



WORLDIA
MN-D2013 EN

PCD Standard Inserts

1 universal PCD grade for all non-ferrous materials from stock



WORLDIA MANANOVA

Easy Choice Fast Delivery

MANANOVA

Easy Choice Fast Delivery

MANANOVA is the name for Worldia's stock-keeping standard product portfolio. It provides best-in-class high-quality products within a wide range of most-common applications at very attractive prices. Each them has an inventory code which simplifies the order process.

Please refer to Worldia's general PCD Turning Inserts catalogue for more grades, geometries, tip sizes, cutting edge designs and coatings.



Contents

ISO Turning 03

Product range overview of indexable inserts
for ISO turning - Inserts description

Chip Control 05

A reliable chip - control solution to help
reducing stringy chipping - MANANOVA

PCD Insert 06

Providing stable , universal , high efficient
cutting effects - MANANOVA EASY CHOICE

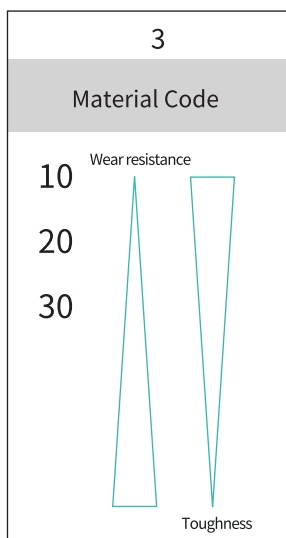
Key Definition - Material designation

Example

M	N	D	10
MANANOVA	1	2	3

1
Application Materials
P Steel
M Stainless Steel
K Cast Iron
S Power Metal
H Hardened Steel
N Non-ferrous Metal

2
Cutting Tool Material
D PCD
N CBN



Key Definition - Identification Code

ANSI	C	-	C	C	G	W	2	1.5	0.5	-	1	N
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 96°	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 
S Solid	E 75° S 90°	E 20°	R ±0.03 ±0.001	R 
W Wiper	H 120° T 60°			
H Heavy cutting	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 IC (inch) Code	 S	 R	1 single 
ISO ANSI	ISO mm ANSI inch	ISO mm ANSI inch	2 double 
3.970 5/32 1.2	01 = 1.59 1 1/16	00 = 0.0 0 .000	3 triple 
4.760 3/16 1.5	02 = 2.38 1.5 3/32	01 = 2.1 0.2 .004	...
5.560 7/32 1.8	T2 = 2.78	02 = 0.2 0.5 .008	...
6.350 06 07 11 11 1/4 2	03 = 3.18 2 1/8	04 = 0.4 1 1/64	
7.940 5/16 2.5	T3 = 3.97 2.5 5/32	08 = 0.8 2 1/32	
9.525 09 11 16 16 3/8 3	04 = 4.76 3 3/16	12 = 1.2 3 3/64	
12.700 12 15 08 1/2 4	05 = 5.56 3.5 7/32	16 = 1.6 4 1/16	
15.875 5/8 5	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	
			10
			Cutting Direction
			N 
			R 
			L 

PCD Insert with chip-breaker

A reliable solution to control and avoid long chips



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

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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

CCGW	Shape		Dimensions						Grade			
	ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	CCGW 060202	CCGW 21.50.5	1N	6.35	2.38	0.2	2.8	2.5	MN 00005			
	CCGW 060204	CCGW 21.51	1N	6.35	2.38	0.4	2.8	2.5	MN 00007			
	CCGW 060204	CCGW 21.51.5	1N	6.35	2.38	0.5	2.8	2.5	MN 00660			
	CCGW 060208	CCGW21.52	1N	6.35	2.38	0.8	2.8	2.5	MN 00496			
	CCGW 09T302	CCGW 32.50.5	1N	9.525	3.97	0.2	4.4	2.5	MN 00009			
	CCGW 09T304	CCGW 32.51	1N	9.525	3.97	0.4	4.4	2.5	MN 00010			
	CCGW 09T304 CBST44	CCGW 32.51 CBST44	1N	9.525	3.97	0.4	4.4	4.4	MN 00839			
	CCGW 09T308	CCGW 32.52	1N	9.525	3.97	0.8	4.4	2.5	MN 00011			
	CCGW 09T308 CBST44	CCGW 32.52 CBST44	1N	9.525	3.97	0.8	4.4	4.4	MN 00840			
	CCGW120404	CCGW431	1N	12.7	4.76	0.4	5.5	2.5	MN 00662			
	CCGW120408	CCGW432	1N	12.7	4.76	0.8	5.5	2.5	MN 00663			
	C - CCGW 060202	C - CCGW 21.50.5	1N	6.35	2.38	0.2	2.8	2.5	MN 00006			
	C - CCGW 09T304	C - CCGW 32.51	1N	9.525	3.97	0.4	4.4	2.5	MN 00075			
	F - CCGW 060204	F - CCGW 21.51	2N	6.35	2.38	0.4	2.8	6.4	MN 00008			

Items with order code MNXXXXX on stock

PCD Insert

CCGT

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CC

80°Positive

7°Relief

Edge mark:

C - chipbreaker

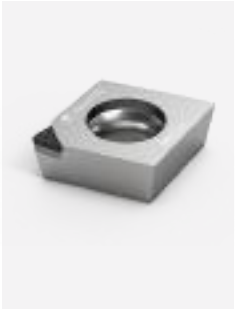
L - full length

F - full face

Application:

ISO N - Non-ferrous Metal

ISO O - Others

CCGT	Shape		Dimensions						Grade			
	ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	CCGT 060202	CCGT 21.50.5	1N	6.35	2.38	0.2	2.8	2.5	MN 00012			
	CCGT 060204	CCGT 21.51	1N	6.35	2.38	0.4	2.8	2.5	MN 00013			
	CCGT 09T302	CCGT 32.50.5	1N	9.525	3.97	0.2	4.4	2.5	MN 00014			
	CCGT 09T304	CCGT 32.51	1N	9.525	3.97	0.4	4.4	2.5	MN 00015			
	CCGT 09T308	CCGT 32.52	1N	9.525	3.97	0.8	4.4	2.5	MN 00016			

Items with order code MNXXXXX on stock

PCD Insert

DCGW-DCGT

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DC

55°Positive

7°Relief

Edge mark:

C - chipbreaker

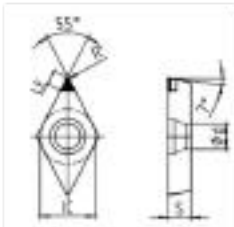
L - full length

F - full face

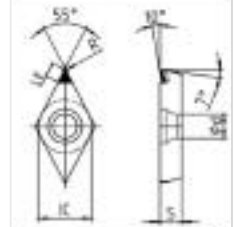
Application:

ISO N - Non-ferrous Metal

ISO O - Others

DCGW	Shape		Dimensions						Grade			
			Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	ISO Code	ANSI Code										
	DCGW 070202	DCGW 21.50.5	1N	6.35	2.38	0.2	2.8	2.5	MN 00017			
	DCGW 070204	DCGW 21.51	1N	6.35	2.38	0.4	2.8	2.5	MN 00018			
	DCGW 11T302	DCGW 32.50.5	1N	9.525	3.97	0.2	4.4	2.5	MN 00019			
	DCGW 11T304	DCGW 32.51	1N	9.525	3.97	0.4	4.4	2.5	MN 00020			
	DCGW 11T308	DCGW 32.52	1N	9.525	3.97	0.8	4.4	2.5	MN 00021			

Items with order code MNXXXXX on stock

DCGT	Shape		Dimensions						Grade			
			Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	ISO Code	ANSI Code										
	DCGT 070202	DCGT 21.50.5	1N	6.35	2.38	0.2	2.8	2.5	MN 00022			
	DCGT 070204	DCGT 21.51	1N	6.35	2.38	0.4	2.8	2.5	MN 00023			
	DCGT 11T302	DCGT 32.50.5	1N	9.525	3.97	0.2	4.4	2.5	MN 00024			
	DCGT 11T302	DCGT 32.50.5	1N	9.525	3.97	0.2	4.4	2.5	MN 00543			
	DCGT 11T302	DCGT 32.50.5	1N	9.525	3.97	0.2	4.4	2.5	MN 00544			
	DCGT 11T304	DCGT 32.51	1N	9.525	3.97	0.4	4.4	2.5	MN 00025			
	DCGT 11T308	DCGT 32.52	1N	9.525	3.97	0.8	4.4	2.5	MN 00026			

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PCD Insert

VCGW-VCGT

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VC

35°Positive

7°Relief

Edge mark:

C - chipbreaker

L - full length

F - full face

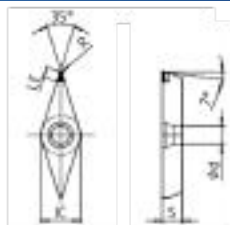
Application:

ISO N - Non-ferrous Metal

ISO O - Others

VCGW

Shape



ISO Code

ANSI Code

Dimensions

Grade

Tips

IC
mm

S
mm

R
mm

Φd
mm

LE
mm

MND
01

MND
10

MND
32

CVD

VCGW 110204

VCGW21.51

1N

6.35

2.38

0.4

2.8

2.5

MN
00512

VCGW 110302

VCGW 220.5

1N

6.35

3.18

0.2

2.8

2.5

MN
00027

VCGW 110304

VCGW 221

1N

6.35

3.18

0.4

2.8

2.5

MN
00028

VCGW 110308

VCGW 221

1N

6.35

3.18

0.8

2.8

2.5

MN
00666

VCGW 160402

VCGW 330.5

1N

9.525

4.76

0.2

4.4

2.5

MN
00029

VCGW 160402 CBST44

VCGW 330.5 CBST44

1N

9.525

4.76

0.2

4.4

4.4

MN
00836

VCGW 160404

VCGW 331

1N

9.525

4.76

0.4

4.4

2.5

MN
00030

VCGW 160404 CBST44

VCGW 331 CBST44

1N

9.525

4.76

0.4

4.4

4.4

MN
00837

VCGW 160408

VCGW 332

1N

9.525

4.76

0.8

4.4

2.5

MN
00031

VCGW 160408

VCGW 332

1N

9.525

4.76

0.8

4.4

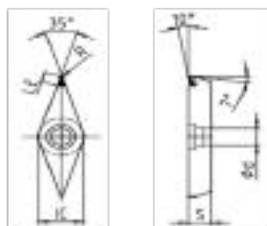
4.4

MN
00838

Items with order code MNXXXXX on stock

VCGT

Shape



ISO Code

ANSI Code

Dimensions

Grade

Tips

IC
mm

S
mm

R
mm

Φd
mm

LE
mm

MND
01

MND
10

MND
32

CVD

VCGT 110302

VCGT 220.5

1N

6.35

3.18

0.2

2.8

2.5

MN
00032

VCGT 110304

VCGT 221

1N

6.35

3.18

0.4

3.3

2.5

MN
00033

VCGT 160402

VCGT 330.5

1N

9.525

4.76

0.2

4.4

2.5

MN
00034

VCGT 160404

VCGT 331

1N

9.525

4.76

0.4

4.4

2.5

MN
00035

VCGT 160408

VCGT 332

1N

9.525

4.76

0.8

4.4

2.5

MN
00036

Items with order code MNXXXXX on stock

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

VBGW	Shape		Dimensions						Grade			
	ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	VBGW 160402	VBGW 330.5	1N	9.525	4.76	0.2	4.4	2.5	MN 00037			
	VBGW 160404	VBGW 331	1N	9.525	4.76	0.4	4.4	2.5	MN 00038			
	VBGW 160408	VBGW 332	1N	9.525	4.76	0.8	4.4	2.5	MN 00039			

Items with order code MNXXXXX on stock

VBGT	Shape		Dimensions						Grade			
	ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	VBGT 110304	VBGT221	1N	6.35	3.18	0.4	2.8	2.5	MN 00805			
	VBGT 160402	VBGT 330.5	1N	9.525	4.76	0.2	4.4	2.5	MN 00040			
	VBGT 160404	VBGT 331	1N	9.525	4.76	0.4	4.4	2.5	MN 00041			
	VBGT 160408	VBGT 332	1N	9.525	4.76	0.8	4.4	2.5	MN 00042			

Items with order code MNXXXXX on stock

PCD Insert

TCGW

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TC	60°Positive
	7°Relief

Edge mark:

C - chipbreaker

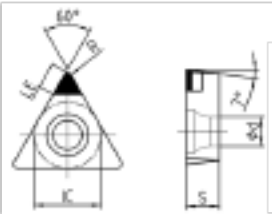
L - full length

F - full face

Application:

ISO N - Non-ferrous Metal

ISO O - Others

TCGW	Shape		Dimensions						Grade			
			Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	TCGW 090202	TCGW 1.81.50.5	1N	5.56	2.38	0.2	2.4	2.5	MN 00043			
	TCGW 090204	TCGW 1.81.51	1N	5.56	2.38	0.4	2.4	2.5	MN 00044			
	TCGW 110302	TCGW 220.5	1N	6.35	3.18	0.2	2.8	2.5	MN 00045			
	TCGW 110304	TCGW 221	1N	6.35	3.18	0.4	2.8	2.5	MN 00046			
	TCGW 110308	TCGW 222	1N	6.35	3.18	0.8	2.8	2.5	MN 00047			
	TCGW 16T304	TCGW 32.51	1N	9.525	3.97	0.4	4.4	2.5	MN 00077			
	TCGW 16T308	TCGW 32.52	1N	9.525	3.97	0.8	4.4	2.5	MN 00079			
	TCGW 160404	TCGW 32.51	1N	9.525	3.97	0.4	4.4	2.5	MN 00051			
	TCGW 160408	TCGW 32.52	1N	9.525	3.97	0.8	4.4	2.5	MN 00053			
	L-TCGW 16T302	L-TCGW 32.50.5	2N	9.525	3.97	0.2	4.4	16.2	MN 00076			
	L-TCGW 16T304	L-TCGW 32.51	2N	9.525	3.97	0.4	4.4	15.9	MN 00078			
	L-TCGW 16T308	L-TCGW 32.52	2N	9.525	3.97	0.8	4.4	15.3	MN 00080			
	F-TCGW 090204	F-TCGW 1.81.51	3N	5.56	2.38	0.4	2.4	9	MN 00057			

Items with order code MNXXXXX on stock

PCD Insert

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

TCGT	Shape		Dimensions						Grade			
	ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	TCGT 090202	TCGT 1.81.50.5	1N	5.56	2.38	0.2	2.4	2.5	MN 00055			
	TCGT 090204	TCGT 1.81.51	1N	5.56	2.38	0.4	2.4	2.5	MN 00056			
	TCGT 110302	TCGT 220.5	1N	6.35	3.18	0.2	2.8	2.5	MN 00058			
	TCGT 110304	TCGT 221	1N	6.35	3.18	0.4	2.8	2.5	MN 00059			
	TCGT 110308	TCGT 222	1N	6.35	3.18	0.8	2.8	2.5	MN 00060			
	L-TCGT 16T304	L-TCGT 32.51	2N	9.525	3.97	0.4	4.4	15.9	MN 00081			

Items with order code MNXXXXX on stock

PCD Insert

TPGW-TPGT

WORLDIA MANANOVA
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TP

60°Positive

11°Relief

Edge mark:

C - chipbreaker

L - full length

F - full face

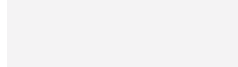
Application:

ISO N - Non-ferrous Metal

ISO O - Others

TPGW	Shape		Dimensions						Grade			
	ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	TPGW 110302	TPGW 220.5	1N	6.35	3.18	0.2	3.3	2.5	MN 00064			
	TPGW 110304	TPGW 221	1N	6.35	3.18	0.4	3.3	2.5	MN 00065			
	TPGW 110308	TPGW 222	1N	6.35	3.18	0.8	3.3	2.5	MN 00066			
	TPGW 160402	TPGW 330.5	1N	9.525	4.76	0.2	4.4	2.5	MN 00067			
	TPGW 160404	TPGW 331	1N	9.525	4.76	0.4	4.4	2.5	MN 00068			
	F-TPGW 110308	F-TPGW 222	3N	9.525	3.18	0.8	3.3	15.3	MN 00048			

Items with order code MNXXXXX on stock

TPGT	Shape		Dimensions						Grade			
	ISO Code	ANSI Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	TPGT090204	TPGT1.81.51	1N	5.56	2.38	0.4	2.4	2.5	MN 00804			
	TPGT 110302	TPGT 22.50.5	1N	6.35	3.18	0.2	3.3	2.5	MN 00069			
	TPGT 110304	TPGT 22.51	1N	6.35	3.18	0.4	3.3	2.5	MN 00070			
	TPGT 110308	TPGT 22.52	1N	6.35	3.18	0.8	3.3	2.5	MN 00071			
	TPGT 160402	TPGT 330.5	1N	9.525	4.76	0.2	4.4	2.5	MN 00072			
	TPGT 160404	TPGT 331	1N	9.525	4.76	0.2	4.4	2.5	MN 00073			

Items with order code MNXXXXX on stock

The relationship between nose radius, feed rate and Ra.

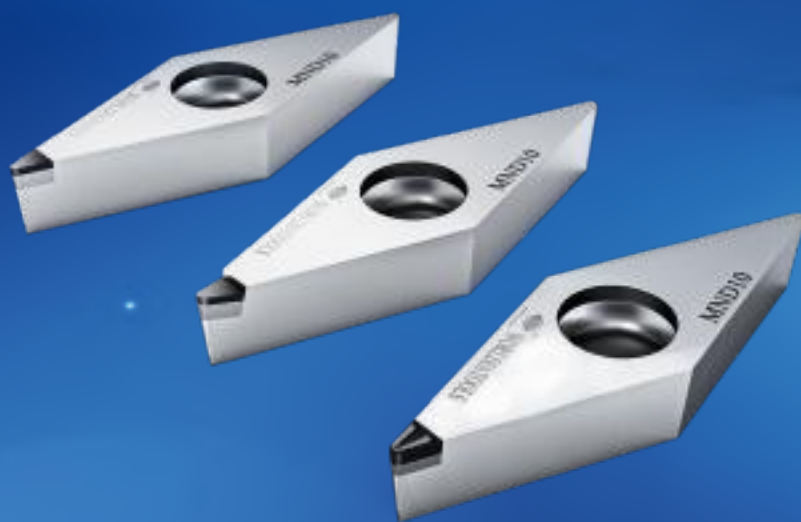
$$\therefore h = r\epsilon - (r\epsilon^2 - (0.5 \times f)^2)^{0.5} = \text{Scallop Height}$$

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

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

Feed rate recommendation:

Nose radius (mm)	Ra μm					
	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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