

Profile milling

Inserts

Face milling cutters

Square shoulder cutters

Slot cutters

Porcupine cutters

Specific applications and Sets

Profile milling



Profile milling

| | |
|-----------------------|------|
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| Aluminium die cutting | G.30 |

Inserts

Face milling cutters

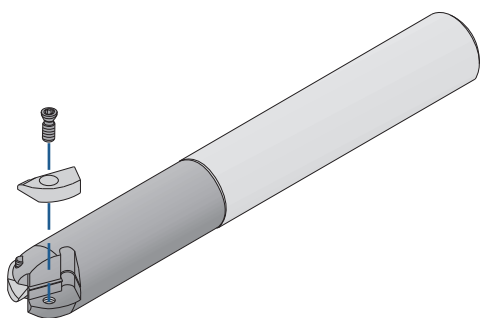
Square shoulder cutters

Slot cutters

Porcupine cutters

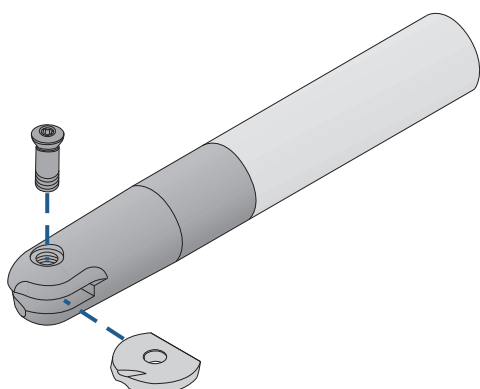
Specific applications and Sets

Profile milling



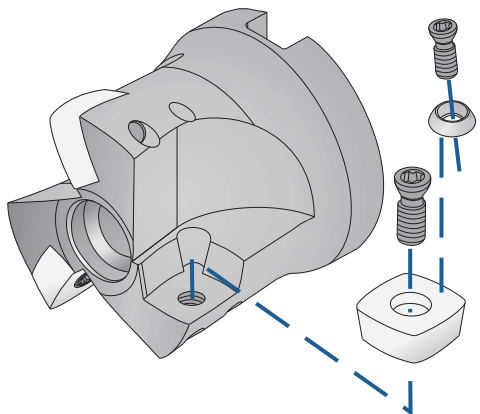
Screw clamping

Since the advent of the Torx screw it has been possible to hold with complete safety positive inserts with center hole. Our range covers all the screw clamping permutations.



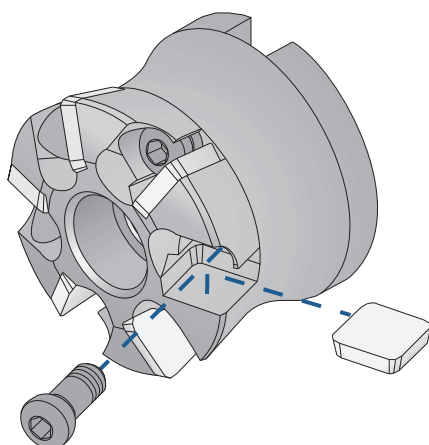
Center screw clamping

Grinded high accuracy center screws ensures that the insert is firmly fixed. This clamping system is only used for finishing applications.



Double clamping



Heavy duty work require good fixation, for this purpose we have as designed our double clamping system, one of the safest available.



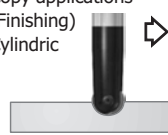
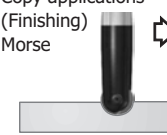
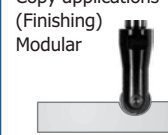

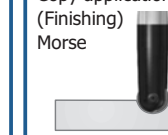
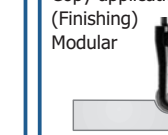
Wedge screw

This easy and clean clamping system has been designed for the high feed cutters with flat inserts. The wedge screw clamping system offers good chip evacuation and easy use.



Roughing ball nose

| | | | | | |
|--|--|--|--|--|--|
| <p>3540.0¹ Roughing (Cylindric)</p>  <p>Page G.04 IN.. 25 IN.. 32</p> | <p>3540.3⁴ Roughing (Morse)</p>  <p>Page G.05 IN.. 32 IN.. 50</p> | | | | |
|--|--|--|--|--|--|




Finishing ball nose

| | | | | | |
|---|---|--|---|---|--|
| <p>85_0 Copy applications (Finishing) Cylindric</p>  <p>Page G.08 WPR 10 WPR 32</p> | <p>85_3 Copy applications (Finishing) Morse</p>  <p>Page G.09 WPR 20 WPR 32</p> | <p>85_06 Copy applications (Finishing) Modular</p>  <p>Page G.10 WPR 10 WPR 25</p> | <p>88_0 Copy applications (Finishing) Cylindric</p>  <p>Page G.11 RPR 10 RPR 32</p> | <p>88_3 Copy applications (Finishing) Morse</p>  <p>Page G.12 RPR 20 RPR 32</p> | <p>88_06 Copy applications (Finishing) Modular</p>  <p>Page G.13 RPR 10 RPR 25</p> |
|---|---|--|---|---|--|





Toroidal cutters

| | | | | | |
|---|---|--|--|--|--|
| <p>89_01 Back draft cutter Cylindric</p>  <p>Page G.14 MTK 12 MTK ... MTK 25</p> | <p>89_06 Back draft cutter Modular</p>  <p>Page G.15 MTK 10 MTK ... MTK 25</p> | | | | |
|---|---|--|--|--|--|



High feed

| | | | | | |
|--|--|--|--|--|--|
| <p>1635.00 High feed</p>  <p>Page G.18 XDKW 0904..</p> | <p>1645.90 High feed</p>  <p>Page G.19 XDKW 1205..</p> | <p>1440.92 High feed</p>  <p>Page G.20 SP.. 1203..</p> | | | |
|--|--|--|--|--|--|

Round Inserts

| | | | | | |
|---|--|---|---|--|--|
| <p>55_5 Round milling</p>  <p>Page G.24 RDHW 0702.. RDHW 1604..</p> | <p>55_5.06 Round milling</p>  <p>Page G.25 RDHW 0702.. RDHW 1604..</p> | <p>55⁴5.90 Round milling</p>  <p>Page G.26 RD.. 12T3M0 RD.. 1604M0</p> | <p>5549.90 Round milling</p>  <p>Page G.27 RPM.. 1204..</p> | | |
|---|--|---|---|--|--|

Aluminium die cutting

| | | | | | |
|--|--|--|--|--|--|
| <p>0344.06 General application</p>  <p>Page G.30 VC.. 1103.. VC.. 2205..</p> | <p>0344.90 General application</p>  <p>Page G.31 VC.. 2205..</p> | | | | |
|--|--|--|--|--|--|

Inserts

Face milling cutters

Square shoulder cutters

Slot cutters

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Specific applications and Sets

Profile milling

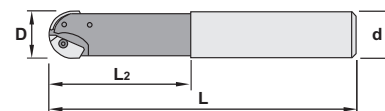
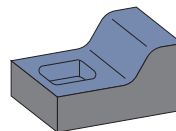
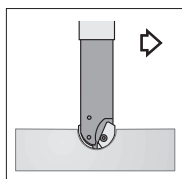


Characteristics:

Indexable ball nose roughing cutter equipped with positive insert that provides low cutting forces and reduced vibration. Its accurate pocket ensures that the insert is firmly fixed. The insert is fixed by Torx screw that allow a good chip evacuation and easy use. Milling cutter equipped with cylindric shank.

Applications:

Ball end mill roughing applications for tool and die. This indexable ball nose cutter works well on steels, hardened steels, stainless steels and casts.



3540.01

| Ref. | | | D | L | L2 | d | Insert size | |
|-------------|---|----|-----|----|----|---------|-------------|--|
| 3540.00.025 | 2 | 25 | 115 | 57 | 25 | IN.. 25 | 0,400 | |
| 3540.00.032 | 2 | 32 | 115 | 57 | 32 | IN.. 32 | 0,500 | |
| 3540.01.025 | 2 | 25 | 150 | 76 | 25 | IN.. 25 | 0,650 | |
| 3540.01.032 | 2 | 32 | 150 | 76 | 32 | IN.. 32 | 0,850 | |



| Ref. | | | |
|-------------|------|------|--|
| 3540.00.025 | 1235 | 5615 | |
| 3540.00.032 | 1550 | 5620 | |
| 3540.01.025 | 1235 | 5615 | |
| 3540.01.032 | 1550 | 5620 | |

| Ref. | IN.. | l | s | d | Positive ball nose insert. |
|---------|---------|-----|------|------|----------------------------|
| | IN.. 25 | - | 4,5 | 12,5 | |
| IN.. 32 | - | 5,6 | 16,0 | | |

| INT | INW | | | | |
|-----|-----|--|--|--|--|
| | | | | | |

For more information see page: A.13



Characteristics:

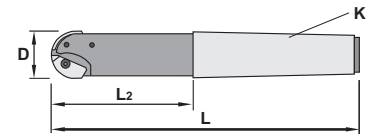
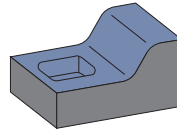
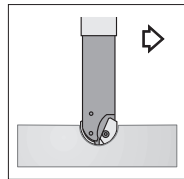
Indexable ball nose roughing cutter equipped with positive insert that provides low cutting forces and reduced vibration. Its accurate pocket ensures that the insert is firmly fixed.

The insert is fixed by Torx screw that allow a good chip evacuation and easy use.

Milling cutter equipped with Morse shank.

Applications:

Ball end mill roughing applications for tool and die. This indexable ball nose cutter works well on steels, hardened steels, stainless steels and casts.

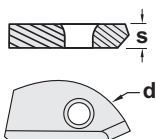


3540.34⁴₅

| Ref. | | D | L | L2 | K | Insert size | |
|-------------|---|----|-----|-----|---|-------------|-------|
| 3540.34.032 | 2 | 32 | 228 | 119 | 4 | IN.. 32 | 1,150 |
| 3540.35.040 | 2 | 40 | 231 | 95 | 5 | IN.. 40 | 2,120 |
| 3540.35.050 | 2 | 50 | 231 | 95 | 5 | IN.. 50 | 2,850 |

| Ref. | | |
|-------------|------|------|
| 3540.34.032 | 1550 | 5620 |
| 3540.35.040 | 1250 | 5620 |
| 3540.35.050 | 1890 | 5625 |

| Ref. | IN.. | | | Positive ball nose insert. |
|---------|------|-----|------|-------------------------------------|
| | l | s | d | |
| IN.. 32 | - | 5,6 | 16,0 | For more information see page: A.13 |
| IN.. 40 | - | 5,6 | 20,0 | |
| IN.. 50 | - | 7,9 | 25,0 | |
| | INT | INW | | |
| | | | | |



Inserts

Face milling cutters

Square shoulder cutters

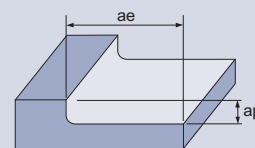
Slot cutters

Porcupine cutters

Specific applications and Sets

Profile milling

Recommended cutting conditions



Side Milling

| Material | m/min Actual Maximum Cutting Speed | mm/tooth Feed rate | Ø20 | | Ø25 | | Ø32 | | Ø40 | |
|--|------------------------------------|-------------------------------|-------------------|--------|-------------------|--------|-------------------|--------|-------------------|--------|
| | | | min ⁻¹ | mm/min | min ⁻¹ | mm/min | min ⁻¹ | mm/min | min ⁻¹ | mm/min |
| Carbon Steels (200 HB) | 150-250 | 0,15-0,6 | 3500 | 4200 | 2800 | 3360 | 2330 | 2800 | 1430 | 1720 |
| | | Vc=220m/min ap<=1,0mm ae=0,3D | | | | | | | | |
| | | 0,1-0,3 | 3500 | 650 | 2800 | 880 | 2330 | 720 | 1430 | 540 |
| | | Vc=220m/min ap=0,5mm ae=0,3D | | | | | | | | |
| Alloy Steels (200-250 HB) | 120-200 | 0,15-0,6 | 3180 | 3820 | 2550 | 3060 | 2120 | 2550 | 1270 | 1530 |
| | | Vc=200m/min ap<=1,0mm ae=0,3D | | | | | | | | |
| | | 0,08-0,3 | 3180 | 540 | 2550 | 660 | 2120 | 530 | 1270 | 410 |
| | | Vc=200m/min ap=0,5mm ae=0,3D | | | | | | | | |
| Alloy Steels (25-35 HRC) | 60-120 | 0,08-0,6 | 2070 | 2500 | 1660 | 2000 | 1380 | 1650 | 870 | 1050 |
| | | Vc=130m/min ap<=1,0mm ae=0,3D | | | | | | | | |
| | | 0,05-0,3 | 2070 | 440 | 1660 | 540 | 1380 | 460 | 870 | 330 |
| | | Vc=130m/min ap=0,5mm ae=0,3D | | | | | | | | |
| Alloy Steels Pre-Harden Steels (40-45 HRC) | 50-100 | 0,07-0,6 | 1110 | 1330 | 890 | 1070 | 740 | 900 | 560 | 670 |
| | | Vc=70m/min ap<=1,0mm ae=0,3D | | | | | | | | |
| | | 0,05-0,3 | 1110 | 150 | 890 | 200 | 740 | 200 | 560 | 100 |
| | | Vc=70m/min ap=0,5mm ae=0,3D | | | | | | | | |
| Cast Iron (150HB) | 120-240 | 0,15-1,2 | 3500 | 4200 | 2800 | 3360 | 2230 | 2800 | 1430 | 1720 |
| | | Vc=220m/min ap<=1,0mm ae=0,3D | | | | | | | | |
| | | 0,1-0,3 | 3500 | 650 | 2800 | 900 | 2230 | 900 | 1430 | 540 |
| | | Vc=220m/min ap=0,5mm ae=0,3D | | | | | | | | |

Note

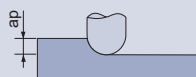
- The cutting data in the table show conditions for VB30=0,3mm (flank wear 30min tool-life).
Overhang is the length below the chuck (l b)

- RPM for high-speed machines is calculated using the following formula: $Revolution\ Speed = \frac{500 \times Actual\ Maximum\ Cutting\ Speed}{\pi \times \sqrt{2 \times R \times ap \times ap^2}}$

- Actual Maximum Cutting Speed:

ap=0,5mm and 1mm

Maximum Cutting Speed at boundary of contact part with work material under the above recommended cutting condition



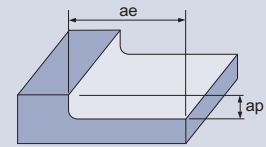
- Cutting conditions on high-speed machine tools are recommended for contouring path milling.

- 3-5° slant milling is recommended for pocketing using a 70% feed rate, please reduce slant angle below 3° for harder materials. Please use machine guards when cutting steel due to flying chips.

Deep Side Milling

| Material | m/min Cutting Speed | mm/tooth Feed rate | Ø20 | | Ø25 | | Ø30 | | Ø40 | |
|---|---------------------|--------------------|-------------------|--------|-------------------|--------|-------------------|--------|-------------------|--------|
| | | | min ⁻¹ | mm/min | min ⁻¹ | mm/min | min ⁻¹ | mm/min | min ⁻¹ | mm/min |
| Carbon Steels (200 HB) | 120-200 | 0,08-0,2 | 2700 | 420 | 2160 | 530 | 1800 | 440 | 1110 | 420 |
| | | | Vc=170m/min | | | | Vc=140m/min | | | |
| | | | ap=1,2D ae=0,1D | | | | | | | |
| Alloy Steels (200-250 HB) | 120-200 | 0,06-0,2 | 2550 | 320 | 2040 | 430 | 1700 | 350 | 1270 | 410 |
| | | | Vc=160m/min | | | | Vc=130m/min | | | |
| | | | ap=1,2D ae=0,1D | | | | | | | |
| Alloy Steels (25-35 HRC) | 100-160 | 0,05-0,15 | 1750 | 220 | 1400 | 330 | 1170 | 270 | 790 | 300 |
| | | | Vc=110m/min | | | | Vc=100m/min | | | |
| | | | ap=1,2D ae=0,1D | | | | | | | |
| Hardened Steels Pre-Harden Steels (40-45 HRC) | 60-120 | 0,04-0,13 | 960 | 70 | 760 | 100 | 640 | 100 | 480 | 90 |
| | | | Vc=60m/min | | | | ap=1,2D ae=0,1D | | | |
| Cast Iron (150HB) | 140-220 | 0,08-0,2 | 2700 | 420 | 2160 | 530 | 1800 | 440 | 1110 | 420 |
| | | | Vc=170m/min | | | | Vc=140m/min | | | |
| | | | ap=1,2D ae=0,1D | | | | | | | |

Recommended cutting conditions



Slotting

| Material | m/min Cutting Speed | mm/tooth Feed rate | Ø20 | | Ø25 | | Ø30 | | Ø40 | | | |
|---|------------------------|-----------------------|-------------------|--------|-------------------|--------|-------------------|--------|-------------------|--------|--|--|
| | | | min ⁻¹ | mm/min | min ⁻¹ | mm/min | min ⁻¹ | mm/min | min ⁻¹ | mm/min | | |
| Carbon Steels (200 HB) | 150-250 | 0,06-0,2 | 3500 | 440 | 2800 | 550 | 2330 | 720 | 1430 | 440 | | |
| | | | Vc=220m/min | | | | | | Vc=180m/min | | | |
| | | | ap=0,3D | | | | | | | | | |
| Alloy Steels (200-250 HB) | 150-230 | 0,05-0,2 | 3180 | 330 | 2550 | 450 | 2120 | 420 | 1270 | 340 | | |
| | | | Vc=200m/min | | | | | | Vc=160m/min | | | |
| | | | ap=0,3D | | | | | | | | | |
| Alloy Steels (25-35 HRC) | 100-160 | 0,03-0,15 | 2070 | 110 | 1660 | 210 | 1380 | 180 | 870 | 170 | | |
| | | | Vc=130m/min | | | | | | Vc=110m/min | | | |
| | | | ap=0,3D | | | | | | | | | |
| Hardened Steels Pre-Harden Steels (40-45 HRC) | 60-120 | 0,02-0,13 | 1100 | 50 | 890 | 80 | 740 | 80 | 560 | 100 | | |
| | | | Vc=70m/min | | | | | | | | | |
| | | | ap=0,3D | | | | | | | | | |
| Cast Iron (150HB) | 140-240 | 0,06-0,2 | 3500 | 440 | 2800 | 660 | 2330 | 540 | 1430 | 540 | | |
| | | | Vc=220m/min | | | | | | Vc=180m/min | | | |
| | | | ap=0,3D | | | | | | | | | |

Note

- These conditions are for general guidance; in actual machining conditions adjust the parameters according to your actual machine and work-piece conditions.
- For long type please reduce speed and feed by 70%.
- In case of using Long Shank Type, no relation to diameters, basic conditions are:
 $n=700\text{min}^{-1}$
 $V_f=210\text{m/min}$
 $a_p=0,1D$
 $a_e=0,3D$

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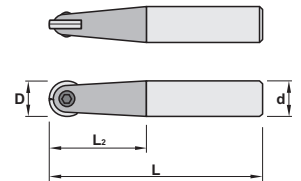
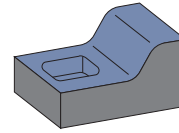
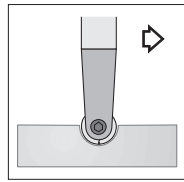
Characteristics:

Indexable ball nose semi-finishing and finishing cutter equipped with positive insert that provides low cutting forces and reduced vibration. Its accurate pocket ensures that the insert is firmly fixed.

Milling cutter equipped with cylindric shank.

Applications:

Ball end mill for tool and die applications. This indexable ball nose cutter works well on steels, hardened steels, stainless steels and casts.



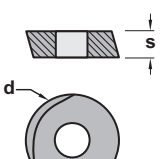

85_0

| Ref. | | | D | L | L2 | d | Insert size | |
|-------------|---|--|----|-----|-----|----|-------------|-------|
| 8530.00.010 | 2 | | 10 | 105 | 50 | 12 | WPR 10 | 0,100 |
| 8540.00.012 | 2 | | 12 | 105 | 50 | 16 | WPR 12 | 0,240 |
| 8550.00.016 | 2 | | 16 | 105 | 50 | 20 | WPR 16 | 0,260 |
| 8560.00.020 | 2 | | 20 | 125 | 70 | 25 | WPR 20 | 0,500 |
| 8580.00.025 | 2 | | 25 | 125 | 70 | 32 | WPR 25 | 0,750 |
| 8590.00.032 | 2 | | 32 | 125 | 70 | 32 | WPR 32 | 0,800 |
| 8530.01.010 | 2 | | 10 | 150 | 80 | 12 | WPR 10 | 0,200 |
| 8540.01.012 | 2 | | 12 | 160 | 90 | 16 | WPR 12 | 0,300 |
| 8550.01.016 | 2 | | 16 | 180 | 100 | 20 | WPR 16 | 0,400 |
| 8560.01.020 | 2 | | 20 | 200 | 120 | 25 | WPR 20 | 0,700 |
| 8580.01.025 | 2 | | 25 | 220 | 140 | 32 | WPR 25 | 1,250 |
| 8590.01.032 | 2 | | 32 | 250 | 160 | 32 | WPR 32 | 1,550 |

| Ref. | | |
|-------------|------|------|
| 8530.00.010 | 1359 | 5615 |
| 8540.00.012 | 1509 | 5620 |
| 8550.00.016 | 1519 | 5620 |
| 8560.00.020 | 1529 | 5620 |
| 8580.00.025 | 1609 | 5530 |
| 8590.00.032 | 1809 | 5530 |
| 8530.01.010 | 1359 | 5615 |
| 8540.01.012 | 1509 | 5620 |
| 8550.01.016 | 1519 | 5620 |
| 8560.01.020 | 1529 | 5620 |
| 8580.01.025 | 1609 | 5530 |
| 8590.01.032 | 1809 | 5530 |

| WPR | | l | s | d | Positive 11° clearance - Round insert. |
|------|--------|---|------|-------|--|
| Ref. | | - | 2,40 | 10,00 | |
| | WPR 10 | - | 2,50 | 12,00 | |
| | WPR 12 | - | 3,00 | 16,00 | |
| | WPR 16 | - | 3,00 | 20,00 | |
| | WPR 20 | - | 4,00 | 25,00 | |
| | WPR 25 | - | 5,00 | 32,00 | |
| | WPR 32 | - | | | |

For more information see page: A.22

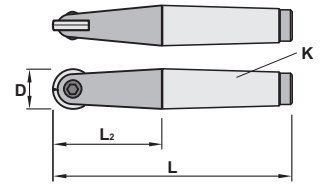
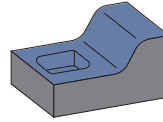
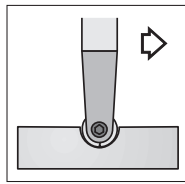


Characteristics:

Indexable ball nose semi-finishing and finishing cutter equipped with positive insert that provides low cutting forces and reduced vibration. Its accurate pocket ensures that the insert is firmly fixed.

Applications:

Ball end mill for tool and die applications. This indexable ball nose cutter works well on steels, hardened steels, stainless steels and casts.



85_3

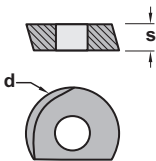
| Ref. | | D | L | K | L2 | Insert size | |
|-------------|---|----|-----|---|-----|-------------|-------|
| 8560.30.020 | 2 | 20 | 190 | 3 | 115 | WPR 20 | 0,670 |
| 8580.34.025 | 2 | 25 | 215 | 4 | 135 | WPR 25 | 1,150 |
| 8590.34.032 | 2 | 32 | 268 | 4 | 160 | WPR 32 | 1,550 |

| Ref. | | |
|-------------|------|------|
| 8560.30.020 | 1529 | 5620 |
| 8580.34.025 | 1609 | 5530 |
| 8590.34.032 | 1809 | 5615 |

| WPR | | l | s | d | Positive 11° clearance - Round insert. |
|------------|---------------|----------|----------|----------|--|
| Ref. | WPR 20 | - | 3,00 | 20,00 | |
| | WPR 25 | - | 4,00 | 25,00 | |
| | WPR 32 | - | 5,00 | 32,00 | |

| WPR | | | | | |
|-----|--|--|--|--|--|
| | | | | | |

For more information see page: A.23



Inserts

Face milling cutters

Square shoulder cutters

Slot cutters

Porcupine cutters

Specific applications and Sets

Profile milling



Shanks page: K.45 - K.48

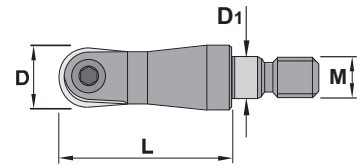
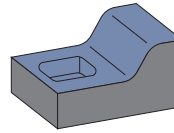
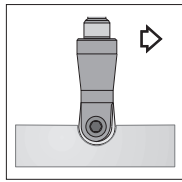
Characteristics:

Indexable ball nose semi-finishing and finishing cutter equipped with positive insert that provides low cutting forces and reduced vibration. Its accurate pocket ensures that the insert is firmly fixed.

Milling cutter equipped with modular shank.

Applications:

Ball end mill for tool and die applications. This indexable ball nose cutter works well on steels, hardened steels, stainless steels and casts.

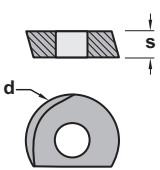


85_06

| Ref. | | | D | L | M | D1 | Insert size | |
|-------------|---|--|----|----|-----|------|-------------|-------|
| 8530.06.010 | 2 | | 10 | 23 | M6 | 6,5 | WPR 10 | 0,016 |
| 8540.06.012 | 2 | | 12 | 23 | M6 | 6,5 | WPR 12 | 0,030 |
| 8550.06.016 | 2 | | 16 | 30 | M8 | 8,5 | WPR 16 | 0,050 |
| 8560.06.020 | 2 | | 20 | 35 | M10 | 10,5 | WPR 20 | 0,095 |
| 8580.06.025 | 2 | | 25 | 40 | M12 | 12,5 | WPR 25 | 0,160 |

| Ref. | | |
|-------------|------|------|
| 8530.06.010 | 1359 | 5515 |
| 8540.06.012 | 1509 | 5520 |
| 8550.06.016 | 1519 | 5520 |
| 8560.06.020 | 1529 | 5520 |
| 8580.06.025 | 1609 | 5530 |

| Ref. | WPR | l | s | d | Positive 11° clearance - Round insert. |
|--------|-----|------|-------|---|--|
| WPR 10 | - | 2,40 | 10,00 | | For more information see page: A.22 |
| WPR 12 | - | 2,50 | 12,00 | | |
| WPR 16 | - | 3,00 | 16,00 | | |
| WPR 20 | - | 3,00 | 20,00 | | |
| WPR 25 | - | 4,00 | 25,00 | | |
| | WPR | | | | |





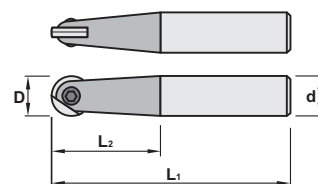
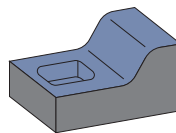
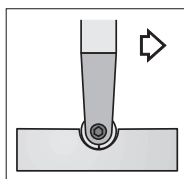
Characteristics:

Indexable ball nose mirror finishing cutter equipped with positive insert that provides low cutting forces and reduced vibration. Its accurate pocket ensures that the insert is firmly fixed.

Milling cutter equipped with cylindric shank.

Applications:

Ball end mill for tool and die applications. This indexable ball nose cutter works well on steels, hardened steels, stainless steels and casts.



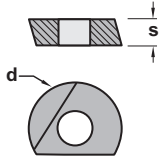

88_0

| Ref. | | D | L1 | d | L2 | Insert size | |
|-------------|---|----|-----|----|-----|-------------|-------|
| 8830.00.010 | 2 | 10 | 105 | 10 | 50 | RPR 10 | 0,100 |
| 8840.00.012 | 2 | 12 | 105 | 12 | 50 | RPR 12 | 0,240 |
| 8850.00.016 | 2 | 16 | 105 | 16 | 50 | RPR 16 | 0,260 |
| 8860.00.020 | 2 | 20 | 125 | 20 | 70 | RPR 20 | 0,500 |
| 8880.00.025 | 2 | 25 | 125 | 25 | 70 | RPR 25 | 0,750 |
| 8890.00.032 | 2 | 32 | 125 | 32 | 70 | RPR 32 | 0,800 |
| 8830.01.010 | 2 | 10 | 150 | 10 | 80 | RPR 10 | 0,200 |
| 8840.01.012 | 2 | 12 | 160 | 12 | 90 | RPR 12 | 0,300 |
| 8850.01.016 | 2 | 16 | 180 | 16 | 100 | RPR 16 | 0,400 |
| 8860.01.020 | 2 | 20 | 200 | 20 | 120 | RPR 20 | 0,700 |
| 8880.01.025 | 2 | 25 | 220 | 25 | 140 | RPR 25 | 1,250 |
| 8890.01.032 | 2 | 32 | 250 | 32 | 160 | RPR 32 | 1,550 |

| Ref. | | |
|-------------|------|------|
| 8830.00.010 | 1353 | 5608 |
| 8840.00.012 | 1354 | 5610 |
| 8850.00.016 | 1619 | 5615 |
| 8860.00.020 | 1529 | 5620 |
| 8880.00.025 | 1609 | 5530 |
| 8890.00.032 | 1809 | 5530 |
| 8830.01.010 | 1353 | 5608 |
| 8840.01.012 | 1354 | 5610 |
| 8850.01.016 | 1619 | 5615 |
| 8860.01.020 | 1529 | 5620 |
| 8880.01.025 | 1609 | 5530 |
| 8890.01.032 | 1809 | 5530 |

| RPR | | l | s | d | Positive 11° clearance - Round insert. |
|------|--------|---|------|-------|--|
| Ref. | RPR 10 | - | 2,60 | 10,00 | |
| | RPR 12 | - | 3,00 | 12,00 | |
| | RPR 16 | - | 4,00 | 16,00 | |
| | RPR 20 | - | 5,00 | 20,00 | |
| | RPR 25 | - | 6,00 | 25,00 | |
| | RPR 32 | - | 7,00 | 32,00 | |

For more information see page: A.16

Inserts

Face milling cutters

Square shoulder cutters

Slot cutters

Porcupine cutters

Specific applications and Sets

Profile milling



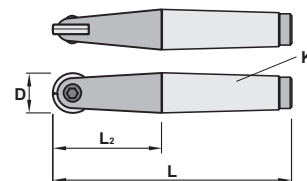
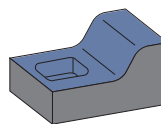
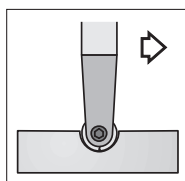
Characteristics:

Indexable ball nose mirror finishing cutter equipped with positive insert that provides low cutting forces and reduced vibration. Its accurate pocket ensures that the insert is firmly fixed.

Milling cutter equipped with Morse shank.

Applications:

Ball end mill for tool and die applications. This indexable ball nose cutter works well on steels, hardened steels, stainless steels and casts.



| 88_3 | | | D | L | K | L2 | Insert size | |
|------|-------------|---|----|-----|---|-----|-------------|-------|
| Ref. | 8860.30.020 | 2 | 20 | 190 | 3 | 115 | RPR 20 | 0,670 |
| | 8880.34.025 | 2 | 25 | 215 | 4 | 135 | RPR 25 | 1,200 |
| | 8890.34.032 | 2 | 32 | 268 | 4 | 160 | RPR 32 | 1,650 |

| Ref. | 8860.30.020 | | 1529 | | 5620 |
|------|-------------|--|------|--|------|
| | 8880.34.025 | | 1609 | | 5530 |
| | 8890.34.032 | | 1809 | | 5530 |

| | | RPR | l | s | d | Positive 11° clearance - Round insert. |
|------|--------|-----|------|-------|---|--|
| Ref. | RPR 20 | - | 5,00 | 20,00 | | For more information see page: A.19 |
| | RPR 25 | - | 6,00 | 25,00 | | |
| | RPR 32 | - | 7,00 | 32,00 | | |
| | RPR | | | | | |



Shanks page: K.45 - K.48

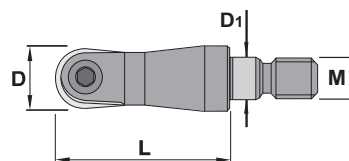
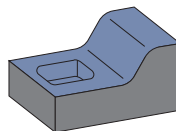
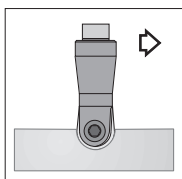
Characteristics:

Indexable ball nose mirror finishing cutter equipped with positive insert that provides low cutting forces and reduced vibration. Its accurate pocket ensures that the insert is firmly fixed.

Milling cutter equipped with modular shank.

Applications:

Ball end mill for tool and die applications. This indexable ball nose cutter works well on steels, hardened steels, stainless steels and casts.



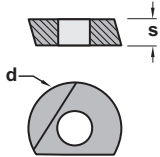

88_06

| Ref. | | D | L | M | D1 | Insert size | |
|-------------|---|----|----|-----|------|-------------|-------|
| 8830.06.010 | 2 | 10 | 23 | M6 | 6,5 | RPR 10 | 0,016 |
| 8840.06.012 | 2 | 12 | 23 | M6 | 6,5 | RPR 12 | 0,030 |
| 8850.06.016 | 2 | 16 | 30 | M8 | 8,5 | RPR 16 | 0,050 |
| 8860.06.020 | 2 | 20 | 30 | M10 | 10,5 | RPR 20 | 0,095 |
| 8880.06.025 | 2 | 25 | 35 | M12 | 12,5 | RPR 25 | 0,160 |

| Ref. | | |
|-------------|------|------|
| 8830.06.010 | 1353 | 5508 |
| 8840.06.012 | 1354 | 5510 |
| 8850.06.016 | 1619 | 5515 |
| 8860.06.020 | 1529 | 5520 |
| 8880.06.025 | 1609 | 5530 |

| RPR | | l | s | d | Positive 11° clearance - Round insert. |
|------|--------|---|------|-------|--|
| Ref. | RPR 10 | - | 2,60 | 10,00 | |
| | RPR 12 | - | 3,00 | 12,00 | |
| | RPR 16 | - | 4,00 | 16,00 | |
| | RPR 20 | - | 5,00 | 20,00 | |
| | RPR 25 | - | 6,00 | 25,00 | |

For more information see page: A.19

Inserts

Face milling cutters

Square shoulder cutters

Slot cutters

Porcupine cutters

Specific applications and Sets

Profile milling



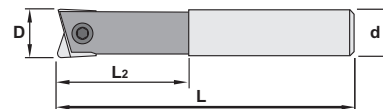
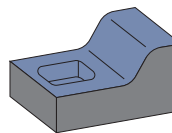
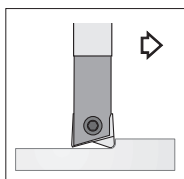
Characteristics:

Indexable back draft cutter equipped with positive insert that provides low cutting forces and reduced vibration. Its accurate pocket ensures that the insert is firmly fixed.

Milling cutter equipped with cylindric shank.

Applications:

Back draft cutter for tool and die applications. This indexable back draft cutter works well on steels, hardened steels, stainless steels and casts.

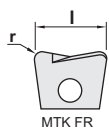


89_01

| Ref. | | | D | L | d | L2 | Insert size | |
|-------------|---|--|----|-----|----|----|-------------|-------|
| 8940.01.012 | 2 | | 12 | 110 | 12 | 53 | MTK 12 | 0,090 |
| 8950.01.016 | 2 | | 16 | 125 | 16 | 63 | MTK 16 | 0,180 |
| 8960.01.020 | 2 | | 20 | 140 | 20 | 75 | MTK 20 | 0,290 |
| 8980.01.025 | 2 | | 25 | 180 | 25 | 90 | MTK 25 | 0,600 |



| | | | |
|------|-------------|------|------|
| Ref. | 8940.01.012 | 1354 | 5608 |
| | 8950.01.016 | 1619 | 5610 |
| | 8960.01.020 | 1629 | 5615 |
| | 8980.01.025 | 1609 | 5530 |



| Ref. | MTK | l | r | Toroidal insert. |
|--------|-----|-------|------|------------------|
| MTK 12 | | 12,00 | 1,00 | |
| MTK 16 | | 16,00 | 1,30 | |
| MTK 20 | | 20,00 | 1,60 | |
| MTK 25 | | 25,00 | 2,00 | |

For more information see page: A.14

| MTK | | | | | | |
|-----|--|--|--|--|--|--|
| | | | | | | |



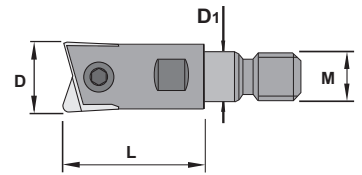
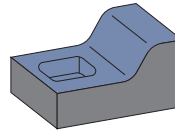
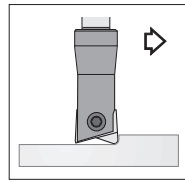
Shanks page: K.45 - K.48

Characteristics:

Indexable back draft cutter equipped with positive insert that provides low cutting forces and reduced vibration. Its accurate pocket ensures that the insert is firmly fixed.

Applications:

Back draft cutter for tool and die applications. This indexable back draft cutter works well on steels, hardened steels, stainless steels and casts.



89_06

| Ref. | | D | L | M | D1 | Insert size | |
|-------------|---|----|----|-----|------|-------------|-------|
| 8930.06.010 | 2 | 10 | 23 | M6 | 6,5 | MTK 10 | 0,016 |
| 8940.06.012 | 2 | 12 | 23 | M6 | 6,5 | MTK 12 | 0,030 |
| 8950.06.016 | 2 | 16 | 30 | M8 | 8,5 | MTK 16 | 0,050 |
| 8960.06.020 | 2 | 20 | 30 | M10 | 10,5 | MTK 20 | 0,095 |
| 8980.06.025 | 2 | 25 | 35 | M12 | 12,5 | MTK 25 | 0,160 |

| Ref. | | |
|-------------|------|------|
| 8930.06.010 | 1353 | 5508 |
| 8940.06.012 | 1354 | 5510 |
| 8950.06.016 | 1619 | 5515 |
| 8960.06.020 | 1629 | 5520 |
| 8980.06.025 | 1609 | 5530 |

| Ref. | MTK | | Toroidal insert. |
|--------|-------|------|-------------------------------------|
| | l | r | |
| MTK 10 | 10,00 | 0,60 | For more information see page: A.14 |
| MTK 12 | 12,00 | 1,00 | |
| MTK 16 | 16,00 | 1,30 | |
| MTK 20 | 20,00 | 1,60 | |
| MTK 25 | 25,00 | 2,00 | |

MTK FR

Inserts

Face milling cutters

Square shoulder cutters

Slot cutters

Porcupine cutters

Specific applications and Sets

Profile milling

Recommended cutting conditions

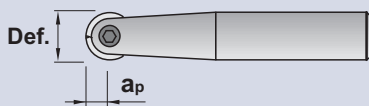
| Material | m/min Cutting speed | mm/tooth Feed rate | Ø8 | | Ø10 | | Ø12 | | | |
|---|---------------------|--------------------|--|--------|-------------------|--------|-------------------|--------|--|--|
| | | | min ⁻¹ | mm/min | min ⁻¹ | mm/min | min ⁻¹ | mm/min | | |
| Carbon Steels Alloy Steels (30 HRC) | 100-200 | 0,2-0,3 | 6370 | 2550 | 5090 | 2040 | 4240 | 1700 | | |
| | | | Vc=160m/min fz=0,2mm/tooth ap=0,025D ae=0,1D | | | | | | | |
| Carbon Steels Alloy Steels (30-40 HRC) | 80-150 | 0,2-0,3 | 4770 | 1910 | 3820 | 1530 | 3180 | 1270 | | |
| | | | Vc=120m/min fz=0,2mm/tooth ap=0,025D ae=0,1D | | | | | | | |
| Die Tool Steels Pre-Harden Steels (30-40 HRC) | 70-100 | 0,1-0,15 | 3180 | 640 | 2550 | 510 | 2120 | 420 | | |
| | | | Vc=80m/min fz=0,1mm/tooth ap=0,025D ae=0,1D | | | | | | | |
| Hardened Steels (55-65 HRC) | 200-250 | 0,2-0,4 | 9150 | 3660 | 7320 | 2930 | 6100 | 2440 | | |
| | | | Vc=230m/min fz=0,2mm/tooth ap=0,01D ae=0,02D | | | | | | | |
| Cast Iron | 100-200 | 0,3-0,4 | 6730 | 3820 | 5090 | 3050 | 4240 | 2550 | | |
| | | | Vc=160m/min fz=0,3mm/tooth ap=0,025D ae=0,1D | | | | | | | |

| Material | m/min Cutting speed | mm/tooth Feed rate | Ø16 | | Ø20 | | Ø25 | | Ø30(32) | |
|---|---------------------|--------------------|--|--------|-------------------|--------|-------------------|--------|-------------------|--------|
| | | | min ⁻¹ | mm/min | min ⁻¹ | mm/min | min ⁻¹ | mm/min | min ⁻¹ | mm/min |
| Carbon Steels Alloy Steels (30 HRC) | 100-200 | 0,2-0,3 | 2400 | 1600 | 2550 | 1300 | 2050 | 1030 | 1700 | 850 |
| | | | Vc=160m/min fz=0,25mm/tooth ap=0,05D ae=0,1D | | | | | | | |
| Carbon Steels Alloy Steels (30-40 HRC) | 80-150 | 0,2-0,3 | 1600 | 1200 | 1910 | 955 | 1530 | 765 | 1280 | 640 |
| | | | Vc=120m/min fz=0,25mm/tooth ap=0,05D ae=0,1D | | | | | | | |
| Die Tool Steels Pre-Harden Steels (30-40 HRC) | 70-100 | 0,1-0,15 | 3200 | 385 | 1280 | 310 | 1020 | 245 | 850 | 205 |
| | | | Vc=80m/min fz=0,12mm/tooth ap=0,05D ae=0,1D | | | | | | | |
| Hardened Steels (55-65 HRC) | 200-250 | 0,2-0,4 | 4575 | 2740 | 3660 | 2200 | 2930 | 1760 | 2440 | 1460 |
| | | | Vc=230m/min fz=0,3mm/tooth ap=0,01D ae=0,02D | | | | | | | |
| Cast Iron | 100-200 | 0,3-0,4 | 3200 | 2240 | 2550 | 1790 | 2050 | 1440 | 1700 | 1190 |
| | | | Vc=160m/min fz=0,35mm/tooth ap=0,05D ae=0,1D | | | | | | | |

Note

- According to the machining situation, refer to the table above to determine the cutting conditions.
 - Be sure to practice safety instructions and precautions such as wearing glasses and safety shoes, and placing safety covers when you use this tool. Because this tool can be broken during machining so failure to follow these instructions may cause personal injury.
 - Never attempt to modify the carbide shank holder. Use the value for the depth of cut (ap) when the carbide shank holder is used.
- Mill diameters D=8~12mm:ap<=0,2mm.
 Mill diameters D=16~32mm:ap<=0,3mm.

$$n = \frac{Vc \cdot 1000}{\pi \cdot Def.} \text{ (Rev./min.)}$$

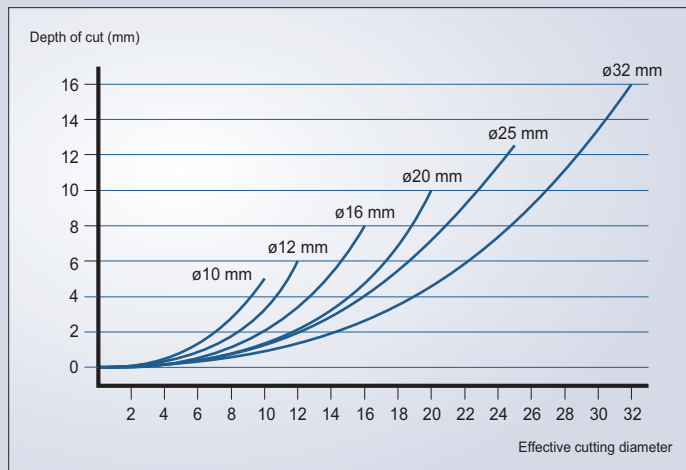


N = Spindle speed (Rev./min.)

Vc = Cutting speed

Def. = Effective cutting diameter

ap = Max. Depth of cut (mm)



Recommended cutting conditions

| Material | m/min Cutting speed | mm/tooth Feed rate | Ø10 | | Ø12 | |
|---|---------------------------|-----------------------|--|--------|-------------------|--------|
| | | | min ⁻¹ | mm/min | min ⁻¹ | mm/min |
| Carbon Steels Alloy Steels (30 HRC) | 100-200 | 0,1-0,2 | 5090 | 2040 | 4240 | 1700 |
| | | | Vc=160m/min fz=0,2mm/tooth ap=0,025D ae=0,1D | | | |
| Carbon Steels Alloy Steels (30-40 HRC) | 80-150 | 0,1-0,2 | 3820 | 1530 | 3180 | 1270 |
| | | | Vc=120m/min fz=0,2mm/tooth ap=0,025D ae=0,1D | | | |
| Die Tool Steels Pre-Harden Steels (30-40 HRC) | 70-100 | 0,05-0,1 | 2550 | 510 | 2120 | 420 |
| | | | Vc=80m/min fz=0,1mm/tooth ap=0,025D ae=0,1D | | | |
| Hardened Steels (55-65 HRC) | 130-180 | 0,05-0,1 | 5090 | 1020 | 4240 | 850 |
| | | | Vc=160m/min fz=0,1mm/tooth ap=0,01D ae=0,02D | | | |
| Cast Iron | 100-200 | 0,2-0,3 | 5090 | 3050 | 4240 | 2550 |
| | | | Vc=160m/min fz=0,3mm/tooth ap=0,025D ae=0,1D | | | |

| Material | m/min Cutting speed | mm/tooth Feed rate | Ø16 | | Ø20 | | Ø25 | | Ø30(32) | |
|---|---------------------------|-----------------------|---|--------|-------------------|--------|-------------------|--------|-------------------|--------|
| | | | min ⁻¹ | mm/min | min ⁻¹ | mm/min | min ⁻¹ | mm/min | min ⁻¹ | mm/min |
| Carbon Steels Alloy Steels (30 HRC) | 100-200 | 0,1-0,2 | 3200 | 1600 | 2550 | 1300 | 2050 | 1030 | 1700 | 850 |
| | | | Vc=160m/min fz=0,25mm/tooth ap=0,05D ae=0,1D | | | | | | | |
| Carbon Steels Alloy Steels (30-40 HRC) | 80-150 | 0,1-0,2 | 2400 | 1200 | 1910 | 955 | 1530 | 765 | 1280 | 640 |
| | | | Vc=120m/min fz=0,25mm/tooth ap=0,05D ae=0,1D | | | | | | | |
| Die Tool Steels Pre-Harden Steels (30-40 HRC) | 70-100 | 0,05-0,1 | 1600 | 385 | 1280 | 310 | 1020 | 245 | 850 | 205 |
| | | | Vc=80m/min fz=0,12mm/tooth ap=0,05D ae=0,1D | | | | | | | |
| Hardened Steels (55-65 HRC) | 130-180 | 0,05-0,1 | 3180 | 950 | 2550 | 760 | 2040 | 610 | 1700 | 510 |
| | | | Vc=160m/min fz=0,15mm/tooth ap=0,01D ae=0,02D | | | | | | | |
| Cast Iron | 100-200 | 0,2-0,3 | 3200 | 2240 | 2550 | 1790 | 2050 | 1440 | 1700 | 1190 |
| | | | Vc=160m/min fz=0,35mm/tooth ap=0,05D ae=0,1D | | | | | | | |

Note

- According to the machining situation, refer to the table above to determine the cutting conditions.
- Be sure to practice safety instructions and precautions such as wearing glasses and safety shoes, and placing safety covers when you use this tool.
- Because this tool can be broken during machining so failure to follow these instructions may cause personal injury.
- Never attempt to modify the carbide shank holder. Use the value for the depth of cut (ap) when the carbide shank is used.
Mill diameters D=8~12mm:ap<=0,05D.
Mill diameters D=16~32mm:ap<=0,1D.
- PCA12M grade is suitable for not so high speed machining.

Inserts

Face milling cutters

Square shoulder cutters

Slot cutters

Porcupine cutters

Specific applications and Sets

Profile milling

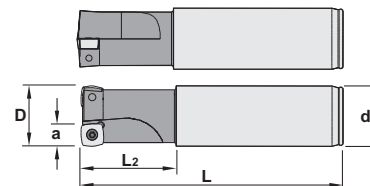
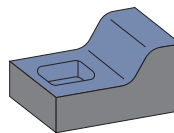
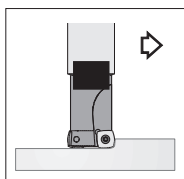


Characteristics:

High feed square insert cutters for peripheral milling ramp milling and drilling, pocket milling and copy milling. Precision type inserts are available for efficient machining in most materials.

Applications:

This copying, milling cutter works well on hard steels, alloyed steels, stainless steels, refractory casts and aluminium alloys. A general milling cutter for diversified manufacture that allows using it in only one pass (roughing and finishing) and it is recommended for machining centers.



1635.00

| Ref. | | | D | L | L2 | d | a | Insert size | |
|-------------|---|----|-----|----|----|----|-------------|-------------|--|
| 1635.00.020 | 2 | 20 | 110 | 35 | 20 | 13 | XDKW 090430 | 0,235 | |
| 1635.00.025 | 2 | 25 | 110 | 35 | 25 | 13 | XDKW 090430 | 0,350 | |
| 1635.00.032 | 3 | 32 | 125 | 35 | 32 | 13 | XDKW 090430 | 0,700 | |

| Ref. | | |
|-------------|------|------|
| 1635.00.020 | 1135 | 5510 |
| 1635.00.025 | 1135 | 5510 |
| 1635.00.032 | 1135 | 5510 |

| XDKW | | l | s | d | High feed. |
|-------------------------------------|-------------|------|------|------|------------|
| Ref. | XDKW 090430 | 9,00 | 4,76 | 9,00 | |
| For more information see page: A.23 | | | | | |
| XDKW | | | | | |
| | | | | | |

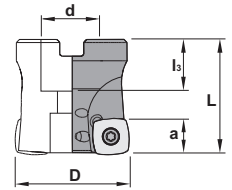
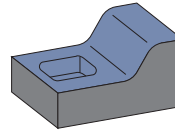
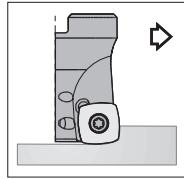


Characteristics:

High feed square insert cutters for peripheral milling ramp milling and drilling, pocket milling and copy milling. Precision type inserts are available for efficient machining in most materials.

Applications:

This copying, milling cutter works well on hard steels, alloyed steels, stainless steels, refractory casts and aluminium alloys. A general milling cutter for diversified manufacture that allows using it in only one pass (roughing and finishing) and it is recommended for machining centers.



1645.90

| Ref. | | D | L | d | l3 | a | Insert size | |
|-------------|---|----|----|----|----|----|-------------|-------|
| 1645.90.040 | 4 | 40 | 40 | 16 | 20 | 14 | XDKW 120530 | 0,200 |
| 1645.90.050 | 5 | 50 | 50 | 22 | 22 | 14 | XDKW 120530 | 0,300 |
| 1645.90.063 | 6 | 63 | 63 | 27 | 25 | 14 | XDKW 120530 | 0,650 |
| 1645.90.080 | 5 | 80 | 80 | 27 | 25 | 14 | XDKW 120530 | 1,150 |

| Ref. | | | |
|-------------|------|------|--------|
| 1645.90.040 | 1240 | 5615 | 1058 |
| 1645.90.050 | 1240 | 5615 | 912,10 |
| 1645.90.063 | 1240 | 5615 | 912,12 |
| 1645.90.080 | 1240 | 5615 | 912,17 |

| XDKW | | | | | High feed. |
|------|-------------|-------|------|-------|-------------------------------------|
| Ref. | XDKW 120530 | l | s | d | |
| | | 12,50 | 5,56 | 12,50 | For more information see page: A.23 |
| XDKW | | | | | |
| | | | | | |

Inserts

Face milling cutters

Square shoulder cutters

Slot cutters

Porcupine cutters

Specific applications and Sets

Profile milling

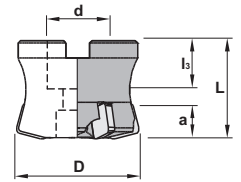
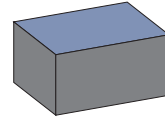
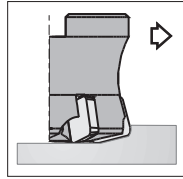


Characteristics:

High feed positive milling cutter with 15° entering angle. Its strong inserts accept high feed per teeth. The original fixing system from Canela allows a quick insert assembly and dismantling.

Applications:

This face milling cutter works well on steels, stainless steel, alloyed steels, cast iron and aluminium alloys. This general purpose milling cutter is recommended for C.N.C. machines.

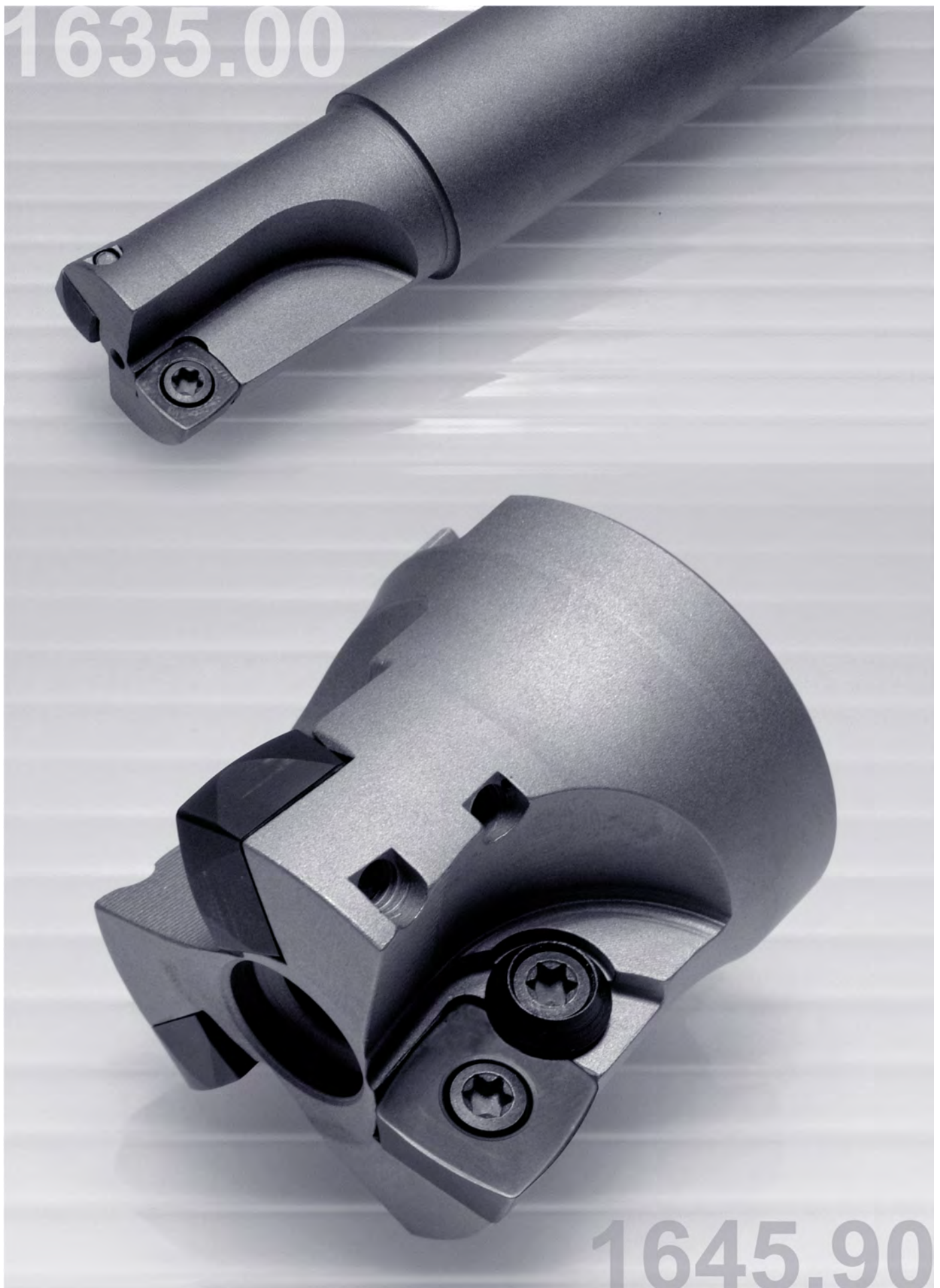


1440.92

| Ref. | | D | L | d | l3 | a | Insert size | |
|-------------|---|-----|----|----|----|---|-------------|-------|
| 1440.92.050 | 5 | 50 | 40 | 22 | 20 | 9 | SP.. 1203.. | 0,300 |
| 1440.92.063 | 5 | 63 | 50 | 27 | 22 | 9 | SP.. 1203.. | 0,700 |
| 1440.92.080 | 6 | 80 | 50 | 32 | 25 | 9 | SP.. 1203.. | 1,100 |
| 1440.92.100 | 7 | 100 | 50 | 40 | 29 | 9 | SP.. 1203.. | 1,800 |

| Ref. | | | | | | |
|-------------|------|------|------|------|------|--------|
| 1440.92.050 | 6226 | 1266 | 1630 | 5615 | 3012 | 912,11 |
| 1440.92.063 | 6226 | 1266 | 1630 | 5615 | 3012 | 912,12 |
| 1440.92.080 | 6226 | 1266 | 1630 | 5615 | 3012 | 912,17 |
| 1440.92.100 | 6226 | 1266 | 1630 | 5615 | 3012 | 912,20 |

| | | SP.. | l | s | d | Positive 11° clearance - Square inserts. |
|--|-------------|------|-------|------|-------|--|
| Ref. | SP.. 1203.. | | 12,70 | 3,18 | 12,70 | |
| For more information see page: A.19-20 | | | | | | |
| | SPKN-L | SPUN | | | | |
| | | | | | | |



Profile milling

Solid carbide

Drills

Boring heads

Arbors and adaptors

Inserts

Face milling cutters

Square shoulder cutters

Slot cutters

Porcupine cutters

Specific applications and Sets

Profile milling

Processing by direct milling is also possible

Since the cutting flute does not extend to the center, there are limitations on the ramp angle and hole diameter, but as shown below, processing by direct milling without a pilot hole is possible for ramping and helical milling.

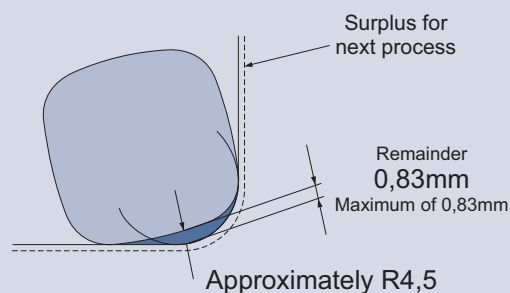
| | Ramping | | Helical milling | | | |
|---|---------------------|---------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| | Ramp angle α | | Helical hole diameter | | | |
| Tool diameter | $\varnothing 32$ | $\varnothing 40$ | $\varnothing 50$ | $\varnothing 63$ | $\varnothing 80$ | $\varnothing 100$ |
| Maximum ramp angle α | 7° | 4,5° | 3° | 1,7° | 1° | 1° |
| Hole diameter | $\varnothing 44-61$ | $\varnothing 61-76$ | $\varnothing 80-96$ | $\varnothing 107-122$ | $\varnothing 142-156$ | $\varnothing 179-195$ |

Note -The ramp angle α should be set within the ranges listed above. Use at ramp angles of 1° or less recommended.
 -For hole diameters outside the ranges listed above, a pilot hole should be drilled before milling.

Method for defining conditions of insert tip programmatically

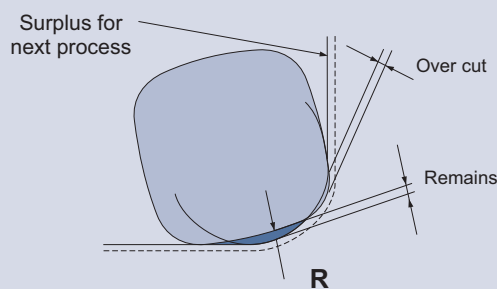
For roughing processing, please create a program with corner R values close to those shown as references below.

When corner R is set to 4,5

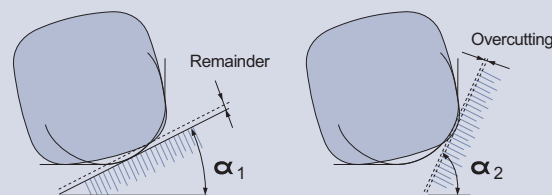
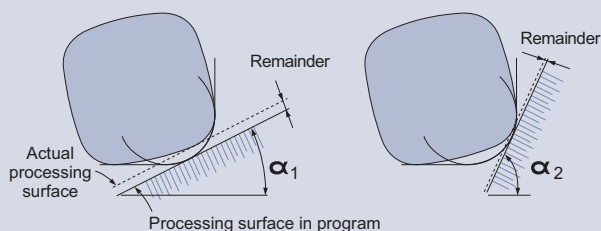


Normally, you should create a program with an input corner R of approximately 4,5. At an approximate input corner R of 4,5, there is no overcutting.

When corner R is set larger



Although overcutting occurs when the approximate R is set to higher values, if the overcutting is within the surplus for the next process, there is no problem with the processing shape and the amount of remainder can be suppressed.



| Approximate input corner R | R4,5 | R5,1 | R5,5 | R5,8 | R6,1 | R6,4 |
|----------------------------|-------------------------------|-------------------------------|------------------------------|-------------------------------|-------------------------------|-------------------------------|
| Remainder | 0,83 $\alpha_1=22,1^\circ$ | 0,66 $\alpha_1=20,3^\circ$ | 0,55 $\alpha_1=19^\circ$ | 0,47 $\alpha_1=17,9^\circ$ | 0,39 $\alpha_1=16,7^\circ$ | 0,32 $\alpha_1=15,4^\circ$ |
| Overcutting | - | 0,1 $\alpha_2=73,4^\circ$ | 0,2 $\alpha_2=67,7^\circ$ | 0,3 $\alpha_2=64,7^\circ$ | 0,4 $\alpha_2=62,3^\circ$ | 0,5 $\alpha_2=60,5^\circ$ |

Note

- Overcutting and remainder vary according to the processing shape. The values in the table above are maximum values.
 - The values of α shown are the slopes of the processing surfaces when overcutting and remainder are at their maximum respective values.

For example, when a program is created with an approximate R of 5,1:

Remainder of around 0,66mm is left when the slope of the processing surface is approximately 20,3°, and when the slope of the processing surface is approximately 73,4°, about 0,1mm of overcutting occurs. At areas with other slopes, the overcutting and remainder values are below these values.

Recommended cutting conditions

| Material | Cutting speed Vc (m/min) | Per-flute feed rate fz (mm/tooth) | Ø 20 (2 flutes) | | | Ø 25 (2 flutes) | | | Ø 32 (2 flutes) | | | Ø 40 (3 flutes) | | |
|--|---|-----------------------------------|---|------------------|-----------------|-----------------------------------|------------------|-----------------|-----------------------------------|------------------|-----------------|-----------------------------------|------------------|-----------------|
| | | | Rotation speed min. ⁻¹ | Feed rate mm/min | Q value cm/min. | Rotation speed min. ⁻¹ | Feed rate mm/min | Q value cm/min. | Rotation speed min. ⁻¹ | Feed rate mm/min | Q value cm/min. | Rotation speed min. ⁻¹ | Feed rate mm/min | Q value cm/min. |
| General Structural Steels (200 HB) | 180-200 | 0,6-1,5 | 2860 | 3430 | 69 | 2290 | 2750 | 69 | 1790 | 5370 | 171 | 1430 | 6400 | 256 |
| | Vc=180m/min fz=1,5mm/tooth ap=1,0mm ae=1,0D | | | | | | | | | | | | | |
| | 90-150 | 0,6-2,0 | 1430 | 1720 | 34 | 1150 | 1380 | 34 | 895 | 2690 | 86 | 720 | 3240 | 130 |
| | Vc=90m/min fz=1,5mm/tooth ap=1,0mm ae=1,0D | | | | | | | | | | | | | |
| Carbon Steels Alloy Steels (30 HRC) | 180-200 | 0,6-1,5 | 2860 | 3430 | 69 | 2290 | 2750 | 69 | 1790 | 5370 | 171 | 1430 | 6400 | 256 |
| | Vc=180m/min fz=1,5mm/tooth ap=1,0mm ae=1,0D | | | | | | | | | | | | | |
| | 90-150 | 0,6-2,0 | 1430 | 1720 | 34 | 1150 | 1380 | 34 | 895 | 2690 | 86 | 720 | 3240 | 130 |
| | Vc=90m/min fz=1,5mm/tooth ap=1,0mm ae=1,0D | | | | | | | | | | | | | |
| Carbon Steels Alloy Steels (30-45 HRC) | 80-120 | 0,4-0,8 | 1430 | 1430 | 29 | 1150 | 1150 | 29 | 895 | 1430 | 45 | 720 | 1730 | 69 |
| Vc=90m/min fz=0,8mm/tooth ap=1,0mm ae=1,0D | | | | | | | | | | | | | | |
| Alloy Steels (45-50 HRC) | 70-120 | 0,02-0,6 | 1590 | 630 | 6 | 1270 | 510 | 6 | 995 | 600 | 19 | 790 | 710 | 28 |
| | | | Vc=100m/min fz=0,3mm/tooth ap=1,0mm ae=1,0D | | | | | | | | | | | |
| | | | 1110 | 660 | 6 | 890 | 530 | 6 | 700 | 280 | 9 | 550 | 330 | 13 |
| | | | Vc=70m/min fz=0,2mm/tooth ap=0,5mm ae=1,0D | | | | | | | | | | | |
| Alloy Steels (50-55 HRC) | 70-100 | 0,05-0,2 | 1110 | 440 | 4 | 890 | 360 | 4 | 700 | 280 | 5 | 550 | 330 | 7 |
| | | | Vc=70m/min fz=0,2mm/tooth ap=1,0mm ae=1,0D | | | | | | | | | | | |
| Alloy Steels (55-60 HRC) | 50-100 | | 790 | 80 | 0,8 | 630 | 63 | 0,8 | 500 | 50 | 0,8 | 400 | 60 | 1 |
| | | | Vc=50m/min fz=0,05mm/tooth ap=0,5mm ae=1,0D | | | | | | | | | | | |
| Cast Iron | 180-200 | 0,8-2,0 | 2860 | 4580 | 92 | 2290 | 3670 | 92 | 1790 | 7160 | 344 | 1430 | 8580 | 515 |
| | Vc=180m/min fz=2,0mm/tooth ap=1,5mm ae=1,0D | | | | | | | | | | | | | |
| | 90-150 | | 1430 | 2290 | 57 | 1150 | 1840 | 58 | 895 | 3580 | 172 | 720 | 4320 | 259 |
| Vc=90m/min fz=2,0mm/tooth ap=1,5mm ae=1,0D | | | | | | | | | | | | | | |

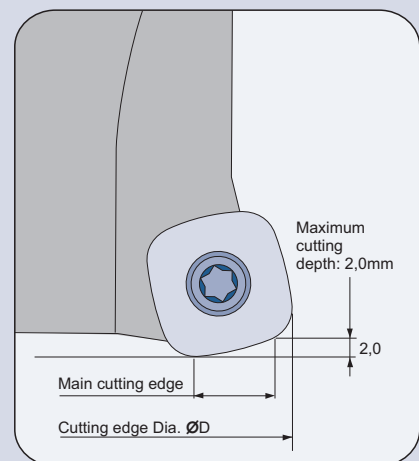
| Material | Cutting speed Vc (m/min) | Per-flute feed rate fz (mm/tooth) | Ø 50 (4 flutes) | | | Ø 63 (4 flutes) | | | Ø 80 (5 flutes) | | | Ø 100 (6 flutes) | | |
|--|---|-----------------------------------|---|------------------|-----------------|-----------------------------------|------------------|-----------------|-----------------------------------|------------------|-----------------|-----------------------------------|------------------|-----------------|
| | | | Rotation speed min. ⁻¹ | Feed rate mm/min | Q value cm/min. | Rotation speed min. ⁻¹ | Feed rate mm/min | Q value cm/min. | Rotation speed min. ⁻¹ | Feed rate mm/min | Q value cm/min. | Rotation speed min. ⁻¹ | Feed rate mm/min | Q value cm/min. |
| General Structural Steels (200 HB) | 180-200 | 0,6-1,5 | 1150 | 6900 | 510 | 910 | 5500 | 520 | 720 | 5400 | 650 | 570 | 5130 | 770 |
| | Vc=180m/min fz=1,5mm/tooth ap=1,5mm ae=1,0D | | | | | | | | | | | | | |
| | 90-150 | 0,6-2,0 | 570 | 3420 | 257 | 455 | 2730 | 258 | 360 | 2700 | 325 | 290 | 2610 | 390 |
| | Vc=90m/min fz=1,5mm/tooth ap=1,5mm ae=1,0D | | | | | | | | | | | | | |
| Carbon Steels Alloy Steels (30 HRC) | 180-200 | 0,6-1,5 | 1150 | 6900 | 510 | 910 | 5500 | 520 | 720 | 5400 | 650 | 570 | 5130 | 770 |
| | Vc=180m/min fz=1,5mm/tooth ap=1,5mm ae=1,0D | | | | | | | | | | | | | |
| | 90-150 | 0,6-2,0 | 570 | 3420 | 257 | 455 | 2730 | 258 | 360 | 2700 | 325 | 290 | 2610 | 390 |
| | Vc=90m/min fz=1,5mm/tooth ap=1,5mm ae=1,0D | | | | | | | | | | | | | |
| Carbon Steels Alloy Steels (30-45 HRC) | 80-120 | 0,4-0,8 | 570 | 1820 | 130 | 455 | 1450 | 140 | 360 | 1440 | 170 | 290 | 1400 | 210 |
| Vc=90m/min fz=0,8mm/tooth ap=1,5mm ae=1,0D | | | | | | | | | | | | | | |
| Alloy Steels (45-50 HRC) | 70-120 | 0,02-0,6 | 630 | 760 | 38 | 500 | 600 | 38 | 400 | 600 | 48 | 320 | 576 | 58 |
| | | | Vc=100m/min fz=0,3mm/tooth ap=1,0mm ae=1,0D | | | | | | | | | | | |
| | | | 440 | 360 | 18 | 350 | 280 | 18 | 280 | 280 | 22 | 220 | 260 | 26 |
| | | | Vc=70m/min fz=0,2mm/tooth ap=1,0mm ae=1,0D | | | | | | | | | | | |
| Alloy Steels (50-55 HRC) | 70-100 | 0,05-0,2 | 440 | 350 | 9 | 350 | 280 | 9 | 270 | 270 | 11 | 220 | 260 | 13 |
| | | | Vc=70m/min fz=0,2mm/tooth ap=0,5mm ae=1,0D | | | | | | | | | | | |
| Alloy Steels (55-60 HRC) | 50-100 | | 310 | 62 | 1,5 | 250 | 50 | 1,5 | 200 | 50 | 2,0 | 160 | 48 | 2,4 |
| | | | Vc=50m/min fz=0,05mm/tooth ap=0,5mm ae=1,0D | | | | | | | | | | | |
| Cast Iron | 180-200 | 0,8-2,0 | 1150 | 9200 | 920 | 910 | 7280 | 920 | 720 | 7200 | 1150 | 570 | 6840 | 1370 |
| | Vc=180m/min fz=2,0mm/tooth ap=2,0mm ae=1,0D | | | | | | | | | | | | | |
| | 90-150 | | 570 | 4560 | 456 | 455 | 3640 | 459 | 360 | 3600 | 576 | 290 | 3840 | 696 |
| Vc=90m/min fz=2,0mm/tooth ap=2,0mm ae=1,0D | | | | | | | | | | | | | | |

Note

- Select the best cutting condition when working, referring to above list.
(If the overhang is 3D or less, the recommended cutting speed is Vc=180-200m/min; 3D or more: Vc=90-130m/min.)

- Thick and heavy chips are generated by using this tool. Be sure to remove them with air blow in order to avoid any breakage by blocking with chips.

The recommended method is "Spindle center through" when blowing air. (Pay attention when removing chips in cavity work with the machining center <vertical type>.)



Inserts

Face milling cutters

Square shoulder cutters

Slot cutters

Porcupine cutters

Specific applications and Sets

Profile milling



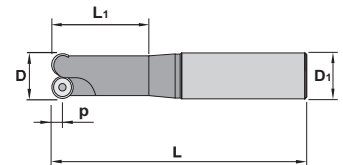
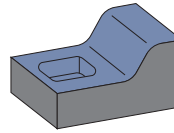
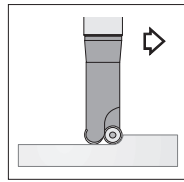
Characteristics:

Round insert end mills for slot milling, peripheral milling, ramp milling and drilling, pocket milling and copy milling. Precision type inserts are available for efficient machining in most materials.

Milling cutter equipped with cylindrical shank.

Applications:

This copying milling cutter works well on hard steels, alloyed steels, stainless steels, refractory casts and aluminium alloys. A general milling cutter for diversified manufacture that allows using it in only one pass (roughing and finishing) and it is recommended for conventional milling machines and machining centers.

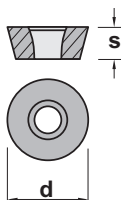


55_5

| Ref. | | | D | L | D1 | L1 | p | Insert size | |
|-------------|---|--|----|-----|----|----|-----|-------------|-------|
| 5525.00.015 | 2 | | 15 | 100 | 20 | 40 | 3,5 | RD.. 0702M0 | 0,180 |
| 5525.01.015 | 2 | | 15 | 150 | 20 | 40 | 3,5 | RD.. 0702M0 | 0,300 |
| 5525.00.016 | 2 | | 16 | 100 | 20 | 40 | 3,5 | RD.. 0702M0 | 0,185 |
| 5525.01.016 | 2 | | 16 | 150 | 20 | 40 | 3,5 | RD.. 0702M0 | 0,310 |
| 5535.00.020 | 2 | | 20 | 100 | 20 | 40 | 5,0 | RD.. 1003M0 | 0,220 |
| 5535.01.020 | 2 | | 20 | 150 | 20 | 40 | 5,0 | RD.. 1003M0 | 0,340 |
| 5545.00.025 | 2 | | 25 | 125 | 25 | 50 | 6,0 | RD.. 12T3M0 | 0,460 |
| 5545.01.025 | 2 | | 25 | 180 | 25 | 60 | 6,0 | RD.. 12T3M0 | 0,670 |
| 5545.00.032 | 3 | | 32 | 125 | 32 | 50 | 6,0 | RD.. 12T3M0 | 0,740 |
| 5545.01.032 | 3 | | 32 | 180 | 32 | 60 | 6,0 | RD.. 12T3M0 | 1,080 |
| 5555.01.032 | 2 | | 32 | 180 | 32 | 60 | 8,0 | RD.. 1604M0 | 1,080 |



| Ref. | | | |
|-------------|------|--|------|
| 5525.00.015 | 1425 | | 5507 |
| 5525.01.015 | 1425 | | 5507 |
| 5525.00.016 | 1425 | | 5507 |
| 5525.01.016 | 1425 | | 5507 |
| 5535.00.020 | 1435 | | 5515 |
| 5535.01.020 | 1435 | | 5515 |
| 5545.00.025 | 1435 | | 5515 |
| 5545.01.025 | 1435 | | 5515 |
| 5545.00.032 | 1435 | | 5515 |
| 5545.01.032 | 1435 | | 5515 |
| 5555.01.032 | 1445 | | 5515 |



| Ref. | RD.. | l | s | d | Positive 15° clearance - Round insert. |
|-------------|------|------|-------|---|--|
| RD.. 0702M0 | - | 2,38 | 7,00 | | For more information see page: A.15 |
| RD.. 1003M0 | - | 3,18 | 10,00 | | |
| RD.. 12T3M0 | - | 3,97 | 12,00 | | |
| RD.. 1604M0 | - | 4,76 | 16,00 | | |
| | RDHW | RDMT | RDMW | | |
| | | | | | |



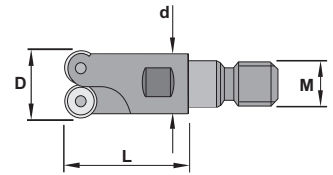
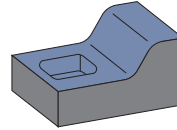
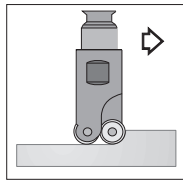
Shanks page: K.45 - K.48

Characteristics:

Round insert end mills for slot milling, peripheral milling, ramp milling and drilling, pocket milling and copy milling. Precision type inserts are available for efficient machining in most materials. Milling cutter equipped with modular shank.

Applications:

This copying milling cutter works well on hard steels, alloyed steels, stainless steels, refractory casts and aluminium alloys. A general milling cutter for diversified manufacture that allows using it in only one pass (roughing and finishing) and it is recommended for conventional milling machines and machining centers.



55_5.06

| Ref. | | D | L | M | d | Insert size | |
|----------------|---|----|----|-----|----|-------------|-------|
| 5525.06.016 | 2 | 16 | 23 | M8 | 14 | RD.. 0702.. | 0,030 |
| 5535.06.020 | 2 | 20 | 30 | M10 | 18 | RD.. 1003.. | 0,060 |
| 5535.06.025 | 3 | 25 | 35 | M12 | 21 | RD.. 1003.. | 0,095 |
| 5535.06.035 | 4 | 35 | 43 | M16 | 29 | RD.. 1003.. | 0,225 |
| 5535.06.042 | 5 | 42 | 43 | M16 | 29 | RD.. 1003.. | 0,320 |
| 5545.06.025 | 2 | 25 | 43 | M12 | 21 | RD.. 12T3.. | 0,095 |
| 5545.06.032 | 3 | 32 | 43 | M16 | 29 | RD.. 12T3.. | 0,230 |
| 5545.06.035 | 3 | 35 | 43 | M16 | 29 | RD.. 12T3.. | 0,250 |
| 5545.06.042 | 4 | 42 | 43 | M16 | 29 | RD.. 12T3.. | 0,320 |
| 5545.06.042Z=5 | 5 | 42 | 43 | M16 | 29 | RD.. 12T3.. | 0,320 |
| 5555.06.032 | 2 | 32 | 43 | M16 | 29 | RD.. 1604.. | 0,250 |

| Ref. | | |
|----------------|------|------|
| 5525.06.016 | 1425 | 5507 |
| 5535.06.020 | 1435 | 5515 |
| 5535.06.025 | 1435 | 5515 |
| 5535.06.035 | 1435 | 5515 |
| 5535.06.042 | 1435 | 5515 |
| 5545.06.025 | 1435 | 5515 |
| 5545.06.032 | 1435 | 5515 |
| 5545.06.035 | 1435 | 5515 |
| 5545.06.042 | 1435 | 5515 |
| 5545.06.042Z=5 | 1435 | 5515 |
| 5555.06.032 | 1445 | 5515 |

| Ref. | RD.. | | | Positive 15° clearance - Round insert. |
|------------|------|------|-------|--|
| | l | s | d | |
| RD..0702M0 | - | 2,38 | 7,00 | |
| RD..1003M0 | - | 3,18 | 10,00 | |
| RD..12T3M0 | - | 3,97 | 12,00 | |
| RD..1604M0 | - | 4,76 | 16,00 | |

| RDHW | RDMT | RDMW |
|------|------|------|
| | | |

For more information see page: A.15

Profile milling

Solid carbide

Drills

Boring heads

Arbors and adaptors

Inserts

Face milling cutters

Square shoulder cutters

Slot cutters

Porcupine cutters

Specific applications and Sets

Profile milling

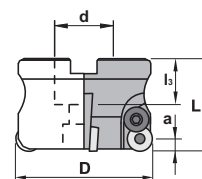
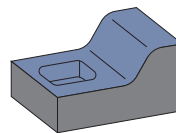
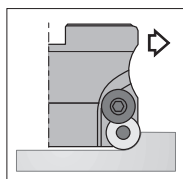


Characteristics:

Round insert end mills for slot milling, peripheral milling, ramp milling and drilling, pocket milling and copy milling. Precision type inserts are available for efficient machining in most materials.

Applications:

This copying milling cutter works well on hard steels, alloyed steels, stainless steels, refractory casts and aluminium alloys. A general milling cutter for diversified manufacture that allows using it in only one pass (roughing and finishing) and it is recommended for conventional milling machines and machining centers.



55⁴/₅ 5.90

| Ref. | | | D | L | d | l3 | a | Insert size | |
|-------------|---|--|-----|----|----|----|---|-------------|-------|
| 5545.90.052 | 5 | | 52 | 50 | 22 | 20 | 6 | RD.. 12T3.. | 0,450 |
| 5545.90.066 | 6 | | 66 | 50 | 27 | 22 | 6 | RD.. 12T3.. | 0,770 |
| 5545.90.080 | 7 | | 80 | 50 | 27 | 22 | 6 | RD.. 12T3.. | 1,200 |
| 5555.90.052 | 4 | | 52 | 50 | 22 | 20 | 8 | RD.. 1604.. | 0,350 |
| 5555.90.066 | 5 | | 66 | 50 | 27 | 22 | 8 | RD.. 1604.. | 0,700 |
| 5555.90.080 | 6 | | 80 | 50 | 27 | 22 | 8 | RD.. 1604.. | 1,050 |
| 5555.90.100 | 7 | | 100 | 55 | 32 | 25 | 8 | RD.. 1604.. | 1,800 |
| 5555.90.125 | 8 | | 125 | 55 | 40 | 30 | 8 | RD.. 1604.. | 3,500 |
| 5555.90.160 | 9 | | 160 | 55 | 40 | 30 | 8 | RD.. 1604.. | 5,600 |

| Ref. | | | | |
|-------------|------|------|--------|------|
| 5545.90.052 | 1235 | 2009 | 912,10 | 5615 |
| 5545.90.066 | 1235 | 2009 | 912,12 | 5615 |
| 5545.90.080 | 1235 | 2009 | 912,12 | 5615 |
| 5555.90.052 | 1245 | 2010 | 912,10 | 5615 |
| 5555.90.066 | 1245 | 2010 | 912,12 | 5615 |
| 5555.90.080 | 1245 | 2010 | 912,12 | 5615 |
| 5555.90.100 | 1245 | 2010 | 912,17 | 5615 |
| 5555.90.125 | 1245 | 2010 | - | 5615 |
| 5555.90.160 | 1245 | 2010 | 912,52 | 5615 |

| Ref. | RD.. | l | s | d | Positive 15° clearance - Round insert. |
|-------------|------|------|------|-------|--|
| RD.. 12T3M0 | | - | 3,97 | 12,00 | |
| RD.. 1604M0 | | - | 4,76 | 16,00 | |
| | RDHW | RDMT | RDMW | | |
| | | | | | |

For more information see page: A.15

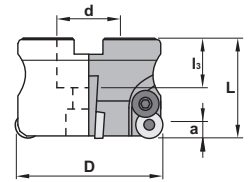
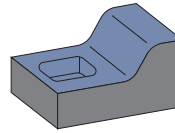
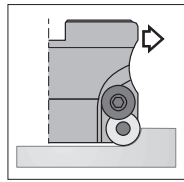


Characteristics:

Round insert end mills for slot milling, peripheral milling, ramp milling and drilling, pocket milling and copy milling. Precision type inserts are available for efficient machining in most materials.

Applications:

This copying milling cutter works well on hard steels, alloyed steels, stainless steels, refractory casts and aluminium alloys. A general milling cutter for diversified manufacture that allows using it in only one pass (roughing and finishing) and it is recommended for conventional milling machines and machining centers.



5549.90

| Ref. | | D | L | d | l3 | a | Insert size | |
|-------------|---|-----|----|----|----|---|--------------|-------|
| 5549.90.040 | 3 | 40 | 40 | 16 | 18 | 6 | RPM.. 1204M0 | 0,200 |
| 5549.90.050 | 4 | 50 | 40 | 22 | 20 | 6 | RPM.. 1204M0 | 0,300 |
| 5549.90.063 | 5 | 63 | 50 | 27 | 22 | 6 | RPM.. 1204M0 | 0,650 |
| 5549.90.080 | 6 | 80 | 50 | 32 | 25 | 6 | RPM.. 1204M0 | 1,150 |
| 5549.90.100 | 7 | 100 | 50 | 40 | 30 | 6 | RPM.. 1204M0 | 1,750 |
| 5549.90.125 | 7 | 125 | 63 | 40 | 30 | 6 | RPM.. 1204M0 | 3,100 |
| 5549.90.160 | 8 | 160 | 63 | 40 | 30 | 6 | RPM.. 1204M0 | 4,100 |

| Ref. | | | | | | |
|-------------|------|------|------|------|--------|----|
| 5549.90.040 | 1025 | 5003 | 1240 | 5615 | 1058 | - |
| 5549.90.050 | 1025 | 5003 | 1240 | 5615 | 912,10 | - |
| 5549.90.063 | 1025 | 5003 | 1240 | 5615 | 912,12 | - |
| 5549.90.080 | 1025 | 5003 | 1240 | 5615 | 912,17 | - |
| 5549.90.100 | 1025 | 5003 | 1240 | 5615 | 912,20 | - |
| 5549.90.125 | 1025 | 5003 | 1240 | 5615 | - | - |
| 5549.90.160 | 1025 | 5003 | 1240 | 5615 | 912,52 | 40 |

| | RPM.. | | | | Positive 11° clearance - Round inserts. |
|--|--------------|------|------|-------|---|
| | Ref. | l | s | d | |
| | RPM.. 1204M0 | - | 4,76 | 12,00 | |
| | RPMT | RPMW | | | |
| | | | | | |

For more information see page: A.15

Recommended cutting conditions

| Material | m/min Cutting Speed | mm/tooth Feed rate | Ø12 - Ø20 | | | Ø24 - Ø25 | | | Ø32 - Ø35 | | |
|---|---------------------|--------------------|--|--------|----------------------|------------------|--------|----------------------|------------------|--------|----------------------|
| | | | min ¹ | mm/min | cm ³ /min | min ¹ | mm/min | cm ³ /min | min ¹ | mm/min | cm ³ /min |
| Mild Steels (200 HB) | 150-250 | 0,3-0,8 | 3980 | 3180 | 28,6 | 3180 | 2540 | 28,6 | 2490 | 2990 | 43,1 |
| | | | Vc=250m/min fz=0,4mm/tooth ap=1,5mm ae=0,3D | | | | | | | | |
| | | | 3980 | 3180 | 47,7 | 3180 | 2540 | 47,6 | 2490 | 2990 | 71,8 |
| Carbon Steels Alloy Steels (30 HRC) | 120-230 | 0,3-0,8 | 3180 | 2540 | 22,9 | 2550 | 2040 | 23 | 1990 | 2390 | 34,4 |
| | | | Vc=200m/min fz=0,4mm/tooth ap=1,5mm ae=0,3D | | | | | | | | |
| | | | 3180 | 2540 | 38,1 | 2550 | 2040 | 38,3 | 1990 | 2390 | 57,4 |
| Carbon Steels Alloy Steels (30-40 HRC) | 100-200 | 0,2-0,6 | 2390 | 960 | 8,6 | 1910 | 760 | 8,6 | 1490 | 890 | 12,8 |
| | | | Vc=150m/min fz=0,2mm/tooth ap=1,5mm ae=0,3D | | | | | | | | |
| | | | 2390 | 1430 | 21,5 | 1910 | 1150 | 21,6 | 1490 | 1340 | 32,2 |
| Carbon Steels Alloy Steels (40-45 HRC) | 60-150 | 0,15-0,3 | 1590 | 480 | 2,9 | 1270 | 380 | 2,9 | 990 | 450 | 4,3 |
| | | | Vc=100m/min fz=0,15mm/tooth ap=1mm ae=0,3D | | | | | | | | |
| | | | 1590 | 640 | 6,4 | 1270 | 510 | 6,4 | 990 | 590 | 9,4 |
| Carbon Steels Alloy Steels (45-50 HRC) | 60-100 | 0,15-0,3 | 1270 | 380 | 2,3 | 1020 | 310 | 2,3 | 800 | 360 | 3,5 |
| | | | Vc=80m/min fz=0,15mm/tooth ap=1mm ae=0,3D | | | | | | | | |
| | | | 1270 | 380 | 3,8 | 1020 | 310 | 3,9 | 800 | 360 | 5,8 |
| Alloy Steels (50-60 HRC) | 50-100 | 0,05-0,2 | 1110 | 220 | 1,3 | 890 | 170 | 1,2 | 690 | 200 | 1,9 |
| | | | Vc=70m/min fz=0,1mm/tooth ap=1mm ae=0,3D | | | | | | | | |
| | | | 1110 | 220 | 2,2 | 890 | 170 | 2,1 | 690 | 200 | 3,2 |
| Stainless Steels | 150-240 | 0,2-0,8 | 3180 | 1590 | 14,3 | 2550 | 1280 | 14,4 | 1990 | 1490 | 21,5 |
| | | | Vc=200m/min fz=0,25mm/tooth ap=1,5mm ae=0,3D | | | | | | | | |
| | | | 2860 | 1716 | 25,7 | 2290 | 1370 | 25,7 | 1790 | 1610 | 38,6 |
| Cast Iron | 100-220 | 0,3-1,0 | 2860 | 2290 | 20,6 | 2290 | 1830 | 20,6 | 1790 | 2150 | 31 |
| | | | Vc=180m/min fz=0,4mm/tooth ap=1,5mm ae=0,3D | | | | | | | | |
| | | | 2860 | 2860 | 42,9 | 2290 | 2290 | 42,9 | 1790 | 2690 | 64,6 |
| Vc=180m/min fz=0,5mm/tooth ap=1,5mm ae=0,5D | | | | | | | | | | | |

| Material | Ø40 - Ø42 (R6) | | | Ø50 - Ø52 (R6) | | | Ø40 - Ø42 (R8) | | | Ø50 - Ø52 (R8) | | |
|--|--|--------|----------------------|------------------|--------|----------------------|------------------|--------|----------------------|------------------|--------|----------------------|
| | min ¹ | mm/min | cm ³ /min | min ¹ | mm/min | cm ³ /min | min ¹ | mm/min | cm ³ /min | min ¹ | mm/min | cm ³ /min |
| Mild Steels (200 HB) | 1990 | 2990 | 71,8 | 1590 | 3180 | 95,4 | 1990 | 1990 | 47,8 | 1590 | 2390 | 71,7 |
| | Vc=250m/min fz=0,5mm/tooth ap=2mm ae=0,3D | | | | | | | | | | | |
| | 1990 | 4780 | 191,2 | 1590 | 5090 | 254,5 | 1990 | 3180 | 159 | 1590 | 3820 | 238,8 |
| Carbon Steels Alloy Steels (30 HRC) | 1590 | 1910 | 45,8 | 1270 | 2030 | 60,9 | 1590 | 1270 | 30,5 | 1270 | 1520 | 45,6 |
| | Vc=200m/min fz=0,4mm/tooth ap=2mm ae=0,3D | | | | | | | | | | | |
| | 1590 | 2860 | 114,4 | 1270 | 3050 | 152,5 | 1590 | 1910 | 95,5 | 1270 | 2290 | 143,1 |
| Carbon Steels Alloy Steels (30-40 HRC) | 1190 | 710 | 17 | 960 | 770 | 23,1 | 1190 | 480 | 11,5 | 960 | 580 | 17,4 |
| | Vc=150m/min fz=0,2mm/tooth ap=2mm ae=0,3D | | | | | | | | | | | |
| | 1190 | 1070 | 42,8 | 960 | 1150 | 57,5 | 1190 | 950 | 47,5 | 960 | 1150 | 71,9 |
| Carbon Steels Alloy Steels (40-45 HRC) | 800 | 360 | 6,5 | 640 | 380 | 8,6 | 800 | 240 | 4,3 | 640 | 290 | 6,5 |
| | Vc=100m/min fz=0,15mm/tooth ap=1,5mm ae=0,3D | | | | | | | | | | | |
| | 800 | 480 | 14,4 | 640 | 510 | 19,1 | 800 | 320 | 12,8 | 640 | 380 | 19 |
| Carbon Steels Alloy Steels (45-50 HRC) | 640 | 290 | 3,5 | 510 | 310 | 4,7 | 640 | 220 | 4 | 510 | 260 | 5,9 |
| | Vc=80m/min fz=0,17mm/tooth ap=1mm ae=0,5D | | | | | | | | | | | |
| | 640 | 330 | 6,6 | 510 | 350 | 8,8 | 640 | 260 | 7,8 | 510 | 310 | 11,6 |
| Alloy Steels (50-60 HRC) | 550 | 160 | 1,9 | 440 | 170 | 2,5 | 550 | 110 | 1,3 | 440 | 130 | 1,9 |
| | Vc=70m/min fz=0,1mm/tooth ap=1mm ae=0,3D | | | | | | | | | | | |
| | 550 | 160 | 3,2 | 440 | 170 | 4,2 | 550 | 110 | 2,2 | 440 | 130 | 3,2 |
| Stainless Steels | 1590 | 1430 | 34,3 | 1270 | 1520 | 45,6 | 1590 | 950 | 22,8 | 1270 | 1140 | 34,2 |
| | Vc=200m/min fz=0,3mm/tooth ap=2mm ae=0,3D | | | | | | | | | | | |
| | 1430 | 2150 | 86 | 1150 | 2300 | 115 | 1430 | 1720 | 86 | 1150 | 2070 | 129,4 |
| Cast Iron | 1430 | 3430 | 137,2 | 1150 | 3680 | 184 | 1430 | 2290 | 114,5 | 1150 | 2760 | 172,5 |
| | Vc=180m/min fz=0,5mm/tooth ap=2mm ae=0,3D | | | | | | | | | | | |
| | Vc=180m/min fz=0,8mm/tooth ap=2mm ae=0,5D | | | | | | | | | | | |

Note

-In this table, cutting conditions indicate regular type conditions for flank wear to be 0,3mm in 30 minutes.

-The following formula shows the chip removal volume (Q) per unit time.

$$Q(\text{cm}^3/\text{min}) = \text{ap}(\text{mm}) \times \text{ae}(\text{mm}) \times \text{Vf}(\text{mm}/\text{min}) / 1000$$

-In the case of slotting, feed speed could be down to 70% of the whole.

-This table shows starting points of general cutting conditions. Please adjust according to rigidity of machine tools, tooling, conditions of work-pieces and so on.

-In steel exceeding 60HRC, such as dice steel between the colds, please set the sending (fz) value per one edge about 1/2.

Recommended cutting conditions

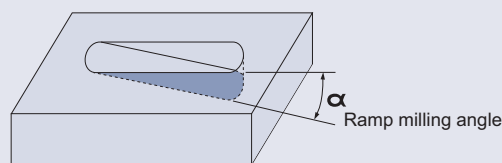
| Material | m/min Cutting Speed | mm/tooth Feed rate | Ø63 (R6) | | | Ø80 (R6) | | | Ø100 (R6) | | |
|--|------------------------|-----------------------|--|--------|----------------------|-------------------|--------|----------------------|-------------------|--------|----------------------|
| | | | min ⁻¹ | mm/min | cm ³ /min | min ⁻¹ | mm/min | cm ³ /min | min ⁻¹ | mm/min | cm ³ /min |
| Mild Steels (200 HB) | 150-250 | 0,3-0,8 | 3780 | 142,9 | - | - | - | - | - | - | - |
| | | | Vc=250m/min fz=0,5mm/tooth ap=2mm ae=0,3D | | | | | | | | |
| | | | 1260 | 6050 | 381,2 | 1000 | 4800 | 384 | 800 | 3200 | 320 |
| Carbon Steels Alloy Steels (30 HRC) | 120-230 | 0,3-0,8 | 1010 | 2420 | 91,5 | - | - | - | - | - | - |
| | | | Vc=200m/min fz=0,4mm/tooth ap=2mm ae=0,3D | | | | | | | | |
| | | | 1010 | 3640 | 229,3 | 800 | 2880 | 230,4 | 640 | 1920 | 192 |
| Carbon Steels Alloy Steels (30-40 HRC) | 100-200 | 0,2-0,6 | 760 | 910 | 34,4 | - | - | - | - | - | - |
| | | | Vc=150m/min fz=0,2mm/tooth ap=2mm ae=0,3D | | | | | | | | |
| | | | 760 | 1370 | 86,3 | 600 | 1080 | 86,4 | 480 | 720 | 72 |
| Carbon Steels Alloy Steels (40-45 HRC) | 60-150 | 0,15-0,3 | 510 | 460 | 13 | - | - | - | - | - | - |
| | | | Vc=100m/min fz=0,15mm/tooth ap=1,5mm ae=0,3D | | | | | | | | |
| | | | 510 | 610 | 28,8 | 400 | 480 | 28,8 | 320 | 320 | 24 |
| Carbon Steels Alloy Steels (45-50 HRC) | 60-100 | 0,15-0,3 | 400 | 360 | 6,8 | - | - | - | - | - | - |
| | | | Vc=80m/min fz=0,15mm/tooth ap=1mm ae=0,3D | | | | | | | | |
| | | | 400 | 410 | 12,9 | 320 | 330 | 13,2 | 250 | 210 | 10,5 |
| Alloy Steels (50-60 HRC) | 50-100 | 0,05-0,2 | 350 | 210 | 3,9 | 270 | 160 | 3,8 | 220 | 110 | 3,3 |
| | | | Vc=70m/min fz=0,1mm/tooth ap=1mm ae=0,3D | | | | | | | | |
| | | | 350 | 210 | 6,6 | 270 | 160 | 6,4 | 220 | 110 | 5,5 |
| Stainless Steels | 150-240 | 0,2-0,8 | 1010 | 1820 | 68,8 | - | - | - | - | - | - |
| | | | Vc=200m/min fz=0,3mm/tooth ap=2mm ae=0,3D | | | | | | | | |
| | | | 910 | 2730 | 172 | 720 | 2160 | 172,8 | 570 | 1430 | 143 |
| Cast Iron | 100-220 | 0,3-1,0 | 910 | 2730 | 103,2 | - | - | - | - | - | - |
| | | | Vc=180m/min fz=0,5mm/tooth ap=2mm ae=0,3D | | | | | | | | |
| | | | 910 | 4370 | 275,3 | 720 | 3460 | 276,8 | 570 | 2280 | 228 |
| Vc=180m/min fz=0,8mm/tooth ap=2mm ae=0,5D | | | | | | | | | | | |

Field Data

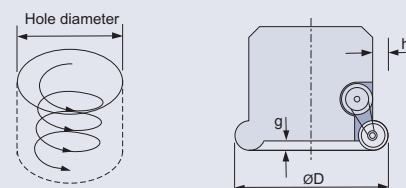
Ramping, Helical Milling, Feeding toward Z-AXIS

There are restrictions to Ramp angle (α) and cutting depth (g) toward Z-axis because of designs of cutting edge.

Ramping



Helical milling



| ØD | Ø40 | Ø50 - Ø52 | Ø63 - Ø66 | Ø80 | Ø100 | Ø125 - Ø160 |
|-----------------------|-----------------|-----------|-----------|---------|---------|-----------------|
| Recommended α | Below 3 degrees | | | | | Below 2 degrees |
| h | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 | 2,5 |
| g | 3,7 | 3,3 | 5,5 | 5,5 | 5,5 | 5,5 |
| Helical hole diameter | 60-78 | 77-100 | 101-124 | 135-158 | 175-198 | 248-255 |

Note

-Chips may be shattered. The wearing of safety glasses and the guard are required in the vicinity of machining.

Inserts

Face milling cutters

Square shoulder cutters

Slot cutters

Porcupine cutters

Specific applications and Sets

Profile milling



Shanks page: K.45 - K.48

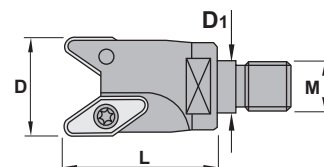
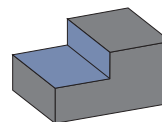
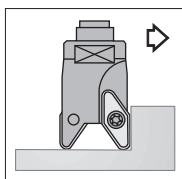
Characteristics:

General application end mills for slot milling, peripheral milling, ramp milling and drilling, pocket milling and copy milling. Precision type inserts are available for efficient machining aluminium alloys.

Milling cutter equipped with modular shank.

Applications:

Aluminium plastics and exotic materials machining.

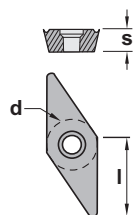


0344.06

| Ref. | | D | L | M | D1 | Insert size | |
|-------------|---|----|----|-----|------|-------------|-------|
| 0344.06.015 | 2 | 15 | 35 | M8 | 8,5 | VCGT 1103.. | 0,040 |
| 0344.06.020 | 2 | 20 | 35 | M10 | 10,5 | VCGT 1103.. | 0,070 |
| 0344.06.025 | 2 | 25 | 50 | M12 | 12,5 | VCGT 1604.. | 0,110 |
| 0344.06.032 | 2 | 32 | 50 | M16 | 17,0 | VCGT 2205.. | 0,240 |
| 0344.06.042 | 3 | 42 | 50 | M16 | 17,0 | VCGT 2205.. | 0,400 |

| Ref. | | |
|-------------|------|------|
| 0344.06.015 | 1225 | 5507 |
| 0344.06.020 | 1225 | 5507 |
| 0344.06.025 | 1240 | 5515 |
| 0344.06.032 | 1250 | 5520 |
| 0344.06.042 | 1250 | 5520 |

| VCGT | | l | s | d | Positive 7° clearance - 35° rhombic inserts |
|-------------------------------------|-------------|-------|------|-------|---|
| Ref. | VCGT 1103.. | 11,00 | 3,18 | 6,35 | |
| | VCGT 1604.. | 16,50 | 4,76 | 9,52 | |
| | VCGT 2205.. | 22,10 | 5,56 | 12,70 | |
| For more information see page: A.22 | | | | | |
| VCGT-AL | VCGT-AP | | | | |
| | | | | | |



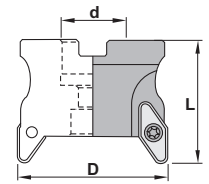
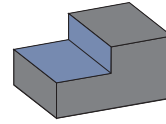
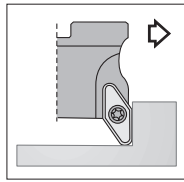


Characteristics:

General application bottom cutter for slot milling, peripheral milling, ramp milling and drilling, pocket milling and copy milling. Precision type inserts are available for efficient machining aluminium alloys.

Applications:

Aluminium plastics and exotic materials machining.

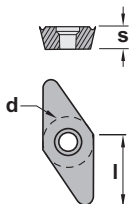


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| Ref. | | D | d | L | Insert size | |
|-------------|---|----|----|----|-------------|-------|
| 0344.90.042 | 3 | 42 | 16 | 55 | VCGT 2205.. | 0,180 |
| 0344.90.052 | 3 | 52 | 22 | 55 | VCGT 2205.. | 0,350 |
| 0344.90.066 | 4 | 66 | 27 | 55 | VCGT 2205.. | 0,800 |
| 0344.90.080 | 5 | 80 | 27 | 55 | VCGT 2205.. | 1,150 |

| Ref. | | |
|-------------|------|------|
| 0344.90.042 | 1250 | 5520 |
| 0344.90.052 | 1250 | 5520 |
| 0344.90.066 | 1250 | 5520 |
| 0344.90.080 | 1250 | 5520 |

| VCGT | | l | s | d | Positive 7° clearance - 35° rhombic inserts |
|-------------------------------------|-------------|----------|----------|----------|---|
| Ref. | VCGT 2205.. | 22,10 | 5,56 | 12,70 | |
| For more information see page: A.22 | | | | | |
| | | | | | |



Inserts

Face milling cutters

Square shoulder cutters

Slot cutters

Porcupine cutters

Specific applications and Sets

Profile milling

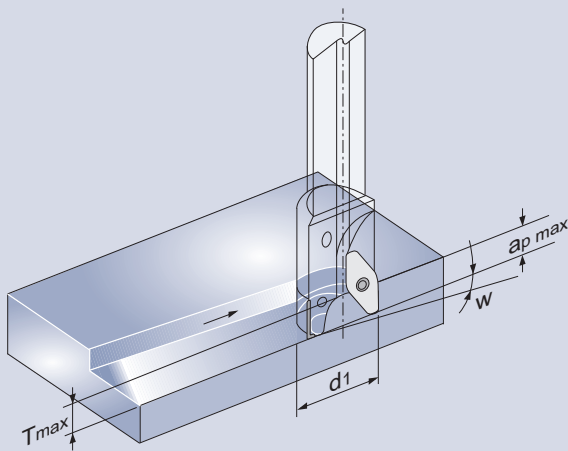
Recommended cutting conditions

| Material | | Cutting Speed | |
|------------------|----------------------------|----------------------|----------------------|
| | | ZR 10 Vc (mm/min) | KM 15 Vc (mm/min) |
| Aluminium alloys | Rm < 280 N/mm ² | 1500 | 1000 |
| | Rm < 280 N/mm ² | 1000 | 800 |
| Copper alloys | Long chipping | 300 | 250 |
| Thermoplastics | | | 300 |
| Aluminium alloys | Si < 12 % | 100 | 800 |
| | Si ≥ 12 % | 200 | |
| Copper alloys | Short chipping | 500 | 400 |
| Magnesium alloys | | | 400 |
| Duroplastics | | 200 | 150 |

| Maximum feed per tooth fz (mm/z) in mm | | |
|--|-------------|-------------|
| VCGT 1103.. | VCGT 1604.. | VCGT 2205.. |
| 0,25 | 0,35 | 0,5 |
| 0,2 | 0,3 | 0,4 |

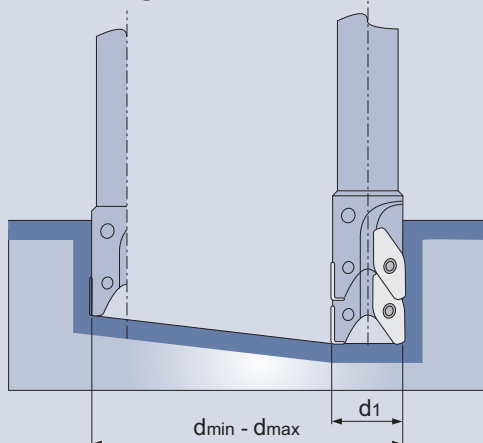
Further application recommendations

Pocket milling and axial plunging



| Helix angle W1 max and internal depth of cut Tmax | | | |
|---|-----------------|-----------------|-----------------|
| | VCGT 110304-ALM | VCGT 160412-ALM | VCGT 220530-ALM |
| ap max | 10 | 13,5 | 15 |
| T max | 6 | 8 | 9 |
| W1 max degree | | | |
| 15 | | | |
| 20 | 25 | | |
| 25 | | 24 | |
| 32 | | | 22 |
| 42 | | | 15 |
| 52 | | | 12 |
| 66 | | | 9 |
| 80 | | | 7 |

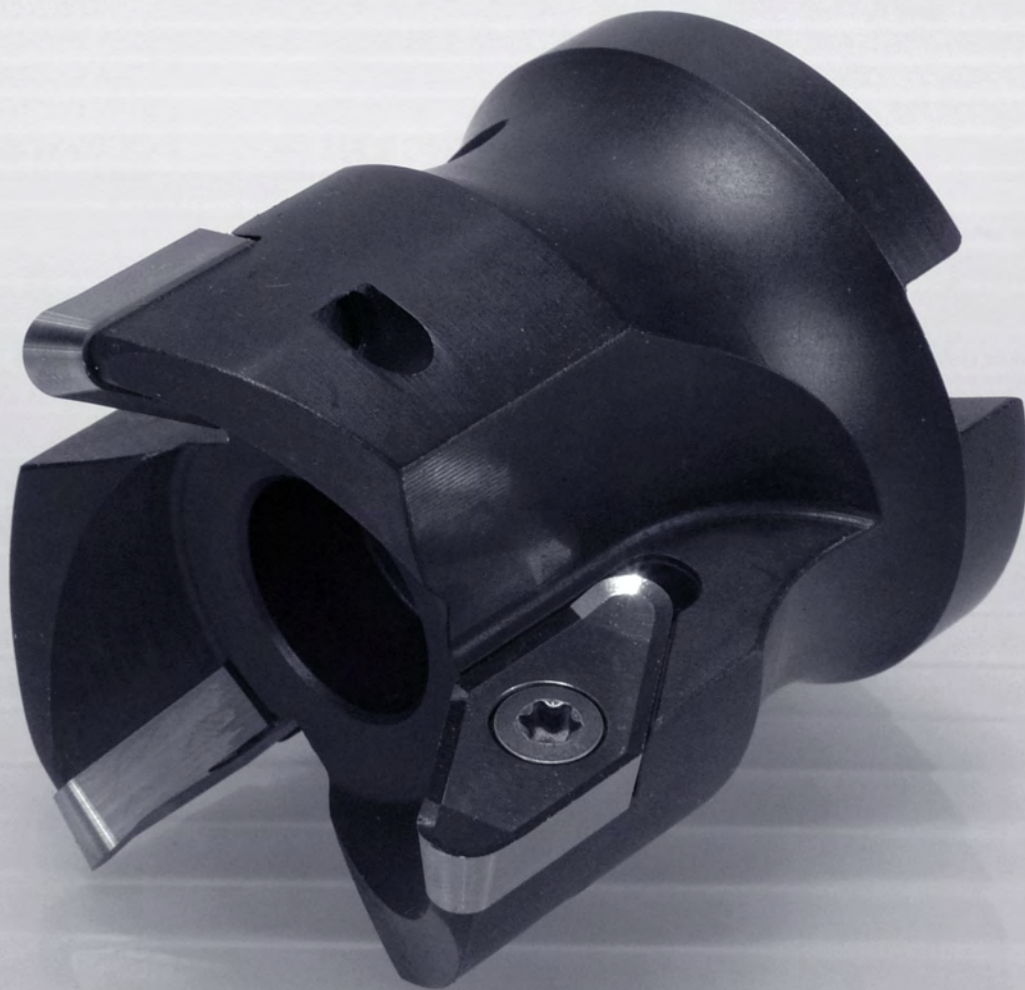
Circular milling



| d1 mm | dmin mm | dmax mm |
|-------|---------|---------|
| 15 | 15 | 15 |
| 20 | 20 | 20 |
| 25 | 25 | 25 |
| 32 | 32 | 32 |
| 42 | 42 | 42 |
| 52 | 52 | 52 |
| 66 | 66 | 66 |
| 80 | 80 | 80 |

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General application bottom cutter for slot milling, peripheral milling, ramp milling and drilling, pocket milling and copy milling. Precision type inserts are available for efficient machining aluminium alloys.



Profile milling

Solid carbide

Drills

Boring heads

Arbors and adaptors