



WORLDIA  
股票代码:688028

MN-N2006 EN

# PCBN Insert

7 material / 1 type, univesal for hardened steel ,  
cast Iron , ductile iron and powder metallurgy.



**WORLDIA MANANOVA**

Easy Choice Fast Delivery

# ManaNova

An easy choica in cutting world



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## ISO Turning ..... 03

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

## PCBN Insert ..... 06

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

## Definition Key - Material designation

### Example

| M        | H | N | 10 | C |
|----------|---|---|----|---|
| ManaNova | 1 | 2 | 3  | 4 |

| 1                          | 2                     | 3             | 4                        |
|----------------------------|-----------------------|---------------|--------------------------|
| Application Materials      | Cutting Tool Material | Material Code | Coating                  |
| <b>P</b> Steel             | <b>D</b> PCD          | 10            | <b>C</b> Coated          |
| <b>M</b> Stainless Steel   | <b>N</b> PCBN         | 20            | <b>Without</b> No coated |
| <b>K</b> Cast Iron         |                       | 30            |                          |
| <b>S</b> Powder metallurgy |                       |               |                          |
| <b>H</b> Hardened Steel    |                       |               |                          |
| <b>N</b> Non-ferrous Metal |                       |               |                          |

### Material Introduction - Easy choice for PCBN Grade

ISO H: Hardened Steel

ISO K: Cast Iron

ISO S: Powder Metallurgy

- Continuous cutting
- ◐ Light interrupted cutting
- ▣ Medium interrupted cutting
- ✱ Heavy interrupted cutting

|              | ISO H                 |                       |                       | ISO K                 |                       | ISO S                 |                       |
|--------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
|              | MHN10C                | MHN20C                | MHN30C                | MKN10                 | MKN20                 | MSN10                 | MSN20                 |
| PCBN Grade   | Smooth                | Moderate              | Toughness             | Cast Iron             | Ductile Iron          | Powder Metallurgy     | Powder Metallurgy     |
| vc           | 180(150~250)<br>m/min | 100(50~150)<br>m/min  | 80(30~120)<br>m/min   | 600(300~800)<br>m/min | 300(150~450)<br>m/min | 300(200~500)<br>m/min | 500(300~800)<br>m/min |
| fn           | 0.1(0.03~0.2)<br>mm/r | 0.1(0.03~0.2)<br>mm/r | 0.1(0.03~0.2)<br>mm/r | 0.1(0.03~0.3)<br>mm/r | 0.1(0.03~0.3)<br>mm/r | 0.1(0.03~0.3)<br>mm/r | 0.1(0.03~0.3)<br>mm/r |
| %            | 45~55                 | 60~70                 | 85~95                 | 85~95                 | 60~70                 | 60~70                 | 85~95                 |
| Grain size   | 1~2<br>μm             | 1~2<br>μm             | 2~3<br>μm             | 2~3<br>μm             | 1~2<br>μm             | 1~2<br>μm             | 2~3<br>μm             |
| Bond         | TiC                   | TiN                   | Co/W                  | Co/W                  | TiCN                  | TiCN                  | Co/W                  |
| First Choice | ●                     | ◐<br>▣<br>✱           | ✱                     | ●<br>◐<br>▣<br>✱      | ●<br>◐<br>▣<br>✱      | ●<br>◐<br>▣<br>✱      | ●<br>◐<br>▣<br>✱      |

● Continuous    ◐ Light interrupted    ▣ Medium interrupted    ✱ Heavy interrupted

## Definition Key - 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            |               |
|--------------|---------------|
| Insert Style |               |
| Without      | Standard      |
| C            | Chip breaker  |
| L            | Full Length   |
| F            | Full Face     |
| S            | Solid         |
| W            | Wiper         |
| H            | Heavy cutting |

| 2            |      |   |      |
|--------------|------|---|------|
| Insert Shape |      |   |      |
| A            | 85°  | M | 86°  |
| B            | 82°  | O | 135° |
| C            | 80°  | P | 108° |
| D            | 55°  | R |      |
| E            | 75°  | S | 90°  |
| H            | 120° | T | 60°  |
| K            | 55°  | V | 35°  |
| L            | 90°  | W | 80°  |

| 3               |     |   |     |
|-----------------|-----|---|-----|
| Clearance Angle |     |   |     |
| A               | 3°  | F | 25° |
| B               | 5°  | G | 30° |
| C               | 7°  | N | 0°  |
| D               | 15° | P | 11° |
| E               | 20° |   |     |

| 4          |        |           |  |
|------------|--------|-----------|--|
| Tolerances |        |           |  |
| G          | ISO mm | ANSI inch |  |
| m          | ±0.025 | ±0.001    |  |
| IC         | ±0.025 | ±0.001    |  |
| S          | ±0.130 | ±0.005    |  |
| R          | ±0.03  | ±0.001    |  |
|            |        |           |  |

| 5            |  |
|--------------|--|
| Pattern Type |  |
| A            |  |
| N            |  |
| T            |  |
| W            |  |
| R            |  |

| 6                         |    |    |    |    |    |           |      |
|---------------------------|----|----|----|----|----|-----------|------|
| Inscribed Circle Diameter |    |    |    |    |    |           |      |
| IC (mm)                   | C  | D  | T  | V  | W  | IC (inch) | Code |
| ISO                       |    |    |    |    |    | ANSI      |      |
| 3.970                     |    |    |    |    |    | 5/32      | 1.2  |
| 4.760                     |    |    | 08 |    |    | 3/16      | 1.5  |
| 5.560                     |    |    | 09 |    |    | 7/32      | 1.8  |
| 6.350                     | 06 | 07 | 11 | 11 |    | 1/4       | 2    |
| 7.940                     |    |    |    |    |    | 5/16      | 2.5  |
| 9.525                     | 09 | 11 | 16 | 16 |    | 3/8       | 3    |
| 12.700                    | 12 | 15 |    |    | 08 | 1/2       | 4    |
| 15.875                    |    |    |    |    |    | 5/8       | 5    |

| 7                |       |      |      |
|------------------|-------|------|------|
| Insert Thickness |       |      |      |
|                  |       |      |      |
| ISO              | mm    | ANSI | inch |
| 01               | 1.59  | 1    | 1/16 |
| 02               | 2.38  | 1.5  | 3/32 |
| T2               | 2.78  |      |      |
| 03               | 3.18  | 2    | 1/8  |
| T3               | 3.97  | 2.5  | 5/32 |
| 04               | 4.76  | 3    | 3/16 |
| 05               | 5.56  | 3.5  | 7/32 |
| 06               | 6.35  | 4    | 1/4  |
| 07               | 7.94  | 5    | 5/16 |
| 09               | 9.525 | 6    | 3/8  |

| 8           |     |      |      |
|-------------|-----|------|------|
| Nose Radius |     |      |      |
|             |     |      |      |
| ISO         | mm  | ANSI | inch |
| 00          | 0.0 | 0    | .000 |
| 01          | 2.1 | 0.2  | .004 |
| 02          | 0.2 | 0.5  | .008 |
| 04          | 0.4 | 1    | 1/64 |
| 08          | 0.8 | 2    | 1/32 |
| 12          | 1.2 | 3    | 3/64 |
| 16          | 1.6 | 4    | 1/16 |
| 20          | 2.0 | 5    | 5/64 |
| 24          | 2.4 | 6    | 3/32 |
| 28          | 2.8 | 7    | 7/64 |

| 9             |        |  |  |
|---------------|--------|--|--|
| Cutting Edges |        |  |  |
| 1             | single |  |  |
| 2             | double |  |  |
| 3             | triple |  |  |
| ...           |        |  |  |

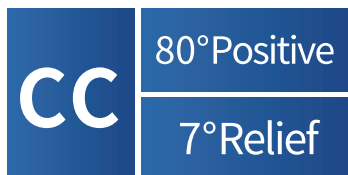
| 10                |  |  |  |
|-------------------|--|--|--|
| Cutting Direction |  |  |  |
| N                 |  |  |  |
| R                 |  |  |  |
| L                 |  |  |  |



# PCBN Insert

## CCGW

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

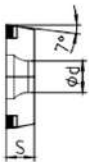


### Application material:

H - Hardened Steel  
K - Cast Iron  
K - Ductile iron(NCI)  
S - Powder metallurgy

### Symbol mark:

● Continuous  
◐ Light interrupted  
◑ Medium interrupted  
✱ Heavy interrupted

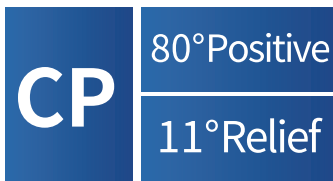
| CCGW                                                                                              | Shape                                                                             |                                                                                   | Dimensions |          |         |         |          |          | Applications |            |            |           |           |           |           |  |
|---------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------------|----------|---------|---------|----------|----------|--------------|------------|------------|-----------|-----------|-----------|-----------|--|
|                                                                                                   |  |  | Tips       | IC<br>mm | S<br>mm | R<br>mm | Φd<br>mm | LE<br>mm | H            | H          | H          | K         | K         | S         | S         |  |
|                                                                                                   | ANSI Code                                                                         | ISO Code                                                                          |            |          |         |         |          |          | Coated       | Coated     | Coated     |           |           |           |           |  |
|                                                                                                   |                                                                                   |                                                                                   |            |          |         |         |          |          | MHN<br>10C   | MHN<br>20C | MHN<br>30C | MKN<br>10 | MKN<br>20 | MSN<br>10 | MSN<br>20 |  |
| <br>MHN Series   | CCGW21.50.5                                                                       | CCGW 060202                                                                       | 2N         | 6.35     | 2.38    | 0.2     | 2.8      | 2.2      | ●            | ●          | ●          | ●         | ●         | ●         | ●         |  |
|                                                                                                   | CCGW21.51                                                                         | CCGW 060204                                                                       | 2N         | 6.35     | 2.38    | 0.4     | 2.8      | 2.2      | ●            | ●          | ●          | ●         | ●         | ●         | ●         |  |
|                                                                                                   | CCGW21.52                                                                         | CCGW 060208                                                                       | 2N         | 6.35     | 2.38    | 0.8     | 2.8      | 2.2      | ●            | ●          | ●          | ●         | ●         | ●         | ●         |  |
| <br>MKN Series | CCGW32.50.5                                                                       | CCGW 09T302                                                                       | 2N         | 9.525    | 3.97    | 0.2     | 4.4      | 2.2      | ●            | ●          | ●          | ●         | ●         | ●         | ●         |  |
|                                                                                                   | CCGW32.51                                                                         | CCGW 09T304                                                                       | 2N         | 9.525    | 3.97    | 0.4     | 4.4      | 2.2      | ●            | ●          | ●          | ●         | ●         | ●         | ●         |  |
|                                                                                                   | CCGW32.52                                                                         | CCGW 09T308                                                                       | 2N         | 9.525    | 3.97    | 0.8     | 4.4      | 2.2      | ●            | ●          | ●          | ●         | ●         | ●         | ●         |  |
|                                                                                                   | CCGW32.53                                                                         | CCGW 09T312                                                                       | 2N         | 9.525    | 3.97    | 1.2     | 4.4      | 2.2      | ●            | ●          | ●          | ●         | ●         | ●         | ●         |  |
| <br>MSN Series | CCGW432                                                                           | CCGW 120408                                                                       | 2N         | 12.7     | 4.76    | 0.8     | 5.5      | 2.2      | ●            |            | ●          |           |           |           |           |  |

use ● symbol for "in stock"

# PCBN Insert

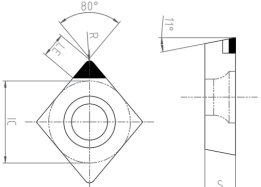
## CPGW-CNGA

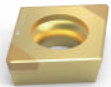
Providing stable , universal , high efficient cutting effects - MANANOVA EASY CHOICE



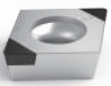
**Application material:**  
H - Hardened Steel  
K - Cast Iron  
K - Ductile iron(NCI)  
S - Powder metallurgy

**Symbol mark:**  
● Continuous  
◐ Light interrupted  
◑ Medium interrupted  
✱ Heavy interrupted

| CPGW | Shape                                                                             |          | Dimensions |            |            |           |           |           | Applications |        |        |   |   |   |   |  |
|------|-----------------------------------------------------------------------------------|----------|------------|------------|------------|-----------|-----------|-----------|--------------|--------|--------|---|---|---|---|--|
|      |  |          |            |            |            |           |           |           | H            | H      | H      | K | K | S | S |  |
|      |                                                                                   |          |            |            |            |           |           |           | ●            | ●      | ★      | ● | ● | ● | ● |  |
|      |                                                                                   |          |            |            |            |           |           |           |              | ★      |        | ★ | ★ | ★ | ★ |  |
|      | ANSI Code                                                                         | ISO Code | Tips       | IC<br>mm   | S<br>mm    | R<br>mm   | Φd<br>mm  | LE<br>mm  | Coated       | Coated | Coated |   |   |   |   |  |
|      |                                                                                   |          | MHN<br>10C | MHN<br>20C | MHN<br>30C | MKN<br>10 | MKN<br>20 | MSN<br>10 | MSN<br>20    |        |        |   |   |   |   |  |



MHN Series



MSN Series

|           |            |    |      |      |     |     |     |  |  |  |  |  |  |  |  |
|-----------|------------|----|------|------|-----|-----|-----|--|--|--|--|--|--|--|--|
| CPGW21.51 | CPGW060204 | 2N | 6.35 | 2.38 | 0.4 | 2.8 | 2.2 |  |  |  |  |  |  |  |  |
| CPGW21.51 | CPGW060204 | 2N | 6.35 | 2.38 | 0.4 | 2.8 | 2.2 |  |  |  |  |  |  |  |  |



**Application material:**  
H - Hardened Steel  
K - Cast Iron  
K - Ductile iron(NCI)  
S - Powder metallurgy

**Symbol mark:**  
● Continuous  
◐ Light interrupted  
◑ Medium interrupted  
✱ Heavy interrupted

| CNGA | Shape                                                                               |          | Dimensions |          |         |         |          |          | Applications |            |            |           |           |           |           |  |
|------|-------------------------------------------------------------------------------------|----------|------------|----------|---------|---------|----------|----------|--------------|------------|------------|-----------|-----------|-----------|-----------|--|
|      |  |          |            |          |         |         |          |          |              |            |            |           |           |           |           |  |
|      |                                                                                     |          |            |          |         |         |          |          |              |            |            |           |           |           |           |  |
|      |                                                                                     |          |            |          |         |         |          |          |              |            |            |           |           |           |           |  |
|      |                                                                                     |          |            |          |         |         |          |          |              |            |            |           |           |           |           |  |
|      | ANSI Code                                                                           | ISO Code | Tips       | IC<br>mm | S<br>mm | R<br>mm | Φd<br>mm | LE<br>mm | H            | H          | H          | K         | K         | S         | S         |  |
|      |                                                                                     |          |            |          |         |         |          |          | Coated       | Coated     | Coated     |           |           |           |           |  |
|      |                                                                                     |          |            |          |         |         |          |          | MHN<br>10C   | MHN<br>20C | MHN<br>30C | MKN<br>10 | MKN<br>20 | MSN<br>10 | MSN<br>20 |  |



MHN Series



MKN Series



MSN Series

|           |             |    |      |      |     |      |     |  |  |  |  |  |  |  |  |
|-----------|-------------|----|------|------|-----|------|-----|--|--|--|--|--|--|--|--|
| CNGA430.5 | CNGA 120402 | 2N | 12.7 | 4.76 | 0.2 | 5.16 | 2.2 |  |  |  |  |  |  |  |  |
| CNGA431   | CNGA 120404 | 2N | 12.7 | 4.76 | 0.4 | 5.16 | 2.2 |  |  |  |  |  |  |  |  |
| CNGA432   | CNGA 120408 | 2N | 12.7 | 4.76 | 0.8 | 5.16 | 2.2 |  |  |  |  |  |  |  |  |
| CNGA432   | CNGA 120408 | 4N | 12.7 | 4.76 | 0.8 | 5.16 | 2.2 |  |  |  |  |  |  |  |  |
| CNGA433   | CNGA 120412 | 2N | 12.7 | 4.76 | 1.2 | 5.16 | 2.2 |  |  |  |  |  |  |  |  |
| CNGA434   | CNGA 120416 | 2N | 12.7 | 4.76 | 1.6 | 5.16 | 2.2 |  |  |  |  |  |  |  |  |
| CNGA434   | CNGA 120416 | 4N | 12.7 | 4.76 | 1.6 | 5.16 | 2.2 |  |  |  |  |  |  |  |  |

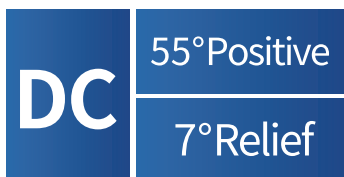
use ● symbol for "in stock"



# PCBN Insert

## DCGW

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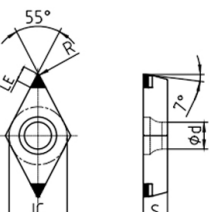


### Application material:

H - Hardened Steel  
K - Cast Iron  
K - Ductile iron(NCI)  
S - Powder metallurgy

### Symbol mark:

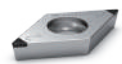
● Continuous  
◐ Light interrupted  
◑ Medium interrupted  
⚙ Heavy interrupted

| DCGW      | Shape                                                                             |          | Dimensions |          |         |         |          |          | Applications |            |            |           |           |           |           |  |  |  |  |  |  |
|-----------|-----------------------------------------------------------------------------------|----------|------------|----------|---------|---------|----------|----------|--------------|------------|------------|-----------|-----------|-----------|-----------|--|--|--|--|--|--|
|           |  |          | Tips       | IC<br>mm | S<br>mm | R<br>mm | φd<br>mm | LE<br>mm | H            | H          | H          | K         | K         | S         | S         |  |  |  |  |  |  |
|           |                                                                                   |          |            |          |         |         |          |          | ●            | ●          | ●          | ●         | ●         | ●         | ●         |  |  |  |  |  |  |
|           |                                                                                   |          |            |          |         |         |          |          | Coated       | Coated     | Coated     |           |           |           |           |  |  |  |  |  |  |
| ANSI Code |                                                                                   | ISO Code |            |          |         |         |          |          | MHN<br>10C   | MHN<br>20C | MHN<br>30C | MKN<br>10 | MKN<br>20 | MSN<br>10 | MSN<br>20 |  |  |  |  |  |  |



MHN Series

|             |             |    |      |      |     |     |     |   |   |   |   |   |   |   |   |
|-------------|-------------|----|------|------|-----|-----|-----|---|---|---|---|---|---|---|---|
| DCGW21.50.5 | DCGW070202  | 2N | 6.35 | 2.38 | 0.2 | 2.8 | 2.2 | ● | ● |   |   |   |   | ● |   |
| DCGW21.51   | DCGW 070204 | 2N | 6.35 | 2.38 | 0.4 | 2.8 | 2.2 | ● | ● | ● | ● | ● | ● | ● | ● |
| DCGW21.52   | DCGW 070208 | 2N | 6.35 | 2.38 | 0.8 | 2.8 | 2.2 | ● | ● | ● | ● | ● | ● | ● | ● |



MKN Series

|             |             |    |       |      |     |     |     |   |   |   |   |   |   |   |   |
|-------------|-------------|----|-------|------|-----|-----|-----|---|---|---|---|---|---|---|---|
| DCGW32.50.5 | DCGW 11T302 | 2N | 9.525 | 3.97 | 0.2 | 4.4 | 2.2 | ● | ● | ● | ● | ● | ● | ● | ● |
| DCGW32.51   | DCGW 11T304 | 2N | 9.525 | 3.97 | 0.4 | 4.4 | 2.2 | ● | ● | ● | ● | ● | ● | ● | ● |
| DCGW32.52   | DCGW 11T308 | 2N | 9.525 | 3.97 | 0.8 | 4.4 | 2.2 | ● | ● | ● | ● | ● | ● | ● | ● |
| DCGW32.53   | DCGW11T312  | 2N | 9.525 | 3.97 | 1.2 | 4.4 | 2.2 | ● | ● |   |   |   |   |   |   |



MSN Series

use ● symbol for "in stock"

# PCBN Insert

## DNGA

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



### Application material:

H - Hardened Steel  
K - Cast Iron  
K - Ductile iron(NCI)  
S - Powder metallurgy

### Symbol mark:

● Continuous  
◐ Light interrupted  
◑ Medium interrupted  
✱ Heavy interrupted

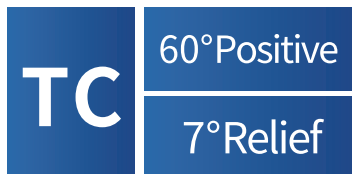
| DNGA                                                                                              | Shape     |             | Dimensions |          |         |         |          |          | Applications         |                      |                      |       |       |       |       |  |
|---------------------------------------------------------------------------------------------------|-----------|-------------|------------|----------|---------|---------|----------|----------|----------------------|----------------------|----------------------|-------|-------|-------|-------|--|
|                                                                                                   |           |             | Tips       | IC<br>mm | S<br>mm | R<br>mm | Ød<br>mm | LE<br>mm | H<br>                | H<br>                | H<br>                | K<br> | K<br> | S<br> | S<br> |  |
|                                                                                                   | ANSI Code | ISO Code    |            |          |         |         |          |          | Coated<br>MHN<br>10C | Coated<br>MHN<br>20C | Coated<br>MHN<br>30C |       |       |       |       |  |
| <br>MHN Series   | DNGA431   | DNGA 150404 | 2N         | 12.7     | 4.76    | 0.4     | 5.16     | 2.2      | ●                    | ●                    | ●                    | ●     | ●     | ●     | ●     |  |
| <br>MKN Series | DNGA432   | DNGA 150408 | 2N         | 12.7     | 4.76    | 0.8     | 5.16     | 2.2      | ●                    | ●                    | ●                    | ●     | ●     | ●     | ●     |  |
|                                                                                                   | DNGA432   | DNGA 150408 | 4N         | 12.7     | 4.76    | 0.8     | 5.16     | 2.2      |                      |                      | ●                    |       |       |       |       |  |
| <br>MSN Series | DNGA433   | DNGA 150412 | 2N         | 12.7     | 4.76    | 1.2     | 5.16     | 2.2      | ●                    | ●                    | ●                    | ●     | ●     | ●     | ●     |  |
|                                                                                                   | DNGA441   | DNGA 150604 | 2N         | 12.7     | 6.35    | 0.4     | 5.16     | 2.2      | ●                    | ●                    | ●                    | ●     | ●     | ●     | ●     |  |
|                                                                                                   | DNGA441   | DNGA 150604 | 4N         | 12.7     | 6.35    | 0.4     | 5.16     | 2.2      |                      | ●                    |                      |       |       |       |       |  |
|                                                                                                   | DNGA442   | DNGA 150608 | 2N         | 12.7     | 6.35    | 0.8     | 5.16     | 2.2      | ●                    | ●                    | ●                    | ●     | ●     | ●     | ●     |  |
|                                                                                                   | DNGA443   | DNGA150612  | 4N         | 12.7     | 6.35    | 1.2     | 5.16     | 2.2      | ●                    |                      |                      |       |       |       |       |  |

use ● symbol for "in stock"

# PCBN Insert

## TCGW

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### Application material:

H - Hardened Steel  
K - Cast Iron  
K - Ductile iron(NCI)  
S - Powder metallurgy

### Symbol mark:

● Continuous  
◐ Light interrupted  
◑ Medium interrupted  
✱ Heavy interrupted

| TCGW       | Shape         |             | Dimensions |          |         |         |          |          | Applications |            |            |            |           |           |           |           |   |
|------------|---------------|-------------|------------|----------|---------|---------|----------|----------|--------------|------------|------------|------------|-----------|-----------|-----------|-----------|---|
|            |               |             | Tips       | IC<br>mm | S<br>mm | R<br>mm | ϕd<br>mm | LE<br>mm | H            | H          | H          | K          | K         | S         | S         |           |   |
|            |               |             |            |          |         |         |          |          | ●            | ●          | ●          | ●          | ●         | ●         | ●         | ●         | ● |
|            |               |             |            |          |         |         |          |          | Coated       | Coated     | Coated     |            |           |           |           |           |   |
| ANSI Code  |               | ISO Code    |            |          |         |         |          |          |              | MHN<br>10C | MHN<br>20C | MHN<br>30C | MKN<br>10 | MKN<br>20 | MSN<br>10 | MSN<br>20 |   |
|            | TCGW1.81.50.5 | TCGW 090202 | 3N         | 5.56     | 2.38    | 0.2     | 2.5      | 2.2      | ●            |            |            |            |           |           |           |           |   |
|            | TCGW1.81.51   | TCGW 090204 | 3N         | 5.56     | 2.38    | 0.4     | 2.8      | 2.2      | ●            | ●          | ●          | ●          | ●         | ●         | ●         | ●         |   |
|            | TCGW1.81.52   | TCGW 090208 | 3N         | 5.56     | 2.38    | 0.8     | 2.8      | 2.2      | ●            | ●          | ●          | ●          | ●         | ●         | ●         | ●         |   |
| MHN Series |               |             |            |          |         |         |          |          |              |            |            |            |           |           |           |           |   |
|            | TCGW21.51     | TCGW 110204 | 3N         | 6.35     | 2.38    | 0.4     | 2.8      | 2.2      | ●            | ●          | ●          | ●          | ●         | ●         | ●         | ●         |   |
|            | TCGW21.52     | TCGW 110208 | 3N         | 6.35     | 2.38    | 0.8     | 2.8      | 2.2      | ●            | ●          | ●          | ●          | ●         | ●         | ●         | ●         |   |
|            |               |             |            |          |         |         |          |          |              |            |            |            |           |           |           |           |   |
| MKN Series | TCGW221       | TCGW 110304 | 3N         | 6.35     | 3.18    | 0.4     | 2.8      | 2.2      | ●            | ●          | ●          | ●          | ●         | ●         | ●         | ●         |   |
|            | TCGW222       | TCGW 110308 | 3N         | 6.35     | 3.18    | 0.8     | 2.8      | 2.2      | ●            | ●          | ●          | ●          | ●         | ●         | ●         | ●         |   |
|            |               |             |            |          |         |         |          |          |              |            |            |            |           |           |           |           |   |
|            | TCGW32.5 1    | TCGW 16T304 | 3N         | 9.525    | 3.97    | 0.4     | 4.4      | 2.2      | ●            |            |            |            |           |           |           |           |   |
| MSN Series |               |             |            |          |         |         |          |          |              |            |            |            |           |           |           |           |   |

use ● symbol for "in stock"

# PCBN Insert

## TNGA

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TN

60°

Negative

### Application material:

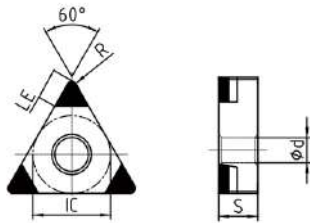
H - Hardened Steel  
K - Cast Iron  
K - Ductile iron(NCI)  
S - Powder metallurgy

### Symbol mark:

● Continuous  
◐ Light interrupted  
◑ Medium interrupted  
✱ Heavy interrupted

TNGA

### Shape



ANSI Code

ISO Code

### Dimensions

### Applications

| Tips    | IC<br>mm    | S<br>mm | R<br>mm | φd<br>mm | LE<br>mm |            |            |            |           |           |           |           |   |
|---------|-------------|---------|---------|----------|----------|------------|------------|------------|-----------|-----------|-----------|-----------|---|
|         |             |         |         |          |          | H          | H          | H          | K         | K         | S         | S         |   |
|         |             |         |         |          |          | ●          | ◐          | ✱          | ●         | ◐         | ◐         | ◐         |   |
|         |             |         |         |          |          | Coated     | Coated     | Coated     |           |           |           |           |   |
|         |             |         |         |          |          | MHN<br>10C | MHN<br>20C | MHN<br>30C | MKN<br>10 | MKN<br>20 | MSN<br>10 | MSN<br>20 |   |
| TNGA331 | TNGA 160404 | 3N      | 9.525   | 4.76     | 0.4      | 3.81       | 2.2        | ●          | ●         |           | ●         |           |   |
| TNGA332 | TNGA 160408 | 3N      | 9.525   | 4.76     | 0.8      | 3.81       | 2.2        | ●          | ●         | ●         | ●         | ●         | ● |
| TNGA333 | TNGA 160412 | 3N      | 9.525   | 4.76     | 1.2      | 3.81       | 2.2        | ●          | ●         | ●         | ●         | ●         | ● |
| TNGA334 | TNGA 160416 | 3N      | 9.525   | 4.76     | 1.6      | 3.81       | 2.2        |            | ●         | ●         |           |           |   |



MHN Series



MKN Series



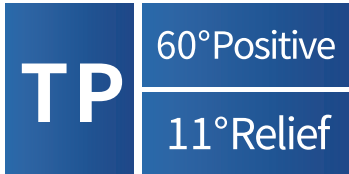
MSN Series

use ● symbol for "in stock"

# PCBN Insert

## TPGW

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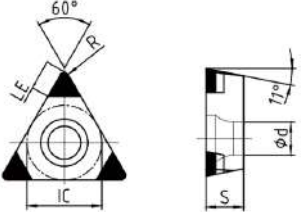


### Application materials:

H - Hardened Steel  
K - Cast Iron  
K - Ductile iron(NCI)  
S - Powder metallurgy

### Symbol mark:

● Continuous  
⬤ Light interrupted  
⬤ Medium interrupted  
⬤ Heavy interrupted

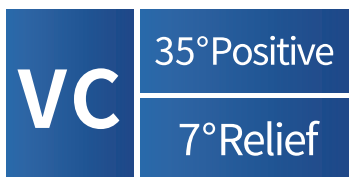
| TPGW                                                                                | Shape                                                                             |             | Dimensions |          |         |         |          |          | Applications |            |            |           |           |           |           |  |  |  |  |  |  |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------|------------|----------|---------|---------|----------|----------|--------------|------------|------------|-----------|-----------|-----------|-----------|--|--|--|--|--|--|
|                                                                                     |  |             | Tips       | IC<br>mm | S<br>mm | R<br>mm | Φd<br>mm | LE<br>mm | H            | H          | H          | K         | K         | S         | S         |  |  |  |  |  |  |
|                                                                                     | ANSI Code                                                                         |             |            |          |         |         |          |          | Coated       | Coated     | Coated     |           |           |           |           |  |  |  |  |  |  |
|                                                                                     | ISO Code                                                                          |             |            |          |         |         |          |          | MHN<br>10C   | MHN<br>20C | MHN<br>30C | MKN<br>10 | MKN<br>20 | MSN<br>10 | MSN<br>20 |  |  |  |  |  |  |
|    | TPGW1.51.50.5                                                                     | TPGW080202  | 3N         | 4.76     | 2.38    | 0.2     | 2.4      | 2.2      | ●            |            |            |           |           |           |           |  |  |  |  |  |  |
| MHN Series                                                                          | TPGW1.51.51                                                                       | TPGW 080204 | 3N         | 4.76     | 2.38    | 0.4     | 2.4      | 2.2      | ●            | ●          | ●          | ●         | ●         | ●         | ●         |  |  |  |  |  |  |
|                                                                                     | TPGW1.51.52                                                                       | TPGW 080208 | 3N         | 4.76     | 2.38    | 0.8     | 2.4      | 2.2      | ●            | ●          | ●          | ●         | ●         | ●         | ●         |  |  |  |  |  |  |
|  | TPGW1.81.50.5                                                                     | TPGW 090202 | 3N         | 5.56     | 2.38    | 0.2     | 2.8      | 2.2      | ●            | ●          | ●          | ●         | ●         |           | ●         |  |  |  |  |  |  |
| MKN Series                                                                          | TPGW1.81.51                                                                       | TPGW 090204 | 3N         | 5.56     | 2.38    | 0.4     | 2.8      | 2.2      | ●            | ●          | ●          | ●         | ●         | ●         | ●         |  |  |  |  |  |  |
|                                                                                     |                                                                                   |             |            |          |         |         |          |          |              |            |            |           |           |           |           |  |  |  |  |  |  |
|  | TPGW21.51                                                                         | TPGW 110204 | 3N         | 6.35     | 2.38    | 0.4     | 2.8      | 2.2      | ●            | ●          | ●          | ●         | ●         | ●         | ●         |  |  |  |  |  |  |
| MSN Series                                                                          | TPGW21.52                                                                         | TPGW 110208 | 3N         | 6.35     | 2.38    | 0.8     | 2.8      | 2.2      | ●            | ●          | ●          | ●         | ●         | ●         | ●         |  |  |  |  |  |  |
|                                                                                     |                                                                                   |             |            |          |         |         |          |          |              |            |            |           |           |           |           |  |  |  |  |  |  |
|                                                                                     | TPGW220.5                                                                         | TPGW 110302 | 3N         | 6.35     | 3.18    | 0.2     | 3.3      | 2.2      | ●            | ●          | ●          | ●         | ●         | ●         | ●         |  |  |  |  |  |  |
|                                                                                     | TPGW221                                                                           | TPGW 110304 | 3N         | 6.35     | 3.18    | 0.4     | 3.3      | 2.2      | ●            | ●          | ●          | ●         | ●         | ●         | ●         |  |  |  |  |  |  |
|                                                                                     | TPGW222                                                                           | TPGW 110308 | 3N         | 6.35     | 3.18    | 0.8     | 2.8      | 2.2      | ●            | ●          |            |           |           |           |           |  |  |  |  |  |  |

use ● symbol for "in stock"

# PCBN Insert

## VCGW

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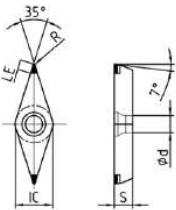


### Application material:

H - Hardened Steel  
K - Cast Iron  
K - Ductile iron(NCI)  
S - Powder metallurgy

### Symbol mark:

● Continuous  
◐ Light interrupted  
◑ Medium interrupted  
✱ Heavy interrupted

| VCGW                                                                                | Shape                                                                             |             | Dimensions |          |         |         |          |          | Applications |            |            |           |           |           |           |  |  |  |  |  |  |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------|------------|----------|---------|---------|----------|----------|--------------|------------|------------|-----------|-----------|-----------|-----------|--|--|--|--|--|--|
|                                                                                     |  |             | Tips       | IC<br>mm | S<br>mm | R<br>mm | Φd<br>mm | LE<br>mm | H            | H          | H          | K         | K         | S         | S         |  |  |  |  |  |  |
|                                                                                     | ANSI Code                                                                         |             |            |          |         |         |          |          | Coated       | Coated     | Coated     |           |           |           |           |  |  |  |  |  |  |
|                                                                                     | ISO Code                                                                          |             |            |          |         |         |          |          | MHN<br>10C   | MHN<br>20C | MHN<br>30C | MKN<br>10 | MKN<br>20 | MSN<br>10 | MSN<br>20 |  |  |  |  |  |  |
|    | VCGW1.51.50.5                                                                     | VCGW 080202 | 2N         | 4.76     | 2.38    | 0.2     | 2.3      | 2.2      | ●            | ●          |            |           |           |           |           |  |  |  |  |  |  |
|                                                                                     | VCGW1.51.51                                                                       | VCGW 080204 | 2N         | 4.76     | 2.38    | 0.4     | 2.3      | 2.2      | ●            | ●          |            |           |           |           |           |  |  |  |  |  |  |
| MHN Series                                                                          |                                                                                   |             |            |          |         |         |          |          |              |            |            |           |           |           |           |  |  |  |  |  |  |
|  | VCGW220.5                                                                         | VCGW 110302 | 2N         | 6.35     | 3.18    | 0.2     | 2.8      | 2.2      | ●            | ●          |            |           |           |           |           |  |  |  |  |  |  |
|                                                                                     | VCGW221                                                                           | VCGW 110304 | 2N         | 6.35     | 3.18    | 0.4     | 2.8      | 2.2      | ●            | ●          | ●          | ●         | ●         | ●         | ●         |  |  |  |  |  |  |
| MKN Series                                                                          | VCGW222                                                                           | VCGW 110308 | 2N         | 6.35     | 3.18    | 0.8     | 2.8      | 2.2      | ●            | ●          | ●          | ●         | ●         | ●         | ●         |  |  |  |  |  |  |
|                                                                                     |                                                                                   |             |            |          |         |         |          |          |              |            |            |           |           |           |           |  |  |  |  |  |  |
|  | VCGW330.5                                                                         | VCGW 160402 | 2N         | 9.525    | 4.76    | 0.2     | 4.4      | 2.2      | ●            | ●          |            |           |           |           |           |  |  |  |  |  |  |
|                                                                                     | VCGW331                                                                           | VCGW 160404 | 2N         | 9.525    | 4.76    | 0.4     | 4.4      | 2.2      | ●            | ●          | ●          | ●         | ●         | ●         | ●         |  |  |  |  |  |  |
| MSN Series                                                                          | VCGW332                                                                           | VCGW 160408 | 2N         | 9.525    | 4.76    | 0.8     | 4.4      | 2.2      | ●            | ●          | ●          | ●         | ●         | ●         | ●         |  |  |  |  |  |  |

use ● symbol for "in stock"



# PCBN Insert

## VBGW

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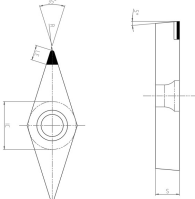
|           |             |
|-----------|-------------|
| <b>VB</b> | 35°Positive |
|           | 5°Relief    |

### Application material:

H - Hardened Steel  
K - Cast Iron  
K - Ductile iron(NCI)  
S - Powder metallurgy

### Symbol mark:

● Continuous  
◐ Light interrupted  
◑ Medium interrupted  
✱ Heavy interrupted

| VBGW | Shape                                                                             |          | Dimensions |          |         |         |          |          | Applications |            |            |           |           |           |           |  |
|------|-----------------------------------------------------------------------------------|----------|------------|----------|---------|---------|----------|----------|--------------|------------|------------|-----------|-----------|-----------|-----------|--|
|      |  |          | Tips       | IC<br>mm | S<br>mm | R<br>mm | Φd<br>mm | LE<br>mm | H            | H          | H          | K         | K         | S         | S         |  |
|      | ANSI Code                                                                         | ISO Code |            |          |         |         |          |          | ●            | ☪☪         | ☼          | ☪☪☪☪      | ☪☪☪☪      | ☪☪☪☪      | ☪☪☪☪      |  |
|      |                                                                                   |          |            |          |         |         |          |          | Coated       | Coated     | Coated     |           |           |           |           |  |
|      |                                                                                   |          |            |          |         |         |          |          | MHN<br>10C   | MHN<br>20C | MHN<br>30C | MKN<br>10 | MKN<br>20 | MSN<br>10 | MSN<br>20 |  |



MHN Series

|           |            |    |      |      |     |     |     |   |   |  |  |  |  |  |  |
|-----------|------------|----|------|------|-----|-----|-----|---|---|--|--|--|--|--|--|
| VBGW220.5 | VBGW110302 | 2N | 6.35 | 3.18 | 0.2 | 2.8 | 2.2 | ● | ● |  |  |  |  |  |  |
| VBGW221   | VBGW110304 | 2N | 6.35 | 3.18 | 0.4 | 2.8 | 2.2 | ● | ● |  |  |  |  |  |  |



MKN Series

|           |            |    |       |      |     |     |     |   |   |   |   |   |   |   |   |
|-----------|------------|----|-------|------|-----|-----|-----|---|---|---|---|---|---|---|---|
| VBGW330.5 | VBGW160402 | 2N | 9.525 | 4.76 | 0.2 | 4.4 | 2.2 | ● | ● | ● | ● | ● | ● | ● | ● |
| VBGW331   | VBGW160404 | 2N | 9.525 | 4.76 | 0.4 | 4.4 | 2.2 | ● | ● | ● | ● | ● | ● | ● | ● |
| VBGW332   | VBGW160408 | 2N | 9.525 | 4.76 | 0.8 | 4.4 | 2.2 | ● | ● | ● | ● | ● | ● | ● | ● |
| VBGW333   | VBGW160412 | 2N | 9.525 | 4.76 | 1.2 | 4.4 | 2.2 | ● | ● | ● | ● | ● | ● | ● | ● |



MSN Series

use ● symbol for "in stock"

# PCBN Insert

## VNGA-MNGA

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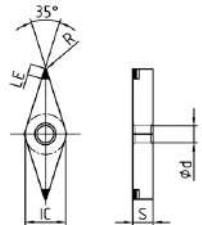


### Application material:

H - Hardened Steel  
K - Cast Iron  
K - Ductile iron(NCI)  
S - Powder metallurgy

### Symbol mark:

● Continuous  
⬤ Light interrupted  
⬤ Medium interrupted  
⬤ Heavy interrupted

| VNGA                    | Shape                                                                             |  | Dimensions |          |         |         |          | Applications |            |            |            |           |           |           |           |   |   |  |
|-------------------------|-----------------------------------------------------------------------------------|--|------------|----------|---------|---------|----------|--------------|------------|------------|------------|-----------|-----------|-----------|-----------|---|---|--|
|                         |  |  | Tips       | IC<br>mm | S<br>mm | R<br>mm | Φd<br>mm | LE<br>mm     | H          | H          | H          | K         | K         | S         | S         |   |   |  |
|                         |                                                                                   |  |            |          |         |         |          |              | ●          | ●          | ●          | ●         | ●         | ●         | ●         | ● | ● |  |
|                         |                                                                                   |  |            |          |         |         |          |              | Coated     | Coated     | Coated     |           |           |           |           |   |   |  |
|                         |                                                                                   |  |            |          |         |         |          |              | MHN<br>10C | MHN<br>20C | MHN<br>30C | MKN<br>10 | MKN<br>20 | MSN<br>10 | MSN<br>20 |   |   |  |
| ANSI Code      ISO Code |                                                                                   |  |            |          |         |         |          |              |            |            |            |           |           |           |           |   |   |  |



MHN Series



MKN Series



MSN Series

|           |             |    |       |      |     |      |     |   |   |   |   |   |   |   |   |
|-----------|-------------|----|-------|------|-----|------|-----|---|---|---|---|---|---|---|---|
| VNGA330.5 | VNGA 160402 | 2N | 9.525 | 4.76 | 0.2 | 3.81 | 2.2 | ● | ● | ● | ● | ● | ● | ● | ● |
| VNGA331   | VNGA 160404 | 2N | 9.525 | 4.76 | 0.4 | 3.81 | 2.2 | ● | ● | ● | ● | ● | ● | ● | ● |
| VNGA332   | VNGA 160408 | 2N | 9.525 | 4.76 | 0.8 | 3.81 | 2.2 | ● | ● | ● | ● | ● | ● | ● | ● |
| VNGA333   | VNGA 160412 | 2N | 9.525 | 4.76 | 1.2 | 3.81 | 2.2 | ● | ● | ● | ● | ● | ● | ● | ● |

use ● symbol for "in stock"

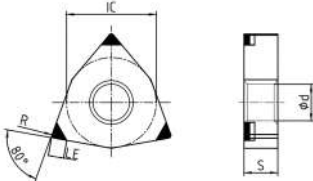


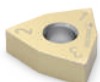
### Application material:

H - Hardened Steel  
K - Cast Iron  
K - Ductile iron(NCI)  
S - Powder metallurgy

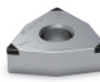
### Symbol mark:

● Continuous  
⬤ Light interrupted  
⬤ Medium interrupted  
⬤ Heavy interrupted

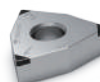
| WNGA      | Shape                                                                               |          | Dimensions |          |         |         |          |          | Applications |            |            |           |           |           |           |  |
|-----------|-------------------------------------------------------------------------------------|----------|------------|----------|---------|---------|----------|----------|--------------|------------|------------|-----------|-----------|-----------|-----------|--|
|           |  |          | Tips       | IC<br>mm | S<br>mm | R<br>mm | Φd<br>mm | LE<br>mm | H            | H          | H          | K         | K         | S         | S         |  |
|           |                                                                                     |          |            |          |         |         |          |          | ●            | ☪☪         | ☼          | ☪☪☼       | ☪☪☼       | ☪☪☼       | ☪☪☼       |  |
|           |                                                                                     |          |            |          |         |         |          |          | Coated       | Coated     | Coated     |           |           |           |           |  |
| ANSI Code |                                                                                     | ISO Code |            |          |         |         |          |          | MHN<br>10C   | MHN<br>20C | MHN<br>30C | MKN<br>10 | MKN<br>20 | MSN<br>10 | MSN<br>20 |  |



MHN Series



MKN Series



MSN Series

|         |             |    |      |      |     |      |     |   |   |   |   |   |   |   |   |
|---------|-------------|----|------|------|-----|------|-----|---|---|---|---|---|---|---|---|
| WNGA431 | WNGA 080404 | 3N | 12.7 | 4.76 | 0.4 | 5.16 | 2.2 | ● | ● | ● | ● | ● | ● | ● | ● |
| WNGA342 | WNGA 080408 | 3N | 12.7 | 4.76 | 0.8 | 5.16 | 2.2 | ● | ● | ● | ● | ● | ● | ● | ● |
| WNGA433 | WNGA 080412 | 3N | 12.7 | 4.76 | 1.2 | 5.16 | 2.2 | ● | ● |   |   | ● |   |   |   |

use ● symbol for "in stock"

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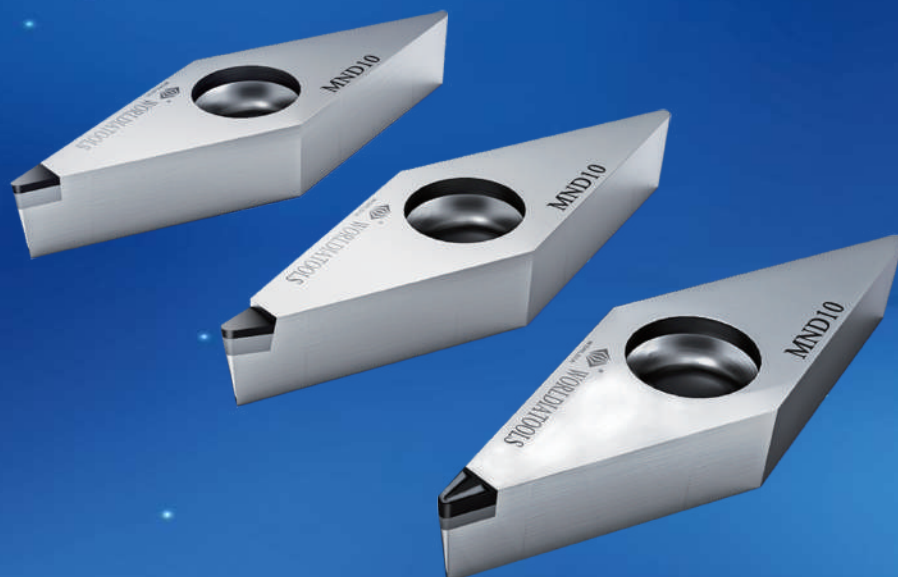
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