



WORLDIA  
MN-D2001

# PCD Insert

Providing stable , universal , high efficient  
cutting effects



**WORLDIA MANANOVA**

Easy Choice    Fast Delivery

# ManaNova

An easy choice in cutting world.



## Designation Key - Material designation

Example

<b>M</b>	<b>N</b>	<b>D</b>	<b>10</b>
ManaNova	1	2	3

1	2	3
<b>Application Materials</b>	<b>Cutting Tool Material</b>	<b>Material Code</b>
<b>P</b> Steel <b>M</b> Stainless Steel <b>K</b> Cast Iron <b>S</b> Exotic Alloy <b>H</b> Hardened Steel <b>N</b> Non-ferrous Metal	<b>D</b> PCD <b>N</b> CBN	

## GRADE COMPARISON TABLE

### PCD

	ISO		WORLDIA	Kennametal	Kyocera	Sumitomo Electric	Mitsubishi Materials	Tungaloy	Seco Tools	Sandvik	Mapal
	Classification	Symbol									
Turning	<b>N</b>	<b>N10</b>	<b>MND10</b>	KD1405	KPD010	DA150	MD220	DX140	PCD20	CD10	PU660

Note: The above table is selected from a publication. We have not obtained approval from each company.



### Designation Key - Identification Code

ANSI	C	-	C	C	G	W	2	1.5	0.5	-	1	N
	1		2	3	4	5	6	7	8		9	10
ISO	C	-	C	C	G	W	06	02	02	-	1	N
	1		2	3	4	5	6	7	8		9	10

1		2				3				4			5	
Insert Style		Insert Shape				Clearance Angle				Tolerances			Pattern Type	
Without	Standard	A	85°	M	86°	A	3°	F	25°	G	ISO mm	ANSI inch	A	
C	Chip breaker	B	82°	O	135°	B	5°	G	30°	m	±0.025	±0.001	N	
L	Full Length	C	80°	P	108°	C	7°	N	0°	IC	±0.025	±0.001	T	
F	Full Face	D	55°	R	90°	D	15°	P	11°	S	±0.130	±0.005	W	
W	Wiper	E	75°	S	90°	E	20°			R	±0.03	±0.001	R	
H	Heavy cutting	H	120°	T	60°									
		K	55°	V	35°									
		L	90°	W	80°									

6							7				8				9		
Inscribed Circle Diameter							Insert Thickness				Nose Radius				Cutting Edges		
IC (mm)	C	D	T	V	W	Code									1	single	
ISO						IC (inch) ANSI	ISO mm	ANSI inch	ISO mm	ANSI inch	00	= 0.0	0	.000	2	double	
3.970						5/32	01 = 1.59	1	1/16	01	= 2.1	0.2	.004	3	triple		
4.760			08			3/16	02 = 2.38	1.5	3/32	02	= 0.2	0.5	.008	⋮			
5.560			09			7/32	T2 = 2.78			03	= 3.18	2	1/8	10			
6.350	06	07	11	11		1/4	03 = 3.18	2	1/8	04	= 0.4	1	1/64	Cutting Direction			
7.940						5/16	T3 = 3.97	2.5	5/32	08	= 0.8	2	1/32	N			
9.525	09	11	16	16		3/8	04 = 4.76	3	3/16	12	= 1.2	3	3/64	R			
12.700		15			08	1/2	05 = 5.56	3.5	7/32	16	= 1.6	4	1/16	L			
15.875						5/8	06 = 6.35	4	1/4	20	= 2.0	5	5/64				
							07 = 7.94	5	5/16	24	= 2.4	6	3/32				
							09 = 9.525	6	3/8	28	= 2.8	7	7/64				

PCD Insert with chip-breaker

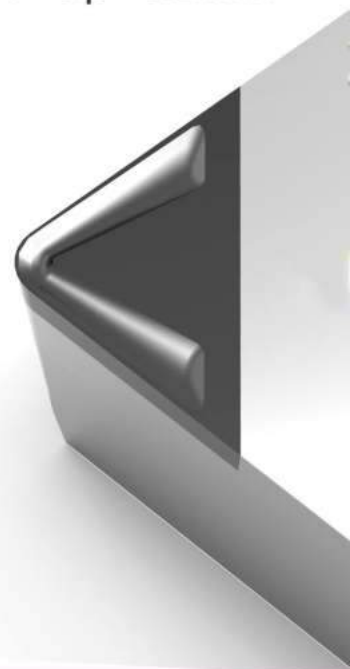
Excellent chip breaking in finishing machining



Material: A6061

Cutting conditions:  $V_c=400\text{m/min}$   $f=0.1\text{mm/rev}$   $a_p=0.2\text{mm}$

Insert type: CCGW09T308





# PCD Insert

CCGW · CCGT

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CC



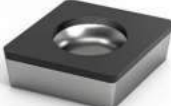
80° Positive


7° Relief

Edge mark:  
C - chipbreaker  
L - full length  
F - full face

Application:  
ISO N - Non-ferrous Metal  
ISO O - Others

● WORLDIA Stocked Item

CCGW	Angle		Dimensions						Grade			
	ANSI Code	ISO Code	Tips	IC mm	S mm	R mm	φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	CCGW 21.50.5	CCGW 060202	1N	6.35	2.38	0.2	2.8	2.5	●			
	CCGW 21.51	CCGW 060204	1N	6.35	2.38	0.4	2.8	2.5	●			
	CCGW 32.50.5	CCGW 09T302	1N	9.525	3.97	0.2	4.4	2.5	●			
	CCGW 32.51	CCGW 09T304	1N	9.525	3.97	0.4	4.4	2.5	●			
	CCGW 32.52	CCGW 09T308	1N	9.525	3.97	0.8	4.4	2.5	●			
	C-CCGW 21.50.5	C-CCGW 060202	1N	6.35	2.38	0.2	2.8	2.5	●			
	C-CCGW 32.51	C-CCGW 09T304	1N	9.525	3.97	0.4	4.4	2.5	●			
	F-CCGW 21.51	F-CCGW 060204	1N	6.35	2.38	0.4	2.8	2.5	●			

CCGT	Angle		Dimensions						Grade			
	ANSI Code	ISO Code	Tips	IC mm	S mm	R mm	φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	CCGT 21.50.5	CCGT 060202	1N	6.35	2.38	0.2	2.8	2.5	●			
	CCGT 21.51	CCGT 060204	1N	6.35	2.38	0.4	2.8	2.5	●			
	CCGT 32.50.5	CCGT 09T302	1N	9.525	3.97	0.2	4.4	2.5	●			
	CCGT 32.51	CCGT 09T304	1N	9.525	3.97	0.4	4.4	2.5	●			
	CCGT 32.52	CCGT 09T308	1N	9.525	3.97	0.8	4.4	2.5	●			

# PCD Insert

DCGW · DCGT

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**DC**

55° Positive

7° Relief

Edge mark:

C - chipbreaker

L - full length

F - full face

Application:

ISO N - Non-ferrous Metal

ISO O - Others

● WORLDIA Stocked Item

DCGW	Angle		Dimensions						Grade			
			Tips	IC mm	S mm	R mm	φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	ANSI Code	ISO Code										
	DCGW 21.50.5	DCGW 070202	1N	6.35	2.38	0.2	2.8	2.5				●
	DCGW 21.51	DCGW 070204	1N	6.35	2.38	0.4	2.8	2.5				●
	DCGW 32.50.5	DCGW 11T302	1N	9.525	3.97	0.2	4.4	2.5				●
	DCGW 32.51	DCGW 11T304	1N	9.525	3.97	0.4	4.4	2.5				●
	DCGW 32.52	DCGW 11T308	1N	9.525	3.97	0.8	4.4	2.5				●

DCGT	Angle		Dimensions						Grade			
			Tips	IC mm	S mm	R mm	φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	ANSI Code	ISO Code										
	DCGT 21.50.5	DCGT 070202	1N	6.35	2.38	0.2	2.8	2.5				●
	DCGT 21.51	DCGT 070204	1N	6.35	2.38	0.4	2.8	2.5				●
	DCGT 32.50.5	DCGT 11T302	1N	9.525	3.97	0.2	4.4	2.5				●
	DCGT 32.51	DCGT 11T304	1N	9.525	3.97	0.4	4.4	2.5				●
	DCGT 32.52	DCGT 11T308	1N	9.525	3.97	0.8	4.4	2.5				●

# PCD Insert

VCGW · VCGT

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## VC

35° Positive

7° Relief

Edge mark:

C - chipbreaker

L - full length


F - full face


Application:

ISO N - Non-ferrous Metal

ISO O - Others

● WORLDIA Stocked Item

VCGW	Angle		Dimensions						Grade			
	ANSI Code	ISO Code	Tips	IC mm	S mm	R mm	φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	VCGW 220.5	VCGW 110302	1N	6.35	3.18	0.2	2.8	2.5	●			
	VCGW 221	VCGW 110304	1N	6.35	3.18	0.4	2.8	2.5	●			
	VCGW 330.5	VCGW 160402	1N	9.525	4.76	0.2	4.4	2.5	●			
	VCGW 331	VCGW 160404	1N	9.525	4.76	0.4	4.4	2.5	●			
	VCGW 332	VCGW 160408	1N	9.525	4.76	0.8	4.4	2.5	●			

VCGT	Angle		Dimensions						Grade			
	ANSI Code	ISO Code	Tips	IC mm	S mm	R mm	φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	VCGT 220.5	VCGT 110302	1N	6.35	3.18	0.2	2.8	2.5	●			
	VCGT 221	VCGT 110304	1N	6.35	3.18	0.4	2.8	2.5	●			
	VCGT 330.5	VCGT 160402	1N	9.525	4.76	0.2	4.4	2.5	●			
	VCGT 331	VCGT 160404	1N	9.525	4.76	0.4	4.4	2.5	●			
	VCGT 332	VCGT 160408	1N	9.525	4.76	0.8	4.4	2.5	●			



# PCD Insert

VBGW · VBGT

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## VB


35° Positive


5° Relief

Edge mark:  
C - chipbreaker  
L - full length  
F - full face

Application:  
ISO N - Non-ferrous Metal  
ISO O - Others

● WORLDIA Stocked Item

VBGW	Angle		Dimensions						Grade			
	ANSI Code	ISO Code	Tips	IC mm	S mm	R mm	φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	VBGW 330.5	VBGW 160402	1N	9.525	4.76	0.2	4.4	2.5	●			
	VBGW 331	VBGW 160404	1N	9.525	4.76	0.4	4.4	2.5	●			
	VBGW 332	VBGW 160408	1N	9.525	4.76	0.8	4.4	2.5	●			

VBGT	Angle		Dimensions						Grade			
	ANSI Code	ISO Code	Tips	IC mm	S mm	R mm	φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	VBGT 330.5	VBGT 160402	1N	9.525	4.76	0.2	4.4	2.5	●			
	VBGT 331	VBGT 160404	1N	9.525	4.76	0.4	4.4	2.5	●			
	VBGT 332	VBGT 160408	1N	9.525	4.76	0.8	4.4	2.5	●			

# PCD Insert

TCGW · TCGT

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**TC**

60° Positive

7° Relief

Edge mark:

C - chipbreaker

L - full length


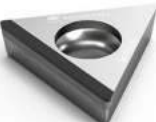
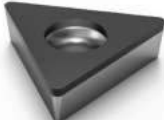
F - full face



Application:

ISO N - Non-ferrous Metal

ISO O - Others

● WORLDIA Stocked Item

TCGW	Angle		Dimensions						Grade			
			Tips	IC mm	S mm	R mm	φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	ANSI Code	ISO Code										
	TCGW 1.81.50.5	TCGW 090202	1N	5.56	2.38	0.2	2.4	2.5	●			
	TCGW 1.81.51	TCGW 090204	1N	5.56	2.38	0.4	2.4	2.5	●			
	TCGW 220.5	TCGW 110302	1N	6.35	3.18	0.2	2.8	2.5	●			
	TCGW 221	TCGW 110304	1N	6.35	3.18	0.4	2.8	2.5	●			
	TCGW 222	TCGW 110308	1N	6.35	3.18	0.8	2.8	2.5	●			
	TCGW 32.51	TCGW 16T304	1N	9.525	3.97	0.4	4.4	2.5	●			
	TCGW 32.52	TCGW 16T308	1N	9.525	3.97	0.8	4.4	2.5	●			
	L-TCGW 32.50.5	L-TCGW 16T302	1N	9.525	3.97	0.2	4.4	2.5	●			
	L-TCGW 32.51	L-TCGW 16T304	1N	9.525	3.97	0.4	4.4	2.5	●			
	L-TCGW 32.52	L-TCGW 16T308	1N	9.525	3.97	0.8	4.4	2.5	●			
	F-TCGW 1.81.51	F-TCGW 090204	3N	5.56	2.38	0.4	2.4	2.5	●			

TCGT	Angle		Dimensions						Grade			
			Tips	IC mm	S mm	R mm	φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	ANSI Code	ISO Code										
	TCGT 1.81.50.5	TCGT 090202	1N	5.56	2.38	0.2	2.4	2.5	●			
	TCGT 1.81.51	TCGT 090204	1N	5.56	2.38	0.4	2.4	2.5	●			
	TCGT 220.5	TCGT 110302	1N	6.35	3.18	0.2	2.8	2.5	●			
	TCGT 221	TCGT 110304	1N	6.35	3.18	0.4	2.8	2.5	●			
	TCGT 222	TCGT 110308	1N	6.35	3.18	0.8	2.8	2.5	●			
	L-TCGT 32.51	L-TCGT 16T304	1N	9.525	3.97	0.4	4.4	2.5	●			

# PCD Insert

TPGW · TPGT

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**TP**

60° Positive

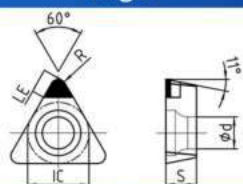
11° Relief

Edge mark:  
C - chipbreaker  
L - full length  
F - full face

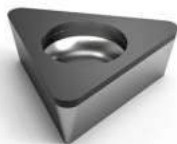
Application:  
ISO N - Non-ferrous Metal  
ISO O - Others

● WORLDIA Stocked Item

TPGW	Angle		Dimensions						Grade			
	ANSI Code	ISO Code	Tips	IC mm	S mm	R mm	φd mm	LE mm	MND 01	MND 10	MND 32	CVD

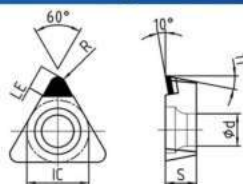


TPGW 220.5	TPGW 110302	1N	6.35	3.18	0.2	3.3	2.5	●			
TPGW 221	TPGW 110304	1N	6.35	3.18	0.4	3.3	2.5	●			
TPGW 222	TPGW 110308	1N	6.35	3.18	0.8	3.3	2.5	●			
TPGW 330.5	TPGW 160402	1N	9.525	4.76	0.2	4.4	2.5	●			
TPGW 331	TPGW 160404	1N	9.525	4.76	0.4	4.4	2.5	●			



F-TPGW 222	F-TPGW 110308	3N	6.35	3.18	0.8	3.3	2.5	●			
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TPGT	Angle		Dimensions						Grade			
	ANSI Code	ISO Code	Tips	IC mm	S mm	R mm	φd mm	LE mm	MND 01	MND 10	MND 32	CVD



TPGT 22.50.5	TPGT 110302	1N	6.35	3.18	0.2	3.3	2.5	●			
TPGT 22.51	TPGT 110304	1N	6.35	3.18	0.4	3.3	2.5	●			
TPGT 22.52	TPGT 110308	1N	6.35	3.18	0.8	3.3	2.5	●			
TPGT 330.5	TPGT 160402	1N	9.525	4.76	0.2	4.4	2.5	●			
TPGT 331	TPGT 160404	1N	9.525	4.76	0.2	4.4	2.5	●			



## The relationship between nose radius, feed rate and Ra.

$$\therefore h = r\epsilon - (r\epsilon^2 - (0.5 \times f)^2) 0.5 = \text{Scallop Height}$$

$$\therefore Ra = (0.25 \sim 0.33) h$$

$$\therefore f_{MAX} = (Ra \times r\epsilon / 50) \frac{1}{2}$$

## Feed rate recommendation:

Nose radius (mm)	Ra $\mu\text{m}$					
	0.2	0.4	0.8	1.6	3.2	6.4
	Feed Rate f ( mm/rev ) $\leq$					
0.2	0.028	0.040	0.057	0.080	0.113	0.160
0.4	0.040	0.057	0.080	0.113	0.160	0.226
0.8	0.057	0.080	0.113	0.160	0.226	0.320
1.2	0.069	0.098	0.139	0.196	0.277	0.392
1.6	0.080	0.113	0.160	0.226	0.320	0.453
2.4	0.098	0.139	0.196	0.277	0.392	0.554

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