



## GROOVE MILLING INSERTS

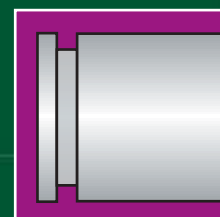
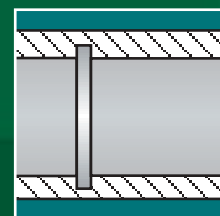
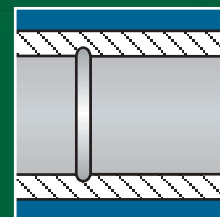
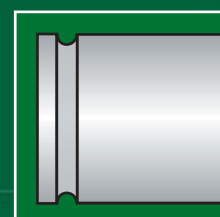
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## GROOVE MILLING TECHNICAL DATA

## Contents

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## VarDEX Ordering Code System

### Shell Mill Groove Inserts

|          |          |           |            |          |          |              |          |          |             |            |
|----------|----------|-----------|------------|----------|----------|--------------|----------|----------|-------------|------------|
| <b>4</b> | <b>W</b> | <b>GM</b> | <b>1.6</b> | <b>C</b> | <b>-</b> | <b>D3770</b> | <b>S</b> | <b>-</b> | <b>1.38</b> | <b>VKX</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 - Insert size</b><br>4 - IC1/2"         | <b>2 - Insert Style</b><br>W - Vertical Wide Inserts                                                   | <b>3 - System</b><br>GM - Groove Milling                                                              | <b>4 - Groove std. Width</b><br>1.1 - 3.15 |
| <b>5 - Profile Shape</b><br>C - With Chamfer | <b>6 - Groove Standard</b><br>CIRC - Circlip<br>DIN471/472<br>DIN3770D<br>DIN3770S<br>BS1806<br>BS4518 | <b>7 - Groove Type</b><br>D - Dynamic<br>S - Static<br>DP- Dynamic pneumatic<br>DH- Dynamic hydraulic | <b>8 - Groove Depth</b><br>0.3 - 3.8       |
|                                              |                                                                                                        |                                                                                                       | <b>9 - Carbide Grade</b><br>VKX            |

### Shell Mill Groove Holders

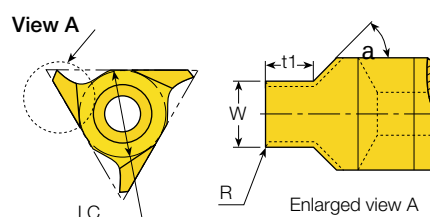
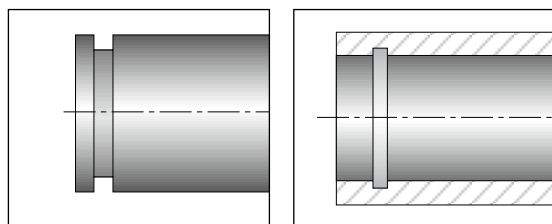
|            |          |            |          |           |          |          |
|------------|----------|------------|----------|-----------|----------|----------|
| <b>SGM</b> | <b>-</b> | <b>D48</b> | <b>-</b> | <b>25</b> | <b>-</b> | <b>4</b> |
| <b>1</b>   |          | <b>2</b>   |          | <b>3</b>  |          | <b>4</b> |

|                                                 |                                       |                                          |                                      |
|-------------------------------------------------|---------------------------------------|------------------------------------------|--------------------------------------|
| <b>1 - System</b><br>SGM - Shell Groove Milling | <b>2 - Cutting Dia.</b><br>48, 63, 80 | <b>3 - Drive Hole dia.</b><br>22, 25, 27 | <b>4 - Insert Size</b><br>4 - IC1/2" |
|-------------------------------------------------|---------------------------------------|------------------------------------------|--------------------------------------|



# Circlip Non Standard

## External / Internal



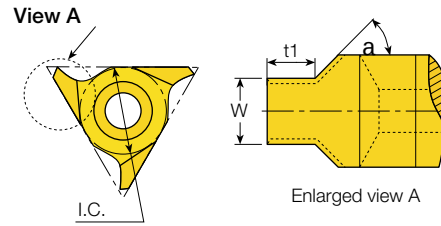
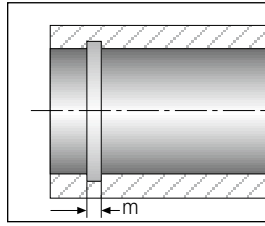
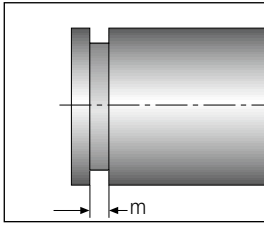
Vertical SGM

## Vertical SGM

| Insert Size                                                                         |      | Ordering Code | Dimensions mm          |      |     | a   | Toolholder        |
|-------------------------------------------------------------------------------------|------|---------------|------------------------|------|-----|-----|-------------------|
| IC                                                                                  | L mm |               | W                      | R    | t1  |     |                   |
|  | 1/2" | 22            | 4WGM1.25C-CIRC-1.5...  | 1.25 | 0.2 | 1.3 | 45°<br>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 |                   |

## Circlip DIN 471/472

### External / Internal



Vertical SGM

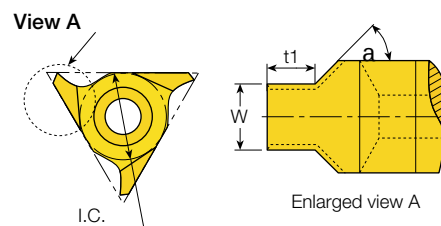
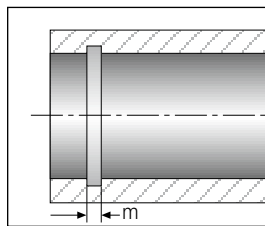
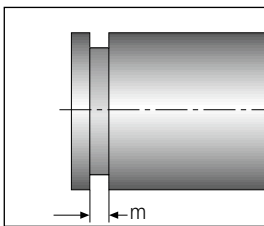
### Vertical SGM



| Insert Size |      | Ordering Code              | Groove Std. |      | a   |                |
|-------------|------|----------------------------|-------------|------|-----|----------------|
| IC          | L mm |                            | *m(H13)     | W    | t1  | Toolholder     |
| 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 |                |

## O Ring DIN 3770

### External / Internal



Vertical SGM

### Vertical SGM



| Insert Size |      |       | Ordering Code            | Groove Std. |      |      |      |      | a              |
|-------------|------|-------|--------------------------|-------------|------|------|------|------|----------------|
| IC          | L mm | St.Dy |                          | *m(H13)     | W    | t    | R1   | R2   | Toolholder     |
| 1/2"        | 22   | St.   | 4WGM1.6C-D3770S-1.38...  | 1.60        | 1.97 | 1.38 | 0.25 | 0.10 | 15° 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 |                |

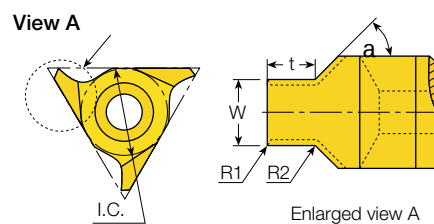
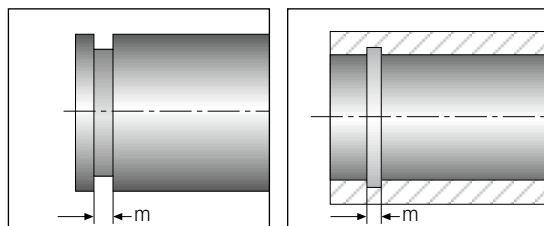
St. = Static

Dy. = Dynamic



# O Ring BS 1806, DIN3601, DIN 3771

## External / Internal



Vertical SGM

## Vertical SGM



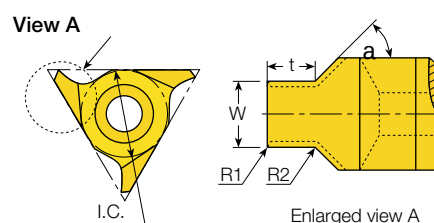
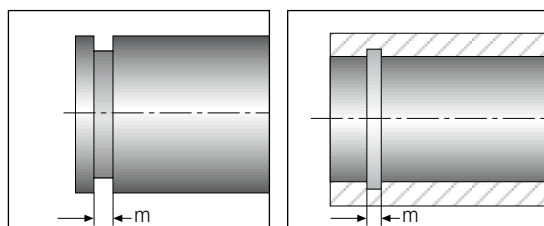
| Insert Size |      | Ordering Code |                           | Groove Std. |      | a    |     |     |                |
|-------------|------|---------------|---------------------------|-------------|------|------|-----|-----|----------------|
| IC          | L mm | St.Dy         |                           | *m(H13)     | W    | t    | R1  | R2  | Toolholder     |
| 1/2"        | 22   | St.           | 4WGM1.80C-BS1806S-1.3...  | 1.80        | 2.37 | 1.30 | 0.2 | 0.6 | 15° SGM-D...-4 |
|             |      |               | 4WGM2.65C-BS1806S-2.0...  | 2.65        | 3.57 | 2.00 | 0.2 | 0.6 |                |
|             |      | Dy.           | 4WGM1.80C-BS1806D-1.57... | 1.80        | 2.37 | 1.55 | 0.2 | 0.6 |                |
|             |      |               | 4WGM2.65C-BS1806D-2.38... | 2.65        | 3.57 | 2.30 | 0.2 | 0.6 |                |

St. = Static

Dy. = Dynamic

# BS 4518

## External / Internal



Vertical SGM

## Vertical SGM

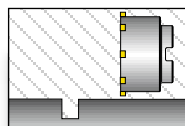


| Insert Size |      | Ordering Code |                           | Groove Std. |      | a    |     |     |                |
|-------------|------|---------------|---------------------------|-------------|------|------|-----|-----|----------------|
| IC          | L mm | St.Dy         |                           | *m(H13)     | W    | t    | R1  | R2  | Toolholder     |
| 1/2"        | 22   | St.           | 4WGM1.6C-BS4518S-1.25...  | 1.60        | 2.37 | 1.25 | 0.5 | 0.2 | 15° 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 | 0.2 |                |
|             |      |               | 4WGM3.0C-BS4518DH-2.60... | 3.00        | 4.07 | 2.60 | 1.0 | 0.2 |                |
|             |      |               |                           |             |      |      |     |     |                |

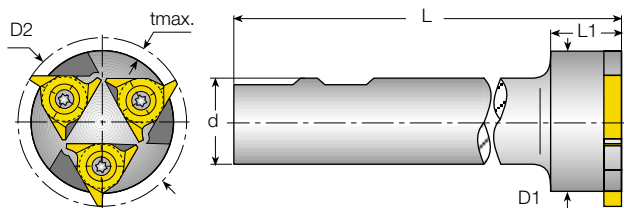
St. = Static

DyP = Dynamic pneumatic

DyH = Dynamic hydraulic

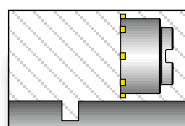


## Toolholders

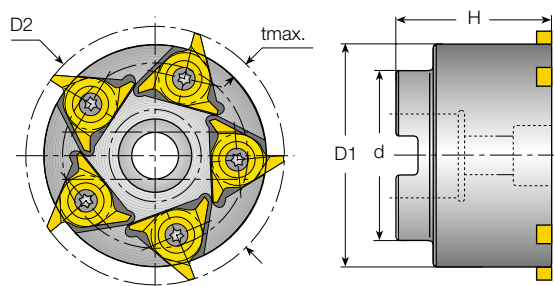


### Multi Insert Holders (3)

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

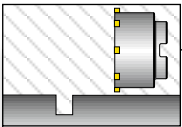


## Toolholders

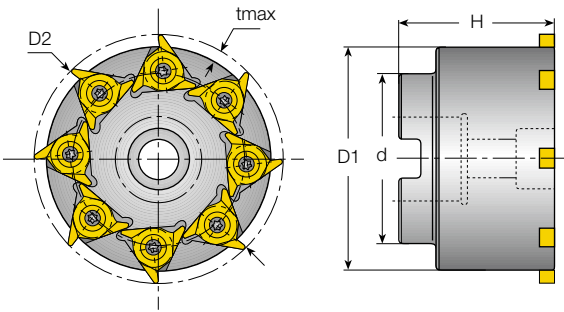


### Multi Insert Holders (5)

| Insert Size |              | Ordering Code |       | Dimensions mm |       |    | Spare Parts  |          |              |
|-------------|--------------|---------------|-------|---------------|-------|----|--------------|----------|--------------|
| IC          |              | D2            | t max | d             | D1    | H  | Insert Screw | Torx Key | Holder Screw |
| 1/2"        | SGM-D63-22-4 | 63            | 3.5   | 45            | 59.51 | 41 | SN4T-90      | HK4T     | M10x35       |



# Toolholders



## Multi Insert Holders (8)

|             |               |               |       |    |    |    | Spare Parts                                                                        |                                                                                     |                                                                                     |
|-------------|---------------|---------------|-------|----|----|----|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| Insert Size | Ordering Code | Dimensions mm |       |    |    |    |  |  |  |
| IC          |               | D2            | t max | d  | D1 | H  | Insert Screw                                                                       | Torx Key                                                                            | Holder Screw                                                                        |
| 1/2"        | SGM-D80-27-4  | 80            | 3.5   | 55 | 72 | 50 | SN4T-90                                                                            | HK4T                                                                                | M12x40                                                                              |

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

| Material |                                                  |                                       | Hardness<br>Brinell<br>HB | $V_c$ [m/min] | Feed $f$ [mm/tooth] |
|----------|--------------------------------------------------|---------------------------------------|---------------------------|---------------|---------------------|
|          |                                                  |                                       |                           | Coated        |                     |
|          |                                                  |                                       |                           | VKX           |                     |
| <b>P</b> | Unalloyed steel                                  | Low carbon (C=0.1-0.25 %)             | 125                       | 100-210       | 0.05-0.1            |
|          |                                                  | Medium carbon (C=0.25-0.55 %)         | 150                       | 100-170       | 0.03-0.07           |
|          |                                                  | High carbon (C=0.55-0.85 %)           | 170                       | 100-160       | 0.02-0.05           |
|          | Low alloy steel<br>(alloying elements $\leq$ 5%) | Non hardened                          | 180                       | 80-150        | 0.05-0.09           |
|          |                                                  | Hardened                              | 275                       | 70-140        | 0.03-0.07           |
|          |                                                  | Hardened                              | 350                       | 70-130        | 0.02-0.05           |
|          | High alloy steel<br>(alloying elements $>$ 5%)   | Annealed                              | 200                       | 70-120        | 0.03-0.07           |
|          |                                                  | Hardened                              | 325                       | 70-100        | 0.03-0.05           |
|          | Cast steel                                       | Low alloy (alloying elements $<$ 5%)  | 200                       | 70-110        | 0.03-0.07           |
|          |                                                  | High alloy (alloying elements $>$ 5%) | 225                       | 50-80         | 0.02-0.05           |
| <b>M</b> | Stainless steel<br>Ferritic                      | Non hardened                          | 200                       | 80-150        | 0.03-0.07           |
|          |                                                  | Hardened                              | 330                       | 80-150        | 0.03-0.05           |
|          | Stainless steel<br>Austenitic                    | Austenitic                            | 180                       | 60-120        | 0.03-0.07           |
|          |                                                  | Super austenitic                      | 200                       | 60-120        | 0.03-0.05           |
|          | Stainless steel<br>Cast ferritic                 | Non hardened                          | 200                       | 60-120        | 0.02-0.05           |
|          |                                                  | Hardened                              | 330                       | 60-120        | 0.01-0.03           |
|          | Stainless steel<br>Cast austenitic               | Austenitic                            | 200                       | 50-100        | 0.03-0.05           |
|          |                                                  | Hardened                              | 330                       | 50-100        | 0.01-0.03           |
|          | High temperature<br>alloys                       | Annealed (Iron based)                 | 200                       | 20-45         | 0.01-0.03           |
|          |                                                  | Aged (Iron based)                     | 280                       | 20-30         | 0.01-0.03           |
|          |                                                  | Annealed (Nickel or Cobalt based)     | 250                       | 10-20         | 0.01-0.03           |
|          |                                                  | Aged (Nickel or Cobalt based)         | 350                       | 10-15         | 0.01-0.03           |
|          | Titanium alloys                                  | Pure 99.5 Ti                          | 400Rm                     | 60-120        | 0.02-0.05           |
|          |                                                  | a+b alloys                            | 1050Rm                    | 20-50         | 0.01-0.03           |
| <b>K</b> | Extra hard steel                                 | Hardened & tempered                   | 55HRc                     | 20-45         | 0.005-0.01          |
|          |                                                  |                                       |                           |               |                     |
|          | Malleable<br>cast iron                           | Ferritic (short chips)                | 130                       | 60-110        | 0.02-0.05           |
|          |                                                  | Pearlitic (long chips)                | 230                       | 50-100        | 0.01-0.03           |
|          | Grey cast iron                                   | Low tensile strength                  | 180                       | 60-110        | 0.03-0.07           |
|          |                                                  | High tensile strength                 | 260                       | 50-80         | 0.03-0.05           |
|          | Nodular SG iron                                  | Ferritic                              | 160                       | 50-100        | 0.03-0.05           |
|          |                                                  | Pearlitic                             | 260                       | 40-70         | 0.03-0.05           |
|          | Aluminium alloys<br>Wrought                      | non aging                             | 60                        | 100-200       | 0.07-0.15           |
|          |                                                  | Aged                                  | 100                       | 100-150       | 0.03-0.05           |
|          | Aluminium alloys                                 | Cast                                  | 75                        | 100-180       | 0.07-0.15           |
|          |                                                  | Cast & aged                           | 90                        | 60-120        | 0.05-0.1            |
|          | Aluminium alloys                                 | Cast Si 13-22%                        | 130                       | 100-150       | 0.05-0.1            |
|          | Copper and<br>copper alloys                      | Brass                                 | 90                        | 60-120        | 0.05-0.1            |
|          |                                                  | Bronze and non leaded copper          | 100                       | 50-100        | 0.03-0.08           |

\* Peripheral feed

## Grades and their Application

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

$$N = \frac{1000 \times V_c}{p \times D}$$

$$V_c = \frac{N \times p \times D}{1000}$$

$N$  - Rotational Velocity [R.P.M.]

$V$  - Cutting Speed [m/min]

$D_2$  - Toolholder Cutting Dia. [mm]

$F_1$  - Tool Feed Rate at the Cutting Egde [mm/min]

$z$  - No. of Cutting Edges

$f$  - Feed per Tooth per Rotation [mm/rev]

