



# Groove Milling

High Precision Tools for Groove Milling



METRIC

# Groove Milling

## High Precision Tools for Groove Milling



See it in action

### GM Solid

Solid Carbide Groove Milling tools for miniature and small bore diameters

Ø3.0 - 10.00 mm

- Min. bore diameter 6mm
- 4 flutes
- Width of groove 0.7-2.0 mm
- Depth of groove max 1.5mm



### Mini-V

Indexable tool with 1 cutting corner for milling applications with miniature and small bore diameters

Ø8.0 - 16 mm

Available in a variety of grooving profiles:

- Square Grooving
- Round Grooving
- DIN 472/471



### GM Slot

Groove Milling tool with 3 corner indexable inserts for internal and external grooving, threading and chamfering applications

- Min. bore diameter 12.7mm
- 3 flutes
- Width of groove 0.74 - 5.25mm
- Depth of groove max 3.25mm



### SGM

Shallow Groove Milling for shallow groove milling applications

- Min. bore diameter 48mm
- Long overhang
- Width of groove 1.25-4.0mm
- Depth of groove max 3.5mm



# GROOVE MILLING CATALOG

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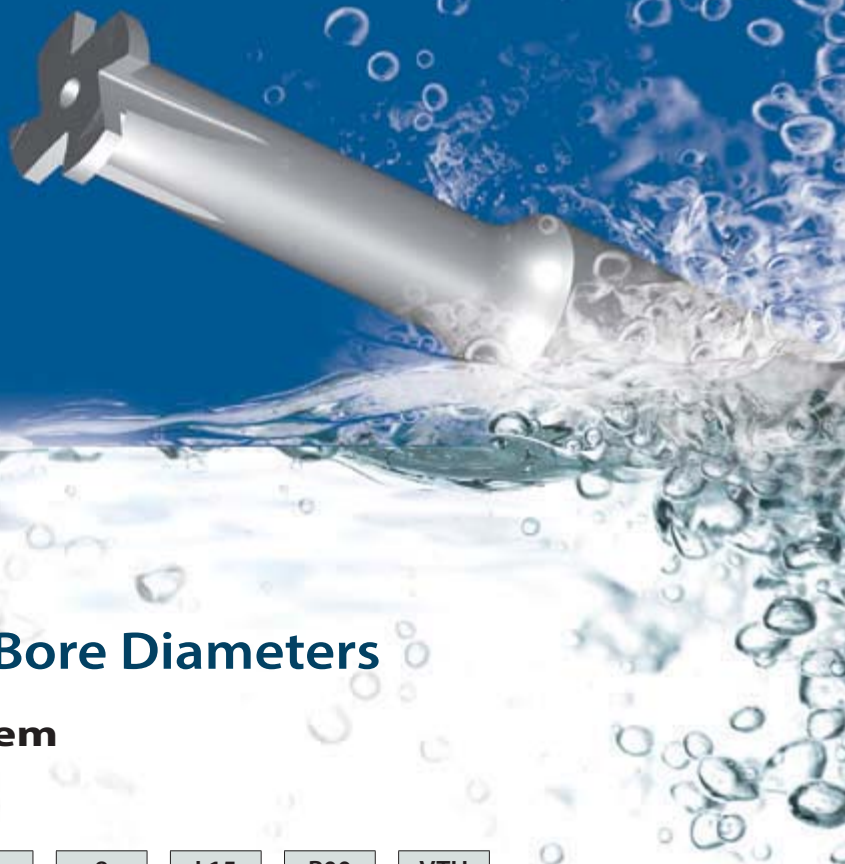
## GM SLOT

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# GM Solid



## For Miniature and Small Bore Diameters

### GM Solid Ordering Code System

#### Square Grooving

|          |          |          |          |            |          |          |            |            |            |
|----------|----------|----------|----------|------------|----------|----------|------------|------------|------------|
| <b>G</b> | <b>S</b> | <b>4</b> | <b>C</b> | <b>070</b> | <b>6</b> | <b>8</b> | <b>L15</b> | <b>R00</b> | <b>VTH</b> |
| <b>1</b> | <b>2</b> | <b>3</b> | <b>4</b> | <b>5</b>   | <b>6</b> | <b>7</b> | <b>8</b>   | <b>9</b>   | <b>10</b>  |

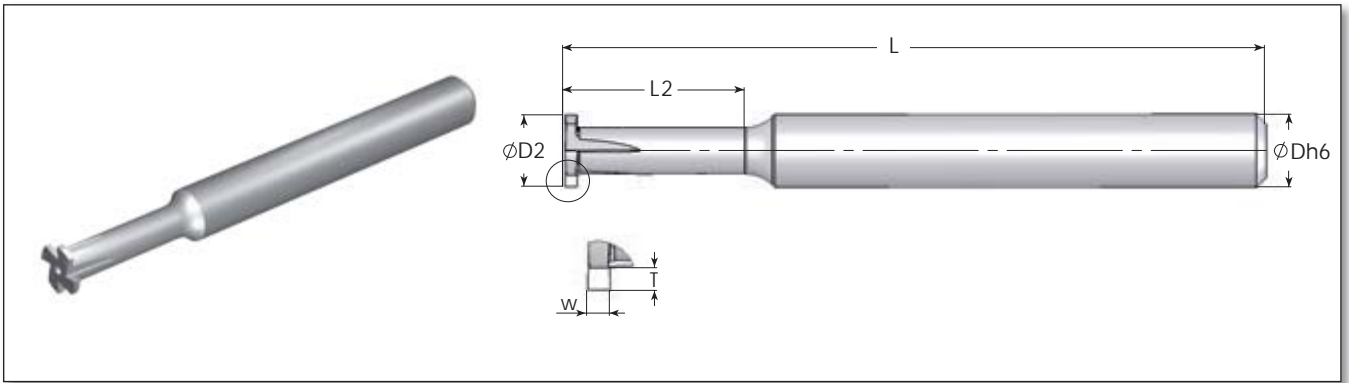
|  |  |  |   |  |  |
|--|--|--|---|--|--|
| <b>1 - Product Line</b><br>G - Grooving                              | <b>2 - Type</b><br>Solid                                   | <b>3 - Number of Flutes</b><br>4 - Four flutes<br>6 - Six flutes | <b>4 - Cooling</b><br>C - Cooling<br>None - Without Cooling | <b>5 - Groove Width (mm)</b><br>070 - 0.7 mm<br>080 - 0.8 mm<br>090 - 0.9 mm<br>100 - 1.0 mm<br>150 - 1.5 mm<br>200 - 2.0 mm | <b>6 - Shank Diameter (mm)</b><br>06 - 6 mm<br>08 - 8 mm<br>10 - 10 mm |
| <b>7 - Groove Depth</b><br>08 - 0.8 mm<br>12 - 1.2 mm<br>15 - 1.5 mm | <b>8 - VV</b><br>L15 - 15 mm<br>L25 - 25 mm<br>L35 - 35 mm | <b>9 - Radius Groove Width Length</b><br>R00 - None              | <b>10 - Carbide Grade Width Length</b><br>VTH               |  |  |

#### Chamfering

|          |          |          |           |           |            |           |            |            |
|----------|----------|----------|-----------|-----------|------------|-----------|------------|------------|
| <b>G</b> | <b>M</b> | <b>4</b> | <b>CH</b> | <b>90</b> | <b>060</b> | <b>06</b> | <b>L15</b> | <b>VTH</b> |
| <b>1</b> | <b>2</b> | <b>3</b> | <b>4</b>  | <b>5</b>  | <b>6</b>   | <b>7</b>  | <b>8</b>   | <b>9</b>   |

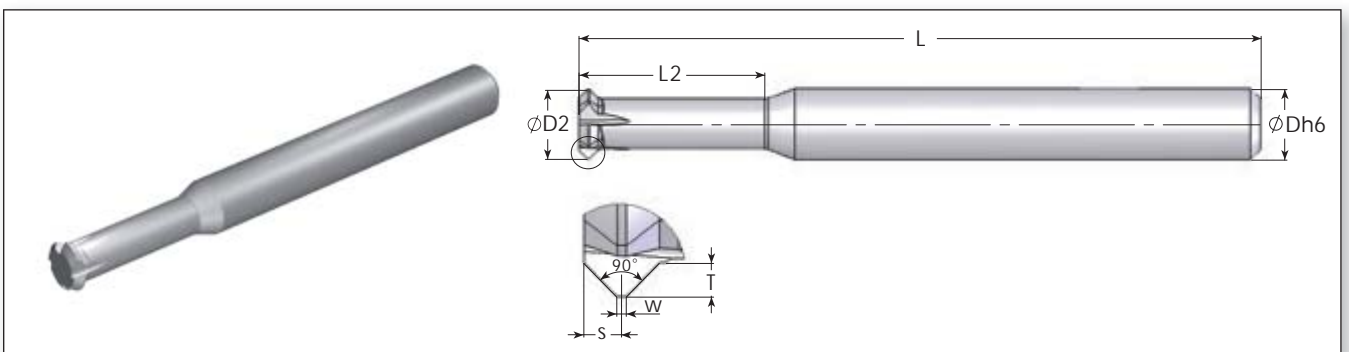
|  |   |  |                                       |                                      |  |
|--|---|--|---------------------------------------|--------------------------------------|--|
| <b>1 - Product Line</b><br>G - Grooving                    | <b>2 - Type</b><br>Milling  | <b>3 - Number of Flutes</b><br>4 - Four flutes | <b>4 - Profile</b><br>CH - Chamfering | <b>5 - Angle of Chamfering</b><br>90 | <b>6 - Shank Diameter</b><br>030 - 3mm<br>040 - 4mm<br>050 - 5mm<br>060 - 6mm<br>080 - 8mm |
| <b>7 - Max. Chamfer Size</b><br>06 - 0.6 mm<br>12 - 1.2 mm | <b>8 - Tool Cutting Length</b><br>L15 - 15 mm<br>L25 - 25 mm<br>L35 - 35 mm | <b>9 - Carbide Grade</b><br>VTH                |                                       |                                      |  |

## GM Solid - Square Grooving



| Width of Groove<br>W +/-0.02mm | Depth of Cut<br>T max mm | Ordering Code           | Dimensions mm |     |    |    |               |
|--------------------------------|--------------------------|-------------------------|---------------|-----|----|----|---------------|
|                                |                          |                         | D2            | Dh6 | L  | L2 | No. of Flutes |
| 0.7                            | 0.8                      | GS4C 0700608-L15R00 VTH | 5.9           | 6   | 58 | 15 | 4             |
| 0.8                            |                          | GS4C 0800608-L15R00 VTH |               |     |    |    |               |
| 0.9                            |                          | GS4C 0900608-L15R00 VTH |               |     |    |    |               |
| 1.0                            |                          | GS4C 1000608-L15R00 VTH |               |     |    |    |               |
| 1.5                            |                          | GS4C 1500608-L15R00 VTH |               |     |    |    |               |
| 0.7                            | 1.2                      | GS4C 0700812-L25R00 VTH | 7.9           | 8   | 68 | 25 | 4             |
| 0.8                            |                          | GS4C 0800812-L25R00 VTH |               |     |    |    |               |
| 0.9                            |                          | GS4C 0900812-L25R00 VTH |               |     |    |    |               |
| 1.0                            |                          | GS4C 1000812-L25R00 VTH |               |     |    |    |               |
| 1.5                            |                          | GS4C 1500812-L25R00 VTH |               |     |    |    |               |
| 2.0                            |                          | GS4C 2000812-L25R00 VTH |               |     |    |    |               |
| 0.7                            | 1.5                      | GS6C 0701015-L35R00 VTH | 9.9           | 10  | 78 | 35 | 6             |
| 0.8                            |                          | GS6C 0801015-L35R00 VTH |               |     |    |    |               |
| 0.9                            |                          | GS6C 0901015-L35R00 VTH |               |     |    |    |               |
| 1.0                            |                          | GS6C 1001015-L35R00 VTH |               |     |    |    |               |
| 1.5                            |                          | GS6C 1501015-L35R00 VTH |               |     |    |    |               |
| 2.0                            |                          | GS6C 2001015-L35R00 VTH |               |     |    |    |               |

## GM Solid - Chamfering



| Depth of Cut<br>T max mm | Ordering Code         | Dimensions mm |     |    |      |     |               |     |
|--------------------------|-----------------------|---------------|-----|----|------|-----|---------------|-----|
|                          |                       | D2            | S   | L  | L2   | W   | No. of Flutes | Dh6 |
| 0.6                      | GM3CH90 03006-L12 VTH | 2.9           | 0.7 | 39 | 12   | 0.2 | 3             | 3   |
| 0.8                      | GM3CH90 04008-L10 VTH | 3.9           | 0.9 | 51 | 10   |     |               | 4   |
| 1.1                      | GM4CH90 05011-L12 VTH | 4.95          | 1.2 | 51 | 12.5 |     |               | 5   |
| 0.6                      | GM4CH90 06006-L15 VTH | 5.9           | 0.8 | 58 | 15   | 4   | 6             |     |
|                          | GM4CH90 06006-L25 VTH |               |     | 68 | 25   |     |               |     |
| 1.2                      | GM4CH90 08012-L25 VTH | 7.9           | 1.4 | 68 | 25   | 8   |               |     |
|                          | GM4CH90 08012-L35 VTH |               |     | 78 | 35   |     |               |     |




# GM Solid Groove Milling Technical Data

Recommended Grades, Cutting Speeds  $V_c$  [m/min], Feed  $f$  [mm/tooth]

| Material Group                         | Vargus No. | Material  | Hardness Brinell HB                     | $V_c$ [m/min] | Peripheral Feed |           |
|--|------------|---|---|---------------|-----------------|-----------|
|  |            |   |   | VTH           | $f$ [mm/tooth]  |           |
| <b>P</b><br>Steel                      | 1          | Unalloyed Steel                                 | Low Carbon (C=0.1-0.25 %)               | 125           | 100-210         | 0.07-0.2  |
|  | 2          |   | Medium Carbon (C=0.25-0.55 %)           | 150           | 100-180         | 0.07-0.2  |
|  | 3          |   | High Carbon (C=0.55-0.85 %)             | 170           | 100-170         | 0.07-0.2  |
|  | 4          | Low Alloy Steel (alloying elements $\leq 5\%$ ) | Non Hardened                            | 180           | 60-90           | 0.07-0.2  |
|  | 5          |   | Hardened                                | 275           | 80-150          | 0.07-0.2  |
|  | 6          |   | Hardened                                | 350           | 70-140          | 0.07-0.2  |
|  | 7          | High Alloy Steel (alloying elements $> 5\%$ )   | Annealed                                | 200           | 60-130          | 0.07-0.2  |
|  | 8          |   | Hardened                                | 325           | 70-110          | 0.07-0.2  |
|  | 9          | Cast Steel                                      | Low Alloy (alloying elements $< 5\%$ )  | 200           | 100-170         | 0.07-0.2  |
|  | 10         |   | High Alloy (alloying elements $> 5\%$ ) | 225           | 70-120          | 0.07-0.2  |
| <b>M</b><br>Stainless Steel            | 11         | Stainless Steel Ferritic                        | Non Hardened                            | 200           | 100-170         | 0.07-0.2  |
|  | 12         |   | Hardened                                | 330           | 100-170         | 0.05-0.15 |
|  | 13         | Stainless Steel Austenitic                      | Austenitic                              | 180           | 70-140          | 0.07-0.2  |
|  | 14         |   | Super Austenitic                        | 200           | 70-140          | 0.07-0.2  |
|  | 15         | Stainless Steel Cast Ferritic                   | Non Hardened                            | 200           | 70-140          | 0.1-0.2   |
|  | 16         |   | Hardened                                | 330           | 70-140          | 0.07-0.2  |
|  | 17         | Stainless Steel Cast Austenitic                 | Austenitic                              | 200           | 70-120          | 0.07-0.2  |
|  | 18         |   | Hardened                                | 330           | 70-120          | 0.07-0.2  |
| <b>K</b><br>Cast Iron                  | 28         | Malleable Cast Iron                             | Ferritic (short chips)                  | 130           | 60-130          | 0.1-0.22  |
|  | 29         |   | Pearlitic (long chips)                  | 230           | 60-120          | 0.07-0.2  |
|  | 30         | Grey Cast Iron                                  | Low Tensile Strength                    | 180           | 60-130          | 0.07-0.2  |
|  | 31         |   | High Tensile Strength                   | 260           | 60-100          | 0.07-0.2  |
|  | 32         | Nodular Sg Iron                                 | Ferritic                                | 160           | 60-125          | 0.07-0.2  |
|  | 33         |   | Pearlitic                               | 260           | 50-90           | 0.07-0.2  |
| <b>N(K)</b><br>Non-Ferrous Metals      | 34         | Aluminium Alloys Wrought                        | Non Aging                               | 60            | 100-250         | 0.1-0.25  |
|  | 35         |   | Aged                                    | 100           | 100-180         | 0.1-0.25  |
|  | 36         | Aluminium Alloys                                | Cast                                    | 75            | 150-400         | 0.1-0.25  |
|  | 37         |   | Cast & Aged                             | 90            | 150-280         | 0.1-0.25  |
|  | 38         | Aluminium Alloys                                | Cast Si 13-22%                          | 130           | 80-150          | 0.1-0.25  |
|  | 39         | Copper and Copper Alloys                        | Brass                                   | 90            | 120-210         | 0.1-0.25  |
|  | 40         |   | Bronze and Non Lead Copper              | 100           | 120-210         | 0.07-0.22 |
| <b>S(M)</b><br>Heat Resistant Material | 23         | Titanium Alloys                                 | Pure 99.5 Ti                            | 400Rm         | 70-140          | 0.07-0.13 |
|  | 24         |   | $\alpha+\beta$ Alloys                   | 1050Rm        | 20-50           | 0.07-0.13 |

## Grades and Their Application

| Grade | Application Type   | Sample  |
|-------|--|---|
| VTH   | A general-purpose, heavy duty groove milling grade<br>TiCN coated for high wear resistance |  |

# Mini-V



## For Miniature and Small Bore Diameters

### Mini-V Ordering Code System

#### Grooving Inserts

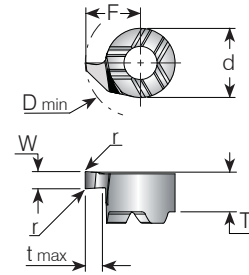
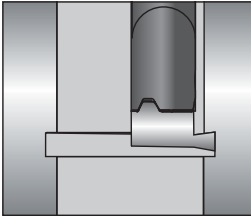
| V                       | 08                      | GS   | W120  | T 100   | R                   | VBX                      |
|-------------------------|-------------------------|--|---|---|---------------------|--------------------------|
| 1                       | 2                       | 3  | 4   | 5   | 6                   | 7                        |
| <b>1 - Product Line</b> | <b>2 - Insert Style</b> | <b>3 - Type of Application</b>   | <b>4 - Groove Width</b>   | <b>5 - Groove Depth</b>   | <b>6 - RH or LH</b> | <b>7 - Carbide Grade</b> |
| V - Mini-V              | 08, 11, 14, 16          | GS - Square Grooving<br>D472 - DIN 472 Grooving Square Partial<br>GSR - Grooving Square with R<br>D7993 - D7993 Grooving Round Partial | W070 - 0.7 mm<br>W080 - 0.8 mm<br>W090 - 0.9 mm<br>W100 - 1.0 mm<br>W110 - 1.1 mm<br>W120 - 1.2 mm<br>W130 - 1.3 mm<br>W150 - 1.5 mm<br>W160 - 1.6 mm<br>W180 - 1.8 mm<br>W200 - 2.0 mm<br>W250 - 2.5mm<br>W300 - 3.0mm<br>W350 - 3.5mm<br>W400 - 4.0mm<br>W430 - 4.3mm | T 100 - 1.0 mm<br>T230 - 2.3 mm<br>T400 - 4.0mm<br>T430 - 4.3mm | R - RH<br>L - LH    | VBX<br>VTX               |

#### Toolholders

| C                                       | V                       | 08                      | -                         | 12                             | 21                  |   |
|---|-------------------------|-------------------------|---------------------------|--------------------------------|---------------------|---|
| 1                                       | 2                       | 3                       |                           | 4                              | 5                   | 6 |
| <b>1 - Holder Type</b>                  | <b>2 - Product Line</b> | <b>3 - Insert Style</b> | <b>4 - Shank Diameter</b> | <b>5 - Tool Overhang</b>       | <b>6 - RH or LH</b> |   |
| C - Carbide Shank<br>None - Steel Shank | V - Mini-V              | 08, 11, 14, 16          | 6, 8, 12, 16              | 12, 21, 29, 30, 42, 50, 56, 64 | None - RH<br>L - LH |   |

# Mini-V Grooving

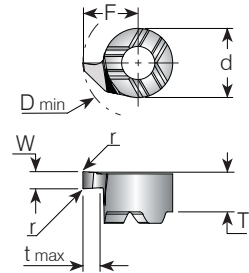
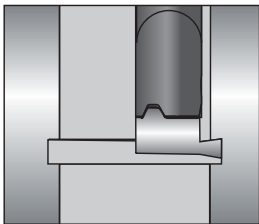
## Internal



| Insert Style | Ordering Code       | Dimensions (mm) |     |       |      |      | Min. Bore dia. |       |          | Toolholder |
|--------------|---------------------|-----------------|-----|-------|------|------|----------------|-------|----------|------------|
|              | RH                  | d               | W   | t max | r    | T    | F              | D min |          |            |
| V08          | V08GS W100T100 R... | 6               | 1   | 1     | 0.05 | 3.6  | 4.80           | 10    | .V08-... |            |
|              | V08GS W150T100 R... |                 | 1.5 |       |      |      |                |       |          |            |
|              | V08GS W200T100 R... |                 | 2   |       |      |      |                |       |          |            |
| V11          | V11GS W100T230 R... | 8               | 1   | 2.3   | 0.05 | 3.95 | 6.70           | 13.8  | .V11-... |            |
|              | V11GS W120T230 R... |                 | 1.2 |       |      |      |                |       |          |            |
|              | V11GS W150T230 R... |                 | 1.5 |       |      |      |                |       |          |            |
|              | V11GS W200T230 R... |                 | 2   |       |      |      |                |       |          |            |
| V14          | V14GS W250T230 R... | 9               | 2.5 | 3.3   | 0.05 | 5.6  | 9              | 18.4  | .V14-... |            |
|              | V14GS W150T400 R... |                 | 1.5 |       |      |      |                |       |          |            |
|              | V14GS W200T400 R... |                 | 2   |       |      |      |                |       |          |            |
|              | V14GS W250T400 R... |                 | 2.5 |       |      |      |                |       |          |            |
| V16          | V16GS W300T400 R... | 11              | 3   | 4.3   | 0.05 | 5.6  | 10.2           | 20.8  | .V16-... |            |
|              | V16GS W200T430 R... |                 | 2   |       |      |      |                |       |          |            |
|              | V16GS W300T430 R... |                 | 3   |       |      |      |                |       |          |            |
|              | V16GS W350T430 R... |                 | 3.5 |       |      |      |                |       |          |            |
|              | V16GS W400T430 R... |                 | 4   |       |      |      |                |       |          |            |

# Mini-V Grooving DIN 472

## Internal

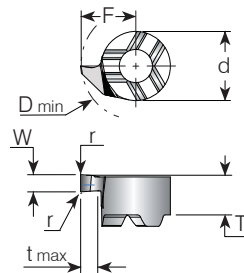
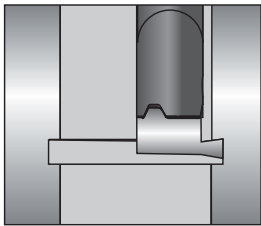


| Insert Style | Ordering Code         | Width of Circlip (mm) |      | Dimensions (mm) |       |      | Min. Bore dia. |       |          | Toolholder |
|--------------|-----------------------|-----------------------|------|-----------------|-------|------|----------------|-------|----------|------------|
|              | RH                    | m                     | W    | d               | t max | T    | F              | D min |          |            |
| V08          | V08D472 W070T100 R... | 0.7                   | 0.73 | 6               | 1     | 3.6  | 4.80           | 10    | .V08-... |            |
|              | V08D472 W080T100 R... | 0.8                   | 0.83 |                 |       |      |                |       |          |            |
|              | V08D472 W090T100 R... | 0.9                   | 0.93 |                 |       |      |                |       |          |            |
|              | V08D472 W110T100 R... | 1.1                   | 1.2  |                 |       |      |                |       |          |            |
|              | V08D472 W130T100 R... | 1.3                   | 1.4  |                 |       |      |                |       |          |            |
|              | V08D472 W160T100 R... | 1.6                   | 1.7  |                 |       |      |                |       |          |            |
| V11          | V11D472 W070T100 R... | 0.7                   | 0.73 | 8               | 1.2   | 3.95 | 6.70           | 13.8  | .V11-... |            |
|              | V11D472 W080T100 R... | 0.8                   | 0.83 |                 | 1.3   |      |                |       |          |            |
|              | V11D472 W090T100 R... | 0.9                   | 0.93 |                 | 1.5   |      |                |       |          |            |
|              | V11D472 W110T230 R... | 1.1                   | 1.2  |                 | 2.3   |      |                |       |          |            |
|              | V11D472 W130T230 R... | 1.3                   | 1.4  |                 | 2.3   |      |                |       |          |            |
|              | V11D472 W160T230 R... | 1.6                   | 1.7  |                 | 2.3   |      |                |       |          |            |
| V14          | V14D472 W130T400 R... | 1.4                   | 1.3  | 9               | 4     | 5.6  | 9              | 18.4  | .V14-... |            |
|              | V14D472 W160T400 R... | 1.7                   | 1.6  |                 |       |      |                |       |          |            |



## Grooving with R

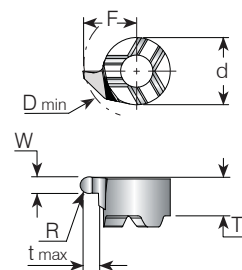
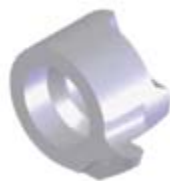
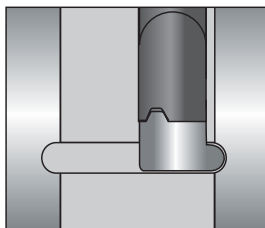
### Internal



| Insert Style | Ordering Code        | Dimensions (mm) |     |       |      |      |     |       | Min. Bore dia. | Toolholder |
|--------------|----------------------|-----------------|-----|-------|------|------|-----|-------|----------------|------------|
|              | RH                   | d               | W   | t max | T    | F    | r   | D min |                |            |
| V08          | V08GSR W150T100 R... | 6               | 1.5 | 1     | 3.6  | 4.80 | 0.2 | 10    | .V08-...       |            |
| V11          | V11GSR W200T230 R... | 8               | 2   | 2.3   | 3.95 | 6.70 | 0.2 | 13.8  | .V11-...       |            |

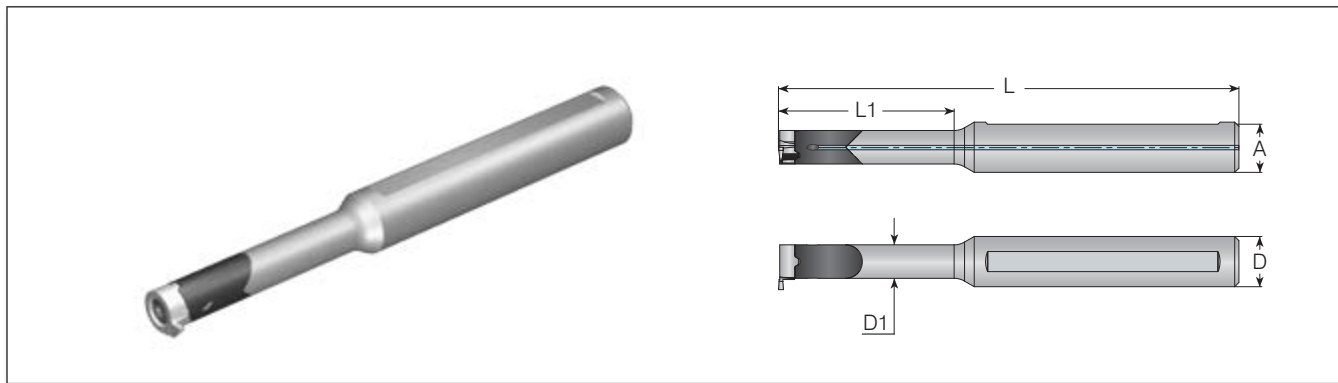
## Grooving DIN 7993 - Round Partial

### Internal



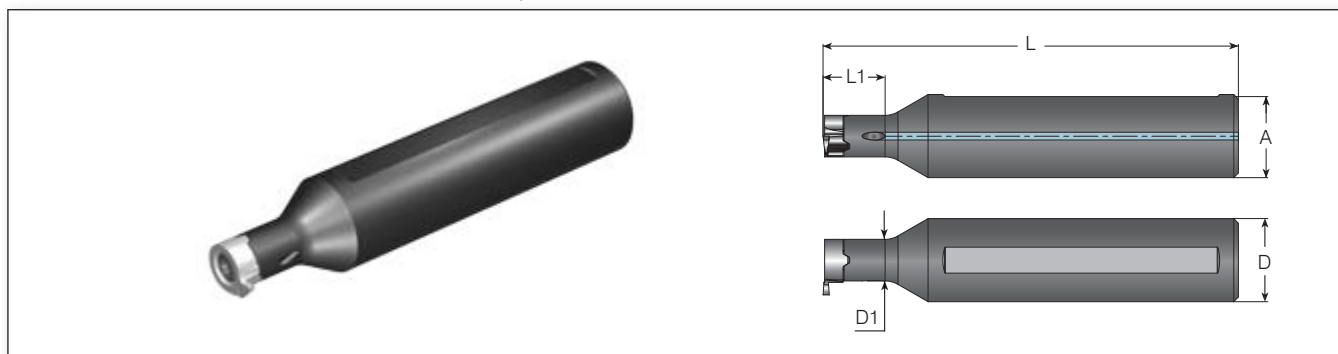
| Insert Style | Ordering Code          | Dimensions (mm) |     |       |      |      |     |       | Min. Bore dia. | Toolholder |
|--------------|------------------------|-----------------|-----|-------|------|------|-----|-------|----------------|------------|
|              | RH                     | d               | W   | t max | T    | F    | R   | D min |                |            |
| V08          | V08D7993 W120T100 R... | 6               | 1.2 | 1     | 3.6  | 4.80 | 0.6 | 10    | .V08-...       |            |
|              | V08D7993 W180T100 R... |                 | 1.8 |       |      |      | 0.9 |       |                |            |
| V11          | V11D7993 W120T230 R... | 8               | 1.2 | 2.3   | 3.95 | 6.70 | 0.6 | 13.8  | .V11-...       |            |
|              | V11D7993 W180T230 R... |                 | 1.8 |       |      |      | 0.9 |       |                |            |
|              | V11D7993 W200T230 R... |                 | 2   |       |      |      | 1.0 |       |                |            |
| V14          | V14D7993 W120T400 R... | 9               | 1.2 | 4     | 5.6  | 9    | 0.6 | 18.4  | .V14-...       |            |
|              | V14D7993 W180T400 R... |                 | 1.8 |       |      |      | 0.9 |       |                |            |
|              | V14D7993 W200T400 R... |                 | 2   |       |      |      | 1.0 |       |                |            |
|              | V14D7993 W220T400 R... |                 | 2.2 |       |      |      | 1.1 |       |                |            |

## Mini-V Toolholders - Carbide Shank with Alloy Steel Head



| Insert Style | Ordering Code |           | Dimensions mm |       |    |    |    | Spare Parts |             |     |
|--------------|---------------|-----------|---------------|-------|----|----|----|-------------|-------------|-----|
|              | Sleeve        | Holder RH | A             | L     | L1 | D  | D1 | Screw       | Size        | Key |
| V08          | -             | CV08-1221 | 11.5          | 80.5  | 21 | 12 | 6  | SNV08       | M2.6x0.45x8 | K2T |
|              | -             | CV08-1230 | 11.5          | 90.5  | 30 | 12 | 6  |             |             |     |
|              | -             | CV08-1242 | 11.5          | 100.5 | 42 | 12 | 6  |             |             |     |
|              | -             | CV08-1250 | 11.5          | 115   | 50 | 12 | 6  |             |             |     |
| V11          | -             | CV11-1229 | 11.5          | 95    | 29 | 12 | 8  | SNV11       | M3.5x0.6x10 | K3T |
|              | -             | CV11-1242 | 11.5          | 110   | 42 | 12 | 8  |             |             |     |
|              | -             | CV11-1256 | 11.5          | 120   | 56 | 12 | 8  |             |             |     |
| V16          | -             | CV16-1240 | 11.0          | 130   | 40 | 12 | 11 | SNV16       | M5x0.8x12   | K4T |
|              | -             | CV16-1256 | 11            | 130   | 56 | 12 | 11 |             |             |     |
|              | -             | CV16-1280 | 11            | 150   | 80 | 12 | 11 |             |             |     |

## Mini-V Toolholders - Alloy Steel Shank





| Insert Style | Ordering Code |           | Dimensions mm |     |    |    |    | Spare Parts |             |      |
|--------------|---------------|-----------|---------------|-----|----|----|----|-------------|-------------|------|
|              | Sleeve        | Holder RH | A             | L   | L1 | D  | D1 | Screw       | Size        | Key  |
| V08          | -             | V08-1612  | 15.6          | 80  | 12 | 16 | 6  | SNV08       | M2.6x0.45x8 | K2T  |
| V11          | -             | V11-1612  | 15.6          | 80  | 12 | 16 | 8  | SNV11       | M3.5x0.6x10 | K3T  |
| V14          | -             | V14-1620  | 15.0          | 100 | 20 | 16 | 11 | SNV14       | M4x0.7x12   | KT15 |
| V16          | -             | V16-1622  | 15.0          | 100 | 22 | 16 | 11 | SNV16       | M5.0x0.8x12 | K4T  |

# Mini-V Groove Milling Technical Data

Recommended Grades, Cutting Speeds Vc [m/min], Feed f [mm/tooth]

| Material Group                    | Vargus No.                             | Material                                 | Hardness Brinell HB                | Vc [m/min]   | Peripheral Feed |           |
|-----------------------------------|--|--|------------------------------------|--------------|-----------------|-----------|
|                                   |  |  |                                    | VBX/VTX      | f [mm/tooth]    |           |
| <b>P</b><br>Steel                 | 1                                      | Unalloyed Steel                          | Low Carbon (C=0.1-0.25 %)          | 125          | 100-210         | 0.07-0.2  |
|                                   | 2                                      |  | Medium Carbon (C=0.25-0.55 %)      | 150          | 100-180         | 0.07-0.2  |
|                                   | 3                                      |  | High Carbon (C=0.55-0.85 %)        | 170          | 100-170         | 0.07-0.2  |
|                                   | 4                                      | Low Alloy Steel (alloying elements ≤5%)  | Non Hardened                       | 180          | 60-90           | 0.07-0.2  |
|                                   | 5                                      |  | Hardened                           | 275          | 80-150          | 0.07-0.2  |
|                                   | 6                                      |  | Hardened                           | 350          | 70-140          | 0.07-0.2  |
|                                   | 7                                      | High Alloy Steel (alloying elements >5%) | Annealed                           | 200          | 60-130          | 0.07-0.2  |
|                                   | 8                                      |  | Hardened                           | 325          | 70-110          | 0.07-0.2  |
|                                   | 9                                      | Cast Steel                               | Low Alloy (alloying elements <5%)  | 200          | 100-170         | 0.07-0.2  |
|                                   | 10                                     |  | High Alloy (alloying elements >5%) | 225          | 70-120          | 0.07-0.2  |
| <b>M</b><br>Stainless Steel       | 11                                     | Stainless Steel Ferritic                 | Non Hardened                       | 200          | 100-170         | 0.07-0.2  |
|                                   | 12                                     |  | Hardened                           | 330          | 100-170         | 0.05-0.15 |
|                                   | 13                                     | Stainless Steel Austenitic               | Austenitic                         | 180          | 70-140          | 0.07-0.2  |
|                                   | 14                                     |  | Super Austenitic                   | 200          | 70-140          | 0.07-0.2  |
|                                   | 15                                     | Stainless Steel Cast Ferritic            | Non Hardened                       | 200          | 70-140          | 0.1-0.2   |
|                                   | 16                                     |  | Hardened                           | 330          | 70-140          | 0.07-0.2  |
|                                   | 17                                     | Stainless Steel Cast Austenitic          | Austenitic                         | 200          | 70-120          | 0.07-0.2  |
|                                   | 18                                     |  | Hardened                           | 330          | 70-120          | 0.07-0.2  |
| <b>K</b><br>Cast Iron             | 28                                     | Malleable Cast Iron                      | Ferritic (short chips)             | 130          | 60-130          | 0.1-0.22  |
|                                   | 29                                     |  | Pearlitic (long chips)             | 230          | 60-120          | 0.07-0.2  |
|                                   | 30                                     | Grey Cast Iron                           | Low Tensile Strength               | 180          | 60-130          | 0.07-0.2  |
|                                   | 31                                     |  | High Tensile Strength              | 260          | 60-100          | 0.07-0.2  |
|                                   | 32                                     | Nodular Sg Iron                          | Ferritic                           | 160          | 60-125          | 0.07-0.2  |
|                                   | 33                                     |  | Pearlitic                          | 260          | 50-90           | 0.07-0.2  |
| <b>N(K)</b><br>Non-Ferrous Metals | 34                                     | Aluminium Alloys Wrought                 | Non Aging                          | 60           | 100-250         | 0.1-0.25  |
|                                   | 35                                     |  | Aged                               | 100          | 100-180         | 0.1-0.25  |
|                                   | 36                                     | Aluminium Alloys                         | Cast                               | 75           | 150-400         | 0.1-0.25  |
|                                   | 37                                     |  | Cast & Aged                        | 90           | 150-280         | 0.1-0.25  |
|                                   | 38                                     | Aluminium Alloys                         | Cast Si 13-22%                     | 130          | 80-150          | 0.1-0.25  |
|                                   | 39                                     | Copper and Copper Alloys                 | Brass                              | 90           | 120-210         | 0.1-0.25  |
|                                   | 40                                     |  | Bronze and Non Leaded Copper       | 100          | 120-210         | 0.07-0.22 |
|                                   | <b>S(M)</b><br>Heat Resistant Material | 23                                       | Titanium Alloys                    | Pure 99.5 Ti | 400Rm           | 70-140    |
| 24                                |  | A+Ss Alloys                              |                                    | 1050Rm       | 20-50           | 0.07-0.13 |

## Grades and Their Application

| Grade      | Application Type   | Sample  |
|------------|--|---|
| <b>VBX</b> | General use carbide grade for Mini-V inserts. TiCN coated.                     |  |
| <b>VTX</b> | TiAlN coated carbide grade. Ideal for Stainless Steel and high cutting speeds. |  |

# GM Slot



## For Small and Medium Bore Diameters

### GM Slot Ordering Code System

#### Inserts Ordering Code System

|   |                                     |  |                  |   |  |                |  |                 |
|---|-------------------------------------|--|------------------|---|--|----------------|--|-----------------|
| <b>7</b><br>1   | <b>V</b><br>2                       | <b>GS</b><br>3   | <b>1.21</b><br>4 | - | <b>1.50</b><br>5                                   | <b>GM</b><br>6 | <b>3</b><br>7                                    | <b>VBX</b><br>8 |
| <b>1-Insert Size</b><br>7 - I.C. 6.8 mm<br>9 - I.C. 8.5 mm<br>11 - I.C. 10.7 mm | <b>2-Insert Style</b><br>V - Style  | <b>3-Type of Application</b><br>GS - Square Grooving<br>GSR - Square Grooving with R<br>GR - Round Grooving<br>CH - Chamfering |                  |   | <b>4-Groove Standard Width (mm)</b><br>0.74 - 5.15 |                | <b>5-Groove Depth (mm)</b><br>1.5<br>2.5<br>3.25 |                 |
| <b>6 - System</b><br>GM - Groove Milling  | <b>7 - Cutting Edge Number</b><br>3 | <b>8 - Carbide Grade</b><br>VBX  |                  |   |  |                |  |                 |

#### HOLDERS Ordering Code System

|   |   |  |                                  |   |   |   |   |               |   |               |
|---|---|--|----------------------------------|---|---|---|---|---------------|---|---------------|
| <b>C</b><br>1   | <b>GM</b><br>2  | <b>9</b><br>3                          | <b>C</b><br>4                    | <b>13</b><br>5  | - | <b>45</b><br>6                              | - | <b>7</b><br>7 | - | <b>3</b><br>8 |
| <b>1 - Holder Type</b><br>C - Carbide Shank<br>None - Steel Shank | <b>2 - System</b><br>GM - Groove Milling  | <b>3 - Shank Dia. (mm)</b><br>9 - 25.4 |                                  | <b>4 - Shank Style</b><br>C - Cylindrical<br>W - Weldon |   | <b>5 - Max Cutting Dia. (mm)</b><br>13 - 22 |   |               |   |               |
| <b>6 - Tool Overhang (mm)</b><br>25<br>45                         | <b>7 - Insert Size</b><br>7 - I.C. 6.8 mm<br>9 - I.C. 8.5mm<br>11 - I.C. 10.7mm |  | <b>8 - Number of Flutes</b><br>3 |   |   |   |   |               |   |               |

## GM Slot - Square Grooving



### Square Grooving

| Insert Size | Groove Dimensions     |                        |        | Ordering Code | Dimensions mm          |      |      | Toolholder |
|-------------|-----------------------|------------------------|--------|---------------|------------------------|------|------|------------|
|             | Width of Circlip (mm) | W +0.03                | t1 max |               | RH                     | Ds   | T    |            |
| 7V          | 0.70                  | 0.74                   | 1.5    | 0.1           | 7VGS0.74-1.50GM3 ...   | 12.7 | 3.15 | -          |
|             | 0.80                  | 0.84                   |        |               | 7VGS0.84-1.50GM3 ...   |      |      |            |
|             | 0.90                  | 0.94                   |        |               | 7VGS0.94-1.50GM3 ...   |      |      |            |
|             | 1.10                  | 1.21                   |        |               | 7VGS1.21-1.50GM3 ...   |      |      |            |
|             | 1.30                  | 1.41                   |        |               | 7VGSR1.41-1.50GM3 ...  |      |      |            |
|             | -                     | 1.50                   |        |               | 7VGSR1.50-1.50GM3 ...  |      |      |            |
|             | -                     | 1.57                   |        |               | 7VGSR1.57-1.50GM3 ...  |      |      |            |
|             | 1.60                  | 1.71                   |        |               | 7VGSR1.71-1.50GM3 ...  |      |      |            |
|             | -                     | 2.00                   |        |               | 7VGSR2.00-1.50GM3 ...  |      |      |            |
|             | -                     | 2.39                   |        |               | 7VGSR2.39-1.50GM3 ...  |      |      |            |
| 9V          | -                     | 2.50                   | 2.5    | 0.2           | 7VGSR2.50-1.50GM3 ...  | 16.7 | 4.45 | -          |
|             | 1.10                  | 1.17                   |        |               | 9VGS1.17-2.50GM3 ...   |      |      |            |
|             | 1.30                  | 1.41                   |        |               | 9VGS1.41-2.50GM3 ...   |      |      |            |
|             | -                     | 1.50                   |        |               | 9VGSR1.50-2.50GM3 ...  |      |      |            |
|             | 1.50                  | 1.57                   |        |               | 9VGSR1.57-2.50GM3 ...  |      |      |            |
|             | 1.60                  | 1.71                   |        |               | 9VGSR1.71-2.50GM3 ...  |      |      |            |
|             | -                     | 2.00                   |        |               | 9VGSR2.00-2.50GM3 ...  |      |      |            |
|             | 2.3                   | 2.39                   |        |               | 9VGSR2.39-2.50GM3 ...  |      |      |            |
|             | -                     | 2.50                   |        |               | 9VGSR2.50-2.50GM3 ...  |      |      |            |
|             | -                     | 3.00                   |        |               | 9VGSR3.00-2.50GM3 ...  |      |      |            |
| 11V         | -                     | 3.18                   | 3.25   | 0.2           | 9VGSR3.18-2.50GM3 ...  | 21.7 | 5.75 | -          |
|             | 1.10                  | 1.17                   |        |               | 11VGS1.17-3.25GM3 ...  |      |      |            |
|             | -                     | 1.3                    |        |               | 11VGS1.30-3.25GM3 ...  |      |      |            |
|             | 1.30                  | 1.42                   |        |               | 11VGS1.42-3.25GM3 ...  |      |      |            |
|             | -                     | 1.50                   |        |               | 11VGSR1.50-3.25GM3 ... |      |      |            |
|             | 1.45                  | 1.55                   |        |               | 11VGSR1.55-3.25GM3 ... |      |      |            |
|             | -                     | 1.57                   |        |               | 11VGSR1.57-3.25GM3 ... |      |      |            |
|             | 1.60                  | 1.71                   |        |               | 11VGSR1.71-3.25GM3 ... |      |      |            |
|             | -                     | 2.00                   |        |               | 11VGSR2.00-3.25GM3 ... |      |      |            |
|             | 2.30                  | 2.39                   |        |               | 11VGSR2.39-3.25GM3 ... |      |      |            |
|             | -                     | 2.50                   |        |               | 11VGSR2.50-3.25GM3 ... |      |      |            |
|             | -                     | 3.00                   |        |               | 11VGSR3.00-3.25GM3 ... |      |      |            |
|             | 3.10                  | 3.18                   |        |               | 11VGSR3.18-3.25GM3 ... |      |      |            |
|             | -                     | 4.00                   |        |               | 11VGSR4.00-3.25GM3 ... |      |      |            |
| -           | 4.75                  | 11VGSR4.75-3.25GM3 ... |        |               |                        |      |      |            |
| 5.15        | 5.26                  | 11VGSR5.26-3.25GM3 ... |        |               |                        |      |      |            |

## GM Slot - Round Grooving



### Round Grooving

| Insert Size | Groove Dimensions |        |      | Ordering Code         | Dimensions mm |      |   | Toolholder   |
|-------------|-------------------|--------|------|-----------------------|---------------|------|---|--|
|             | W +0.03           | t1 max | r    |                       | RH            | Ds   | T |  |
| 7V          | 2.2               | 1.50   | 1.1  | 7VGR1.10-1.50GM3 ...  | 12.7          | 3.15 | - | CGMC 8C13-40-7-3<br>CCGMC 9C13-45-7-3<br>GMC 20W13-25-7-3      |
| 9V          | 2.50              | 2.5    | 1.25 | 9VGR1.10-2.50GM3 ...  | 16.7          | 4.45 | - | CGMC 7/16C17-45-9-3<br>CGMC 11.5C17-50-9-3<br>GMC 20W17-35-9-3 |
| 11V         | 2.00              |        | 1.0  | 11VGR1.00-3.25GM3 ... | 22.7          | 5.75 | - | CGMC 14C22-60-11-3<br>CGMC 15C22-65-11-3<br>GMC 25W22-45-11-3  |
|             | 2.20              | 3.25   | 1.1  | 11VGR1.10-3.25GM3 ... |               |      |   |  |
|             | 3.00              |        | 1.5  | 11VGR1.50-3.25GM3 ... |               |      |   |  |

## GM Slot - Chamfering

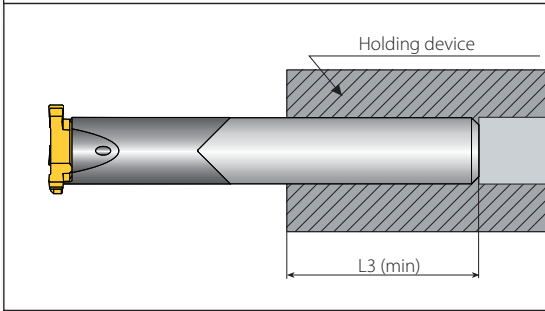
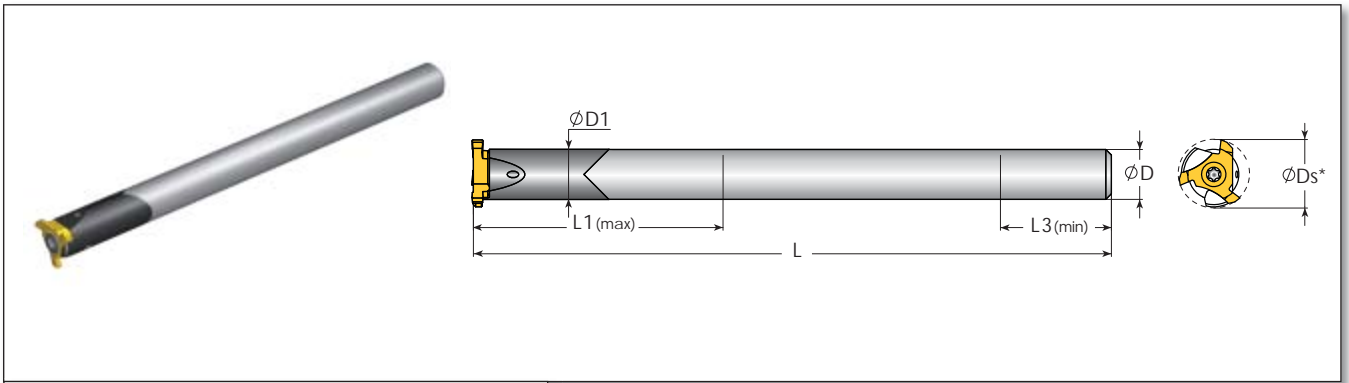


### Chamfering

| Insert Size | Groove Dimensions |        |   | Ordering Code         | Dimensions mm |      |      | Toolholder   |
|-------------|-------------------|--------|---|-----------------------|---------------|------|------|--|
|             | W +0.03           | t1 max | r |                       | RH            | Ds   | T    |  |
| 7V          | 1.2               | 1.50   | - | 7VCH1.20-1.50GM3 ...  | 12.7          | 3.15 | 1.6  | CGMC 8C13-40-7-3<br>CCGMC 9C13-45-7-3<br>GMC 20W13-25-7-3      |
| 9V          | 1.4               | 2.50   | - | 9VCH1.40-2.50GM3 ...  | 16.7          | 4.45 | 2.25 | CGMC 7/16C17-45-9-3<br>CGMC 11.5C17-50-9-3<br>GMC 20W17-35-9-3 |
| 11V         | 1.6               | 3.25   | - | 11VCH1.60-3.25GM3 ... | 22.7          | 5.75 | 2.9  | CGMC 14C22-60-11-3<br>CGMC 15C22-65-11-3<br>GMC 25W22-45-11-3  |



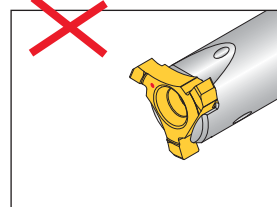
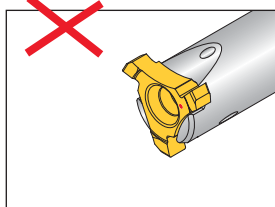
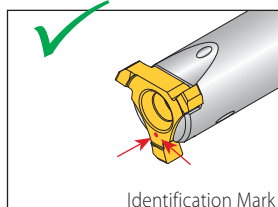
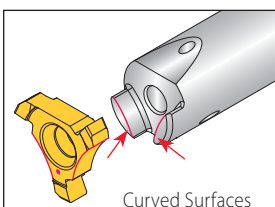
# GM Slot Toolholders - Carbide Cylindrical Shank for Groove Milling Application



| Insert Size | Ordering Code       | Dimensions mm |    |          |      |      | Spare Parts |             |               |                    |          |
|-------------|---------------------|---------------|----|----------|------|------|-------------|-------------|---------------|--------------------|----------|
|             |                     | L             | L1 | L3 (min) | D    | D1   | Screw       | Size        | Key/Blade     | Handle             | Size     |
| 7V          | CGMC 9C13-45-7-3    | 115           | 45 | 20       | 9    | 9    | SN2T8-M1    | M3.0x0.5x9  | K2T           | -                  | Torx T8  |
|             | CGMC 8C13-40-7-3    |               | 40 | 18       | 8    |      |             |             |               |                    |          |
|             | CGMC 5/16C13-40-7-3 |               |    |          | 8    |      |             |             |               |                    |          |
| 9V          | CGMC 11.5C17-50-9-3 | 125           | 50 | 25       | 11.5 | 11.5 | SN3T15-M2   | M4x0.7x13.5 | Blade T15-1/4 | Smart Handle 1/4X2 | Torx T15 |
|             | CGMC 12C17-50-9-3   |               | 50 | 26       | 12   |      |             |             |               |                    |          |
|             | CGMC 7/16C17-45-9-3 |               | 45 | 25       | 11   |      |             |             |               |                    |          |
| 11V         | CGMC 15C22-65-11-3  | 135           | 65 | 32       | 15   | 15   | SN4T20-M3   | M5x0.8x15.5 | Blade T20-1/4 | Smart Handle 1/4X2 | Torx T20 |
|             | CGMC 14C22-60-11-3  |               | 60 | 30       | 14   |      |             |             |               |                    |          |
|             | CGMC 5/8C22-60-11-3 |               | 65 | 34       | 16   |      |             |             |               |                    |          |

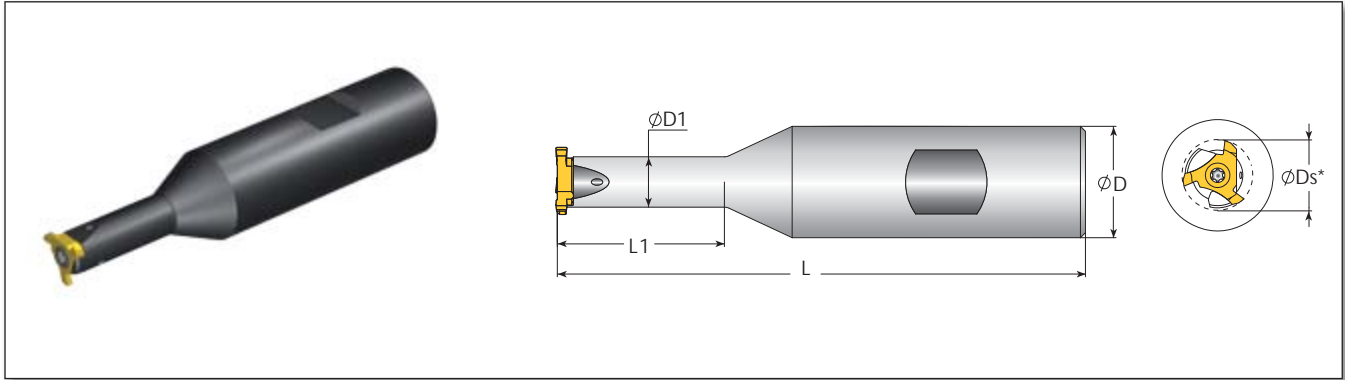
\*For Ds dimensions, see pages 13-14

For Correct Clamping:



Always mount insert with the identification mark between the two curved surfaces on the toolholder

## GM Slot Toolholders - Weldon Shank for Groove Milling Application



| Insert Size | Ordering Code        | Dimensions mm |      |          |      |      | Spare Parts |             |               |                    |          |
|-------------|----------------------|---------------|------|----------|------|------|-------------|-------------|---------------|--------------------|----------|
|             |                      | L             | L1   | L3 (min) | D    | D1   | Screw       | Size        | Key/Blade     | Handle             | Size     |
| 7V          | GMC 20W13-25-7-3     | 95            | 25   | -        | 20   | 9    | SN2T8-M1    | M3.0x0.5x9  | K2T           | -                  | Torx T8  |
|             | GMC 075W050-100-7-3  | 95.3          | 25.4 | -        | 19   | 9    |             |             |               |                    |          |
| 9V          | GMC 20W17-30-9-3     | 100           | 30   | -        | 20   | 11.5 | SN3T15-M2   | M4x0.7x13.5 | Blade T15-1/4 | Smart Handle 1/4X2 | Torx T15 |
|             | GMC 075W066-118-9-3  | 101.6         | 30   | -        | 19   | 11.5 |             |             |               |                    |          |
| 11V         | GMC 25W22-45-11-3    | 115           | 45   | -        | 25   | 15   | SN4T20-M3   | M5x0.8x15.5 | Blade T20-1/4 | Smart Handle 1/4X2 | Torx T20 |
|             | GMC 100W085-175-11-3 | 114.3         | 44.5 | -        | 25.4 | 15   |             |             |               |                    |          |

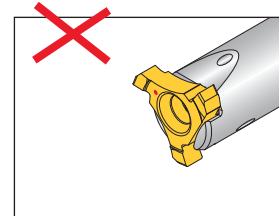
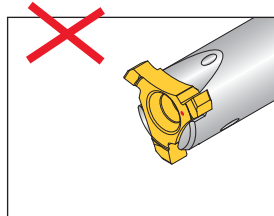
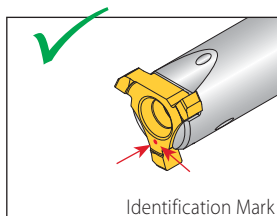
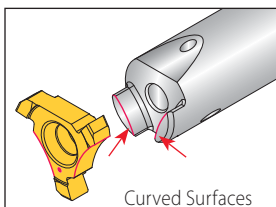
\*For Ds dimensions, see pages 13-14

For Correct Clamping:

9V



11V





Always mount insert with the identification mark between the two curved surfaces on the toolholder

# GM Slot Groove Milling Technical Data

Recommended Grades, Cutting Speeds Vc [m/min], Feed f [mm/tooth]

| Material Group                         | Vargus No.                   | Material                                 | Hardness Brinell HB                | Vc [m/min] | Peripheral Feed |           |
|--|------------------------------|--|------------------------------------|------------|-----------------|-----------|
|  |                              |  |                                    | VBX/VTX    | f [mm/tooth]    |           |
| <b>P</b><br>Steel                      | 1                            | Unalloyed Steel                          | Low Carbon (C=0.1-0.25 %)          | 125        | 80-160          | 0.07-0.3  |
|  | 2                            |  | Medium Carbon (C=0.25-0.55 %)      | 150        | 80-150          | 0.07-0.3  |
|  | 3                            |  | High Carbon (C=0.55-0.85 %)        | 170        | 80-150          | 0.07-0.3  |
|  | 4                            | Low Alloy Steel (alloying elements ≤5%)  | Non Hardened                       | 180        | 80-160          | 0.07-0.3  |
|  | 5                            |  | Hardened                           | 275        | 80-150          | 0.07-0.3  |
|  | 6                            |  | Hardened                           | 350        | 80-140          | 0.07-0.25 |
|  | 7                            | High Alloy Steel (alloying elements >5%) | Annealed                           | 200        | 60-100          | 0.07-0.3  |
|  | 8                            |  | Hardened                           | 325        | 50-80           | 0.07-0.25 |
|  | 9                            | Cast Steel                               | Low Alloy (alloying elements <5%)  | 200        | 80-160          | 0.07-0.25 |
|  | 10                           |  | High Alloy (alloying elements >5%) | 225        | 60-120          | 0.07-0.25 |
| <b>M</b><br>Stainless Steel            | 11                           | Stainless Steel Ferritic                 | Non Hardened                       | 200        | 70-130          | 0.07-0.3  |
|  | 12                           |  | Hardened                           | 330        | 60-110          | 0.04-0.25 |
|  | 13                           | Stainless Steel Austenitic               | Austenitic                         | 180        | 70-130          | 0.07-0.3  |
|  | 14                           |  | Super Austenitic                   | 200        | 60-120          | 0.07-0.25 |
|  | 15                           | Stainless Steel Cast Ferritic            | Non Hardened                       | 200        | 80-140          | 0.07-0.3  |
|  | 16                           |  | Hardened                           | 330        | 60-100          | 0.07-0.25 |
|  | 17                           | Stainless Steel Cast Austenitic          | Austenitic                         | 200        | 80-140          | 0.07-0.3  |
|  | 18                           |  | Hardened                           | 330        | 60-100          | 0.07-0.25 |
| <b>K</b><br>Cast Iron                  | 28                           | Malleable Cast Iron                      | Ferritic (short chips)             | 130        | 50-70           | 0.07-0.3  |
|  | 29                           |  | Pearlitic (long chips)             | 230        | 80-140          | 0.07-0.25 |
|  | 30                           | Grey Cast Iron                           | Low Tensile Strength               | 180        | 80-140          | 0.07-0.3  |
|  | 31                           |  | High Tensile Strength              | 260        | 60-110          | 0.07-0.25 |
|  | 32                           | Nodular Sg Iron                          | Ferritic                           | 160        | 60-100          | 0.07-0.3  |
| 33                                     | Pearlitic                    |  | 260                                | 60-100     | 0.07-0.3        |           |
| <b>N(K)</b><br>Non-Ferrous Metals      | 34                           | Aluminium Alloys Wrought                 | Non Aging                          | 60         | 80-300          | 0.07-0.3  |
|  | 35                           |  | Aged                               | 100        | 100-250         | 0.07-0.3  |
|  | 36                           | Aluminium Alloys                         | Cast                               | 75         | 100-200         | 0.07-0.3  |
|  | 37                           |  | Cast & Aged                        | 90         | 100-220         | 0.07-0.3  |
|  | 38                           | Aluminium Alloys                         | Cast Si 13-22%                     | 130        | 80-300          | 0.07-0.25 |
|  | 39                           | Copper and Copper Alloys                 | Brass                              | 90         | 80-300          | 0.07-0.3  |
| 40                                     | Bronze and Non Leaded Copper |  | 100                                | 100-200    | 0.07-0.25       |           |
| <b>S(M)</b><br>Heat Resistant Material | 23                           | Titanium Alloys                          | Pure 99.5 Ti                       | 400Rm      | 40-80           | 0.07-0.13 |
|  | 24                           |  | A+Ss Alloys                        | 1050Rm     | 20-50           | 0.07-0.13 |

## Grades and Their Application

| Grade      | Application Type   | Sample  |
|------------|--|---|
| <b>VBX</b> | TiCN coated carbide grade. Excellent grade for steels and general use. |  |
| <b>VTX</b> | TiAlN coated carbide grade. Ideal for Stainless Steels.                |  |



## For Medium Applications

### SGM Ordering Code System

#### Inserts

|   |   |    |     |   |   |       |   |   |      |     |
|---|---|----|-----|---|---|-------|---|---|------|-----|
| 4 | W | GM | 1.6 | C | - | D3770 | S | - | 1.38 | VKX |
| 1 | 2 | 3  | 4   | 5 |   | 6     | 7 |   | 8    | 9   |

|                        |
|------------------------|
| <b>1 - Insert Size</b> |
| 4 - IC1/2"             |

|                           |
|---------------------------|
| <b>2 - Insert Style</b>   |
| W - Vertical Wide Inserts |

|                     |
|---------------------|
| <b>3 - System</b>   |
| GM - Groove Milling |

|                              |
|------------------------------|
| <b>4 - Groove Std. Width</b> |
| 1.1 - 3.15                   |

|                          |
|--------------------------|
| <b>5 - Profile Shape</b> |
| C - With Chamfer         |

|  |
|--|
| <b>6 - Groove Standard</b>   |
| CIRC - Circlip<br>DIN471/472<br>DIN3770D<br>DIN3770S<br>BS1806<br>BS4518 |

|   |
|---|
| <b>7 - Groove Type</b>  |
| D - Dynamic<br>S - Static<br>DP - Dynamic pneumatic<br>DH - Dynamic hydraulic |

|                         |
|-------------------------|
| <b>8 - Groove Depth</b> |
| 0.3 - 3.8               |

|                          |
|--------------------------|
| <b>9 - Carbide Grade</b> |
| VKX                      |

#### Shell Groove Mill

|     |   |     |   |    |   |   |
|-----|---|-----|---|----|---|---|
| SGM | - | D48 | - | 25 | - | 4 |
| 1   |   | 2   |   | 3  |   | 4 |

|                            |
|----------------------------|
| <b>1 - System</b>          |
| SGM - Shell Groove Milling |

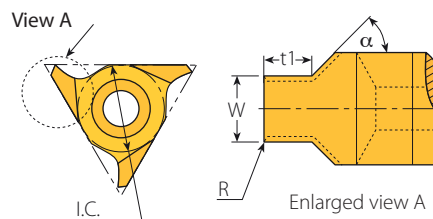
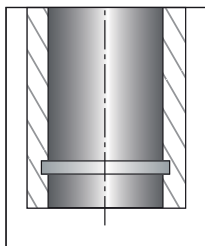
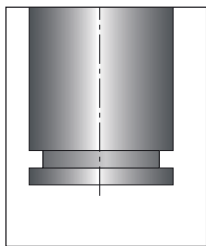
|                         |
|-------------------------|
| <b>2 - Cutting Dia.</b> |
| 48, 63, 80              |

|                            |
|----------------------------|
| <b>3 - Drive Hole Dia.</b> |
| 22, 25, 27                 |

|                        |
|------------------------|
| <b>4 - Insert Size</b> |
| 4 - IC1/2"             |

## SGM - Circlip Non Standard

External / Internal



Vertical SGM

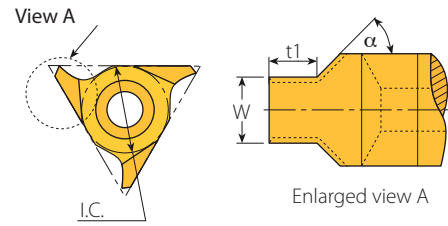
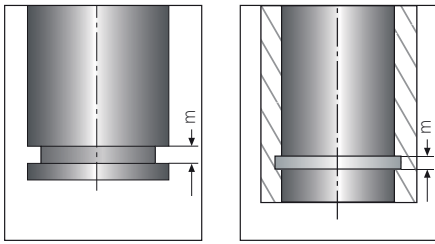
### Vertical SGM

| Insert Size            |      | Ordering Code          | Dimensions mm |     |     | $\alpha$ | Toolholder |
|------------------------|------|------------------------|---------------|-----|-----|----------|------------|
| IC                     | L mm |                        | W             | R   | t1  |          |            |
| 1/2"                   | 22   | 4WGM1.25C-CIRC-1.5...  | 1.25          | 0.2 | 1.3 | 45°      | SGM-D...-4 |
|                        |      | 4WGM1.35C-CIRC-1.5...  | 1.35          | 0.2 | 1.3 |          |            |
|                        |      | 4WGM1.45C-CIRC-1.5...  | 1.45          | 0.2 | 1.3 |          |            |
|                        |      | 4WGM1.50C-CIRC-1.5...  | 1.50          | 0.2 | 1.3 |          |            |
|                        |      | 4WGM1.65C-CIRC-2.0...  | 1.65          | 0.2 | 1.8 |          |            |
|                        |      | 4WGM1.75C-CIRC-2.0...  | 1.75          | 0.2 | 1.8 |          |            |
|                        |      | 4WGM1.85C-CIRC-2.50... | 1.85          | 0.2 | 2.3 |          |            |
|                        |      | 4WGM2.00C-CIRC-2.50... | 2.00          | 0.2 | 2.3 |          |            |
|                        |      | 4WGM2.20C-CIRC-3.50... | 2.20          | 0.2 | 3.3 |          |            |
|                        |      | 4WGM2.30C-CIRC-3.50... | 2.30          | 0.2 | 3.3 |          |            |
|                        |      | 4WGM2.50C-CIRC-3.50... | 2.50          | 0.3 | 3.3 |          |            |
|                        |      | 4WGM2.65C-CIRC-3.50... | 2.65          | 0.3 | 3.3 |          |            |
|                        |      | 4WGM2.70C-CIRC-3.50... | 2.70          | 0.3 | 3.3 |          |            |
|                        |      | 4WGM2.80C-CIRC-3.50... | 2.80          | 0.3 | 3.3 |          |            |
|                        |      | 4WGM3.00C-CIRC-3.50... | 3.00          | 0.3 | 3.3 |          |            |
|                        |      | 4WGM3.20C-CIRC-3.50... | 3.20          | 0.3 | 3.3 |          |            |
|                        |      | 4WGM3.30C-CIRC-3.50... | 3.30          | 0.3 | 3.3 |          |            |
|                        |      | 4WGM3.50C-CIRC-4.00... | 3.50          | 0.3 | 3.8 |          |            |
|                        |      | 4WGM3.70C-CIRC-4.00... | 3.70          | 0.3 | 3.8 |          |            |
|                        |      | 4WGM3.90C-CIRC-4.00... | 3.90          | 0.3 | 3.8 |          |            |
| 4WGM4.00C-CIRC-4.00... | 4.00 | 0.3                    | 3.8           |     |     |          |            |



## SGM - Circlip DIN 471/472

External / Internal



Vertical SGM

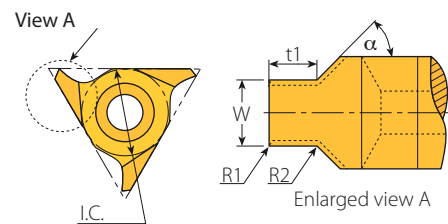
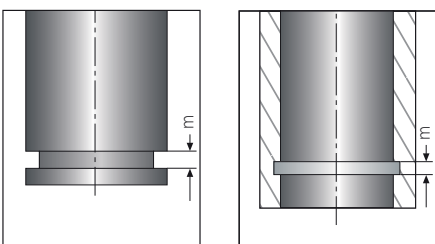
### SGM

| Insert Size |      | Ordering Code              | Groove Std. |      |     | α   | Toolholder |
|-------------|------|----------------------------|-------------|------|-----|-----|------------|
| IC          | L mm |                            | m(H13)      | W    | t1  |     |            |
| 1/2"        | 22   | 4WGM1.1C-D471/472-0.35...  | 1.10        | 1.19 | 0.3 | 45° | SGM-D...-4 |
|             |      | 4WGM1.1C-D471/472-0.40...  | 1.10        | 1.19 | 0.4 |     |            |
|             |      | 4WGM1.3C-D471/472-0.50...  | 1.30        | 1.39 | 0.4 |     |            |
|             |      | 4WGM1.3C-D471/472-0.55...  | 1.30        | 1.39 | 0.5 |     |            |
|             |      | 4WGM1.6C-D471/472-0.70...  | 1.60        | 1.69 | 0.6 |     |            |
|             |      | 4WGM1.6C-D471/472-0.85...  | 1.60        | 1.69 | 0.8 |     |            |
|             |      | 4WGM1.6C-D471/472-1.00...  | 1.60        | 1.69 | 0.9 |     |            |
|             |      | 4WGM1.85C-D471/472-1.25... | 1.85        | 1.94 | 1.1 |     |            |
|             |      | 4WGM1.85C-D471/472-1.00... | 1.85        | 1.94 | 0.9 |     |            |
|             |      | 4WGM2.15C-D471/472-1.50... | 2.15        | 2.24 | 1.4 |     |            |
|             |      | 4WGM2.65C-D471/472-1.50... | 2.65        | 2.74 | 1.4 |     |            |
|             |      | 4WGM2.65C-D471/472-1.75... | 2.65        | 2.74 | 1.6 |     |            |
|             |      | 4WGM3.15C-D471/472-1.75... | 3.15        | 3.24 | 1.6 |     |            |



## SGM - O Ring DIN 3770

External / Internal



Vertical SGM

### SGM

| Insert Size |      | Ordering Code | Groove Std.              |      |      |      |      | α    | Toolholder |            |
|-------------|------|---------------|--------------------------|------|------|------|------|------|------------|------------|
| IC          | L mm | St.Dy         | m(H13)                   | W    | t    | R1   | R2   |      |            |            |
| 1/2"        | 22   | St.           | 4WGM1.6C-D3770S-1.38...  | 1.60 | 1.97 | 1.38 | 0.25 | 0.10 | 75°        | SGM-D...-4 |
|             |      |               | 4WGM2.0C-D3770S-1.72...  | 2.00 | 2.37 | 1.72 | 0.25 | 0.10 |            |            |
|             |      |               | 4WGM2.5C-D3770S-2.15...  | 2.50 | 3.02 | 2.15 | 0.25 | 0.10 |            |            |
|             |      |               | 4WGM3.15C-D3770S-2.70... | 3.15 | 3.77 | 2.70 | 0.60 | 0.20 |            |            |
|             |      | Dy.           | 4WGM1.6C-D3770D-1.47...  | 1.60 | 1.97 | 1.47 | 0.25 | 0.10 |            |            |
|             |      |               | 4WGM2.0C-D3770D-1.83...  | 2.00 | 2.37 | 1.83 | 0.25 | 0.10 |            |            |

St. = Static

Dy. = Dynamic



## SGM - O Ring BS 1806, DIN3601, DIN 3771

External / Internal

View A  
I.C.  
Enlarged view A  
Vertical SGM

### SGM



| Insert Size |      | Ordering Code |                           | Groove Std. |      |      |     | α   | Toolholder |            |
|-------------|------|---------------|---------------------------|-------------|------|------|-----|-----|------------|------------|
| IC          | L mm | St.D          | m(H13)                    | W           | t    | R1   | R2  |     |            |            |
| 1/2"        | 22   | St.           | 4WGM1.80C-BS1806S-1.3...  | 1.80        | 2.37 | 1.30 | 0.6 | 0.2 | 75°        | SGM-D...-4 |
|             |      |               | 4WGM2.65C-BS1806S-2.0...  | 2.65        | 3.57 | 2.00 | 0.6 | 0.2 |            |            |
|             |      | Dy.           | 4WGM1.80C-BS1806D-1.57... | 1.80        | 2.37 | 1.55 | 0.6 | 0.2 |            |            |
|             |      |               | 4WGM2.65C-BS1806D-2.38... | 2.65        | 3.57 | 2.30 | 0.6 | 0.2 |            |            |

St. = Static  
Dy. = Dynamic

## SGM - BS 4518

External / Internal

View A  
I.C.  
Enlarged view A  
Vertical SGM

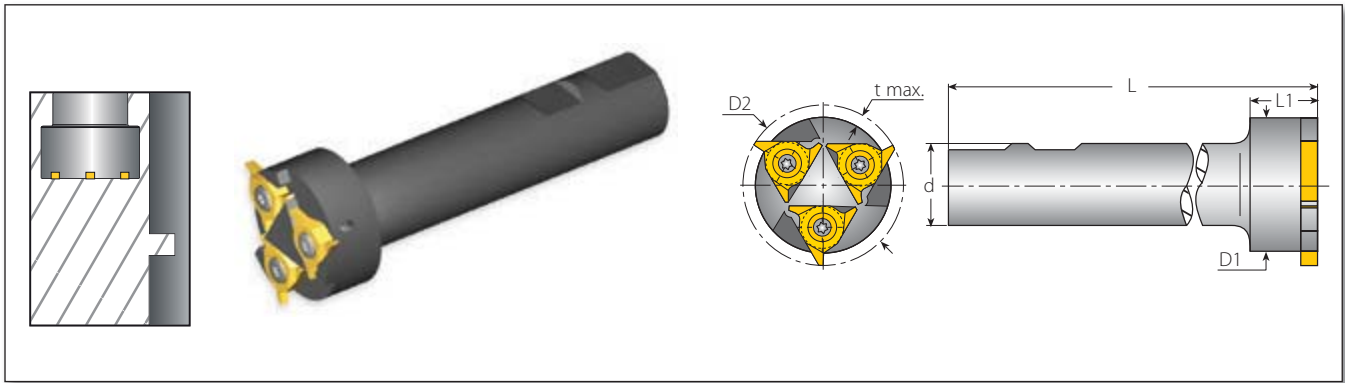
### SGM





| Insert Size               |      | Ordering Code |                           | Groove Std.               |      |      |      | α   | Toolholder |            |
|---------------------------|------|---------------|---------------------------|---------------------------|------|------|------|-----|------------|------------|
| IC                        | L mm | St.Dy         | m(H13)                    | W                         | t    | R1   | R2   |     |            |            |
| 1/2"                      | 22   | St.           | 4WGM1.6C-BS4518S-1.25...  | 1.60                      | 2.37 | 1.25 | 0.5  | 0.2 | 75°        | SGM-D...-4 |
|                           |      |               | 4WGM2.4C-BS4518S-1.95...  | 2.40                      | 3.17 | 1.95 | 0.5  | 0.2 |            |            |
|                           |      |               | 4WGM3.0C-BS4518S-2.51...  | 3.00                      | 3.77 | 2.51 | 1.0  | 0.2 |            |            |
|                           |      | DyP           | 4WGM2.4C-BS4518DP-2.20... | 2.40                      | 3.27 | 2.20 | 0.5  | 0.2 |            |            |
|                           |      |               | 4WGM3.0C-BS4518DP-2.77... | 3.00                      | 4.07 | 2.77 | 1.0  | 0.2 |            |            |
|                           |      |               | DyH                       | 4WGM2.4C-BS4518DH-2.09... | 2.40 | 3.27 | 2.09 | 0.5 |            |            |
| 4WGM3.0C-BS4518DH-2.60... | 3.00 | 4.07          |                           | 2.60                      | 1.0  | 0.2  |      |     |            |            |

St. = Static  
DyP = Dynamic pneumatic  
DyH = Dynamic hydraulic

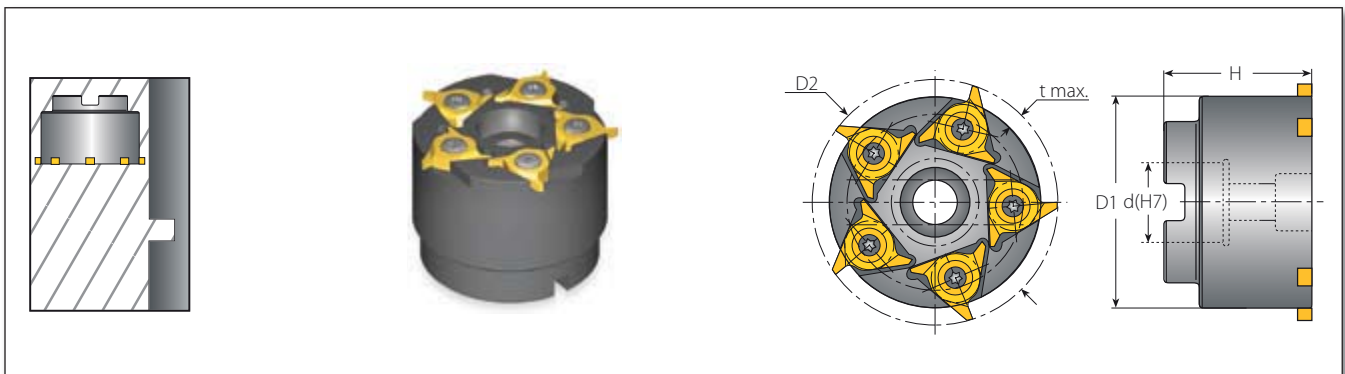
## SGM - Toolholders






### Multi Insert Holders (3)

| Insert Size | Ordering Code | Dimensions mm |       |     |    |    |    | Spare Parts   |   |
|-------------|---------------|---------------|-------|-----|----|----|----|---|---|
| IC          |               | D2            | t max | L   | L1 | d  | D1 |  |  |
| 1/2"        | SGM-D48-25-4  | 48            | 3.5   | 125 | 20 | 25 | 40 | SN4T-90   | HK4T  |

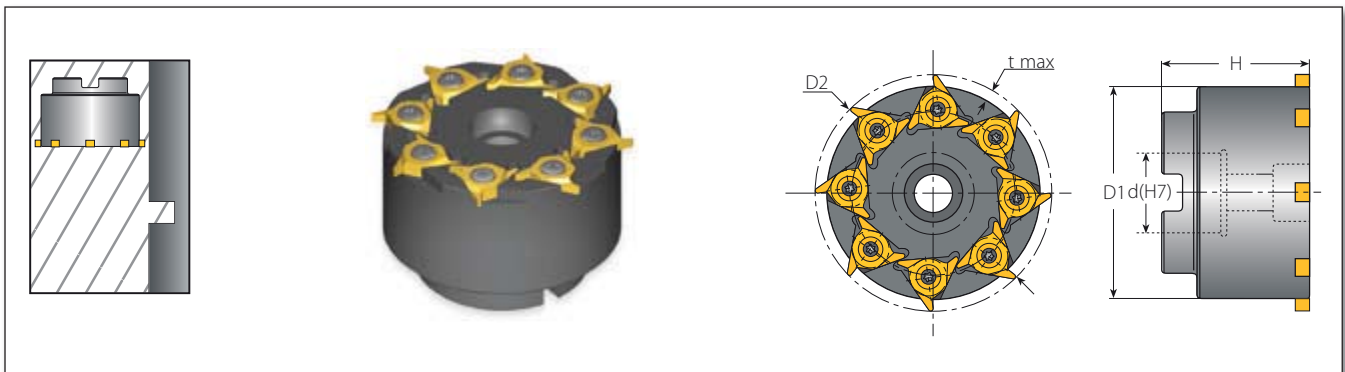
## SGM - Toolholders






### Multi Insert Holders (5)

| Insert Size | Ordering Code | Dimensions mm |       |       |      |    | Spare Parts  |   |   |
|-------------|---------------|---------------|-------|-------|------|----|--|---|---|
| IC          |               | D2            | t max | d(H7) | D1   | H  |  |  |  |
| 1/2"        | SGM-D63-22-4  | 63            | 3.5   | 22    | 54.0 | 41 | SN4T-90  | HK4T  | M10x1.5x35  |

## SGM - Toolholders



### Multi Insert Holders (8)


| Insert Size | Ordering Code | Dimensions mm |       |       |    |    | Spare Parts  |   |   |
|-------------|---------------|---------------|-------|-------|----|----|--|---|---|
| IC          |               | D2            | t max | d(H7) | D1 | H  |  |  |  |
| 1/2"        | SGM-D80-27-4  | 80            | 3.5   | 27    | 72 | 50 | SN4T-90  | HK4T  | M12x1.75x40   |

# SGM Groove Milling Technical Data

Recommended Grades, Cutting Speeds Vc [m/min], Feed f [mm/tooth]

| Material Group                         | Vargus No. | Material                                 | Hardness Brinell HB                | Vc [m/min] | Peripheral Feed |           |
|--|------------|--|------------------------------------|------------|-----------------|-----------|
|  |            |  |                                    | VKX        | f [mm/tooth]    |           |
| <b>P</b><br>Steel                      | 1          | Unalloyed Steel                          | Low Carbon (C=0.1-0.25%)           | 125        | 100-220         | 0.05-0.15 |
|  | 2          |  | Medium Carbon (C=0.25-0.55%)       | 150        | 100-170         | 0.03-0.12 |
|  | 3          |  | High Carbon (C=0.55-0.85%)         | 170        | 100-160         | 0.02-0.09 |
|  | 4          | Low Alloy Steel (alloying elements ≤5%)  | Non Hardened                       | 180        | 80-150          | 0.05-0.15 |
|  | 5          |  | Hardened                           | 275        | 70-140          | 0.03-0.12 |
|  | 6          |  | Hardened                           | 350        | 70-130          | 0.02-0.09 |
|  | 7          | High Alloy Steel (alloying elements >5%) | Annealed                           | 200        | 70-120          | 0.03-0.12 |
|  | 8          |  | Hardened                           | 325        | 70-100          | 0.03-0.09 |
|  | 9          | Cast Steel                               | Low Alloy (alloying elements <5%)  | 200        | 70-110          | 0.03-0.09 |
|  | 10         |  | High Alloy (alloying elements >5%) | 225        | 50-80           | 0.02-0.09 |
| <b>M</b><br>Stainless Steel            | 11         | Stainless Steel Ferritic                 | Non Hardened                       | 200        | 80-150          | 0.03-0.12 |
|  | 12         |  | Hardened                           | 330        | 80-150          | 0.03-0.09 |
|  | 13         | Stainless Steel Austenitic               | Austenitic                         | 180        | 60-120          | 0.03-0.12 |
|  | 14         |  | Super Austenitic                   | 200        | 60-120          | 0.03-0.09 |
|  | 15         | Stainless Steel Cast Ferritic            | Non Hardened                       | 200        | 60-120          | 0.02-0.09 |
|  | 16         |  | Hardened                           | 330        | 60-120          | 0.01-0.06 |
|  | 17         | Stainless Steel Cast Austenitic          | Austenitic                         | 200        | 50-100          | 0.03-0.09 |
|  | 18         |  | Hardened                           | 330        | 50-100          | 0.01-0.06 |
| <b>K</b><br>Cast Iron                  | 28         | Malleable Cast Iron                      | Ferritic (short chips)             | 130        | 60-110          | 0.02-0.09 |
|  | 29         |  | Pearlitic (long chips)             | 230        | 50-100          | 0.01-0.06 |
|  | 30         | Grey Cast Iron                           | Low Tensile Strength               | 180        | 60-110          | 0.03-0.12 |
|  | 31         |  | High Tensile Strength              | 260        | 50-80           | 0.03-0.09 |
|  | 32         | Nodular Sg Iron                          | Ferritic                           | 160        | 50-100          | 0.03-0.09 |
|  | 33         |  | Pearlitic                          | 260        | 40-70           | 0.03-0.09 |
| <b>N(K)</b><br>Non-Ferrous Metals      | 34         | Aluminium Alloys Wrought                 | Non Aging                          | 60         | 100-200         | 0.07-0.25 |
|  | 35         |  | Aged                               | 100        | 100-150         | 0.03-0.09 |
|  | 36         | Aluminium Alloys Cast                    | Cast                               | 75         | 100-180         | 0.07-0.25 |
|  | 37         |  | Cast & Aged                        | 90         | 60-120          | 0.05-0.15 |
|  | 38         | Aluminium Alloys Cast Si 13-22%          | 130                                | 100-150    | 0.05-0.15       |           |
|  | 39         | Copper and Copper Alloys                 | Brass                              | 90         | 60-120          | 0.05-0.15 |
|  | 40         |  | Bronze and Non Leaded Copper       | 100        | 50-100          | 0.3-0.15  |
| <b>S(M)</b><br>Heat Resistant Material | 19         | High Temperature Alloys                  | Annealed (iron based)              | 200        | 20-45           | 0.01-0.06 |
|  | 20         |  | Aged (iron based)                  | 280        | 20-30           | 0.01-0.06 |
|  | 21         |  | Annealed (nickel or cobalt based)  | 250        | 10-20           | 0.01-0.06 |
|  | 22         |  | Aged (nickel or cobalt based)      | 350        | 10-15           | 0.01-0.06 |
|  | 23         | Titanium Alloys                          | Pure 99.5 Ti                       | 400Rm      | 60-120          | 0.02-0.09 |
|  | 24         |  | A+B Alloys                         | 1050Rm     | 20-50           | 0.01-0.06 |
| <b>H(K)</b><br>Hardned Material        | 25         | Extra Hard Steel                         | Hardened & Tempered                | 45-50HRC   | 15-45           | 0.05-0.15 |
|  | 26         |  |                                    | 51-55HRC   | 15-40           | 0.05-0.15 |

## Grades and Their Application

| Grade | Application Type                        | Sample  |
|-------|---|---|
| VKX   | Excellent for general use<br>TiN coated |  |

$$N = \frac{1000 \times V_c}{\pi \times D} \quad V_c = \frac{N \times \pi \times D}{1000}$$

- N - Rotational Velocity [R.P.M.]
- V - Cutting Speed [m/min]
- D2 - Toolholder Cutting Dia. [mm]
- F1 - Tool Feed Rate at the Cutting Edge [m/min]
- z - No. of Cutting Edges
- f - Feed per Tooth per Rotation [mm/tooth]

