	200	160	135
		C > 0.55%	Annealed	190	639	200	80	50	530	385	275	270	220	160	240	160	125
		C > 0.55%	Heat-treated	300	1013	200	80	50	380	245	180	210	180	150	160	120	110
	Free cutting steel(short chip)	Annealed	220	745	200	80	50	600	420	300	440	310	250	340	220	175	
	Low-alloyed steel	Annealed	175	591	180	80	50	610	410	285	350	260	220	240	175	135	
		Heat-treated	300	1013	180	80	50	530	350	250	220	170	150	140	100	85	
		Heat-treated	380	1282	180	80	50	330	230	175	160	120	100	100	70	55	
		Heat-treated	430	1477	180	80	50	265	185	140	90	70					
High-alloyed steel and high-alloyed tool steel	Annealed	200	675	160	80	50	445	295	215	330	230	150	210	145	85		
	Hardened and tempered	300	1013	160	80	50	300	200	160	230	140	110	130	85	65		
	Hardened and tempered	400	1361	150	80	50	220	140	105	80	70						
Stainless steel	Ferritic/Martensite,Annealed	200	675										180	150	120		
	Martensite,Heat-treated	330	1114										140	100	70		
M	Stainless steel	Austenitic,hardened	200	675													
		Austenitic,precipitation hardened stainless steel(PH stainless steel)	300	1013													
		Austenitic,ferritic,duplex	230	778													
K	Malleable cast iron	Ferritic	200	400													
		Pearlitic	260	700													
	Grey cast iron	Low tensile strength	180	200													
		High tensile strength/Austenitic	245	350													
	Nodular cast iron	Ferritic	155	400													
Pearlitic		265	700														
		GGV(CGI)	230	400													
N	Wrought aluminum alloy	Non-aging alloy	30	-													
		Aged alloy	100	340													
	Cast aluminum alloy	≤ 12% Si, non-aging alloy	75	260													
		≤ 12% Si, aged alloy	90	310													
		> 12% Si, non-aging alloy	130	450													
	Magnesium alloy		70	250													
	Copper and copper alloy(bronze/ brass)	Unalloyed,electrolytic copper	100	340													
Brass,bronze,red brass		90	310														
Cu alloy,short chip		110	380														
High tensile,Ampco alloy		300	1010														
S	Heat-resistant alloy	Fe-based	Annealed	200	680												
			Aged	280	940												
		Ni or Co based	Annealed	250	840												
			Aged	350	1180												
		Cast	320	1080													
	Titanium alloy	Pure Titanium	200	680													
		α and β alloy,aged	375	1260													
		β alloy	410	1400													
Tungsten alloy		300	1010														
Molybdenum alloy		300	1010														
H	Hardened steel	Hardened and tempered	50HRC														
		Hardened and tempered	55HRC														
		Hardened and tempered	60HRC														
	Chilled cast iron	Hardened and tempered	50HRC														

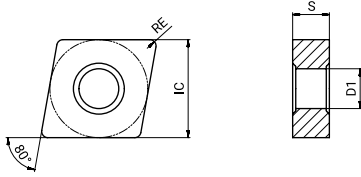
*The recommended cutting data always refer to general cutting conditions. The actual selection should be adjusted according to the factors such as machine rigidity, tool body, workpiece conditions and coolant (f should be adjust according to insert radius)

Cutting Data Recommendation--Positive Insert

ISO		Materials		Workpiece Materials													
				Brinell Hardness (HB)	Tensile strength (N/mm ²)	AT202			AC052P			AC150P			AC250P		
						f (mm/rev)			f (mm/rev)			f (mm/rev)			f (mm/rev)		
						0.1	0.2	0.4	0.1	0.2	0.4	0.1	0.2	0.4	0.1	0.2	0.4
P	Unalloyed steel	C ≤ 0.25%	Annealed	125	428	200	100	70	600	430	310	465	400	330	360	310	260
		0.25 < C ≤ 0.55%	Annealed	190	639	200	100	70	540	385	275	360	330	260	290	250	190
		0.25 < C ≤ 0.55%	Heat-treated	210	708	200	80	50	380	260	180	270	240	220	200	180	160
		C > 0.55%	Annealed	190	639	200	80	50	520	365	255	330	300	290	250	220	210
		C > 0.55%	Heat-treated	300	1013	200	80	50	360	225	160	210	180	170	160	130	120
	Free cutting steel(short chip)	Annealed	220	745	200	80	50	580	400	280	440	400	380	320	290	275	
	Low-alloyed steel	Annealed	175	591	180	80	50	590	390	265	330	310	300	260	240	220	
		Heat-treated	300	1013	180	80	50	510	330	230	180	170	160	135	120	100	
		Heat-treated	380	1282	180	80	50	320	210	155	120	100	90	100	85	65	
		Heat-treated	430	1477	180	80	50	265	165	120	80	70		65	55		
High-alloyed steel and high-alloyed tool steel	Annealed	200	675	160	80	50	425	275	195	320	290	280	270	240	220		
	Hardened and tempered	300	1013	160	80	50	280	180	140	200	170	150	170	140	120		
	Hardened and tempered	400	1361	150	80	50	200	120	105	80	70		65	55			
Stainless steel	Ferritic/Martensite,Annealed	200	675											190	170	150	
	Martensite,Heat-treated	330	1114											90	80	60	
M	Stainless steel	Austenitic,hardened	200	675													
		Austenitic,precipitation hardened stainless steel(PH stainless steel)	300	1013													
		Austenitic,ferritic,duplex	230	778													
K	Malleable cast iron	Ferritic	200	400													
		Pearlitic	260	700													
	Grey cast iron	Low tensile strength	180	200													
		High tensile strength/Austenitic	245	350													
	Nodular cast iron	Ferritic	155	400													
Pearlitic		265	700														
		GGV(CGI)	230	400													
N	Wrought aluminum alloy	Non-aging alloy	30	-													
		Aged alloy	100	340													
	Cast aluminum alloy	≤ 12% Si, non-aging alloy	75	260													
		≤ 12% Si, aged alloy	90	310													
		> 12% Si, non-aging alloy	130	450													
	Magnesium alloy		70	250													
	Copper and copper alloy(bronze/ brass)	Unalloyed,electrolytic copper	100	340													
Brass,bronze,red brass		90	310														
Cu alloy,short chip		110	380														
High tensile,Ampco alloy		300	1010														
S	Heat-resistant alloy	Fe-based	Annealed	200	680												
			Aged	280	940												
		Ni or Co based	Annealed	250	840												
			Aged	350	1180												
		Cast	320	1080													
	Titanium alloy	Pure Titanium	200	680													
		α and β alloy,aged	375	1260													
β alloy		410	1400														
Tungsten alloy		300	1010														
Molybdenum alloy		300	1010														
H	Hardened steel	Hardened and tempered	50HRC														
		Hardened and tempered	55HRC														
		Hardened and tempered	60HRC														
	Chilled cast iron	Hardened and tempered	50HRC														

*The recommended cutting data always refer to general cutting conditions. The actual selection should be adjusted according to the factors such as machine rigidity, tool body, workpiece conditions and coolant (f should be adjust according to insert radius)

Negative 80° (C)

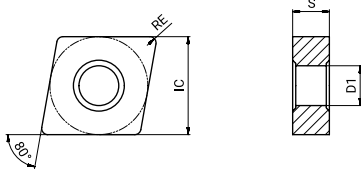


Dimension (mm)			
Product code	IC	S	D1
CN_1204_	12.7	4.76	5.16
CN_1606_	15.875	6.35	6.35
CN_1906_	19.05	6.35	7.94

Inserts	Product code	RE (mm)	Recommended parameters		Machining conditions																							
			f (mm/rev)	ap (mm)	p					M				K			N	S										
					AT202	AC052P	AC150P	AC250P	AC350P	AC100M	AC200M	AP200U	AP301M	AC100K	AC102K	AC202K	AW100K	AP100S										
Finishing		CNMG 120404E-PB1	0.4	0.05-0.15	0.26-3.2	●		▲	▲																			
		120408E-PB1	0.8	0.10-0.30	0.52-3.2	●		▲	▲																			
		120412E-PB1	1.2	0.15-0.45	0.78-3.2			▲	▲																			
		CNMG 120404E-SC1	0.4	0.07-0.18	0.20-0.8										●													
		120408E-SC1	0.8	0.10-0.25	0.20-0.8										●													
		CNMG 120404E-MB2	0.4	0.05-0.15	0.26-3.2							●	●	●														
Light cutting		CNMG 120404E-SL3	0.4	0.12-0.25	0.60-3.0									●											●			
		120408E-SL3	0.8	0.15-0.30	0.80-3.0										●											●		
Semi-finishing		CNMG 120404E-PB3	0.4	0.06-0.18	0.30-3.5	●		▲	▲																			
		120408E-PB3	0.8	0.12-0.36	0.60-3.5	●	●	▲	▲																			
		120412E-PB3	1.2	0.18-0.54	0.90-3.5	●	●	▲	▲																			
		CNMG 120404E-PC3	0.4	0.07-0.20	0.34-3.9	●		▲	▲																			
		120408E-PC3	0.8	0.14-0.40	0.68-3.9	●		▲	▲																			
		120412E-PC3	1.2	0.20-0.60	1.02-3.9	●		▲	▲																			
Medium		CNMG 120404E-PD3	0.4	0.08-0.22	0.40-4.3	●	●	▲	▲	●																		
		120408E-PD3	0.8	0.15-0.44	0.80-4.3	●	●	▲	▲	●																		
		120412E-PD3	1.2	0.23-0.66	1.20-4.3	●	●	▲	▲	●																		
		160608E-PD3	0.8	0.15-0.44	0.80-5.3		●	▲	▲	●																		
		160612E-PD3	1.2	0.23-0.66	1.20-5.3		●	▲	▲	●																		
		190608E-PD3	0.8	0.15-0.44	0.80-6.4		●	▲	▲	●																		
		190612E-PD3	1.2	0.23-0.66	1.20-6.4		●	▲	▲	●																		
		190616E-PD3	1.6	0.30-0.66	1.60-6.4		●	▲	▲	●																		

●: Stock available ▲: Stock available now but will be replaced in the future.

Negative 80° (C)

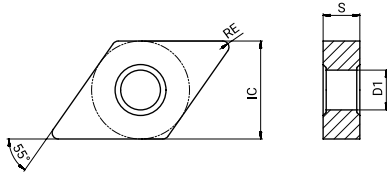


Dimension (mm)			
Product code	IC	S	D1
CN_1204_	12.7	4.76	5.16
CN_1606_	15.875	6.35	6.35
CN_1906_	19.05	6.35	7.94








Inserts	Product code	RE (mm)	Recommended parameters		Machining conditions															
					● Good condition ◐ General condition ◑ Bad condition															
			f (mm/rev)	ap (mm)	p					M			K			N	S			
		AT202	AC052P	AC150P	AC250P	AC350P	AC100M	AC200M	AP200U	AP301M	AC100K	AC102K	AC202K	AW100K	AP100S					
Medium		CNMG 120404E-SC3	0.4	0.08-0.22	0.40-4.3						●	●	●						●	
		120408E-SC3	0.8	0.15-0.44	0.80-4.3						●	●	●						●	
		120412E-SC3	1.2	0.23-0.66	1.20-4.3						●	●	●						●	
		160612E-SC3	1.2	0.23-0.66	1.20-5.3						●	●	●						●	
		160616E-SC3	1.6	0.30-0.88	1.60-5.3						●	●	●						●	
		190612E-SC3	1.2	0.23-0.66	1.20-6.4						●	●	●						●	
		190616E-SC3	1.6	0.30-0.88	1.60-6.4						●	●	●						●	
		CNMG 120404E-MC3	0.4	0.08-0.22	0.32-4.3						●	●	●							
		120408E-MC3	0.8	0.15-0.44	0.64-4.3						●	●	●						●	
		120412E-MC3	1.2	0.23-0.66	0.96-4.3						●	●	●							
		120416E-MC3	1.6	0.30-0.88	1.28-4.3						●	●	●							
		160608E-MC3	0.8	0.15-0.44	0.64-5.3						●	●	●							
		160612E-MC3	1.2	0.23-0.66	0.96-5.3						●	●	●							
		190608E-MC3	0.8	0.15-0.44	0.64-6.4						●	●	●							
	190612E-MC3	1.2	0.23-0.66	0.96-6.4						●	●	●								
		CNMG 120404E-PC4	0.4	0.08-0.22	0.40-4.3				▲	▲						●	●			
		120408E-PC4	0.8	0.15-0.44	0.80-4.3		●	▲	▲							●	●			
		120412E-PC4	1.2	0.23-0.66	1.20-4.3		●	▲	▲							●	●			
		160612E-PC4	1.2	0.23-0.66	1.20-5.3		●	▲	▲							●	●			
		160616E-PC4	1.6	0.30-0.88	1.60-5.3		●	▲	▲							●	●			
		190612E-PC4	1.2	0.23-0.66	1.20-6.4		●	▲	▲							●	●			
Roughing		CNMG 120408E-MC4	0.8	0.20-0.60	1.20-6.4						●	●	●					●		
		120412E-MC4	1.2	0.30-0.90	1.80-6.4						●	●	●					●		
		160612E-MC4	1.2	0.30-0.90	1.80-8.1						●	●	●					●		
		160616E-MC4	1.6	0.40-1.20	2.40-8.1						●	●	●							
		190612E-MC4	1.2	0.30-0.90	1.80-9.7						●	●	●							
		190616E-MC4	1.6	0.40-1.20	2.40-9.7						●	●	●							

●: Stock available ▲: Stock available now but will be replaced in the future.

Negative 55° (D)

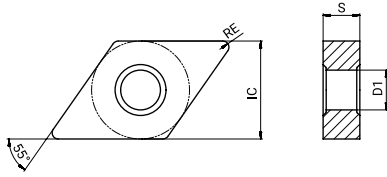


Dimension (mm)			
Product code	IC	S	D1
DN_1104_	9.525	4.76	3.81
DN_1504_	12.7	4.76	5.16
DN_1506_	12.7	6.35	5.16

Inserts	Product code	RE (mm)	Recommended parameters		Machining conditions																					
			f (mm/rev)	ap (mm)	p					M				K			N	S								
					AT202	AC052P	AC150P	AC250P	AC350P	AC100M	AC200M	AP200U	AP301M	AC100K	AC102K	AC202K	AW100K	AP100S								
Profiling	 DNMG 110408E-BS	0.8	0.10-0.25	0.70-2.0		●																				
Finishing	 DNMG 110404E-PB1	0.4	0.05-0.15	0.26-2.3	●		▲	▲																		
	150404E-PB1	0.4	0.05-0.15	0.26-3.1	●		▲	▲																		
	150408E-PB1	0.8	0.10-0.30	0.52-3.1	●	●	▲	▲																		
	150604E-PB1	0.4	0.05-0.15	0.26-3.1	●		▲	▲																		
	150608E-PB1	0.8	0.10-0.30	0.52-3.1	●	●	▲	▲																		
	 DNMG 150404E-SC1	0.4	0.07-0.18	0.20-0.8																						
	150408E-SC1	0.8	0.10-0.25	0.20-0.8																						
	150604E-SC1	0.4	0.07-0.18	0.20-0.8																						
	150608E-SC1	0.8	0.10-0.25	0.20-0.8																						
	 DNMG 150404E-MB2	0.4	0.05-0.15	0.26-2.9							●	●													●	
	150408E-MB2	0.8	0.10-0.30	0.52-2.9							●	●													●	
	150604E-MB2	0.4	0.05-0.15	0.26-2.9							●	●													●	
150608E-MB2	0.8	0.10-0.30	0.52-2.9							●	●													●		
Light cutting	 DNMG 110408E-SL3	0.8	0.12-0.30	0.80-2.5																					●	
	150404E-SL3	0.4	0.12-0.25	0.60-2.5																					●	
	150408E-SL3	0.8	0.12-0.30	0.80-2.5																					●	
	150604E-SL3	0.4	0.12-0.25	0.60-2.5																					●	
	150608E-SL3	0.8	0.12-0.30	0.80-2.5																					●	
Semi-finishing	 DNMG 150404R-M1T	0.4	0.10-0.35	0.70-4.5	●																					
	150404L-M1T	0.4	0.10-0.35	0.70-4.5	●																					
	 DNMG 150404E-PB3	0.4	0.06-0.18	0.30-3.1	●		▲	▲																		
	150408E-PB3	0.8	0.12-0.36	0.60-3.1	●	●	▲	▲																		
	150412E-PB3	1.2	0.18-0.54	0.90-3.1	●	●	▲	▲																		
	150604E-PB3	0.4	0.06-0.18	0.30-3.1	●		▲	▲																		
	150608E-PB3	0.8	0.12-0.36	0.60-3.1	●	●	▲	▲																		
	150612E-PB3	1.2	0.18-0.54	0.90-3.1	●	●	▲	▲																		

●: Stock available ▲: Stock available now but will be replaced in the future.

Negative 55° (D)

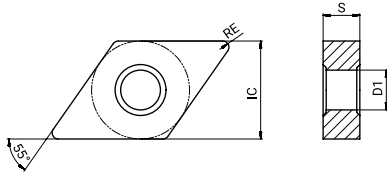


Dimension (mm)			
Product code	IC	S	D1
DN_1104_	9.525	4.76	3.81
DN_1504_	12.7	4.76	5.16
DN_1506_	12.7	6.35	5.16

Inserts	Product code	RE (mm)	Recommended parameters		Machining conditions																
					● Good condition ◐ General condition ◑ Bad condition ● ● ● ◐ ◑ ● ◐ ◑ ◐ ◑ ● ◐ ◑ ◐ ◑ ◐ ●																
			f (mm/rev)	ap (mm)	p					M				K			N	S			
				AT202	AC052P	AC150P	AC250P	AC350P	AC100M	AC200M	AP200U	AP301M	AC100K	AC102K	AC202K	AW100K	AP100S				
Semi-finishing	DNMG 110408E-PC3	0.8	0.14-0.40	0.68-2.6			▲	▲													
	110412E-PC3	1.2	0.20-0.60	1.02-2.6			▲	▲													
	150404E-PC3	0.4	0.07-0.20	0.34-3.5	●		▲	▲													
	150408E-PC3	0.8	0.14-0.40	0.68-3.5	●		▲	▲													
	150412E-PC3	1.2	0.20-0.60	1.02-3.5	●		▲	▲													
	150604E-PC3	0.4	0.07-0.20	0.34-3.5	●		▲	▲													
	150608E-PC3	0.8	0.14-0.40	0.68-3.5	●		▲	▲													
	150612E-PC3	1.2	0.20-0.60	1.02-3.5	●		▲	▲													
Medium	DNMG 110404E-PD3	0.4	0.08-0.22	0.40-2.9	●		▲	▲													
	110408E-PD3	0.8	0.15-0.44	0.80-2.9	●	●	▲	▲													
	150404E-PD3	0.4	0.08-0.22	0.40-3.9	●		▲	▲													
	150408E-PD3	0.8	0.15-0.44	0.80-3.9	●	●	▲	▲	●												
	150412E-PD3	1.2	0.23-0.66	1.20-3.9		●	▲	▲	●												
	150604E-PD3	0.4	0.08-0.22	0.40-3.9			▲	▲													
	150608E-PD3	0.8	0.15-0.44	0.80-3.9		●	▲	▲	●												
	150612E-PD3	1.2	0.23-0.66	1.20-3.9		●	▲	▲	●												
	DNMG 150608R-PL5	0.8	0.15-0.44	0.80-3.9			▲	▲													
	DNMG 150404E-SC3	0.4	0.08-0.22	0.40-3.9						●	●	●						●			
	150408E-SC3	0.8	0.15-0.44	0.80-3.9						●	●	●						●			
	150412E-SC3	1.2	0.23-0.66	1.20-3.9						●	●	●						●			
	150604E-SC3	0.4	0.08-0.22	0.40-3.9						●	●	●						●			
	150608E-SC3	0.8	0.15-0.44	0.80-3.9						●	●	●						●			
	150612E-SC3	1.2	0.23-0.66	1.20-3.9						●	●	●						●			
	DNMG 110404E-MC3	0.4	0.08-0.22	0.32-2.9						●	●	●									
	110408E-MC3	0.8	0.15-0.44	0.64-2.9						●	●	●									
150404E-MC3	0.4	0.08-0.22	0.32-3.9						●	●	●										
150408E-MC3	0.8	0.15-0.44	0.64-3.9						●	●	●										
150412E-MC3	1.2	0.23-0.66	0.96-3.9						●	●	●										
150604E-MC3	0.4	0.08-0.22	0.32-3.9						●	●	●										
150608E-MC3	0.8	0.15-0.44	0.64-3.9						●	●	●										
150612E-MC3	1.2	0.23-0.66	0.96-3.9						●	●	●										

●: Stock available ▲: Stock available now but will be replaced in the future.

Negative 55° (D)

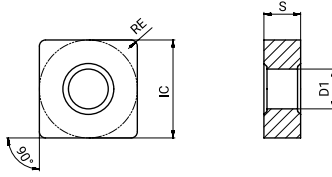


Dimension (mm)			
Product code	IC	S	D1
DN_1104_	9.525	4.76	3.81
DN_1504_	12.7	4.76	5.16
DN_1506_	12.7	6.35	5.16

Inserts	Product code	RE (mm)	Recommended parameters		Machining conditions																
			f (mm/rev)	ap (mm)	p					M				K			N		S		
					AT202	AC052P	AC150P	AC250P	AC350P	AC100M	AC200M	AP200U	AP301M	AC100K	AC102K	AC202K	AW100K	AP100S			
Medium	DNMG 150404E-PC4	0.4	0.08-0.22	0.40-3.9	●		▲	▲									●	●			
	150408E-PC4	0.8	0.15-0.44	0.80-3.9	●	●	▲	▲									●	●			
	150412E-PC4	1.2	0.23-0.66	1.20-3.9		●	▲	▲									●	●			
	150604E-PC4	0.4	0.08-0.22	0.40-3.9	●		▲	▲									●	●			
	150608E-PC4	0.8	0.15-0.44	0.80-3.9	●	●	▲	▲									●	●			
	150612E-PC4	1.2	0.23-0.66	1.20-3.9		●	▲	▲									●	●			
Roughing	DNMG 150408E-MC4	0.8	0.20-0.60	1.20-5.4						●	●	●									
	150412E-MC4	1.2	0.30-0.90	1.80-5.4						●	●	●									
	150608E-MC4	0.8	0.20-0.60	1.20-5.4						●	●	●								●	
	150612E-MC4	1.2	0.30-0.90	1.80-5.4						●	●	●								●	
	DNMG 110404E-KC4	0.4	0.09-0.24	0.48-3.5													●	●			
	110408E-KC4	0.8	0.18-0.48	0.96-3.5													●	●			
	150404E-KC4	0.4	0.09-0.24	0.48-4.6													●	●			
	150408E-KC4	0.8	0.18-0.48	0.96-4.6													●	●			
	150412E-KC4	1.2	0.26-0.72	1.44-4.6													●	●			
	150604E-KC4	0.4	0.09-0.24	0.48-4.6													●	●			
	150608E-KC4	0.8	0.18-0.48	0.96-4.6													●	●			
	150612E-KC4	1.2	0.26-0.72	1.44-4.6													●	●			
	DNMG 150408E-PD5	0.8	0.20-0.60	1.20-5.4		●	▲	▲	●												
	150412E-PD5	1.2	0.30-0.90	1.80-5.4		●	▲	▲	●												
	150416E-PD5	1.6	0.40-1.20	2.40-5.4		●	▲	▲													
	150608E-PD5	0.8	0.20-0.60	1.20-5.4		●	▲	▲	●												
	150612E-PD5	1.2	0.30-0.90	1.80-5.4		●	▲	▲	●												
	150616E-PD5	1.6	0.40-1.20	2.40-5.4		●	▲	▲	●												
	DNMA 150404E-KD5	0.4	0.10-0.30	0.60-5.4													●	●			
	150408E-KD5	0.8	0.20-0.60	1.20-5.4													●	●	●		
	150412E-KD5	1.2	0.30-0.90	1.80-5.4													●	●	●		
	150604E-KD5	0.4	0.10-0.30	0.60-5.4													●	●			
	150608E-KD5	0.8	0.20-0.60	1.20-5.4													●	●	●		
	150612E-KD5	1.2	0.30-0.90	1.80-5.4													●	●	●		

●: Stock available ▲: Stock available now but will be replaced in the future.

Negative 90° (S)

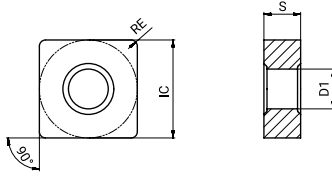


Dimension (mm)			
Product code	IC	S	D1
SN_1204_	12.7	4.76	5.16
SN_1506_	15.875	6.35	6.35
SN_1906_	19.05	6.35	7.94

Inserts	Product code	RE (mm)	Recommended parameters		Machining conditions															
			f (mm/rev)	ap (mm)	p					M				K			N	S		
					AT202	AC052P	AC150P	AC250P	AC350P	AC100M	AC200M	AP200U	AP301M	AC100K	AC102K	AC202K	AW100K	AP100S		
Finishing	SNMG 120404E-PB1	0.4	0.05-0.15	0.26-3.2	●		▲	▲												
	120408E-PB1	0.8	0.10-0.30	0.52-3.2	●	●	▲	▲												
	120412E-PB1	1.2	0.15-0.45	0.78-3.2		●	▲	▲												
Finishing	SNMG 120404E-MB2	0.4	0.05-0.15	0.26-3.2						●	●	●							●	
	120408E-MB2	0.8	0.10-0.30	0.52-3.2						●	●	●							●	
	120412E-MB2	1.2	0.15-0.45	0.78-3.2						●	●	●							●	
Light cutting	SNMG 120404E-SL3	0.4	0.12-0.25	0.60-3.0									●						●	
	120408E-SL3	0.8	0.15-0.30	0.80-3.0									●						●	
	120412E-SL3	1.2	0.18-0.35	1.00-3.0									●						●	
Semi-finishing	SNMG 120404E-PC3	0.4	0.07-0.20	0.34-3.8	●		▲	▲												
	120408E-PC3	0.8	0.14-0.40	0.68-3.8	●		▲	▲												
	120412E-PC3	1.2	0.20-0.60	1.02-3.8	●		▲	▲												
Medium	SNMG 120404E-PD3	0.4	0.08-0.22	0.40-4.2	●		▲	▲	●											
		0.8	0.15-0.44	0.80-4.2	●	●	▲	▲	●											
		1.2	0.23-0.66	1.20-4.2	●	●	▲	▲	●											
		0.8	0.15-0.44	0.80-6.3		●	▲	▲	●											
	SNMG 120408E-SC3	0.8	0.15-0.44	0.80-4.2						●	●	●								●
		1.2	0.23-0.66	1.20-4.2						●	●	●								●
		1.2	0.23-0.66	1.20-5.2						●	●	●								●
		1.6	0.30-0.88	1.60-5.2						●	●	●								●
		1.2	0.23-0.66	1.20-6.3						●	●	●								●
	SNMG 120404-M3T	0.4	0.20-0.40	1.0-4.0	●															
		0.8	0.20-0.40	1.0-4.0	●															
	SNMG 120404E-MC3	0.4	0.08-0.22	0.32-4.2						●	●	●								
		0.8	0.15-0.44	0.64-4.2						●	●	●								
		1.2	0.23-0.66	0.96-4.2						●	●	●								
		1.2	0.23-0.66	0.96-5.2						●	●	●								
1.6		0.30-0.88	1.28-5.2						●	●	●									
1.2		0.23-0.66	0.96-6.3						●	●	●									
1.6		0.30-0.88	1.28-6.3						●	●	●									

●: Stock available ▲: Stock available now but will be replaced in the future.

Negative 90° (S)

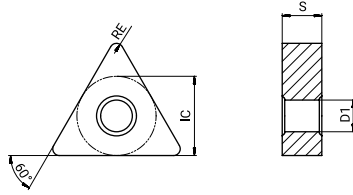


Dimension (mm)			
Product code	IC	S	D1
SN_0903_	9.525	3.18	3.81
SN_1204_	12.7	4.76	5.16
SN_1506_	15.875	6.35	6.35
SN_1906_	19.05	6.35	7.94

Inserts	Product code	RE (mm)	Recommended parameters		Machining conditions																	
			f (mm/rev)	ap (mm)	p					M				K			N	S				
					AT202	AC052P	AC150P	AC250P	AC350P	AC100M	AC200M	AP200U	AP301M	AC100K	AC102K	AC202K	AW100K	AP100S				
Medium	SNMG 120404E-PC4	0.4	0.08-0.22	0.40-4.2	●		▲	▲										●	●			
	120408E-PC4	0.8	0.15-0.44	0.80-4.2	●	●	▲	▲										●	●	●		
	120412E-PC4	1.2	0.23-0.66	1.20-4.2	●	●	▲	▲										●	●	●		
Roughing	SNMG 120408E-MC4	0.8	0.20-0.60	1.20-6.4						●	●	●									●	
	120412E-MC4	1.2	0.30-0.90	1.80-6.4						●	●	●									●	
	150612E-MC4	1.2	0.30-0.90	1.80-7.9						●	●	●										
	150616E-MC4	1.6	0.40-1.20	2.40-7.9						●	●	●										
	190612E-MC4	1.2	0.30-0.90	1.80-9.5						●	●	●										
	190616E-MC4	1.6	0.40-1.20	2.40-9.5						●	●	●									●	
	SNMG 090304E-KC4	0.4	0.09-0.24	0.48-3.8																		
	090308E-KC4	0.8	0.18-0.48	0.96-3.8																		
	120404E-KC4	0.4	0.09-0.24	0.48-5.1																●	●	
	120408E-KC4	0.8	0.18-0.48	0.96-5.1																●	●	
	120412E-KC4	1.2	0.26-0.72	1.44-5.1																●	●	
	150608E-KC4	0.8	0.18-0.48	0.96-6.4																●	●	
	150612E-KC4	1.2	0.26-0.72	1.44-6.4																●	●	
	150616E-KC4	1.6	0.35-0.96	1.92-6.4																●	●	
	190608E-KC4	0.8	0.18-0.48	0.96-7.6																●	●	
	190612E-KC4	1.2	0.26-0.72	1.44-7.6																●	●	
	190616E-KC4	1.6	0.35-0.96	1.92-7.6																●	●	
	190624E-KC4	2.4	0.53-1.44	2.88-7.6																		
	SNMG 150608E-PD5	0.8	0.20-0.60	1.20-7.9		●	▲	▲	●													
	150612E-PD5	1.2	0.30-0.90	1.80-7.9		●	▲	▲	●													
	150616E-PD5	1.6	0.40-1.20	2.40-7.9		●	▲	▲	●													
	190612E-PD5	1.2	0.30-0.90	1.80-9.5		●	▲	▲	●													
	190616E-PD5	1.6	0.40-1.20	2.40-9.5		●	▲	▲	●													

●: Stock available ▲: Stock available now but will be replaced in the future.

Negative 60° (T)

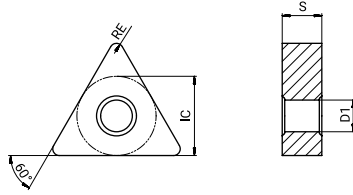


Dimension (mm)			
Product code	IC	S	D1
TN_1103_	6.35	3.18	2.26
TN_1604_	9.525	4.76	3.81
TN_2204_	12.7	4.76	5.16






Inserts	Product code	RE (mm)	Recommended parameters		Machining conditions																		
			f (mm/rev)	ap (mm)	p					M				K			N		S				
					AT202	AC052P	AC150P	AC250P	AC350P	AC100M	AC200M	AP200U	AP301M	AC100K	AC102K	AC202K	AW100K	AP100S					
Finishing	 TNMG 160404E-PB1 160408E-PB1 160412E-PB1	0.4	0.05-0.15	0.26-3.1	●		▲	▲															
		0.8	0.10-0.30	0.52-3.1	●	●	▲	▲															
		1.2	0.15-0.45	0.78-3.1	●	●	▲	▲															
	 TNMG 160404E-SC1 160408E-SC1	0.4	0.07-0.18	0.20-0.8									●										
		0.8	0.10-0.25	0.20-0.8									●										
		 TNMG 160404E-MB2 160408E-MB2	0.4	0.05-0.15	0.26-3.1						●	●	●								●		
0.8	0.10-0.30		0.52-3.1						●	●	●								●				
Light cutting	 TNMG 160404E-SL3 160408E-SL3 160412E-SL3	0.4	0.12-0.25	0.60-3.0								●							●				
		0.8	0.15-0.30	0.80-3.0								●							●				
		1.2	0.18-0.30	1.00-3.0								●							●				
Semi-finishing	 TNMG 160404R-M1T 160404L-M1T	0.4	0.10-0.30	0.10-0.30	●																		
		0.4	0.10-0.30	0.10-0.30	●																		
	 TNMG 160404E-PB3 160408E-PB3 160412E-PB3	0.4	0.06-0.18	0.30-3.3	●		▲	▲															
		0.8	0.12-0.36	0.60-3.3	●	●	▲	▲															
		1.2	0.18-0.54	0.90-3.3	●	●	▲	▲															
	 TNMG 160404E-PC3 160408E-PC3 160412E-PC3	0.4	0.07-0.20	0.34-3.7	●		▲	▲															
		0.8	0.14-0.40	0.68-3.7	●		▲	▲															
		1.2	0.20-0.60	1.02-3.7	●		▲	▲															
	Medium	 TNMG 160404E-PD3 160408E-PD3 160412E-PD3	0.4	0.08-0.22	0.40-4.1	●		▲	▲	●													
0.8			0.15-0.44	0.80-4.1	●	●	▲	▲	●														
1.2			0.23-0.66	1.20-4.1	●	●	▲	▲	●														
 TNMG 160404R-M2T 160404L-M2T		0.4	0.10-0.30	0.70-3.5	●																		
		0.4	0.10-0.30	0.70-3.5	●																		
 TNMG 160404R-PL5 160408R-PL5 160404L-PL5 160408L-PL5		0.4	0.08-0.22	0.40-4.1	●		▲	▲															
		0.8	0.15-0.44	0.80-4.1	●	●	▲	▲															
		0.4	0.08-0.22	0.40-4.1	●		▲	▲															
		0.8	0.15-0.44	0.80-4.1	●	●	▲	▲															
 TNMG 160404E-SC3 160408E-SC3 160412E-SC3		0.4	0.08-0.22	0.40-4.1						●	●	●									●		
		0.8	0.15-0.44	0.80-4.1						●	●	●									●	●	
		1.2	0.23-0.66	1.20-4.1						●	●	●									●	●	

●: Stock available ▲: Stock available now but will be replaced in the future.

Negative 60° (T)

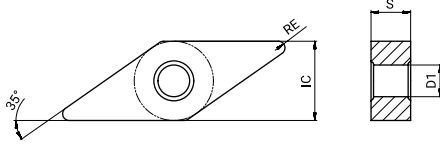


Dimension (mm)			
Product code	IC	S	D1
TN_1103_	6.35	3.18	2.26
TN_1604_	9.525	4.76	3.81
TN_2204_	12.7	4.76	5.16

Inserts	Product code	RE (mm)	Recommended parameters		Machining conditions																							
			f (mm/rev)	ap (mm)	p					M				K			N	S										
					AT202	AC052P	AC150P	AC250P	AC350P	AC100M	AC200M	AP200U	AP301M	AC100K	AC102K	AC202K	AW100K	AP100S										
Medium	 TNMG 160404E-MC3 160408E-MC3 160412E-MC3 220408E-MC3 220412E-MC3	0.4	0.08-0.22	0.32-4.1							●	●	●															
		0.8	0.15-0.44	0.64-4.1								●	●	●														
		1.2	0.23-0.66	0.96-4.1								●	●	●														
		0.8	0.15-0.44	0.64-4.9								●	●	●													●	
		1.2	0.23-0.66	0.96-4.9								●	●	●														
	 TNMG 160404E-PC4 160408E-PC4 160412E-PC4 220412E-PC4	0.4	0.08-0.22	0.40-4.1	●			▲	▲																			
		0.8	0.15-0.44	0.80-4.1	●	●		▲	▲																			
		1.2	0.23-0.66	1.20-4.1		●		▲	▲																			
1.2		0.23-0.66	1.20-4.9				▲	▲																				
Roughing	 TNMG 160408E-MC4 160412E-MC4 220408E-MC4 220412E-MC4	0.8	0.20-0.60	1.20-5.8							●	●	●													●		
		1.2	0.30-0.90	1.80-5.8								●	●	●													●	
		0.8	0.20-0.60	1.20-6.6								●	●	●														
		1.2	0.30-0.90	1.80-6.6								●	●	●														
	 TNMG 110304E-KC4 160404E-KC4 160408E-KC4 160412E-KC4 160416E-KC4 220412E-KC4 220416E-KC4	0.4	0.09-0.24	0.48-3.3																								
		0.4	0.09-0.24	0.48-4.9																								
		0.8	0.18-0.48	0.96-4.9																								
		1.2	0.26-0.72	1.44-4.9																								
		1.6	0.35-0.96	1.92-4.9																								
		1.2	0.26-0.72	1.44-6.0																								
		1.6	0.35-0.96	1.92-6.0																								
	 TNMG 160408E-PD5 160412E-PD5 220408E-PD5 220412E-PD5 220416E-PD5	0.8	0.20-0.60	1.20-5.8		●	▲	▲	●																			
		1.2	0.30-0.90	1.80-5.8		●	▲	▲	●																			
		0.8	0.20-0.60	1.20-7.7		●	▲	▲	●																			
		1.2	0.30-0.90	1.80-7.7		●	▲	▲	●																			
		1.6	0.40-1.20	2.40-7.7		●	▲	▲	●																			

●: Stock available ▲: Stock available now but will be replaced in the future.

Negative 35° (V)

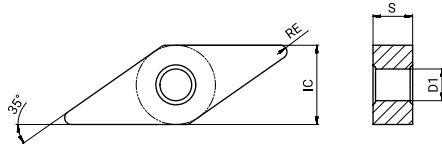


Dimension (mm)			
Product code	IC	S	D1
VN_1604_	9.525	4.76	3.81

Inserts	Product code	RE (mm)	Recommended parameters		Machining conditions															
			f (mm/rev)	ap (mm)	p					M			K			N		S		
					AT202	AC052P	AC150P	AC250P	AC350P	AC100M	AC200M	AP200U	AP301M	AC100K	AC102K	AC202K	AW100K	AP100S		
Finishing	VNMG 160404E-PB1 160408E-PB1	0.4	0.05-0.15	0.26-2.1	●		▲	▲												
		0.8	0.10-0.30	0.52-2.1	●	●	▲	▲												
	VNMG 160404E-SC1 160408E-SC1	0.4	0.10-0.25	0.20-0.8									●							
		0.8	0.15-0.30	0.20-0.8									●							
	VNMG 160404E-MB2 160408E-MB2	0.4	0.05-0.15	0.26-2.1						●	●	●								●
		0.8	0.10-0.30	0.52-2.1						●	●	●								●
Light cutting	VNMG 160404E-SL3 160408E-SL3	0.4	0.10-0.20	0.60-2.5									●						●	
		0.8	0.12-0.25	0.80-2.5									●							●
Profiling	VNMG 160404E-BS 160408E-BS	0.4	0.08-0.20	0.20-2.0	●	●														
		0.8	0.08-0.20	0.20-2.0	●	●														
Semi-finishing	VNMG 160404E-PB3 160408E-PB3 160412E-PB3	0.4	0.06-0.18	0.30-3.1	●		▲	▲												
		0.8	0.12-0.36	0.60-3.1	●	●	▲	▲												
		1.2	0.18-0.54	0.90-3.1	●	●	▲	▲												
	VNMG 160404E-PC3 160408E-PC3 160412E-PC3	0.4	0.07-0.20	0.34-3.3	●		▲	▲												
		0.8	0.14-0.40	0.68-3.3	●		▲	▲												
		1.2	0.20-0.60	1.02-3.3	●		▲	▲												

●: Stock available ▲: Stock available now but will be replaced in the future.

Negative 35° (V)

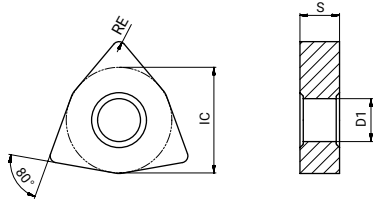


Dimension (mm)			
Product code	IC	S	D1
VN_1604_	9.525	4.76	3.81

Inserts	Product code	RE (mm)	Recommended parameters		Machining conditions															
					● Good condition ● General condition ✖ Bad condition ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●															
			f (mm/rev)	ap (mm)	p					M				K			N	S		
					AT202	AC052P	AC150P	AC250P	AC350P	AC100M	AC200M	AP200U	AP301M	AC100K	AC102K	AC202K	AW100K	AP100S		
Medium	 VNMG 160404E-PD3 160408E-PD3 160412E-PD3	0.4	0.08-0.22	0.40-3.3	●		▲	▲												
		0.8	0.15-0.44	0.80-3.3	●	●	▲	▲	●											
		1.2	0.23-0.66	1.20-3.3	●	●	▲	▲	●											
	 VNMG 160404-M3T 160408-M3T	0.4	0.20-0.40	1.0-4.0	●															
		0.8	0.20-0.40	1.0-4.0	●															
	 VNMG 160404E-SC3 160408E-SC3 160412E-SC3	0.4	0.08-0.22	0.40-3.3							●	●	●						●	
		0.8	0.15-0.44	0.80-3.3							●	●	●						●	
		1.2	0.23-0.66	1.20-3.3							●	●	●						●	
	 VNMG 160404E-MC3 160408E-MC3	0.4	0.08-0.22	0.32-3.3							●	●	●							
		0.8	0.15-0.44	0.64-3.3							●	●	●							
 VNMG 160404E-PC4 160408E-PC4 160412E-PC4	0.4	0.08-0.22	0.40-3.3	●		▲	▲								●	●				
	0.8	0.15-0.44	0.80-3.3	●	●	▲	▲								●	●				
	1.2	0.23-0.66	1.20-3.3	●	●	▲	▲								●	●				
Roughing	 VNMG 160404E-KC4 160408E-KC4 160412E-KC4	0.4	0.09-0.24	0.48-3.3											●	●				
		0.8	0.18-0.48	0.96-3.3											●	●				
		1.2	0.26-0.72	1.44-3.3											●	●				
Finishing	 VNGG 160401FP-UF 160402FP-UF 160404FP-UF	0.1	0.02-0.1	0.5-2.0									●							
		0.2	0.02-0.1	0.5-2.0										●						
		0.4	0.02-0.1	0.5-2.0										●						

●: Stock available ▲: Stock available now but will be replaced in the future.

Negative 80° (W)



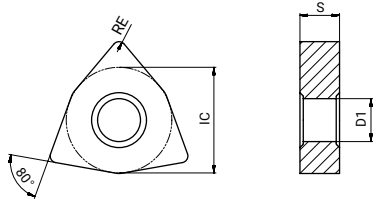
Dimension (mm)			
Product code	IC	S	D1
WN_0604_	9.525	4.76	3.81
WN_0804_	12.7	4.76	5.16

Inserts	Product code	RE (mm)	Recommended parameters		Machining conditions																	
			f (mm/rev)	ap (mm)	p					M				K			N	S				
					AT202	AC052P	AC150P	AC250P	AC350P	AC100M	AC200M	AP200U	AP301M	AC100K	AC102K	AC202K	AW100K	AP100S				
Finishing	 WNUMG 080404-F1T 080408-F1T	0.4	0.05-0.15	0.50-2.5	●																	
		0.8	0.05-0.15	0.50-2.5	●																	
	 WNUMG 080404-PB1 080408E-PB1 080412E-PB1	0.4	0.05-0.15	0.26-2.2	●		▲	▲														
		0.8	0.10-0.30	0.52-2.2	●	●	▲	▲														
		1.2	0.15-0.45	0.78-2.2	●	●	▲	▲														
	 WNUMG 080404-SC1 080408E-SC1	0.4	0.10-0.25	0.20-0.8								●										
		0.8	0.15-0.30	0.20-0.8								●										
	 WNUMG 080404-MB2 080408E-MB2	0.4	0.05-0.15	0.26-2.2						●	●									●		
0.8		0.10-0.30	0.52-2.2						●	●									●			
Light cutting	 WNUMG 060404E-SL3 060408E-SL3 080404E-SL3 080408E-SL3 080412E-SL3	0.4	0.12-0.25	0.60-2.5									●							●		
		0.8	0.15-0.25	0.80-2.5									●								●	
		0.4	0.12-0.25	0.60-3.0									●								●	
		0.8	0.15-0.25	0.80-3.0									●								●	
		1.2	0.18-0.30	1.00-3.0									●								●	
Semi-finishing	 WNUMG 080404E-PB3 080408E-PB3 080412E-PB3	0.4	0.06-0.18	0.30-2.3	●		▲	▲														
		0.8	0.12-0.36	0.60-2.3	●	●	▲	▲														
		1.2	0.18-0.54	0.90-2.3	●	●	▲	▲														
	 WNUMG 080404E-PC3 080408E-PC3 080412E-PC3	0.4	0.07-0.20	0.34-2.6	●		▲	▲														
		0.8	0.14-0.40	0.68-2.6	●		▲	▲														
		1.2	0.20-0.60	1.02-2.6	●		▲	▲														

●: Stock available ▲: Stock available now but will be replaced in the future.

ISO Turning Insert

Negative 80° (W)

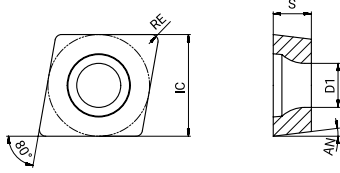


Dimension (mm)			
Product code	IC	S	D1
WN_0604_	9.525	4.76	3.81
WN_0804_	12.7	4.76	5.16

Inserts	Product code	RE (mm)	Recommended parameters		Machining conditions															
			f (mm/rev)	ap (mm)	● Good condition					⊕ General condition					⊗ Bad condition					
					●	●	●	⊕	⊗	●	⊕	⊗	⊕	⊗	●	⊕	⊗	⊕	●	
					p					M				K				N	S	
					AT202	AC052P	AC150P	AC250P	AC350P	AC100M	AC200M	AP200U	AP301M	AC100K	AC102K	AC202K	AW100K	AP100S		
Medium		WNMG 080404R-PL5	0.4	0.20-0.50	0.40-4.0				▲											
		080404L-PL5	0.4	0.20-0.50	0.40-4.0				▲											
		080408R-PL5	0.8	0.20-0.50	0.40-5.0				▲				●							
		080408L-PL5	0.8	0.20-0.50	0.40-5.0				▲				●							
		WNMG 060408E-PD3	0.8	0.15-0.44	0.80-2.1		●	▲	▲											
		080404E-PD3	0.4	0.08-0.22	0.40-2.9	●	●	▲	▲	●										
		080408E-PD3	0.8	0.15-0.44	0.80-2.9	●	●	▲	▲	●										
		080412E-PD3	1.2	0.23-0.66	1.20-2.9	●	●	▲	▲	●										
		WNMG 080404E-SC3	0.4	0.08-0.22	0.40-2.9						●	●	●							●
		080408E-SC3	0.8	0.15-0.44	0.80-2.9						●	●	●							●
		080412E-SC3	1.2	0.23-0.66	1.20-2.9						●	●	●							●
		WNMG 080404-M3T	0.4	0.20-0.40	1.0-4.0	●														
		080408-M3T	0.8	0.20-0.40	1.0-4.0	●														
		WNMG 060408E-MC3	0.8	0.15-0.44	0.64-2.1						●	●	●							
		060412E-MC3	1.2	0.23-0.66	0.96-2.1						●	●	●							
		080404E-MC3	0.4	0.08-0.22	0.32-2.9						●	●	●							
		080408E-MC3	0.8	0.15-0.44	0.64-2.9						●	●	●							●
		080412E-MC3	1.2	0.23-0.66	0.96-2.9						●	●	●							
		WNMG 080404E-PC4	0.4	0.08-0.22	0.40-2.9	●		▲	▲							●	●			
		080408E-PC4	0.8	0.15-0.44	0.80-2.9	●	●	▲	▲							●	●			
080412E-PC4		1.2	0.23-0.66	1.20-2.9	●	●	▲	▲							●	●				

●: Stock available ▲: Stock available now but will be replaced in the future.

Positive 80° (C)

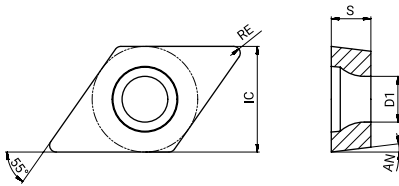


Dimension (mm)				
Product code	IC	S	D1	AN
CC_0602_	6.35	2.38	2.8	7°
CC_09T3_	9.525	3.97	4.4	7°

Inserts	Product code	RE (mm)	Recommended parameters		Machining conditions																						
			f (mm/rev)	ap (mm)	● Good condition ◐ General condition ◑ Bad condition																						
					AT202	AC052P	AC150P	AC250P	AC350P	AC100M	AC200M	AP200U	AP301M	AC100K	AC102K	AC202K	AW100K	AP100S									
Finishing	CCGT 060201FP-LF	<0.1	0.05-0.2	0.35-3.0									●														
	060202FP-LF	0.2	0.05-0.2	0.35-3.0									●														
	060204FP-LF	0.4	0.05-0.2	0.35-3.0									●														
	09T301FP-LF	<0.1	0.05-0.2	0.35-3.0									●														
	09T302FP-LF	0.2	0.05-0.2	0.35-3.0									●														
	09T304FP-LF	0.4	0.05-0.2	0.35-3.0									●														
	CCGT 060201FP-UF	0.1	0.02-0.15	0.10-1.4									●														
	060202FP-UF	0.2	0.02-0.15	0.10-1.4									●														
	060204FP-UF	0.4	0.03-0.20	0.10-1.4									●														
	09T301FP-UF	0.1	0.02-0.15	0.10-2.4									●														
	09T302FP-UF	0.2	0.02-0.15	0.10-2.4									●														
	09T304FP-UF	0.4	0.03-0.20	0.10-2.4									●														
	CCGT 060201F-UF	0.1	0.02-0.15	0.10-1.4									▲														
	060202F-UF	0.2	0.02-0.15	0.10-1.4									▲														
	060204F-UF	0.4	0.03-0.20	0.10-1.4									▲														
	09T301F-UF	0.1	0.02-0.15	0.10-2.4									▲														
	09T302F-UF	0.2	0.02-0.15	0.10-2.4									▲														
	09T304F-UF	0.4	0.03-0.20	0.10-2.4									▲														
	09T308F-UF	0.8	0.03-0.25	0.10-2.4									▲														
	CCGT 060201E-UF	0.1	0.02-0.15	0.10-1.4									●													●	
	060202E-UF	0.2	0.02-0.15	0.10-1.4									●													●	
	060204E-UF	0.4	0.03-0.20	0.10-1.4									●													●	
	09T301E-UF	0.1	0.02-0.15	0.10-2.4									●													●	
	09T302E-UF	0.2	0.02-0.15	0.10-2.4									●													●	
09T304E-UF	0.4	0.03-0.20	0.10-2.4									●													●		
09T308E-UF	0.8	0.03-0.25	0.10-2.4									●													●		

● : Stock available ▲ : Stock available now but will be replaced in the future.

Positive 55° (D)

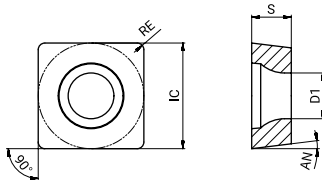


Dimension (mm)				
Product code	IC	S	D1	AN
DC_0702_	6.35	2.38	2.8	7°
DC_11T3_	9.525	3.97	4.4	7°

Inserts	Product code	RE (mm)	Recommended parameters		Machining conditions																						
			f (mm/rev)	ap (mm)	p				M				K				N		S								
					AT202	AC052P	AC150P	AC250P	AC350P	AC100M	AC200M	AP200U	AP301M	AC100K	AC102K	AC202K	AW100K	AP100S									
Finishing	DCGT 0702005FP-LF	<0.05	0.05-0.15	0.35-3.0										●													
	070201FP-LF	<0.1	0.05-0.2	0.35-3.0										●													
	070202FP-LF	0.2	0.05-0.2	0.35-3.0										●													
	070204FP-LF	0.4	0.05-0.2	0.35-3.0										●													
	11T301FP-LF	<0.1	0.05-0.2	0.35-3.0										●													
	11T302FP-LF	0.2	0.05-0.2	0.35-3.0										●													
	11T304FP-LF	0.4	0.05-0.2	0.35-3.0										●													
	DCGT 0702005FP-UF	<0.05	0.02-0.15	0.10-1.4											●												
	070201FP-UF	0.1	0.02-0.15	0.10-1.4											●												
	070202FP-UF	0.2	0.02-0.15	0.10-1.4											●												
	070204FP-UF	0.4	0.03-0.20	0.10-1.4											●												
	11T301FP-UF	0.1	0.02-0.15	0.10-2.4											●												
	11T302FP-UF	0.2	0.02-0.15	0.10-2.4											●												
	11T304FP-UF	0.4	0.03-0.20	0.10-2.4											●												
	DCGT 0702005F-UF	<0.05	0.02-0.15	0.10-1.4											▲												
	070201F-UF	0.1	0.02-0.15	0.10-1.4											▲												
	070202F-UF	0.2	0.02-0.15	0.10-1.4											▲												
	070204F-UF	0.4	0.03-0.20	0.10-1.4											▲												
	11T301F-UF	0.1	0.02-0.15	0.10-2.4											▲												
	11T302F-UF	0.2	0.02-0.15	0.10-2.4											▲												
	11T304F-UF	0.4	0.03-0.20	0.10-2.4											▲												
	DCGT 070201E-UF	0.1	0.02-0.15	0.10-1.4											●												●
	070202E-UF	0.2	0.02-0.15	0.10-1.4											●												●
	070204E-UF	0.4	0.03-0.20	0.10-1.4											●												●
11T301E-UF	0.1	0.02-0.15	0.10-2.4											●												●	
11T302E-UF	0.2	0.02-0.15	0.10-2.4											●												●	
11T304E-UF	0.4	0.03-0.20	0.10-2.4											●												●	

●: Stock available ▲: Stock available now but will be replaced in the future.

Positive 90° (S)

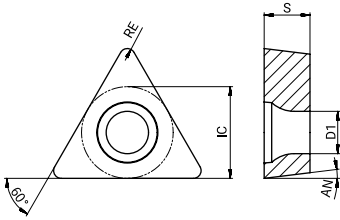


Dimension (mm)				
Product code	IC	S	D1	AN
SC_09T3_	9.525	3.97	4.4	7°
SC_1204_	12.7	4.76	5.5	7°
SC_3809_	38.1	9.525	9.8	7°

Inserts		Product code	RE (mm)	Recommended parameters		Machining conditions															
						● Good condition ◐ General condition ✖ Bad condition															
						● ● ● ◐ ✖ ● ◐ ◐ ◐ ● ● ✖ ◐ ●															
				p					M			K			N	S					
				f (mm/rev)	ap (mm)	AT202	AC052P	AC150P	AC250P	AC350P	AC100M	AC200M	AP200U	AP301M	AC100K	AC102K	AC202K	AW100K	AP100S		
Semi-Finishing		SCGT 09T308F-NC2	0.8	0.10-0.40	0.64-4.3														●		
Finishing		SCMT 09T304E-PB1	0.4	0.04-0.14	0.30-2.4	●		▲	▲		●	●	●								
		09T308E-PB1	0.8	0.09-0.28	0.60-2.4	●		▲	▲		●	●	●								
		120404E-PB1	0.4	0.04-0.14	0.30-3.2			▲	▲		●	●	●								
Semi-Finishing		SCMT 09T304E-PC2	0.4	0.05-0.16	0.35-2.9	●		▲	▲		●	●	●							●	
		09T308E-PC2	0.8	0.10-0.32	0.70-2.9	●		▲	▲		●	●	●							●	
		120404E-PC2	0.4	0.05-0.16	0.35-3.8	●		▲	▲		●	●	●							●	
		120408E-PC2	0.8	0.10-0.32	0.70-3.8	●	●	▲	▲		●	●	●							●	
		120412E-PC2	1.2	0.16-0.48	1.05-3.8		●	▲	▲		●	●	●							●	
Semi-Finishing		SCMT 09T304-M2T	0.4	0.10-0.25	0.70-3.5	●															
		09T308-M2T	0.8	0.10-0.25	0.70-3.5	●															
Medium		SCMT 09T304E-KC2	0.4	0.06-0.18	0.40-3.1	●		▲	▲	●						●	●				
		09T308E-KC2	0.8	0.12-0.36	0.80-3.1	●		▲	▲	●						●	●				
		120404E-KC2	0.4	0.06-0.18	0.40-4.2	●		▲	▲	●						●	●				
		120408E-KC2	0.8	0.12-0.36	0.80-4.2	●		▲	▲	●						●	●				
		120412E-KC2	1.2	0.18-0.54	1.20-4.2			▲	▲	●						●	●				
		SCMW 09T304E-KD5	0.4	0.10-0.22	0.40-4.8											●	●				
		09T308E-KD5	0.8	0.20-0.44	0.80-4.8											●	●	●			
		120404E-KD5	0.4	0.10-0.22	0.40-6.4											●	●	●			
		120408E-KD5	0.8	0.20-0.44	0.80-6.4											●	●	●			
		120412E-KD5	1.2	0.30-0.66	1.20-6.4											●	●	●			
Roughing		SCMT 380932S-HT	3.2	0.70-1.40	4.0-18.0					●											

●: Stock available ▲: Stock available now but will be replaced in the future.

Positive 60° (T)



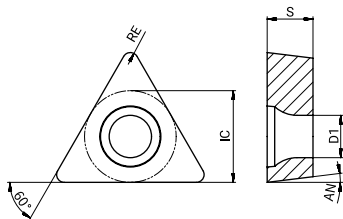
Dimension (mm)				
Product code	IC	S	D1	AN
TC_1102_	6.35	2.38	2.8	7°
TC_16T3_	9.525	3.97	4.4	7°

Inserts	Product code	RE (mm)	Recommended parameters		Machining conditions																							
			f (mm/rev)	ap (mm)	p				M				K				N	S										
			AT202	AC052P	AC150P	AC250P	AC350P	AC100M	AC200M	AP200U	AP301M	AC100K	AC102K	AC202K	AW100K	AP100S												
Finishing	TCGT 110201FP-LF	<0.1	0.05-0.2	0.35-3.0										●														
	110202FP-LF	0.2	0.05-0.2	0.35-3.0										●														
	110204FP-LF	0.4	0.05-0.2	0.35-3.0										●														
	16T304FP-LF	0.4	0.05-0.2	0.35-3.0										●														
	TCGT 110201FP-UF	<0.1	0.02-0.15	0.10-2.4											●													
	110202FP-UF	0.2	0.02-0.15	0.20-2.4											●													
	110204FP-UF	0.4	0.03-0.20	0.20-2.4											●													
	16T304FP-UF	0.4	0.03-0.20	0.20-2.4											●													
	TCGT 110201F-UF	0.1	0.02-0.15	0.10-2.4											▲													
	110202F-UF	0.2	0.02-0.15	0.20-2.4											▲													
	110204F-UF	0.4	0.03-0.20	0.20-2.4											▲													
	16T304F-UF	0.4	0.03-0.20	0.20-2.4											▲													
	TCGT 110201E-UF	0.1	0.02-0.15	0.10-2.4											●												●	
	110202E-UF	0.2	0.02-0.15	0.20-2.4											●												●	
	110204E-UF	0.4	0.03-0.20	0.20-2.4											●												●	
	16T304E-UF	0.4	0.03-0.20	0.20-2.4											●												●	
Semi-Finishing	TCGT 110204F-NC2	0.4	0.05-0.20	0.32-4.9																						●		
	16T304F-NC2	0.4	0.05-0.20	0.32-7.4																						●		
	16T308F-NC2	0.8	0.10-0.40	0.64-7.4																						●		

●: Stock available ▲: Stock available now but will be replaced in the future.

ISO Turning Insert

Positive 60° (T)



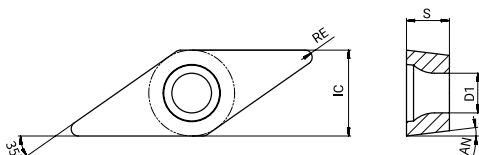
Dimension (mm)				
Product code	IC	S	D1	AN
TCMT_0902_	5.56	2.38	2.5	7°
TC_1102_	6.35	2.38	2.8	7°
TC_16T3_	9.525	3.97	4.4	7°

Dimension (mm)				
Product code	IC	S	D1	AN
TPMT_0902_	5.56	2.38	2.5	11°
TPMT_1103_	6.35	3.18	3.4	11°
TPMT_1603_	9.525	3.18	4.4	11°

Inserts		Product code	RE (mm)	Recommended parameters		Machining conditions																
				f (mm/rev)	ap (mm)	p					M			K			N		S			
						AT202	AC052P	AC150P	AC250P	AC350P	AC100M	AC200M	AP200U	AP301M	AC100K	AC102K	AC202K	AW100K	AP100S			
Finishing		TCMT 090204E-PB1	0.4	0.04-0.14	0.30-1.9	●		▲	▲		●	●	●									
		110202E-PB1	0.2	0.02-0.07	0.15-2.2	●		▲	▲		●	●	●									
		110204E-PB1	0.4	0.04-0.14	0.30-2.2	●		▲	▲		●	●	●									
		110208E-PB1	0.8	0.09-0.28	0.60-2.2	●		▲	▲		●	●	●									
		16T304E-PB1	0.4	0.04-0.14	0.30-3.3	●		▲	▲		●	●	●									
		16T308E-PB1	0.8	0.09-0.28	0.60-3.3	●		▲	▲		●	●	●									
		TPMT 090202E-PB1	0.2	0.02-0.07	0.15-1.9	●																
		090204E-PB1	0.4	0.04-0.14	0.30-1.9	●																
		090208E-PB1	0.8	0.09-0.28	0.60-1.9	●																
		110302E-PB1	0.2	0.02-0.07	0.15-2.2	●																
		110304E-PB1	0.4	0.04-0.14	0.30-2.2	●																
		110308E-PB1	0.8	0.09-0.28	0.60-2.2	●																
		160304E-PB1	0.4	0.04-0.14	0.30-3.3	●																
		160308E-PB1	0.8	0.09-0.28	0.60-3.3	●																
Semi-Finishing		TCMT 090204E-PC2	0.4	0.05-0.16	0.35-2.6	●		▲	▲		●	●	●							●		
		090208E-PC2	0.8	0.10-0.32	0.70-2.6	●		▲	▲		●	●	●								●	
		110204E-PC2	0.4	0.05-0.16	0.35-3.0	●		▲	▲		●	●	●								●	
		110208E-PC2	0.8	0.10-0.32	0.70-3.0	●		▲	▲		●	●	●									●
		16T304E-PC2	0.4	0.05-0.16	0.35-4.5	●		▲	▲		●	●	●									●
		16T308E-PC2	0.8	0.10-0.32	0.70-4.5	●	●	▲	▲		●	●	●									●
		16T312E-PC2	1.2	0.16-0.48	1.05-4.5			▲	▲		●	●	●									●
		TPMT 090204E-PC2	0.4	0.05-0.16	0.35-2.6	●		▲	▲		●	●	●									
		090208E-PC2	0.8	0.10-0.32	0.70-2.6	●		▲	▲		●	●	●									
		110304E-PC2	0.4	0.05-0.16	0.35-3.0	●		▲	▲		●	●	●									●
		110308E-PC2	0.8	0.10-0.32	0.70-3.0	●		▲	▲		●	●	●									
		160304E-PC2	0.4	0.10-0.25	0.60-2.0	●					●	●	●									
		160308E-PC2	0.8	0.10-0.25	0.60-2.0	●					●	●	●									

●: Stock available ▲: Stock available now but will be replaced in the future.

Positive 35° (V)

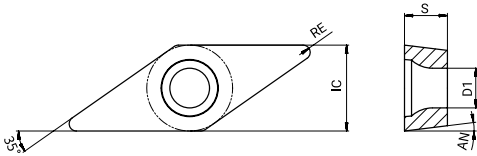


Dimension (mm)				
Product code	IC	S	D1	AN
VB_1103_	6.35	3.18	2.8	5°
VB_1604_	9.52	4.76	4.4	5°
VC_1103_	6.35	3.18	2.8	7°
VP_1103_	6.35	3.18	2.8	11°

Inserts	Product code	RE (mm)	Recommended parameters		Machining conditions																						
			f (mm/rev)	ap (mm)	p					M			K			N		S									
					AT202	AC052P	AC150P	AC250P	AC350P	AC100M	AC200M	AP200U	AP301M	AC100K	AC102K	AC202K	AW100K	AP100S									
Finishing		VBGT 1103005FP-LF	<0.05	0.05-0.2	0.35-3.0																						
		110301FP-LF	<0.1	0.05-0.2	0.35-3.0																						
		110302FP-LF	0.2	0.05-0.2	0.35-3.0																						
		110304FP-LF	0.4	0.05-0.2	0.35-3.0																						
		160401FP-LF	<0.1	0.05-0.2	0.35-3.0																						
		160402FP-LF	0.2	0.05-0.2	0.35-3.0																						
		VCGT 1103005FP-LF	<0.05	0.05-0.2	0.35-3.0																						
		110301FP-LF	<0.1	0.05-0.2	0.35-3.0																						
		110302FP-LF	0.2	0.05-0.2	0.35-3.0																						
		110304FP-LF	0.4	0.05-0.2	0.35-3.0																						
		VPGT 1103005FP-LF	<0.05	0.05-0.2	0.35-3.0																						
		110301FP-LF	<0.1	0.05-0.2	0.35-3.0																						
		110302FP-LF	0.2	0.05-0.2	0.35-3.0																						
		VBGT 110301FP-UF	0.1	0.02-0.15	0.10-1.4																						
		110302FP-UF	0.2	0.02-0.15	0.20-1.4																						
		110304FP-UF	0.4	0.03-0.20	0.20-1.4																						
		160401FP-UF	0.1	0.02-0.15	0.10-1.4																						
		160402FP-UF	0.2	0.02-0.15	0.20-1.4																						
			VBGT 110301F-UF	0.1	0.02-0.15	0.10-1.4																					
	110302F-UF		0.2	0.02-0.15	0.20-1.4																						
110304F-UF	0.4		0.03-0.20	0.20-1.4																							
160401F-UF	0.1		0.02-0.15	0.10-1.4																							
160402F-UF	0.2		0.02-0.15	0.20-1.4																							
	VBGT 110301E-UF	0.1	0.02-0.15	0.10-1.4																						●	
	110302E-UF	0.2	0.02-0.15	0.20-1.4																						●	
	110304E-UF	0.4	0.03-0.20	0.20-1.4																						●	
	160401E-UF	0.1	0.02-0.15	0.10-1.4																						●	
	160402E-UF	0.2	0.02-0.15	0.20-1.4																						●	

●: Stock available ▲: Stock available now but will be replaced in the future.

Positive 35° (V)

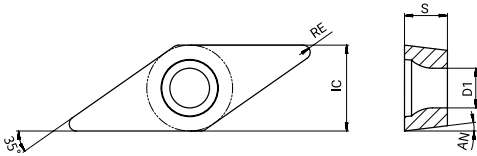


Dimension (mm)				
Product code	IC	S	D1	AN
VB_1103_	6.35	3.18	2.8	5°
VB_1604_	9.52	4.76	4.4	5°
VC_1103_	6.35	3.18	2.8	7°
VC_1604_	9.525	4.76	4.4	7°
VC_2205_	12.7	5.56	5.5	7°
VP_1103_	6.35	3.18	2.8	11°
VP_2205_	12.7	5.56	5.5	11°

Inserts	Product code	RE (mm)	Recommended parameters		Machining conditions																	
					p					M			K			N		S				
			f (mm/rev)	ap (mm)	AT202	AC052P	AC150P	AC250P	AC350P	AC100M	AC200M	AP200U	AP301M	AC100K	AC102K	AC202K	AW100K	AP100S				
Finishing		VCVT 1103005FP-UF	<0.05	0.02-0.15	0.10-1.4																	
		110301FP-UF	0.1	0.02-0.15	0.10-1.4									●								
		110302FP-UF	0.2	0.02-0.15	0.20-1.4									●								
		110304FP-UF	0.4	0.03-0.20	0.20-1.4									●								
		VCVT 1103005F-UF	<0.05	0.02-0.15	0.10-1.4									▲								
		110301F-UF	0.1	0.02-0.15	0.10-1.4									▲								
		110302F-UF	0.2	0.02-0.15	0.20-1.4									▲								
		110304F-UF	0.4	0.03-0.20	0.20-1.4									▲								
		VCVT 110301E-UF	0.1	0.02-0.15	0.10-1.4									●								●
		110302E-UF	0.2	0.02-0.15	0.20-1.4									●								●
		110304E-UF	0.4	0.03-0.20	0.20-1.4									●								●
			VPGT 110301FP-UF	0.1	0.02-0.15	0.1-1.4									●							
110302FP-UF	0.2		0.02-0.15	0.2-1.4									●									
	VPGT 110301F-UF		0.1	0.02-0.15	0.1-1.4									▲								
	110302F-UF		0.2	0.02-0.15	0.2-1.4									▲								
Semi-Finishing		VCVT 110302F-NC2	0.2	0.02-0.10	0.16-2.8																●	
		110304F-NC2	0.4	0.05-0.20	0.32-2.8																	●
		160404F-NC2	0.4	0.05-0.20	0.32-4.2																	●
		160408F-NC2	0.8	0.10-0.40	0.64-4.2																	●
		160412F-NC2	1.2	0.14-0.60	0.96-4.2																	●
		220530F-NC2	3.0	0.36-1.50	2.40-5.5																	●
		VPGT 220520E-NC2	2.0	0.24-1.0	1.60-5.5																	●
		VPGT 220520F-NC2	2.0	0.24-1.0	1.60-5.5																	●
Profiling machining		VBMT 110302E-BS	0.2	0.10-0.32	0.70-2.1	●	●															
		110304E-BS	0.4	0.05-0.16	0.35-3.1	●	●															
		110308E-BS	0.8	0.10-0.32	0.70-3.1	●	●															
		160404E-BS	0.4	0.06-0.18	0.40-3.3	●	●															
		160408E-BS	0.8	0.12-0.36	0.80-3.3	●	●															
		160412E-BS	1.2	0.18-0.54	1.20-3.3	●	●															

●: Stock available ▲: Stock available now but will be replaced in the future.

Positive 35° (V)



Dimension (mm)				
Product code	IC	S	D1	AN
VB_1103_	6.35	3.18	2.8	5°
VB_1604_	9.52	4.76	4.4	5°
VC_1103_	6.35	3.18	2.8	7°
VC_1604_	9.525	4.76	4.4	7°

Inserts Left-hand shown where it's applicable	Product code	RE (mm)	Recommended parameters		Machining conditions																
			f (mm/rev)	ap (mm)	p					M				K			N	S			
					AT202	AC052P	AC150P	AC250P	AC350P	AC100M	AC200M	AP200U	AP301M	AC100K	AC102K	AC202K	AW100K	AP100S			
Finishing	VBMT 110304E-PB1	0.4	0.04-0.14	0.30-1.4	●		▲	▲			●	●	●								
	110308E-PB1	0.8	0.09-0.28	0.60-1.4	●		▲	▲			●	●	●								
	160402E-PB1	0.2	0.02-0.07	0.15-2.1	●		▲	▲			●	●	●								
	160404E-PB1	0.4	0.04-0.14	0.30-2.1	●		▲	▲			●	●	●								
	160408E-PB1	0.8	0.09-0.28	0.60-2.1	●		▲	▲			●	●	●								
	VCMT 160404E-PB1	0.4	0.04-0.14	0.30-2.1			▲	▲			●	●	●								
160408E-PB1	0.8	0.09-0.28	0.60-2.1			▲	▲			●	●	●									
Semi-Finishing	VBMT 110304E-PC2	0.4	0.05-0.16	0.35-2.1	●		▲	▲			●	●	●								●
	110308E-PC2	0.8	0.10-0.32	0.70-2.1	●		▲	▲			●	●	●								●
	160404E-PC2	0.4	0.05-0.16	0.35-3.1	●	●	▲	▲			●	●	●								●
	160408E-PC2	0.8	0.10-0.32	0.70-3.1	●	●	▲	▲			●	●	●								●
	160412E-PC2	1.2	0.16-0.48	1.05-3.1		●	▲	▲			●	●	●								●
	VCMT 110304E-PC2	0.4	0.05-0.16	0.35-2.1			▲	▲			●	●	●								
	110308E-PC2	0.8	0.10-0.32	0.70-2.1			▲	▲			●	●	●								
	160404E-PC2	0.4	0.05-0.16	0.35-3.1			▲	▲			●	●	●								
160408E-PC2	0.8	0.10-0.32	0.70-3.1			▲	▲			●	●	●									
Medium	VBMT 160404E-KC2	0.4	0.06-0.18	0.40-3.3	●		▲	▲			●	●	●					●	●		
	160408E-KC2	0.8	0.12-0.36	0.80-3.3	●	●	▲	▲			●	●	●					●	●		
	160412E-KC2	1.2	0.18-0.54	1.20-3.3	●	●	▲	▲			●	●	●					●	●		
Finishing	VBET 1103003FR-F	<0.03	0.01-0.18	0.1-0.3										●							
	1103003FL-F	<0.03	0.01-0.18	0.1-0.3										●							
	1103005FR-F	<0.05	0.01-0.18	0.1-0.3										●							
	1103005FL-F	<0.05	0.01-0.18	0.1-0.3										●							
	110301FR-F	<0.1	0.01-0.18	0.1-0.3										●							
	110301FL-F	<0.1	0.01-0.18	0.1-0.3										●							
	110302FR-F	<0.2	0.01-0.18	0.1-0.3										●							
	110302FL-F	<0.2	0.01-0.18	0.1-0.3										●							

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