



WORLDIA
MN-D2010 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

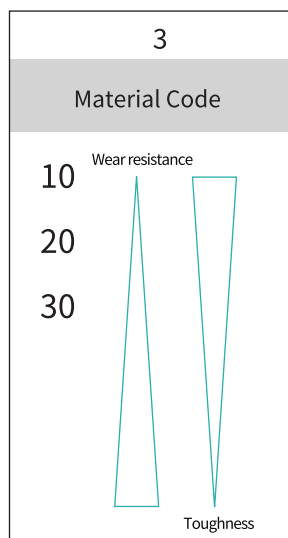
Key Definition - Material designation

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



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

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PCD Insert with chip-breaker

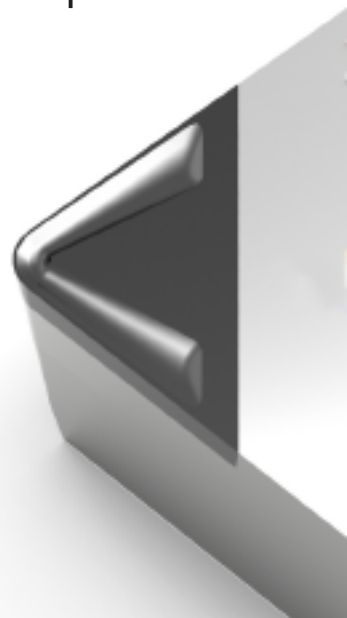
A reliable solution to control and avoid long chips



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

WORLDIA MANANOVA
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CC

80°Positive

7°Relief

Edge mark:

C - chipbreaker

L - full length

F - full face

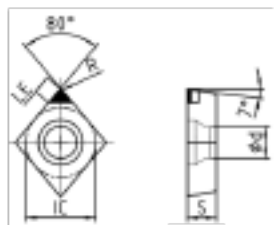
Application:

ISO N - Non-ferrous Metal

ISO O - Others

CCGW

Shape



ANSI Code

ISO Code

Dimensions

Grade

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

MN
00005

CCGW 21.51

CCGW 060204

1N

6.35

2.38

0.4

2.8

2.5

MN
00007

CCGW 21.51.5

CCGW 060204

1N

6.35

2.38

0.5

2.8

2.5

MN
00660

CCGW21.52

CCGW 060208

1N

6.35

2.38

0.8

2.8

2.5

MN
00496

CCGW 32.50.5

CCGW 09T302

1N

9.525

3.97

0.2

4.4

2.5

MN
00009

CCGW 32.51

CCGW 09T304

1N

9.525

3.97

0.4

4.4

2.5

MN
00010

CCGW 32.51

CCGW 09T304

1N

9.525

3.97

0.4

4.4

4.4

MN
00839

CCGW 32.52

CCGW 09T308

1N

9.525

3.97

0.8

4.4

2.5

MN
00011

CCGW 32.52

CCGW 09T308

1N

9.525

3.97

0.8

4.4

4.4

MN
00840

CCGW431

CCGW120404

1N

12.7

4.76

0.4

5.5

2.5

MN
00662

CCGW432

CCGW120408

1N

12.7

4.76

0.8

5.5

2.5

MN
00663

C - CCGW 21.50.5

C - CCGW 060202

1N

6.35

2.38

0.2

2.8

2.5

MN
00006

C - CCGW 32.51

C - CCGW 09T304

1N

9.525

3.97

0.4

4.4

2.5

MN
00075

F - CCGW 21.51

F - CCGW 060204

2N

6.35

2.38

0.4

2.8

6.4

MN
00008

Items with order code MNXXXXX on stock

PCD Insert

CCGT

WORLDIA MANANOVA
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CC

80°Positive

7°Relief

Edge mark:

C - chipbreaker

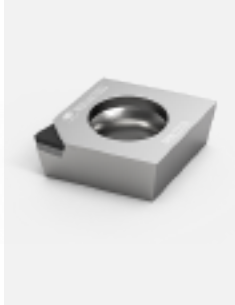
L - full length

F - full face

Application:

ISO N - Non-ferrous Metal

ISO O - Others

CCGT	Shape		Dimensions						Grade			
	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	MN 00012			
	CCGT 21.51	CCGT 060204	1N	6.35	2.38	0.4	2.8	2.5	MN 00013			
	CCGT 32.50.5	CCGT 09T302	1N	9.525	3.97	0.2	4.4	2.5	MN 00014			
	CCGT 32.51	CCGT 09T304	1N	9.525	3.97	0.4	4.4	2.5	MN 00015			
	CCGT 32.52	CCGT 09T308	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

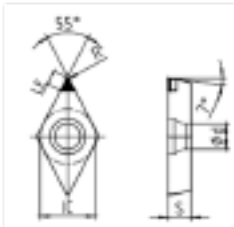
L - full length

F - full face

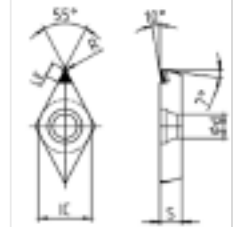
Application:

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
	ANSI Code	ISO Code										
	DCGW 21.50.5	DCGW 070202	1N	6.35	2.38	0.2	2.8	2.5	MN 00017			
	DCGW 21.51	DCGW 070204	1N	6.35	2.38	0.4	2.8	2.5	MN 00018			
	DCGW 32.50.5	DCGW 11T302	1N	9.525	3.97	0.2	4.4	2.5	MN 00019			
	DCGW 32.51	DCGW 11T304	1N	9.525	3.97	0.4	4.4	2.5	MN 00020			
	DCGW 32.52	DCGW 11T308	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
	ANSI Code	ISO Code										
	DCGT 21.50.5	DCGT 070202	1N	6.35	2.38	0.2	2.8	2.5	MN 00022			
	DCGT 21.51	DCGT 070204	1N	6.35	2.38	0.4	2.8	2.5	MN 00023			
	DCGT 32.50.5	DCGT 11T302	1N	9.525	3.97	0.2	4.4	2.5	MN 00024			
	DCGT 32.50.5	DCGT 11T302	1N	9.525	3.97	0.2	4.4	2.5	MN 00543			
	DCGT 32.50.5	DCGT 11T302	1N	9.525	3.97	0.2	4.4	2.5	MN 00544			
	DCGT 32.51	DCGT 11T304	1N	9.525	3.97	0.4	4.4	2.5	MN 00025			
	DCGT 32.52	DCGT 11T308	1N	9.525	3.97	0.8	4.4	2.5	MN 00026			

Items with order code MNXXXXX on stock

PCD Insert

VCGW-VC GT

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VC

35°Positive

7°Relief

Edge mark:

C - chipbreaker

L - full length

F - full face

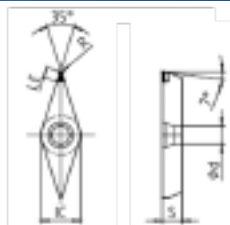
Application:

ISO N - Non-ferrous Metal

ISO O - Others

VCGW

Shape



ANSI Code

ISO Code

Dimensions

Grade

Tips

IC
mm

S
mm

R
mm

Φd
mm

LE
mm

MND
01

MND
10

MND
32

CVD

VCGW21.51

VCGW 110204

1N

6.35

2.38

0.4

2.8

2.5

MN
00512

VCGW 220.5

VCGW 110302

1N

6.35

3.18

0.2

2.8

2.5

MN
00027

VCGW 221

VCGW 110304

1N

6.35

3.18

0.4

2.8

2.5

MN
00028

VCGW 221

VCGW 110308

1N

6.35

3.18

0.8

2.8

2.5

MN
00666

VCGW 330.5

VCGW 160402

1N

9.525

4.76

0.2

4.4

2.5

MN
00029

VCGW 330.5

VCGW 160402

1N

9.525

4.76

0.2

4.4

4.4

MN
00030

VCGW 331

VCGW 160404

1N

9.525

4.76

0.4

4.4

2.5

MN
00031

VCGW 331

VCGW 160404

1N

9.525

4.76

0.4

4.4

4.4

MN
00836

VCGW 332

VCGW 160408

1N

9.525

4.76

0.8

4.4

2.5

MN
00837

VCGW 332

VCGW 160408

1N

9.525

4.76

0.8

4.4

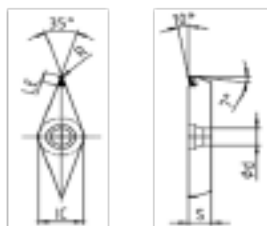
4.4

MN
00838

Items with order code MNXXXX on stock

VC GT

Shape



ANSI Code

ISO Code

Dimensions

Grade

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

MN
00032

VCGT 221

VCGT 110304

1N

6.35

3.18

0.4

3.3

2.5

MN
00033

VCGT 330.5

VCGT 160402

1N

9.525

4.76

0.2

4.4

2.5

MN
00034

VCGT 331

VCGT 160404

1N

9.525

4.76

0.4

4.4

2.5

MN
00035

VCGT 332

VCGT 160408

1N

9.525

4.76

0.8

4.4

2.5

MN
00036

Items with order code MNXXXX on stock

PCD Insert

VBGW-VBGT

WORLDIA MANANOVA
Easy Choice Fast Delivery

VB

35°Positive

5°Relief

Edge mark:

C - chipbreaker

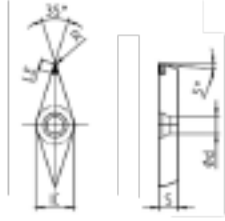
L - full length

F - full face

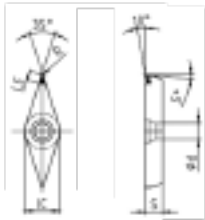
Application:

ISO N - Non-ferrous Metal

ISO O - Others

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

Items with order code MNXXXXX on stock

VBGT	Shape		Dimensions						Grade			
			Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	ANSI Code	ISO Code										
	VBGT221	VBGT 110304	1N	6.35	3.18	0.4	2.8	2.5	MN 00805			
	VBGT 330.5	VBGT 160402	1N	9.525	4.76	0.2	4.4	2.5	MN 00040			
	VBGT 331	VBGT 160404	1N	9.525	4.76	0.4	4.4	2.5	MN 00041			
	VBGT 332	VBGT 160408	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			
	ANSI Code	ISO Code	Tips	IC mm	S mm	R mm	Φd mm	LE mm	MND 01	MND 10	MND 32	CVD
	TCGW 1.81.50.5	TCGW 090202	1N	5.56	2.38	0.2	2.4	2.5	MN 00043			
	TCGW 1.81.51	TCGW 090204	1N	5.56	2.38	0.4	2.4	2.5	MN 00044			
	TCGW 220.5	TCGW 110302	1N	6.35	3.18	0.2	2.8	2.5	MN 00045			
	TCGW 221	TCGW 110304	1N	6.35	3.18	0.4	2.8	2.5	MN 00046			
	TCGW 222	TCGW 110308	1N	6.35	3.18	0.8	2.8	2.5	MN 00047			
	TCGW 32.51	TCGW 16T304	1N	9.525	3.97	0.4	4.4	2.5	MN 00077			
	TCGW 32.52	TCGW 16T308	1N	9.525	3.97	0.8	4.4	2.5	MN 00079			
	TCGW 32.51	TCGW 16T304	1N	9.525	3.97	0.4	4.4	2.5	MN 00051			
	TCGW 32.52	TCGW 16T308	1N	9.525	3.97	0.8	4.4	2.5	MN 00053			
	L-TCGW 32.50.5	L-TCGW 16T302	2N	9.525	3.97	0.2	4.4	16.2	MN 00076			
	L-TCGW 32.51	L-TCGW 16T304	2N	9.525	3.97	0.4	4.4	15.9	MN 00078			
	L-TCGW 32.52	L-TCGW 16T308	2N	9.525	3.97	0.8	4.4	15.3	MN 00080			
	F-TCGW 1.81.51	F-TCGW 090204	3N	5.56	2.38	0.4	2.4	9	MN 00057			

Items with order code MNXXXXX on stock

PCD Insert

TCGT

WORLDIA MANANOVA
Easy Choice Fast Delivery

TC

60°Positive

7°Relief

Edge mark:

C - chipbreaker

L - full length

F - full face

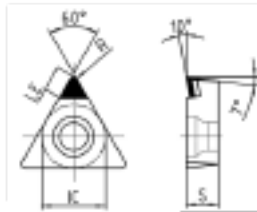
Application:

ISO N - Non-ferrous Metal

ISO O - Others

TCGT

Shape



Dimensions

Grade

ANSI Code

ISO Code

Tips

IC
mm

S
mm

R
mm

Φd
mm

LE
mm

MND
01

MND
10

MND
32

CVD

TCGT 1.81.50.5

TCGT 090202

1N

5.56

2.38

0.2

2.4

2.5

MN
00055

TCGT 1.81.51

TCGT 090204

1N

5.56

2.38

0.4

2.4

2.5

MN
00056

TCGT 220.5

TCGT 110302

1N

6.35

3.18

0.2

2.8

2.5

MN
00058

TCGT 221

TCGT 110304

1N

6.35

3.18

0.4

2.8

2.5

MN
00059

TCGT 222

TCGT 110308

1N

6.35

3.18

0.8

2.8

2.5

MN
00060

L-TCGT 32.51

L-TCGT 16T304

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
Easy Choice Fast Delivery

TP

60°Positive

11°Relief

Edge mark:

C - chipbreaker

L - full length

F - full face

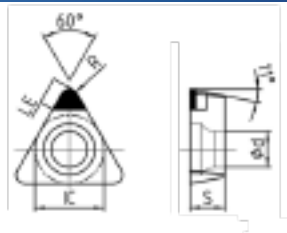
Application:

ISO N - Non-ferrous Metal

ISO O - Others

TPGW

Shape



ANSI Code

ISO Code

Dimensions

Grade

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

MN 00064

TPGW 221

TPGW 110304

1N

6.35

3.18

0.4

3.3

2.5

MN 00065

TPGW 222

TPGW 110308

1N

6.35

3.18

0.8

3.3

2.5

MN 00066

TPGW 330.5

TPGW 160402

1N

9.525

4.76

0.2

4.4

2.5

MN 00067

TPGW 331

TPGW 160404

1N

9.525

4.76

0.4

4.4

2.5

MN 00068

F-TPGW 222

F-TPGW 110308

3N

9.525

3.18

0.8

3.3

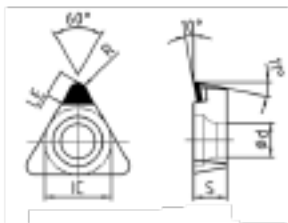
15.3

MN 00804

Items with order code MNXXXXX on stock

TPGT

Shape



ANSI Code

ISO Code

Dimensions

Grade

Tips

IC mm

S mm

R mm

Φd mm

LE mm

MND 01

MND 10

MND 32

CVD

TPGT1.81.51

TPGT090204

1N

5.56

2.38

0.4

2.4

2.5

MN 00804

TPGT 22.50.5

TPGT 110302

1N

6.35

3.18

0.2

3.3

2.5

MN 00069

TPGT 22.51

TPGT 110304

1N

6.35

3.18

0.4

3.3

2.5

MN 00070

TPGT 22.52

TPGT 110308

1N

6.35

3.18

0.8

3.3

2.5

MN 00071

TPGT 330.5

TPGT 160402

1N

9.525

4.76

0.2

4.4

2.5

MN 00072

TPGT 331

TPGT 160404

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.

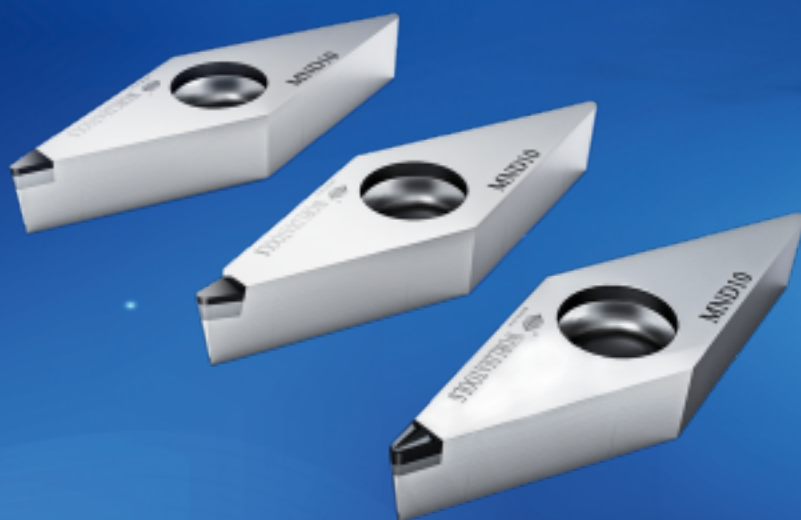
$$\therefore h = r\epsilon - (r\epsilon^2 - (0.5 \times f)^2)^{0.5} = \text{Scallop Height}$$

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

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

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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